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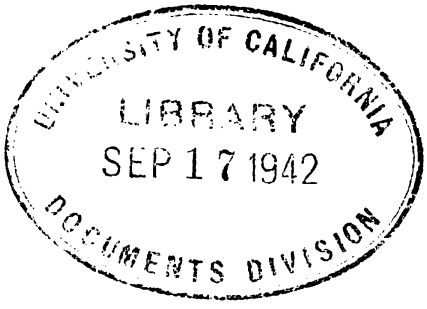
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U.S. WAR DEPARTMENT

# TECHNICAL MANUAL

# STORAGE AND ISSUE

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TECHNICAL MANUAL

# STORAGE AND ISSUE

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CHANGES No. 1

WAR DEPARTMENT,
WASHINGTON, June 9, 1942.

TM 10-250, October 1, 1940, is changed as follows:

**44. Flour and cereal products, rice, and dry beans.**

* * * * * * *

*c. Yeast.*—(1) *Compressed.*—Highly perishable. Store when possible at 35° F. Arrange for frequent deliveries. Refrigeration always essential.

* * * * * * *

[A. G. 062.11 (5-2-42).] (C 1, June 9, 1942.)

**45. Packing-house products.**—*a. Beef.*—(1) **(a)** The greatest influences toward deterioration of fresh beef are molds and bacteria, both of which are favored by warmth and moisture. While the growth of mold on fresh beef is not harmful, it may impart a moldy flavor to the surface of the meat. The surface of moldy beef, therefore, should be wiped or washed with a mild salt brine or vinegar and carefully trimmed.

**(b)** Chilled beef, in sides, quarters, or wholesale market cuts should not be held more than 7 to 9 days at a temperature of 30° to 32° F. and a relative humidity of 80 percent. Higher temperature or greater relative humidity results in mold growth and sliminess in direct ratio to the rise of temperature or humidity. Refrigerators chilled by ice are always damp and are likely to be productive of mold and sliminess of the beef. Boxes artificially refrigerated are drier and more effective for storing fresh beef. Fresh beef should not be held in ice-cooled chill rooms for more than 6 or 7 days or in an ice-cooled refrigerator for more than 5 or 6 days unless the refrigerator is one specially designed for that type of service.

(2) Best results in freezing beef are obtained by quick freezing in subzero temperatures as low as −25° F., then storing in a holding freezer at a temperature of 0° F. Frozen beef can be held at such temperatures for 9 months with but slight change and for 12 months without appreciable deterioration.

(3) Frozen beef quarters cannot be hung conveniently * * * must be kept solidly frozen. The storage temperature should never exceed 10° F., and 0° F. will give much better results. Deterioration first occurs under the "skirt" or "hanging tenderloin."

*b. Fresh pork, veal, and mutton.*—These cannot be held for as long a time as fresh beef. They must be kept under refrigeration at all

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times. The best temperature for pork is 26° to 28° F. and when carried at 35° F. it should be moved within 48 hours. For longer storage periods, these products should be properly frozen. Fresh pork should not be held at 26° to 28° F. for longer than 1 week. Veal, because of the lack of fat, dries out rapidly if held in chillroom temperatures. Fresh meat specialties, such as livers, kidneys, hearts, etc., keep in good condition for only a comparatively short time. They should never be stocked beyond immediate needs unless solidly frozen. They keep for months in the frozen state.

* * * * * * *

[A. G. 062.11 (5-2-42).] (C 1, June 9, 1942.)

46. **Fish, fresh.**—No attempt is made to hold or store fish that are not frozen. Frozen fish are best held at 0° F., at which temperature this product may be carried for periods as long as 6 or 8 months. Any higher freezer storage temperature will shorten the storage period. Deterioration may occur rapidly at temperatures above 15° F.

[A. G. 062.11 (5-2-42).] (C 1, June 9, 1942.)

51. **Dairy products.**—*a. Butter and oleomargarines.*—(1) *General.*—They must be kept under refrigeration at all times. Butter may be safely carried for 2 or 3 weeks at a temperature of 35° F. If kept for longer periods, it should be held in a sharp freezer, preferably at zero or lower. The storage qualities of butter * * * such as metallic, fishy, cheesy, etc. Butter should be packed compactly; the larger the package, the better. Carton butter does not store well, as too much surface is exposed to the air. Coolers where butter is kept should be comparatively dry and absolutely free from odors. Humidity above 80 percent favors mold growth.

* * * * * * *

*b. Cheese.*—(1) Cured cheese stores * * * separating the cheeses in the box. Cheese storage rooms should be protected against the cheese skipper. The best method is to maintain a temperature below 43° F. or to screen all openings with fine-meshed screening. Whole cheese of good quality may be stored for a year or more at temperatures around 40° F. provided it is properly cared for by turning and wiping with clean cloths. The flavor may be improved during such curing period.

* * * * * * *

*c. Milk.*—(1) *Fresh.*—Unless pasteurized, fresh milk should be held at a temperature not above 40° F. Any higher temperature furthers the growth of bacteria, resulting in increasing acidity of the milk. Pasteurized fresh milk should not be carried beyond 48



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hours at 35° F. Although it may remain sweet for a longer period, the quality is seriously impaired. If it is desired to keep fresh milk for longer periods, it must be frozen solid, in which condition it can be held for months.

* * * * * * *

[A. G. 062.11 (5–2–42).] (C 1, June 9, 1942.)

**52. Fruits, fresh, dried, and frozen.**

* * * * * * *

*c. Frozen.*—These must be carried at 0° F., except that 10° F. is suitable for short storage periods of from 3 to 4 months. Mold grows at 26° F. In 20- or 30-pound containers, allow 24 hours at ordinary room temperatures to thaw for use. In 1-pound cartons, they thaw for use in about 1 hour. All properly prepared frozen fruits and vegetables will keep for a year or longer at 0° F. After thawing, frozen fruits and vegetables must be used immediately, as fermentation and mold growth start on thawing.

[A. G. 062.11 (5–2–42).] (C 1, June 9, 1942.)

**53. Vegetables, fresh.**—*a. General.*—(1) Fresh vegetables are * * * in proportion to the storage temperature. With storage temperatures ranging from 32° to 45° F., depending upon the characteristics of the various kinds, the process is retarded. Under proper conditions, some may be carried up to several months in storage. Most green leaf vegetables, however, are not carried beyond a week or 10 days. Humidities are carried relatively high, although care should be taken to prevent excessive moisture, which causes "sliminess" with subsequent decay, especially of leafy vegetables. All fresh vegetables are marketed in open crates or baskets and should not be packed tightly when stored, as they spoil from suboxidation.

* * * * * * *

*b. Potatoes.*

* * * * * * *

(2) In the life processes * * * shrinkage is pronounced owing to evaporation. The ideal storage temperature is 38° to 40° F. Although a lower temperature retards the life process, it also has a tendency to turn the starches to a form of sugar, evidenced by a darkening of the flesh which becomes more pronounced, and which is distasteful when cooked. The relative humidity must be high enough * * * shrink 11.56 percent.

(3) Ventilation or aeration * * * no dimension should be over 10 feet. In order to avoid undue weight on the lower strata, the height of piles should be limited. Potatoes that are well



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cured and from dry ground may be stacked up to 5 feet. Those which are less hardy should not be piled over 3 or 4 feet high.

* * * * * * *

*d. Onions.*—Fully matured, sound, clean, onions with no loose skins, keep well from 4 to 5 months, depending on the variety and environmental characteristics. The ideal temperature is 32° F. with a relative humidity of 75 to 77 percent and a positive, gentle air movement. Onions should be stored in bins or crates, never in bags. The storage room must have a free circulation of air. Where cold storage is not available (as is usually the case with onions, as they cannot be stored in rooms with other articles because of their contaminating odor), onions keep for a period of 6 weeks if put in a thin layer (4 or 5 inches thick) on the floor or in bins in a dry warehouse.

[A. G. 062.11 (5-2-42).] (C 1, June 9, 1942.)

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
*Chief of Staff.*

OFFICIAL:

J. A. ULIO,
*Major General,*
*The Adjutant General.*



U. S. GOVERNMENT PRINTING OFFICE: 1942

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TECHNICAL MANUAL
No. 10–250

WAR DEPARTMENT,
WASHINGTON, *October 1, 1940.*

# STORAGE AND ISSUE

**Prepared under direction of
The Quartermaster General**

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## SECTION I

## GENERAL

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**1. General.**—This manual treats of the storage and issue of raw materials, commodities, manufactured articles, means of transportation, unit assemblages, and units of equipment procured, stored, or issued for the Army by the Quartermaster Corps.

**2. Purpose.**—The purpose of this manual is to furnish detailed information essential to the personnel engaged in the work of storing and issuing quartermaster supplies.

**3. Scope.**—This manual deals with the operation of storage and issue as applied to quartermaster supplies. "Storage and issue" embraces the care of supplies and their orderly arrangement in warehouses or other places of storage to prevent confusion with its attendant errors as to quantity and condition of the supplies. The subjects of procurement and property accounting are presented in separate manuals. The maintenance of stock at the proper levels avoids the accumulation of excesses or the occurrence of shortages that prevent the even flow of supply. A system of issues permits easy supply to troops and at the same time complies with the law and regulations as to allowances and accounting.

**4. Designations and definitions.**—*a. Supply arms and services.*—The supply arms and services of the Army are—

(1) Quartermaster Corps.
(2) Medical Department.
(3) Corps of Engineers.
(4) Ordnance Department.
(5) Signal Corps.
(6) Chemical Warfare Service.
(7) Air Corps.
(8) Coast Artillery Corps.

*b. Supply establishment.*—(1) *General.*—Supply establishments are those establishments by means of which the supply functions of chiefs of arms and services are accomplished, such as arsenals, manufacturing plants, and depots.

(2) *Depots.*—Depots are supply establishments maintained primarily for the purpose of receiving, storing, and distributing supplies. They may be charged with other functions, including procurement, as directed by regulations and orders.

*c. Supplies.*—Supplies include all raw materials, commodities, manufactured articles, means of transportation, unit assemblages, and units of equipment procured, stored, or issued for the Army. They are classified as war reserves and current supplies.

(1) *War reserves.*—War reserves are reserves of essential items,



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some of which are further classified as critical, maintained to meet war requirements.

(*a*) *Essential items.*—Essential items are those items so designated by the War Department which are essential for effective combat. Items listed as mobilization requirements in Tables of Basic Allowances, including component parts and accessories, are examples of essential items.

(*b*) *Critical items.*—Critical items are those essential items for which suitable substitutes do not exist and for which the maximum procurement rate falls short of war requirements.

(2) *Current supplies.*—Current supplies are those items which are necessary to meet current peacetime requirements. In time of war or major emergency, the war reserves pass to the status of current supplies.

*d. Unit assemblage.*—The unit assemblage is that portion of the authorized equipment of a mobile organization stored or issued as a unit under special instructions from the Secretary of War, such as evacuation hospital equipment or regimental dispensary equipment.

*e. Unit of equipment.*—The unit of equipment consists of a container and its contents authorized in Tables of Basic Allowances for issue to an organization for a special purpose, such as a shoe repair outfit, an arm repair chest, a medical and surgical chest, a field demolition equipment, or a sketching outfit.

**5. Peacetime storage and issue.**—*a. General.*—The Quartermaster Corps stores and issues supplies in accordance with storage and issue lists approved by the Secretary of War.

*b. Requirements and restrictions.*—In general, supplies in the hands of troops and in station storage are restricted to the minimum necessary to meet current peace requirements. All supplies in excess of the minimum necessary for the current requirements of troops are stored in depots and are available both for current requirements and for inclusion in the amounts prescribed for war reserves. No stocks are segregated or obligated for specific projects except as directed by the War Department, and these are not depleted for current use without specific authority of the War Department. In order to avoid losses both in segregated and nonsegregated stocks due to deterioration, turnover is provided for by local supply officers by issuing or shipping old stocks and replacing with new stocks whenever practicable.

*c. Depletion of war reserves.*—War reserves in depot storage are not depleted without War Department authority, except that issues may be made to components other than the Regular Army when re-



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imbursement therefor is obtained and the funds thus obtained are used to replenish war reserves.

*d. Storage space.*—(1) *Allotment.*—Storage space in the zone of the interior is allotted to the supply arms and services by the Secretary of War.

(2) *Additional and surplus space.*—The chief of each supply arm or service having storage functions makes application to The Adjutant General for any additional storage space that may be required from time to time by his arm or service and also reports to The Adjutant General whenever any storage space allotted to him becomes surplus.

*e. Records and reports.*—(1) *As to storage space.*—(*a*) *Records, by whom kept.*—The Quartermaster General is charged with keeping adequate records of all storage space owned, leased, or required by the War Department and of its utilization and disposition.

(*b*) *Data and periodic reports for maintenance of records.*—The chiefs of other supply arms and services furnish The Quartermaster General with such information as he may need and with periodic reports in the form required to enable him to maintain the records.

(*c*) *Reports to be rendered.*—The Quartermaster General forwards semiannually to The Adjutant General reports in the form prescribed by current War Department instructions, showing the status of all storage space as of June 30 and December 31.

(2) *Supplies on hand in depots.*—The chief of each supply arm or service maintains records of the kind, quantity, location, and condition of supplies in depots and of data necessary to compute the itemized and total value of such supplies.

## SECTION II

## DEPOTS IN ZONE OF INTERIOR

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**6. Classification and designation.**—*a. Classification.*—Depots in the zone of the interior are classified as—

General depots.
Area general depots.
Arm or service depots.
Area arm or service depots.



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*b. Designation.*—(1) *General depots.*—(*a*) These are under the administrative control of the War Department and are designated according to location; e. g., New York General Depot.

(*b*) Each general depot is organized into sections corresponding to the supply arms and services having supplies stored therein, and these sections are designated by appropriate names; e. g., Quartermaster Section, San Francisco General Depot.

(2) *Area general depots.*—(*a*) These are designated according to the appropriate territorial command; e. g., Hawaiian General Depot.

(*b*) In case there are two or more area general depots within a corps area, a geographical designation is used; e. g., Panama Pacific General Depot.

(3) *Arm or service depots.*—(*a*) These are under the administrative control of the chief of a supply arm or service and except in cases of certain historically named depots, are designated according to location and the supply arm or service concerned; e. g., Augusta Arsenal; Jeffersonville Quartermaster Depot.

(*b*) When necessary the character of the depot is indicated; e. g., Front Royal Quartermaster Depot (Remount).

(4) *Area arm or service depots.*—(*a*) These are designated according to the appropriate territorial command and the supply arm or service concerned; e. g., Eighth Corps Area Ordnance Depot; Panama Ordnance Depot.

(*b*) In case there are two or more arm or service depots pertaining to the same supply arm or service within a corps area, a geographical designation is used as in the case of area general depots.

**7. Duties of chiefs of supply arms and services.**—*a. General.*—The chief of each supply arm or service is charged with—

(1) Full responsibility for the proper storage and issue of supplies pertaining to his arm or service, subject to prescribed limitations.

(2) Maintenance of the required stocks.

(3) Furnishing the technically trained and other personnel for the proper functioning of his sections, and increasing or diminishing the personnel as in his judgment becomes necessary.

(4) Issuance of such special instructions to his representative at each depot as will insure proper care of supplies and prompt and efficient service.

(5) Keeping such records of stock on hand as are required by War Department regulations, orders, and instructions, and such other records as may be necessary for adjusting stocks between depots.

(6) Responsibility for the proper expenditure of public funds pertaining to his arm or service.



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*b. The Quartermaster General.*—The Quartermaster General designates a depot quartermaster at each of the general depots who has charge under the commanding officer, or the guard, fire protection, general police, utilities, transportation, and other quartermaster activities common to all sections of the depot. These functions are carried on within the limits of funds allotted by The Quartermaster General.

*c. Packing, marking, handling, etc., of supplies.*—All packing, marking, handling, reconditioning, rewarehousing, and inventorying of supplies within each section of each general depot are charged against and limited by allotments of funds for these purposes furnished by the chief of supply arm or service concerned.

*d. Certain responsibilities not to be restricted.*—Nothing in the regulations should be construed to interfere in any way with the responsibility of the chief of a supply arm or service in connection with the technical operation and functioning of the section assigned to him under his representative at any general depot; nor with the responsibility of the Chief of Finance in connection with the technical operation of the offices of finance officers, United States Army, and depot finance officers; nor should they be construed as relieving The Quartermaster General of responsibility for the supply or employment of labor common to the several activities of general depots in accordance with the needs of such depots.

**8. Depot commanders.**—*a. Designation.*—Each general depot is commanded by an officer of suitable grade and experience who is designated "Commanding Officer, _____ General Depot."

*b. Staff.*—The staff of a commanding officer of a general depot does not exceed 1 executive officer, 1 depot quartermaster, 1 clerk, and 1 orderly, unless specifically authorized by the War Department or, in the case of an area general depot, by the corps area commander.

*c. Functions and duties.*—The commanding officer of a general depot exercises the customary functions of a commanding officer and reports direct to The Adjutant General or, in the case of an area general depot, to the corps area commander. In general, it is the function of the commanding officer of a general depot to coordinate the activities of the several depot supply officers, while leaving to them the internal management of their respective sections. Specifically, the duties and responsibilities of a commanding officer of a general depot include—

(1) Coordination of the activities pertaining to general maintenance, transportation, finance, supplies, and utilities at his depot.



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(2) Supervision of the procurement, utilization, and disposition of all storage facilities connected with the depot, under the limitations contained in AR 30–1415 and AR 30–1420; the depot quartermaster being required to keep a current record of storage space pertaining to the depot.

(3) Assignment of storage space to the various arms and services having supplies at the depot in accordance with their needs. Reallotment of storage space to meet the varying requirements of the several supply arms and services. Investigation of commercial storage in the locality which would be suitable and available for Government use in emergency.

(4) Control of labor and facilities for services of a general or overhead nature common to the several activities of the depot.

(*a*) This does not include labor employed by a depot supply officer in connection with the work pertaining to his particular section and for the payment of which funds are made available by the chief of the supply arm or service concerned.

(*b*) While the commanding officer has no authority over the number or compensation of the personnel employed by an arm or service in the work of the section assigned it, if he is of the opinion that any section is employing too large or too small a number of personnel of any class; that their compensation is too great or too small; that any of the personnel are inefficient or objectionable; or that the operations in any arm or service section are inefficient or otherwise objectionable; he addresses a written memorandum on the subject to the depot supply officer, and in case the conditions are not changed to remove these objections he makes full report of the facts to The Adjutant General (for area general depots, to the corps area commander), inclosing copy of his memorandum to the depot supply officer and copy of the latter's reply.

(*c*) Depot commanders are responsible for the efficient operation of utilities common to their depots, and the responsibility of the chiefs of supply arms and services with respect to such utilities is limited to furnishing the personnel and the funds (within the allotments made) required in accordance with the approved recommendations of the depot commander.

(5) Facilitating, by the efficient management of the labor and facilities at his disposal, the handling of incoming and outgoing freight and the loading and unloading of cars and other means of transportation.

(6) Whenever necessary, or in conformity with instructions received from the War Department, prescribing priorities with respect



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to shipments on requisitions and with regard to the use of transportation for incoming and outgoing supplies.

(7) Administration of the guard, fire, and police protection at the depot.

(8) Supervision and control of methods of storage so far as they relate to safety and proper utilization of the storage space allotted, and, insofar as practicable, consolidation of storage activities into Government-owned properties.

(9) Making pertinent recommendations from time to time regarding reductions in overhead, delays in filling requisitions or in disposing of surplus property, release of rented storage no longer required, lease of Government-owned storage not required, inventories, deterioration of property in storage, or other matters.

(10) Cooperation in every way with the chiefs of the various supply arms and services in order that their instructions for the storage and issue of supplies may be carried out.

**9. Depot supply officers.**—*a. Representatives.*—(1) The chief of each supply arm or service having supplies at a general depot is represented normally by a commissioned officer designated as such representative; e. g., Medical Supply Officer, San Francisco General Depot.

(2) Whenever, in the opinion of the chief of a supply arm or service, the duties incident to storage and issue of supplies pertaining to his arm or service at any particular depot can be efficiently performed by a warrant officer or noncommissioned officer, he is authorized to designate such person as his representative.

*b. Duties.*—(1) Proper storage, care, maintenance, issue, transfer, accounting, and inventory of all supplies, equipment, and material pertaining to his arm or service in accordance with War Department regulations and orders and such instructions as may be prescribed by the chief of his arm or service.

(2) Control of the necessary technical and other personnel, military and civilian, to handle supplies and records of supplies pertaining to his arm or service.

(3) Supervision of the loading and unloading of supplies pertaining to his arm or service, proper marking of all shipments, and transmittal of information in regard to shipments to consignees, through prescribed channels, in accordance with instructions issued from time to time by the chief of his arm or service. Under no circumstances will a depot supply officer arrange for transportation except through duly constituted transportation agencies under the supervision of the commanding officer of the depot. The above re-



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strictions as to arrangements for transportation have no reference to shipments by parcel post or special delivery mail.

(4) Whenever any shortage in stock is indicated or anticipated in any article of supply, or the necessity arises for special control of expenditures or reduction of allowances, a depot supply officer brings the matter at once to the attention of the chief of his arm or service. The latter takes the necessary steps to relieve the shortage and reports to The Adjutant General with suitable recommendations any articles in which special control of expenditures or reduction of allowances is indicated as necessary.

(5) Depot supply officers communicate directly with the depot commander concerning matters pertaining to storage space and to routine operations of the depot which are under the control of the depot commander, and directly with the chiefs of supply arms and services concerning technical matters, as prescribed by Army Regulations and War Department orders.

**10. Quartermaster depots.**—*a.* The organization of quartermaster depots and the administration thereof are the responsibilities of The Quartermaster General.

*b.* The depot commanders are designated by order of the Secretary of War on the recommendation of The Quartermaster General.

**11. Area depots.**—*a.* Area depots are under the control of the corps area commander who designates the commanders thereof and the chiefs of supply sections.

*b.* The responsibility to the corps area commander of the representatives of the several supply arms and services on his staff, as far as concerns the organization, operation, and administration of the area arm or service depots and of the supply sections of area general depots, is similar to and carries with it the same authority as do the duties and responsibilities of the chiefs of the several supply arms and services with respect to arm or service depots and supply sections of general depots as prescribed in paragraphs 7 and 10.

**12. Issues and transfers from depots.**—*a.* Supplies are obtained by troops in accordance with AR 35–6540 and such additional instructions as may be issued by chiefs of supply arms and services. (See sec. XV.)

*b.* Chiefs of supply arms and services prescribe the procedure to be followed by the depot supply officer when the depot cannot furnish all articles called for on a requisition and are responsible that prompt action is taken to supply such articles.

*c.* (1) All commanders require their supply officers to exercise foresight to the end that supplies required may be requested on regular, periodical requisitions.



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(2) Special or emergency requisitions are used only when the need for the articles so requisitioned could not reasonably have been foreseen. The quantities requisitioned should be limited to those required.

*d.* After favorable action by a corps area commander, or the commanding officer of an activity exempt for supply from corps area control, on a request for supplies not authorized by regulations or by Tables of Basic Allowances or other War Department authority, the request is forwarded to the chief of the supply arm or service concerned, who takes final action thereon in all cases covered by established War Department policies regarding maintenance of war reserves, limitations on the expenditure of appropriated funds, or fair and equitable treatment of all components of the Army. Important cases not covered by War Department policy are forwarded to The Adjutant General with appropriate recommendations requesting that, if possible, a policy be established to govern action in similar cases.

*e.* Department (but not corps area) commanders are authorized to take final action on all requisitions for supplies contained in area depots under their control, except in case of specific items reserved by the War Department.

## SECTION III

## CLASSIFICATION OF SUPPLIES FOR STORAGE AND ISSUE

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| Classes for storage and issue | 14 |
| Classification of stock | 15 |
| Maximum and minimum stock | 16 |

**13. Quartermaster Corps Supplement.**—The Federal Standard Stock Catalog lists the supplies and specifications applicable to all Government Departments. The Quartermaster Corps Supplement to the Federal Standard Stock Catalog contains sections classifying those items which are considered standard stock for the Quartermaster Corps. The class number and the serial page number of the class concerned appear in the upper outer corner of each page, so that when properly arranged, i. e., classes in numerical order, with pages of each in numerical sequence, the Quartermaster Corps Supplement is self-indexing.

**14. Classes for storage and issue.**—*a.* The Federal Government has adopted the following classes for the storage and issue of supplies:



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| Class No. | Title |
|---|---|
| 1 | *Guns* (antiaircraft; boat; coast defense; drill; field; machine; main battery; secondary battery; siege): Gun mounts; instruments (fire control; optical); and their parts. |
| 2 | *Arms, small:* And all accessories, outfits, and parts. |
| 3 | *Mines; nets; torpedoes:* Torpedo tubes; and all accessories, outfits, and parts. |
| 4 | *Ammunition:* Ammunition details; blasting apparatus; bombs. |
| 5 | *Flags:* Bunting. |
| 6 | *Anchors:* Anchor chains; and other ground tackle (boat and ship). |
| 7 | *Fuel:* Charcoal; coal; coke; dust fuels; gas; gasoline; oil (fuel); wood; etc. |
| 8 | *Motor vehicles:* Bicycles; trailers; and all accessories, outfits, and parts. |
| 9 | *Boats.* |
| 10 | *Boilers and engines* (boat; power): And all accessories, outfits, and parts. |
| 11 | *Pumps:* And their parts. |
| 12 | *Boat and ship fittings.* |
| 13 | *Engine room and fire room fittings, supplies, and tools.* |
| 14 | *Oils* (illuminating and lubricating): Greases; and all lubricants. |
| 15 | *Electric cable and wire* (insulated). |
| 16 | *Radio and sound signal apparatus:* And all accessories, outfits, and parts. |
| 17 | *Electric apparatus:* And all accessories, outfits, and parts. |
| 18 | *Instruments of precision:* And all accessories, outfits, and parts. |
| 19 | *Blocks; rigging:* And all accessories, outfits, and parts. |
| 20 | *Submarine material.* |
| 21 | *Cordage:* Hemp; jute; oakum; twine; including manufactured articles. |
| 22 | *Rope, wire, and wire, bare:* Including manufactured articles. |
| 23 | *Boat and ship utensils.* |
| 24 | *Duck; canvas; tentage:* Including manufactured articles and accessories. |
| 25 | *Tobacco products:* Cigars; cigarettes; and all accessories, outfits, and supplies. |
| 26 | *Furniture.* |
| 27 | *Dry goods; textiles:* Bedding; buttons; curtains; cushions; draperies; findings; floor coverings; linoleum; notions; oilcloth; trimmings; upholstery materials; yarns; etc. |
| 28 | *Blank forms.* |
| 29 | *Toilet articles:* And all accessories, outfits, and parts. |
| 30 | *Bathroom and toilet fixtures:* And all accessories, outfits, and parts. |
| 31 | *Lighting apparatus* (nonelectric): And all accessories, outfits, and parts. |
| 32 | *Fire surfacing and heat insulating material.* |
| 33 | *Gaskets; hose; packing; rubber* (sheet and strip): Hose fittings; tubing (flexible); including manufactured articles. |
| 34 | *Leather:* Belting; harness; saddlery; including manufactured leather articles. |
| 35 | *Books:* Blueprints; charts; drawings; libraries; maps; newspapers; periodicals; professional publications; etc. |
| 36 | *Musical instruments:* Music; and all accessories, outfits, and parts. |
| 37 | *Athletic equipment; recreational apparatus; sporting goods:* Special wearing apparel. |
| 38 | *Brooms; brushes.* |
| 39 | *Lumber; timber:* (Barrels; boxes; cases; crates) wooden; railroad ties; including manufactured lumber. |



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| Class No. | Title |
|---|---|
| 40 | *Tools, machine* (bending rolls; drop hammers; drills; grinders; lathes; milling machines; planers; presses; punches; riveters; rolling machines; saws; shears; etc.): And all accessories, outfits, and parts. |
| 41 | *Tools, hand.* |
| 42 | *Hardware* (builders'; general). |
| 43 | *Bolts; nuts; rivets; screws; washers.* |
| 44 | *Pipe; tubes; tubing* (nonflexible). |
| 45 | *Pipe fittings.* |
| 46 | *Metal in bars* (flat; hexagon; octagon; round; square): Billets; ingots; pigs; slabs. |
| 47 | *Metal in plates and sheets.* |
| 48 | *Metal shapes* (angles; channels; half rounds; I-beams; tees; zees; etc.): Steel rails; structural metal. |
| 49 | *Aircraft:* Aeronautic apparatus; and all accessories, outfits, and parts. |
| 50 | *Foundry apparatus:* And all accessories, outfits, and supplies. |
| 51 | *Acids; chemicals; drugs; gases; soaps:* Abrasive materials; cleaning, cutting, and polishing compounds. |
| 52 | *Paints:* Paint ingredients. |
| 53 | *Stationery:* Bags, paper; books, blank; boxes, paper; cartons; drafting room, office, and printers' supplies. |
| 54 | *Office equipment:* Adding machines; cash registers; numbering machines; typewriters; etc. |
| 55 | *Textile clothing; knitted goods.* |
| 56 | *Food:* Groceries; ice; provisions; subsistence. |
| 57 | *Hospital, laboratory, and surgical apparatus:* And all accessories, outfits, parts, and supplies. |
| 58 | *Railway, dock, and yard equipment:* Including fire fighting apparatus. |
| 59 | *Building material:* Asphalt; brick; cement; granite; gravel; lime; millwork; roofing material; sand; stone; tar; tiling; etc. |
| 60 | *Boilers and engines* (power plant; ship): And all accessories, outfits, and parts. |
| 61 | *Gyrocompasses:* And all accessories, outfits, and parts. |
| 62 | *Articles of special value:* Bullion; jewelry; museum collections; paintings; precious metal and stones; statuary; works of art; etc. |
| 63 | *Tableware* (barracks; crews' mess; hotel; hospital; officers' mess; ship saloon): Aluminum ware; chinaware; glassware; silverware. |
| 64 | *Bake shop and kitchen apparatus and utensils:* Aluminum utensils; galley gear; tinware; and all accessories, outfits, and parts. |
| 65 | *Ovens; ranges; stoves:* And all accessories, outfits, and parts. |
| 66 | *Machinery:* And equipment. |
| 67 | *Forage:* Bulbs and roots; plants, shrubs, and trees; seeds. |
| 68 | *Livestock.* |
| 69 | *Vehicles* (animal and hand drawn): And all accessories, outfits, and parts. |
| 70 | *Agricultural implements:* And all accessories, outfits, and parts. |
| 71 | *Badges; insignia; medals;* etc. |
| 72 | *Boots; shoes:* Leather and rubber clothing. |
| 73 | *Caps; hats:* Gloves; men's and women's furnishings. |
| 74 | *Individual equipment* (field and landing force). |



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*b.* The above classification, insofar as applicable, is prescribed for the Quartermaster Corps and is used for all purposes of storage, issue, stock record accounting, stock reports, and requisitioning property. All items of standard stock have been or will be listed with correct nomenclature in their proper classes in the Quartermaster Corps Supplement. In some cases the placing of articles in classes has been entirely arbitrary, since many articles might properly be placed within any one of several of the various classes. In order to locate any article accurately, reference should be made to the index of the Quartermaster Corps Supplement which will be published when the Quartermaster Corps Supplement is completed.

*c.* Information relative to the procurement, storage, and issue of each item of standard stock is shown in the symbol column in the Quartermaster Corps Supplement. A key to the symbol column is published on the first page of each class.

**15. Classification of stock.**—*a. Main classifications.*—All Quartermaster Corps supplies are divided into—

Standard stock.
Nonstandard stock.

(1) *Standard stock.*—The items listed in the Quartermaster Corps Supplement constitute the standard stock. They are regularly procured, stored, and issued in the manner indicated in the symbol column.

(2) *Nonstandard stock.*—Articles not included in the Quartermaster Corps Supplement are classified as nonstandard stock. When existing stocks become exhausted such articles are procured locally as required.

*b. Subclassifications.*—(1) *Retail.*—That carried in retail bins, racks, rooms, spaces, etc., for ready issue in small quantity.

(2) *Bulk.*—Full and unbroken packages of stock.

(3) *Excess.*—That in excess of local needs.

(4) *Surplus.*—That in excess of War Department needs, which has been declared surplus.

**16. Maximum and minimum stock.**—*a. Responsibility.*—The fundamental principle of stock maintenance is that there shall always be on hand as much of any item as will probably be required before the stock of that item can be replenished. The maintenance of stocks at levels which accomplish this purpose without creating excesses is an indication of efficient administration. Post and station quartermasters, quartermaster supply officers of general depots, and commanding officers of quartermaster depots are responsible for the maintenance of balanced stocks in sufficient quantities to meet their



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requirements within funds available. Stocks of articles subject to rapid deterioration or to obsolescence should be maintained at as low a level as practicable, and close supervision should be given to stock of this kind in order to prevent loss. The oldest stock on hand should invariably be issued first.

*b. Entry on stock cards.*—The maximum and minimum stock requirements of each item carried in stock are computed and entered on stock cards. In order that these figures may always reflect actual requirements, supply officers should maintain a constant study of past consumption and change the maximum and minimum stock requirements when conditions indicate the necessity therefor.

*c. Maximum stock.*—(1) *Depots.*—(*a*) The maximum stock requirements of depots are based on issues actually made during a past period which should not exceed 1 year. The troop strength of the distribution area assigned to the depot is taken into consideration, and the quantities established as maximum stock are revised whenever a considerable change in troop strength occurs.

(*b*) The maximum stock requirements of depots in the Panama Canal, Puerto Rican, Hawaiian, and Philippine Departments are computed as directed by department commanders and take into consideration such war reserve stock as may be authorized for storage in those departments.

(2) *Posts.*—The maximum stock requirements of posts and stations are computed subject to the approval of corps area and department commanders and are based on—

(*a*) Issues actually made during a past period which should not exceed 6 months.

(*b*) Troop strength.

(*c*) Recruiting activities.

(*d*) Summer training camp activities.

(*e*) Restricted items listed in Circular No. 1-4, OQMG, funds for the procurement of which are not sufficient to justify the carrying of large stock at posts.

NOTE.—The words "should not exceed 6 months" in (2)(*a*) above do not mean that a 6 months' supply should be carried at all posts. The time required to obtain replenishment of stock (location of post, distance from supply point, etc.) should be taken into consideration in determining the maximum stock to be carried.

*d. Minimum stock.*—The minimum stock requirements of any item are the minimum quantities which the stock of that item is allowed to reach before action is taken to replenish stock. In determining this figure, consideration should be given to the length of time necessary to replenish stock.



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## SECTION IV

## WAREHOUSING

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**17. General.**—The details of warehousing are dependent to a large degree on the kind and amount of supplies and local warehousing conditions, and each situation constitutes a separate problem to be worked out locally in detail. The purpose here is to indicate certain fundamentals and methods for general guidance in carrying out warehousing operations.

**18. Location.**—*a.* The location of the storage area is directly affected by the purpose for which it is to be used. In the zone of the interior, depots or storage plants have two functions. They serve as a place for collection and temporary storage of supplies procured for the Army and for this reason should be located near the point of production. They also serve as reservoirs upon which the Army draws for its requirements and should be centrally or conveniently located with reference to the point of consumption. The transportation net usually will decide the location of the storage plant. Bottle necks must be avoided. The plant must be so located that collection and distribution may be made with equal facility.

*b.* The cost of moving freight from warehouse to destination after it is loaded upon railroad cars or boats is a very small part of the total cost of the movement. Terminal expenses in many cases greatly exceed the expense entailed in the mere hauling of a carload of supplies. To reduce the handling and other terminal expense to a minimum it is essential that there be scientific planning for the location of a storage plant prior to its actual construction. The lay-out of a storage plant is usually more of a traffic problem than one of storage, and as such should be planned by an expert who has made a thorough study of arrangement of terminal facilities. The arrangement of



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each lay-out must be based upon a study of the requirements of each individual problem.

*c.* Some of the factors which must be carefully considered in planning a storage plant, which may be operated with maximum efficiency at a minimum expense are—

(1) Available space.
(2) Physical characteristics of the selected space.
(3) Climatic conditions of the locality.
(4) Kinds of transportation to be employed.
(5) Relative location with reference to the transportation net.
(6) Material to be handled through storage.
(7) Type of handling equipment to be employed.

**19. Military warehouses.**—These are designed and constructed with reference to the railroads and highways so that the bulk of the supplies is received and shipped through doors in the sides of the building rather than in ends. When a railroad sidetrack runs along one side of a warehouse the doors of the building should be so placed that cars can be spotted with the car doors opposite the doors of the warehouse. Blocked or superfluous doors existing in the warehouse should be closed, kept locked, and marked with a "closed" sign in large letters painted on them. "Open" or "fire" doors should be plainly marked to indicate their purpose. Except when absolutely unavoidable, not more than one door of an insulated warehouse should be opened at one time during freezing weather. The principal doorways of a large warehouse should preferably be at the sides. A clearing space or spaces of such size as to accommodate, without confusion, the receipts and issues at any one time should be provided near a principal doorway. These spaces should be so located as to reduce labor to the minimum.

**20. Conditions to be fulfilled.**—In warehousing supplies their arrangement should be such that—

*a.* Supplies are reasonably secure against theft and protected from the deteriorating effects of weather, heat, light, and moisture, and the destructive effects of vermin.

*b.* They may be readily removed for issue or shipment, and labor of handling is reduced to the minimum.

*c.* They may readily be inspected and checked for inventory purposes.

*d.* Waste space is reduced to the minimum consistent with efficient and economical operation.

*e.* Maximum permissible floor load is not exceeded.



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*f.* Arrangement does not interfere with the functioning of the fire-extinguishing system or with the free and efficient use of fire-fighting apparatus.

*g.* Supplies are segregated by item and any subdivision of item, such as sizes, lots, or grades, which may affect storage, issue, and inventory.

*h.* Inflammatory materials are segregated.

**21. Systematic stowing.**—*a.* The systematic stowing of packaged goods is one of the most important duties of a warehouseman. Inventorying cannot be successfully accomplished and stores cannot be properly cared for unless systematically stowed.

*b.* Two systems of stowing, block and numeral, are in common use in Government warehouses, and both are used in all warehouses where a varied line of goods is stowed.

(1) *Block system.*—This is used when the packages are uniform in shape and contain the same quantity of the same item (e. g., the same size, shape, nature, quality, weight, color, make, brand, and style). The packages are arranged in solid blocks two or more packages wide, two or more deep, and two or more high, with the markings on all the packages in the block facing in the same direction toward an aisle. As successive stacks are removed, the markings on the packages of the remaining stacks come in view. When supplies are issued from a block, one end row in that block is fully removed before any packages are taken from the next row. A new shipment is never stowed in front of an old shipment of the same item, as this would hamper the issuing of the old supplies first. In all cases, the old supplies are issued first, thereby maintaining rotation of stock.

(2) *Numeral system.*—This is used when stowing packages containing varying quantities of the same item. They are stored so that the markings on each package face an aisle, usually a checking aisle. The packages are stowed two deep, two or more wide, and two or more high, with the markings of the packages of each stack facing in opposite directions. An example of the use of the numeral system of stowing is that of crates containing bacon. Since the crates contain varying quantities, ranging from 95 to 105 pounds, it is necessary that the contents of each crate be known in taking inventory.

*c.* In the block system of stowing, all crate markings in the front stack are visible, the other crate markings are covered. In taking inventory each crate must be moved to note its exact contents unless a pile card can be correctly maintained. Packages not uniform in



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shape or not containing the same item and the same quantity may be stowed by the numeral system. Access can then be had to the markings of each package in one or the other of the checking aisles.

*d.* A clearing space (see fig. 1) should be provided near the principal doorway. It should be of such size as to accommodate, without confusion, receipts and issues taking place at the same time. In large depots the clearing space may, for example, be of such size as to hold a carload or more of supplies, but even in the smaller storehouses it should afford room for a wagon or truck load without having to pile boxes on each other or to block the doorway. The greater the demand for a particular article, the nearer, in general, it should be to the clearing space.

*e.* The distance from the aisle line, to or from which goods are delivered, to the back of the pile should not be over 15 feet. With a block of goods occupying 240 square feet of floor space, for instance, it is a mistake to build a pile 24 feet deep with a 10-foot aisle frontage. With such a pile, almost the entire lot must be delivered before the vacated or honeycombed space becomes available for a new lot. But if such a block is piled in a space 15 feet deep with a 16-foot aisle frontage, and partial deliveries are made along one end of the pile from the aisle to the back (taking out a row at a time), then the vacated space becomes available for new lots. Withdrawals across the entire front of a pile should not be permitted.

*f.* Each lot of goods should be kept separated by a distinct but small break between them. It is not necessary that any lot should front on more than one aisle. The arrows shown in figure 1 indicate the directions to which goods on the aisles should face. When the same commodity is piled in adjoining blocks, a space of not over 2 inches should separate different lots. No space should ordinarily be left between separate lots of different commodities, but each may be separated by a connecting aisle, if deemed necessary and space is available. Issues should be made from the oldest stock on hand. To accomplish this, dates of receipt may be marked on the bottom of the packages of each lot or block and a record kept of the receiving date and location of the goods.

*g.* The maximum height of a stack is governed by the following considerations:

(1) It must not cause a weight on the floor system in excess of the maximum safe load which the floor will sustain.

(2) Sufficient space must be left between the top of the stack and the ceiling to permit easy removal of the top packages and, in the



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block system, to permit inspection of the top of the block for detection of pilfering.

(3) The stack must not exceed the height that permits the free and efficient use of the fire apparatus.

*h.* The use of a system of unit stacks (stacks having the same amount of one kind of property) facilitates the making of a rapid and accurate inventory. Material should be piled singly or in multiples of five. Packages may be piled singly up to 10 in a column. Beyond this the columns may be made as high as the space will permit without exceeding the allowable live load per square foot, but of whole groups of five only. Groups should not be broken to fill in a remaining space too small for a whole group, unless crowded conditions make it unavoidable. Thus, every column of articles small enough to be piled in groups of five will contain some multiple of five and will be uniform for that article. For instance, if a space holds 24 packages piled snug to the top, the column should be made of 20 packages only, i. e., four groups of five each.

*i.* Each stack should bear a marker giving the contents by weight, or number of packages and contents of each package, or both.

*j.* (1) Bins, cabinets, or shelves furnish convenient places for storing small, loose articles not packed in boxes, and should be well lighted. Articles liable to theft should be located in rooms which can be locked. If such rooms are not available, inclosures of heavy wire netting or other suitable material may be used to form spaces which can be locked. Only employees authorized for duty in such inclosures should be permitted therein.

(2) Whenever an original package is opened and part of its contents removed, the remainder of the contents of the package should be placed in bins or on shelves.

(3) Arrangement of loose articles in unit strings or bundles, each containing a convenient number of such articles, facilitates the inventory count; e. g., 100 buckles on a string or wire; 10 towels in a bundle.

*k.* Stacks should not be built up in such a manner that a structural column is entirely surrounded by packages. A passage from an aisle to and around the columns should be provided to facilitate inspection and inventory.

*l.* Goods should be placed all one way, unless, for stability, it is necessary to reverse or cross pile. Cross piling, or laying goods in each tier or course at right angles to those just below, while increasing stability, decreases accessibility and sureness of count. As stability is generally less vital than accessibility and flexibility,



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cross piling should be resorted to only in special cases. Where ventilation is required, as in piling lumber, crossbars separating each course should be used. Thus, the goods in all the courses may lie all one way. The best way, in general, for the goods to lie is with their ends out toward the aisle into which they are withdrawn. If, however, space is economized to a marked degree by placing the goods in some other way, this should ordinarily be done.

**22. Aisle arrangement** (fig. 1).—*a.* The first essential in good warehousing is an economical and efficient arrangement of aisles. In order properly to handle goods in a warehouse, it is necessary that a certain amount of space be given over for use as aisles. Such space is, however, valuable for storage and must be reduced to the minimum. Aisles are given designations usually indicative of their use or nature.

*b.* Main aisles are those aisles which bear the most traffic. They should, as a rule, run from a doorway to the opposite doorway or wall. They should be of such width as to permit the passage, without loss of speed, of loaded warehouse trucks moving in opposite directions. When the ordinary hand truck (30 inches wide) is used, a main aisle 6½ to 7 feet wide is sufficient. Ten feet in width is considered the maximum for such an aisle. The distance between main aisles should seldom exceed 40 feet, as otherwise time is wasted in handling packages.

*c.* Lateral aisles are secondary aisles which cross the main aisles at a right angle. They should ordinarily run from wall to wall. It is not usually necessary that they be of sufficient width for two-way traffic. The economic width of such an aisle when the hand truck only is used is 3½ feet. Ten feet is the maximum permissible when a lateral aisle must be planned for two-way traffic.

*d.* Connecting aisles are short aisles connecting main or lateral aisles. They are used to facilitate the handling of goods when it becomes necessary to store lots consisting of two or more distinct items in the area included between adjoining main and lateral aisles. These aisles should seldom exceed 3½ feet in width. Such aisles are ordinarily economical only when placed between storage bins or racks.

*e.* Checking aisles, as the name implies, are aisles provided for the purpose of inventorying items packed in various-sized containers making necessary the viewing of each package. Bacon packed in crates, the weight of each of which may vary, is an example of such an item. As it is unnecessary for goods to be handled through these aisles, the width is limited to that necessary for checking and should rarely exceed 2 feet. The installation of many checking aisles is usually a sign of poor warehousing technique. It is ordinarily the result of poor ar-



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rangement of stock. Such an aisle not only constitutes a waste of space but also increases the fire hazard. Numerous small aisles enable a fire to spread rapidly through a warehouse. The need of these checking aisles may normally be eliminated if the stock is kept by packaged as well as contents units and recorded on a pile card.

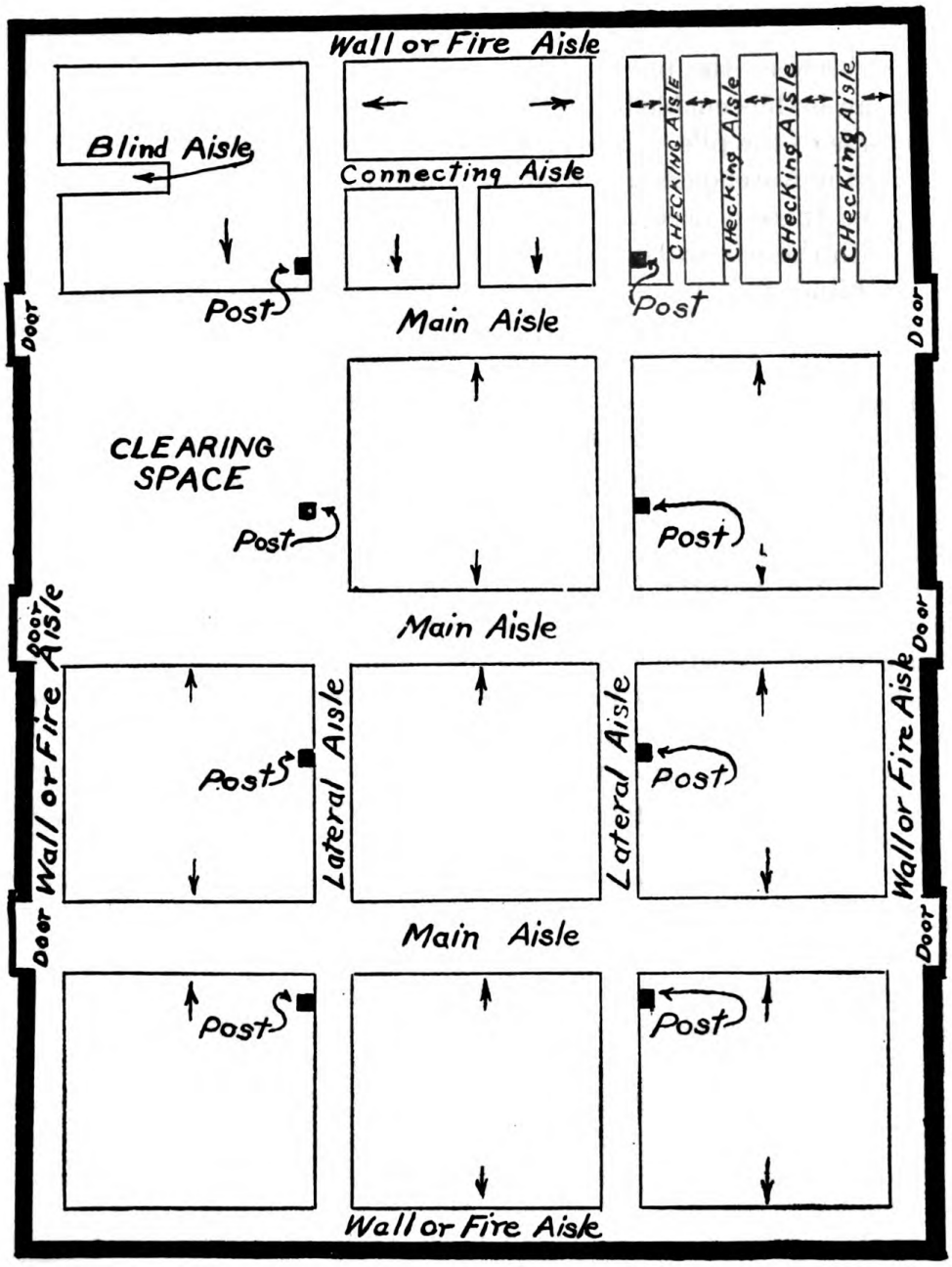



FIGURE 1.—Floor plan showing a typical aisle arrangement in a warehouse.
Floor space: 119 ft. × 87.5 ft. = 10,412 sq. ft.
Width of main aisles = 7 ft.
Width of lateral, wall or fire, aisles = 3½ ft.



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*f.* Wall or fire aisles are aisles surrounding the warehouse just within the walls. Their purpose is to provide accessibility in case of fire and to protect the walls from possible danger caused by the side pressure exerted by sacked or baled material piled against them. Such aisles should not be more than 3½ feet wide. When economy in the use of storage space is secondary to the rotation of stock, the wall aisle serves a further purpose. Loaded trucks may encircle the entire warehouse passing between the pile and the walls of the building. The warehouseman is thus enabled in making a shipment to load from an additional side of the pile. The wall aisle renders less difficult the task of keeping the warehouse free from rats and mice. Where such an aisle exists and there is need for additional storage space, the aisle may be filled with the particular commodity pertaining to each pile.

*g.* A blind aisle is an aisle having but one open end. It may be a checking aisle or may be provided for the handling of goods stored in the middle of a section between main and lateral aisles. Its width is governed by the use to which it is to be put.

*h.* Aisles should be straight and continuous. Their boundaries should be plainly marked upon the floor by painted lines approximately 2 inches wide.

**23. Labor.**—*a.* The problem of handling labor efficiently must be solved by the natural talent of the warehouse foreman. It is his duty to decide whether a piece of work should be done by 1 man, 10 or 20 men. As a general rule 1 man will do a certain job in fewer man-hours than 2 or 5 men, because he keeps moving and is not slowed up by the other men getting in his way or failing to keep pace with him. Therefore, the foreman should work his men singly or in small groups, and put at the head of each group a gang foreman who sets the pace.

*b.* Trucks should be loaded with a uniform number of packages so that tally may be accomplished easily, and they should be loaded to maximum capacity to save trucking labor.

*c.* In the unloading and stowing of a carload of packages weighing about 60 pounds each, not over 6 men can work efficiently. This permits 2 men to work in the car loading trucks, 1 at each end of the car, 2 men piling and 2 men trucking, using 3 trucks each, 1 truck being loaded, 1 being unloaded, and 1 on the way to or from the car. A trucker should never remain idle while his truck is being loaded or unloaded.

*d.* All work to be done should be carefully studied and planned and the personnel assigned accordingly.

**24. Record of tonnage handled.**—Every depot warehouse should have a record of the total tonnage handled in and out during



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the month; also a record of the handling and clerical labor employed for the period. These records are purely warehouse data and offer ready reference for the solution of future warehousing problems and in obtaining cost data.

**25. Lighting.**—Adequate light reduces labor cost by increasing the volume of supplies that can be handled, owing to the ease with which checking, sorting, and piling are performed, decreases the number of accidents, and increases the efficiency and the morale of the workmen, with a resultant decrease in labor turn-over. It also has effect in reducing to a minimum those discrepancies which develop from incorrect checking and shipping, those caused by damage from breakage, and those created by water damages, which could not be detected if supplies were stored in improperly lighted rooms. Ceiling lights, as a rule, give ample light for the handling of merchandise piled or stacked, while drop and extension cord lights are used where merchandise is stored in shelves or bins. The distributing power of light is reduced to a great extent by dirty globes and fixtures, and for this reason fixtures and globes should be cleaned regularly so as to obtain the full benefit of the candlepower used. Electric-light switches should be so arranged that it is not necessary to illuminate an entire unit when light is needed in only one section, and the use of pull-chain sockets effects large savings in current when operations are confined to single bays.

**26. Platforms.**—A very important factor in any efficient scheme of warehousing is the construction of platforms for convenience in loading and unloading of supplies. When space permits, covered platforms 10 feet in width are constructed along the side or sides of the warehouse fronting on the sidetrack and roads. Such platforms provide necessary space to facilitate the handling of incoming and outgoing supplies and may also be used in an emergency for temporary storage awaiting shipment or classification.

**27. Warehousing terms.**—A study of warehousing must include a knowledge of principal warehousing terms. (See fig. 2.)

*a. Article.*—Term applied to a collection of items within a class, such as flags (all nations), hats, white (all sizes), pigments in oil (all colors), screws of one kind or type (all sizes).

*b. Bin.*—Receptacle for storing small articles built either with or without lids. Bins are often improvised by using packing cases.

*c. Bin tag.*—A tag fastened on the front of a bin in which small articles are stored. It should contain the same information as does a pile card and is used for the same purpose.



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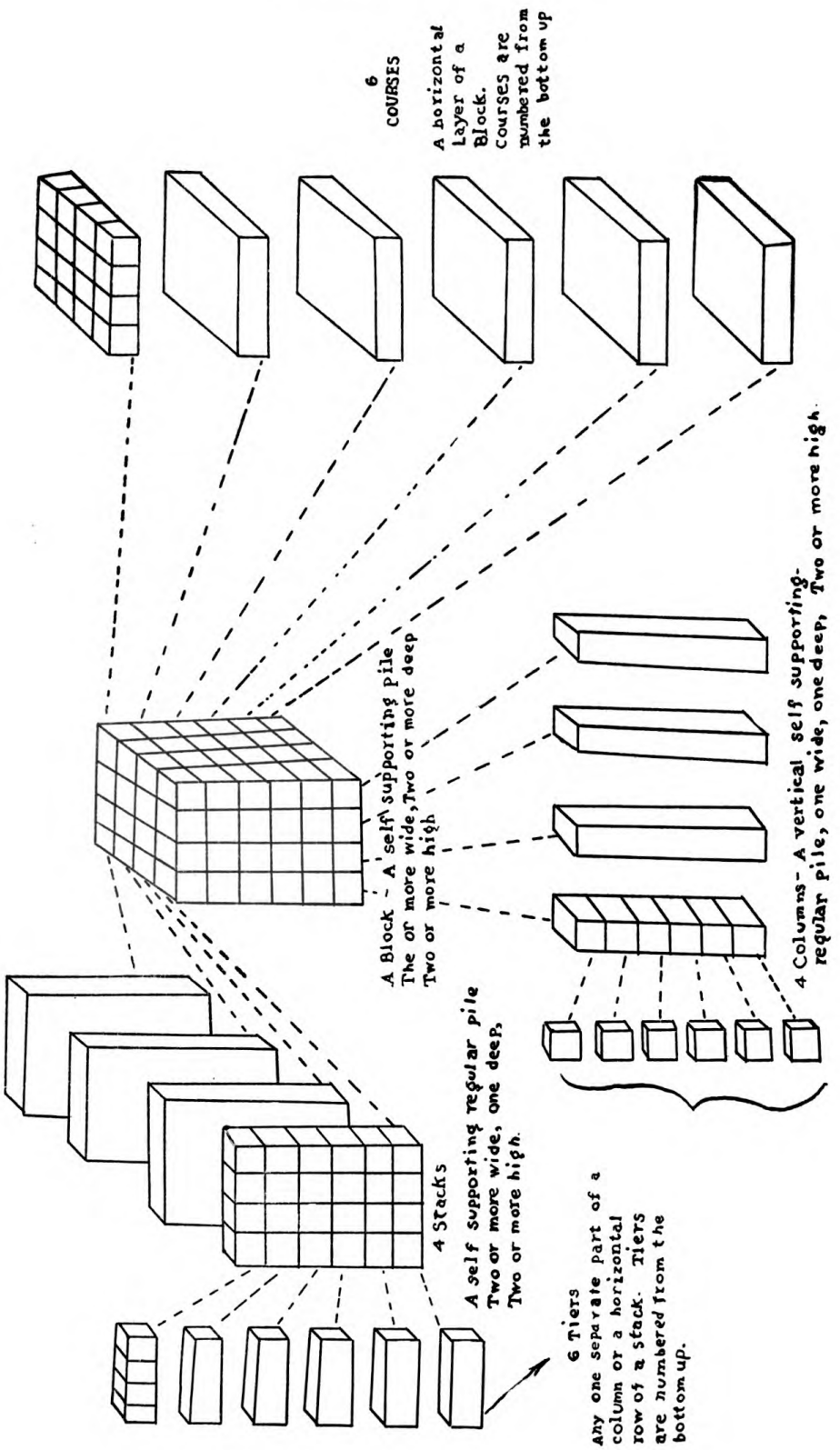



FIGURE 2.



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*d. Binder.*—Strip of burlap, heavy paperboard, thin lumber, or any other material placed between layers of packages to keep the pile together.

*e. Block.*—A self-supporting regular pile, two or more wide, two or more deep, and two or more high. A block may be either rectangular or pyramidal.

*f. Column.*—A vertical, self-supporting, regular pile, one wide, one deep, two or more high.

*g. Course.*—A horizontal layer of a block. Courses are numbered from the bottom up.

*h. Dunnage.*—Boards or other material placed on the floor on which goods are piled to avoid direct contact with the floor; also boards or other material placed between layers of a pile as a means of providing ventilation.

*i. Inventory.*—A detailed account, catalog, or schedule of articles of supplies.

*j. Item.*—Any one kind of stores; e. g., canned corn, No. 2 size cans, xyz brand. Difference in size, shape, nature, quality, weight, color, make brand, or style generally determines different items.

*k. Lot.*—A quantity of supplies of the same general classification, such as subsistence, clothing, equippage, received and stowed at any one time; e. g., 100 cases of subsistence, 50 cases, 24 cans in each case, canned corn, No. 2 size cans, xyz brand; or 50 cases, 24 cans in each case, canned peas, No. 2 size cans, xyz brand.

*l. Pile.*—A pile is a heap. Regular piles are defined under column, stack, block, etc. The depth of a pile extends from the aisle line back to the last unit, the width extends along the aisle line, and the height, from the floor up to include the top unit.

*m. Pile card.*—A card securely fastened to a pile showing the quantity of each item in each lot. The card should show the correct nomenclature of the article and the number of articles in the unit. At the time material is stowed or removed from a pile, an entry of the number of units so moved must be made on the pile card and the balance changed accordingly. To be of any value the pile card must always show the accurate balance in the pile.

*n. Rack.*—Open grating, framework, or similar construction in or on which articles may be placed, generally used in warehousing or stowing long articles, such as pipe, bars, etc., which cannot be piled because of their shape.

*o. Row.*—A uniform arrangement of bins or racks. A single row is usually placed against a wall. Double rows are placed back to back.



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*p. Stack.*—A self-supporting regular pile, two or more wide, one deep, two or more high. A stack may be either rectangular or pyramidal.

*q. Stowing.*—The putting away of things, usually stores, by a proper method. It embraces removal and the general rules for handling.

*r. Tier.*—Any one separate part of a column, row, or stack. Tiers are numbered in the order of their stowing—from the bottom up.

*s. Unit.*—A quantity of an item; i. e., each, number, dozen, fathom, gallon, pair, pound, ream, set, yard, etc. Usually termed "unit of issue" to distinguish from "unit price."

**28. Lay-out of storage areas.**—*a.* The importance of carefully worked out storage plans for storage areas cannot be overemphasized. By intelligent planning, excess carrying charges and operating expenses resulting from wasted and poorly utilized space are obviated, and the expense of future rearrangements of stock is avoided. To lay out new areas or rearrange stock in old areas properly, the following steps are necessary:

(1) Classification and listing of items according to classes.

(2) Determination of proper storage-space unit.

(3) Determination of proper aisle spaces.

(4) Determination of proper lay-out of storage and aisle space with general location of items and calculation of total space needed.

(5) In the planning of storage lay-outs, particular attention should be paid to the location of entrances, aisles, posts, platforms, windows, and other similar features so that they do not interfere with but facilitate the handling of stores.

*b.* In the construction of bins and the arrangement of stock, consideration is given to the structural strength of available floor space. The allowable live load in pounds per square foot of space is ascertained and plainly marked in each warehouse, and care is exercised to see that the stores are so distributed that the estimated weight which may be safely carried is not exceeded.

*c.* The space allotted to any one item is sufficient at least to hold the maximum expected on hand at one time, with each lot distinct.

*d.* After the storage lay-out has been determined, charts showing lay-out and location of stocks are prepared and posted at such places as the officer in charge may direct.

**29. Location of stock.**—*a.* The arrangement of stock requires the most careful consideration and planning. Before action is taken to place or rearrange stock, a lay-out plan is prepared in which definite space is allotted to each storage class. Normally all the articles



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in any class are stored in the space allotted to that class, but local conditions, such as the presence of large quantities of excess stores, may make it desirable or necessary to allot two or more places for one class.

*b.* The arrangement of items of stock within a class is in alphabetical, numerical sequence regardless of whether it is standard or nonstandard stock, unless the nature of the item or storage conditions make it necessary to deviate from this sequence.

*c.* The placing of many items depends on the shape and character of the item and the character of the storage facilities. The location and segregation of special materials, such as inflammables and perishable foodstuffs, are governed by their physical characteristics and the need for special care in storage. Items which are carried in large quantities and frequently issued, and large heavy items which are difficult to handle, are placed in a convenient location to provide short hauls.

*d.* Stores are never located where they may be damaged. Placing articles so that they project from the edge of a bin or platform is to be avoided. In general, articles are kept off the floor or the ground. In placing items subject to deterioration from heat and dryness or from cold and dampness, it should be remembered that the air near the ceiling is usually warmer and dryer than that near the floor.

*e.* Stores are stowed only in the spaces reserved for the purpose. Tools or equipment in regular use in storerooms are provided with special places marked so as to show the purpose for which reserved.

**30. A warehousing problem.**—Consider the problem of planning for the warehousing of the following classes:

55—Clothing, including uniforms and underwear.
71—Badges, insignia, medals, etc.
72—Boots, shoes, raincoats, and oilskins.
73—Caps, hats, gloves, socks, and neckties.

*a. Steps.*—(1) *First step.*—Determine the amount of supplies to be warehoused. This depends on the size and location of the post. For example, a post that has a normal garrison of 3,000 men and is located where cotton clothing is used during the summer months needs more space for both summer and winter clothing than a post of the same size garrison so located that either winter or summer clothing, but not both, is required. In considering the quantity to be warehoused, the maximum on hand at any one time must be taken into account. This avoids constant rearrangement, owing to the fluctuation of stock because of seasonal requirements, when less than the maximum space required is reserved.



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(2) *Second step.*—Determine the storage space available. It differs widely at different posts and depends on the warehouse or separate floors that can be assigned to these classes.

(3) *Third step.*—Determine the size and type of storage unit to be used. As a standard rectangular storage space unit is the most practical for general storage, the size of the units depends on the dimensions of the storage floors, the location of aisles, main, lateral, connecting, checking, and wall or fire. The general rule is that aisle space is reduced to the minimum required for working the stock, which includes handling and checking. Having determined the space that must be set aside for aisles, clearing spaces for receiving and issuing stock, and for office and fitting rooms, a floor plan is prepared that shows the storage space units.

(4) *Fourth step.*—Determine the number of storage space units to be assigned to each class. It is done by computing the space required to hold the class and is the sum of the spaces for each item in the class, plus at least 25 percent additional space for handling of old and new stocks. It involves a decision as to the height of columns, stocks, or blocks, which must never be so high as to exceed the allowable weight per square foot of floor space as determined by the design of the building used. Where space permits, supplies are not piled higher than can be handled by a man on the floor. These plans are for ideal warehouse conditions. If lack of space compels crowding of supplies, great care is taken to avoid as much rehandling as possible.

(5) *Fifth step.*—After the storage lay-out has been determined, the following charts are prepared and posted at conspicuous points throughout offices and warehouses for the information of all concerned:

(*a*) A lay-out chart of the depot or post, if a large one, showing the space assigned for storage purposes.

(*b*) A location chart for each warehouse showing location of different classes of stores.

(*c*) A location chart for each floor. Floor location charts show the location of stock according to classification, location, and dimensions of aisles, clearing space, receiving, packing, shipping, and issuing sections, offices, entrances, elevators, doors, windows, and similar features.

(6) *Sixth step.*—The amount of space necessary for the storage of class 55, clothing, having been determined, these articles are stored in alphabetical and numerical sequence in the order in which they are listed in the Federal Standard Stock Catalog. This is done by



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taking each bulk item, as for example, breeches, service, cotton, o. d., size 28–25, stock number 55–B–275, and placing it facing the aisle followed by the next item, breeches, service, cotton, o. d., size 28–27, stock 55–B–282, and so on in numerical and alphabetical sequence, each stack or block fronting on the aisles like houses on a street. The piling begins in the left front portion of the space as the warehouseman faces the stock, continues to the right until the space is filled, then around the corner, always building from left to right. Different items of bulk stock never touch each other; a space of 2 or 3 inches

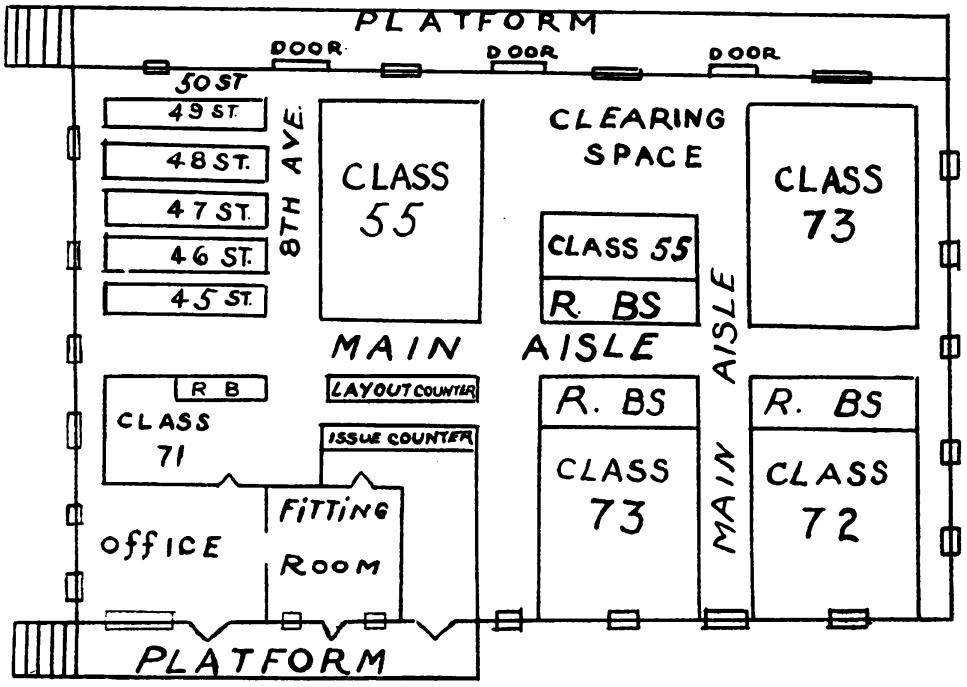



FIGURE 3.—Clothing warehouse.
Class 55—Clothing.
Class 71—Badges, insignia, medals.
Class 72—Boots, shoes.
Class 73—Caps, hats, gloves.

separates each item from the next. This is essential for inventory purposes.

*b. Solution.*—Graphic charts (figs. 3, 4, and 5) covering the system of stowing as outlined in paragraph 21 are shown because they best illustrate the numeral system of piling; and also, there is a chart (fig. 6) giving lay-out of bulk and retail stock.

(1) Figure 3 shows the floor plan of a warehouse assigned to classes 55, 71, 72, and 73, which includes the various articles of issue clothing.

(2) Figure 4 shows an enlargement of the storage unit (fig. 3), bounded by Seventh and Eighth Avenues on the west and east, and



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Forty-fifth and Fiftieth Streets on the south and north, and the stowing of two articles of class 55, item by item. The use of solid blocks for large quantities of the same item is not shown, as the amount of clothing at a post seldom amounts to such large quantities for any one time. Likewise, the uneven lengths of different items are not shown as the illustration covers breeches, cotton, and woolen, packed in the same sized containers.

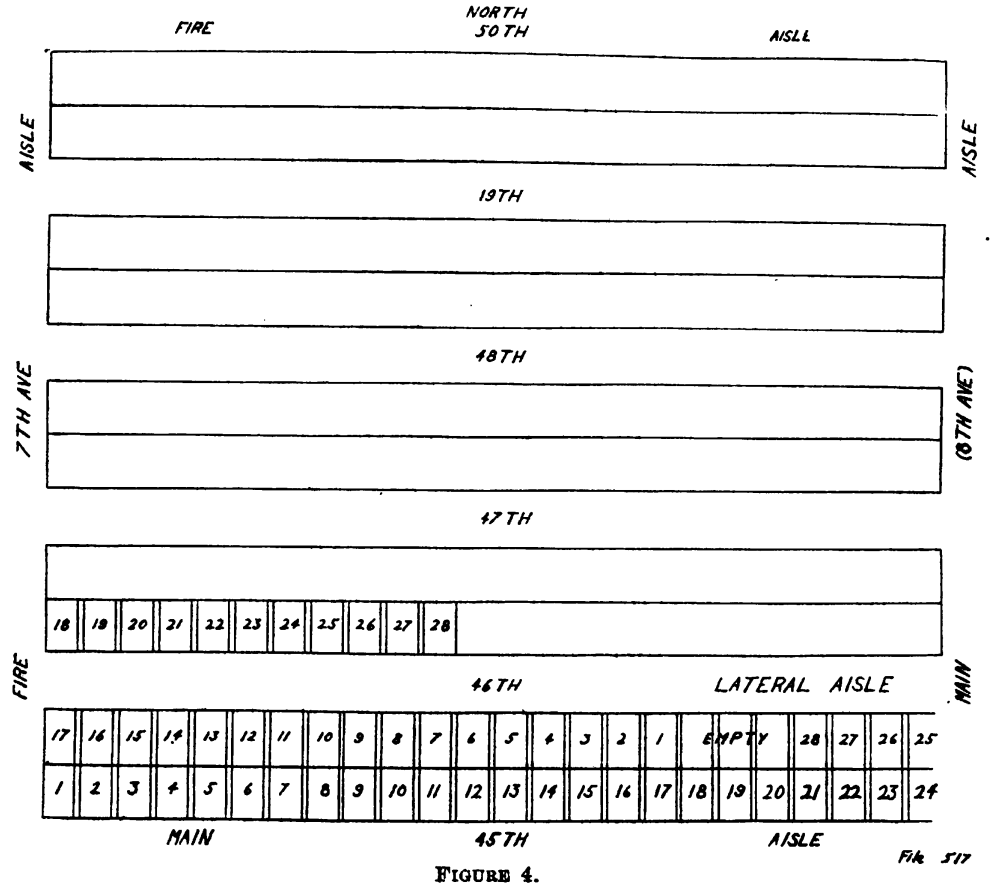



FIGURE 4.

(3) Figure 5 shows the significance of the numerals indicating each item on Forty-fifth and Forty-sixth Streets on figure 4.

*c. Comments.*—(1) The storage space for the bulk stock of an entire class having been determined, that bulk stock is placed, item by item, in columns and rows, like houses on a street. By regarding each bulk item as a house, one can readily visualize the plan by assuming that the space allotted for any one class is similar to that bounded by Seventh and Eighth Avenues, and by Forty-fifth and Fiftieth Streets, in a city in which Seventh Avenue is to the west of Eighth Avenue and Fiftieth Street is to the north of Forty-fifth. If the space



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is bounded by two building walls, a fire wall and a main passage, or by two main passages and a fire aisle, Seventh Avenue and Fiftieth Street are the fire aisles; Eighth Avenue and Forty-fifth Street, the

Class 55

| | Breeches, service, cotton, o.d. size | | | Breeches, service. woolen, o. d. size | |
|---|---|---|---|---|---|
| 1 | 55-B-35400 | 28-25 | 1 | 55-B-50110 | 28-25 |
| 2 | 55-B-35405 | 28-27 | 2 | 55-B-50115 | 28-27 |
| 3 | 55-B-35430 | 30-25 | 3 | 55-B-50135 | 30-25 |
| 4 | 55-B-35435 | 30-27 | 4 | 55-B-50140 | 30-27 |
| 5 | 55-B-35445 | 31-25 | 5 | 55-B-50150 | 31-25 |
| 6 | 55-B-35450 | 31-27 | 6 | 55-B-50155 | 31-27 |
| 7 | 55-B-35460 | 32-25 | 7 | 55-B-50165 | 32-25 |
| 8 | 55-B-35465 | 32-27 | 8 | 55-B-50170 | 32-27 |
| 9 | 55-B-35470 | 32-29 | 9 | 55-B-50175 | 32-29 |
| 10 | 55-B-35490 | 34-27 | 10 | 55-B-50195 | 34-27 |
| 11 | 55-B-35495 | 34-29 | 11 | 55-B-50200 | 34-29 |
| 12 | 55-B-35515 | 36-27 | 12 | 55-B-50220 | 36-27 |
| 13 | 55-B-35520 | 36-29 | 13 | 55-B-50225 | 36-29 |
| 14 | 55-B-35540 | 38-27 | 14 | 55-B-50245 | 38-27 |
| 15 | 55-B-35545 | 38-29 | 15 | 55-B-50250 | 38-29 |
| 16 | 55-B-35565 | 40-27 | 16 | 55-B-50270 | 40-27 |
| 17 | 55-B-35585 | 42-27 | 17 | 55-B-50290 | 42-27 |
| 18 | 55-B-35605 | 44-29 | 18 | 55-B-50310 | 44-29 |

FIGURE 5.

main passages. The first item is placed on the corner of Forty-fifth Street and Seventh Avenue on the north side facing Forty-fifth Street. Item after item is then placed from left to right on Forty-fifth Street until Eighth Avenue is reached, completing the first half of the double



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row; around the corner to Forty-sixth street, and item by item along the south side of Forty-sixth Street until Seventh Avenue is reached, completing the second half of the first double row across Forty-sixth Street at Seventh Avenue, and continuing item by item along the north side of Forty-sixth Street from Seventh Avenue to Eighth Avenue, following the procedure to Fiftieth Street.

(2) Stock is never placed against any wall because of possible fire damage, as the heat of burning stock against a wall might cause that wall first to buckle and then to fall.

(3) Some items manifestly require larger sites than others. These represent apartment houses, hotels, and theaters; the small items are visualized as dwelling houses and cigar stores. Furthermore, large blocks of stock, such as provisions stored in a solid block, might and ordinarily do require as much space as two or three city blocks. In such cases the item is stored in a solid block and the next street located at the end of such large block; i. e., the distance between Forty-sixth Street and Forty-seventh Street might equal or exceed the distance between Forty-eighth and Forty-ninth Streets. The passage between these rows of bulk stock, if practicable, is at least 3 feet wide.

(4) Different items of bulk stock never touch each other. This perfect segregation is essential for accurate inventory. An intervening space of 2 or 3 inches suffices, but the space must always be there.

*d. Model lay-out plan.*—Figure 6 shows a completed lay-out plan for the storage of shirts, EM, worsted, o. d.

## SECTION V

## STORAGE PRECAUTIONS

Paragraph
Storage of supplies in buildings ..... 31
Storage of supplies in the open ..... 32

**31. Storage of supplies in buildings.**—In warehouse activities many articles placed in storage, because of their nature, affect other articles. The effect of light, heat, moisture, odors, or other conditions on supplies to be stored is always considered in warehousing. The following special considerations are useful in storing the articles listed:

*Acid, sulphuric.*—This is stored in a cool, dry place. The fumes damage all animal and vegetable matter. The acid must not under any circumstances comes in contact with water, as great heat will generate. It is usually packed in carboys with the neck exposed, and is stowed one high only, unless in racks.



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*Ammonia.*—This is stored so as to guard against leakage. It affects vegetable colors in textiles. It is kept isolated from other supplies.

*Asbestos.*—This is stored in storerooms fitted with closed bins.

*Awnings.*—Before storing, awnings are thoroughly dry. They are stowed in dry places. Freshly painted canvas articles are not stowed where ventilation is poor. When stowed, they are turned over from time to time to prevent nesting of rats.

*Band instruments, general.*—When any band instrument is not in use it is invariably kept in the case provided for that purpose.

*Brass wind instruments.*—Grease or oil is never applied to valves. Valves are always kept free of dirt. Grease is put upon the slides but only in very small quantities, and care is exercised that no grease gets into the interior of the instrument. If the top and bottom caps of valves become tightly fixed, no force is used to remove them, as the caps may be readily removed by holding them under running hot water for a short time. The use of pliers and pincers is prohibited. Before the instrument is put away, all water is removed, as the retention of moisture in the interior is the prime cause of corroding and eventually destroying the soldering at the joints.

*Wood wind instruments.*—The exterior is dried with a soft cloth or chamois skin, and the ends of the joints kept perfectly dry. A swab, which is naturally an absorbent of moisture, is not left in the bore of a wood reed instrument, as it causes the wood to expand and split. Exposure of wood, steel springs, and screws to fog and dampness tends to shorten the period of usefulness of this class of instruments. This is especially true at seacoast posts. Oil is kept on the springs and screws at all times to prevent rusting. Frequent inspections are made.

*Batteries, dry.*—These are stowed in a perfectly dry place, where temperature is not above 150° F. They are not stored against metal articles or on metal shelves.

*Bleaching powders (used in laundries).*—These are rapidly decomposed by water, heat, light, and air. They are kept cool, dry, and isolated.

*Bluing, laundry.*—This is protected from dampness.

*Brushes, bristle.*—These are dusted with pulverized moth balls (naphthalene), as they are quickly destroyed by moths. They are stowed on edge with space for air circulation underneath and through the pile.

*Clothing*—This is kept dry. Woolen clothing is subject to attack by moths. When originally packed, it is sprinkled with naphthalene



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If repacked, line box with wrapping paper and sprinkle naphthalene between the folds of the clothing and between layers. When unpacked and placed on shelves or in bins for issue, sprinkle napthalene around the clothing in ample quantities.

*Oilskin garments.*—These stick together if allowed to become warm. If they are confined without ventilation there is likelihood of combustion. They are unpacked immediately upon receipt at the warehouse and hung in such a manner as to receive thorough ventilation. If space does not permit of this method, packages containing oilskin garments are stowed so as to provide a good circulation of air between cases.

*Canvas.*—This material, oiled or waterproofed, is stowed in a cool, dry place and a good circulation of air allowed. It is located within easy reach in case of fire.

*Cement, linoleum.*—This is kept in airtight containers.

*Cement, Portland.*—This product is kept dry under all conditions. It is stowed on dunnage with canvas covering. If exposed to weather or extreme moisture, it "sets" or solidifies and becomes worthless.

*Clay, fire.*—This is stowed in closed bins.

*Cooperage.*—Wooden containers, such as barrels, tubs, cases, shooks, etc., made of staves, hoops, headings, boards, are kept dry at all times to avoid warping.

*Cordage.*—All twines, cord, rope, and cable made of textile material are kept dry to avoid rotting.

*Drills.*—These are wrapped in oiled paper and kept in a dry place.

*Drums, empty, paint.*—Nozzles are coated with red lead and stowed with nozzle down.

*Fans, electric.*—These are stored away from electric cables to prevent possible burning out of armatures and are protected from water.

*Files, metal.*—These are stored in such a manner as to prevent contact with each other and are kept dry.

*Gaskets, rubber.*—These are kept free from oil or grease and are not exposed to light and excessive heat.

*Hardware, light.*—Shelves are utilized for storing of such loose articles as saws, hammers, and other hand tools. Securely locked cabinets are used for the storing of smaller and more valuable articles. Such small, loose articles as bolts, nuts, parts, etc., are stored in bins. Racks are provided for pipes, rods, and other articles of similar character. The use of racks conserves storage space and tends to prevent the warping or bending of the articles so stored.

*Horseshoes and horseshoe nails.*—On account of the weight of these and similar articles, care is used to prevent overloading of the floor capacity.



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*Hose, fire.*—All water is drained from it before stowing. The hose is stretched once every 3 months and water run through it. If cotton-covered, the covering is dry before stowing. The hose is kept in a cool, dry place and, to prevent kinks, is coiled rather than folded. It is kept free of oil.

*Hose, rubber.*—This is not stowed near a radiator, steam pipe, etc., as excessive heat causes rapid deterioration.

*Iron rods, pipes, and sheets.*—These are stored in racks and protected from moisture, which causes rust and deterioration.

*Kerosene.*—This is stored with gasoline. This article is never stowed in or near storehouses containing property other than gasoline, oils, and paints.

*Lampblack.*—This is kept carefully wrapped and confined to prevent sifting through package and damaging other goods.

*Leather.*—This is stowed in a cool, dry place and inspected periodically. When in storage it is subject to mold and dryness.

*Lime.*—This is stowed in a dry place, preferably in closed bins. If unslaked, prevent moisture as far as possible.

*Linoleum.*—This is easily cracked and broken when cold. It is stowed in rolls on end. Care is taken that nothing is piled on top of it.

*Moth balls or naphthalene.*—These are kept in airtight containers.

*Nails and spikes*—Kegs containing nails and spikes are stowed on their sides with the heads facing the aisle so that various sizes are readily located. A temporary ramp may be provided for the stowing of kegs containing heavy material, such as nails, spikes, horseshoes, etc. The kegs are then rolled up the ramp, thus saving a direct lift. Care is taken not to overload the floor capacity.

*Oils.*—Where possible these are stored in an oil house provided for the purpose. If an oil house is not provided, special storerooms are set aside for this purpose. Oils are protected from sparks and open flames. Care is exercised to prevent leakage. Linseed oil is not stowed on sawdust, as spontaneous ignition may result. All oils are isolated from rags, paper, etc.

*Paints.*—Where possible these are stored in a separate building provided for the purpose, usually together with oils. If a separate building is not provided, special storerooms are set aside for the purpose. Care is exercised to prevent leakage. All paints in drums are stowed under cover, and water is not allowed to stand on drums. Most ready-mixed paints give off inflammable gases.

*Aluminum paint.*—This is kept at a temperature below 90° F.

*Anticorrosive paints.*—These are kept in a cool, dry place. These paints generate gases and therefore drums are kept airtight to prevent blowing out.



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*Red lead.*—This is issued and used as soon as practicable and never held in stock longer than 6 months.

*Paper.*—All kinds are stowed in a dry place and protected from moisture, dust, or dirt.

*Paper, roofing.*—This is always stowed on end to prevent warping.

*Polish, metal.*—This is kept in paint room or other places separate from other stores. Extreme temperature is damaging.

*Plumbago (graphite, black lead, wad, and mineral carbon).*—Packages are kept tight to prevent the contents sifting through and damaging other goods.

*Rags.*—These are kept isolated because of the fire hazard and because they may contain vermin of various types. After rags have been used, they are not kept in storehouses or storage spaces on account of the danger of spontaneous ignition.

*Rubber.*—This is stowed away from light and heat and kept from contact with metal.

*Shellac.*—This is stored together with paints. Clear shellac darkens if stored in metal containers. Colored mixed shellac is not appreciably affected by metal containers. Either type is kept indefinitely in earthenware or glass containers.

*Soda (sodium carbonate, carbonic soda, sal soda, and washing soda).*—Packages are kept tight to prevent sifting through and damaging other goods. These articles give off moisture.

*Sponges.*—Store in medium temperature. Heat and dryness has damaging effect. Musty odors from sponges may affect other goods.

*Tentage.*—Store in dry place to prevent damage from moisture. After use, tentage is thoroughly aired and dried before stowing.

*Tires and tubes.*—These are stowed away from light and heat and kept from contact with metal. These articles contain sulfur which bleaches colors of other goods and damages foodstuffs.

*Tools.*—These are kept covered with a film of oil or wrapped in oiled paper and are inspected frequently to see that they are free of rust. Tools that have been used are, before storing, thoroughly cleaned with a wire brush or abrasive paper to remove rust, and all those parts not covered with paint are slushed with a heavy oil.

*Typewriters.*—Store in a dry place and with protection against excessive moisture.

*Utensils, cooking.*—Wipe occasionally with oily rags to prevent rust. Utensils subject to rust that are returned to storage after having been used are thoroughly cleaned, free from rust, and given a protective coating of oil.

*Varnish.*—Stored together with paints, using same precautions.



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*Wagons, carts, and other animal-drawn vehicles.*—When received for storage these are knocked down for economy of space before stowing. Wheels are stowed on edge, preferably in a rack. Beds and sideboards are laid flat, care being used to prevent warping. Poles, doubletrees, singletrees, reach poles, and axles may be placed in racks or stacked. In either case care is taken in stacking to prevent warping of poles, reach poles, etc., and damage to metal parts from coming in contact with other parts.

*Wax paraffin.*—This is stored in a cool place to prevent molding.

*Wire.*—This is stowed in a dry place.

**32. Storage of supplies in the open.**—*a.* Whenever the lack of storage facilities makes it necessary, supplies, especially forage, may be stored in the open. Provision should be made for dry foundations, ventilation where overheating is likely, and protection for tops and sides.

(1) A foundation to keep the supplies off the ground and sufficiently high to protect against the accumulations of surface water is laid. Any available material such as logs, stones, or cordwood may be used, or a regular platform may be constructed. Necessary passages for ventilation are arranged for as the piling proceeds. Paulins are provided for field use to protect piles of supplies against the weather and when used as a top or side covering are lashed in place.

(2) The arrangement of packages within a pile, whether indoors or out, is such as will facilitate counting and inspection. In building a pile, only packages of uniform dimensions are used. Packages of more than one article are not mixed. As a rule, sloping roofs are added. Space of approximately 15 feet is left between the piles for the free passage of vehicles. It tends to solidify if alternate rows of headers and stretchers are used and joints are broken uniformly.

(3) As a general rule, supplies are packed in containers of rectangular shape or in bales. They are placed in a secure pile with vertical sides by use of alternate layers of headers and stretchers. If baled goods cannot be built up solidly by using headers and stretchers, binders of canvas or other similar material are employed. The ratio between the length and width of the packages shows the minimum width of pile that may be used, since it is necessary that the over-all width of a layer of stretchers equals that of a layer of headers. A multiple of the minimum width may, of course, be used. A pile built up in this way consists of a series of complete sections,



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each side of which is equal in length to the width of the pile, and is therefore convenient since sections can be cut away complete.

(4) Except at places where large quantities are kept and issues are infrequent, the most suitable height from the standpoint of labor involved and convenience in making issues and taking stock is from 7 to 10 feet.

(5) A sloping roof is formed by reducing the width of the layers alternately by one stretcher or two headers until a layer one header wide only is reached.

(6) A pile, triangular in cross section, may be made by placing all packages as headers and breaking joints transversely. The number of packages in each layer is uniformly reduced by one.

*b.* The above is not intended to indicate method of storage in the theater of operations, where the security of the supplies as well as speed in handling must be given primary consideration.

## SECTION VI

## STORAGE OF MOTOR VEHICLES

| | Paragraph |
|---|---|
| General | 33 |
| Engines | 34 |
| Axles and transmissions | 35 |
| Electrical units | 36 |
| Tires and tubes | 37 |
| Storage batteries | 38 |
| Waterproofing of paulins and covers | 39 |
| Waterproofing compound | 40 |
| Protective coatings for metal and wood | 41 |

**33. General.**—*a. Kind of storage.*—All motor vehicles which are not in use are stored, if practicable, in covered and closed storage. When covered and closed storage is not available or cannot be made available, paulins for covering the vehicles are used.

*b. Overhauling.*—Before being stored, motor vehicles for storage are, if possible, overhauled and placed in thoroughly serviceable condition. If for any reason it is impossible to overhaul these vehicles, a careful inspection of them is made, and each vehicle is carefully tagged showing all spare parts and repairs needed to place each in serviceable condition. These tags are attached to the vehicle and are shellacked to protect them against oil and moisture.

*c. Jacking and blocking.*—All motor vehicles stored in the open, under sheds, or in buildings are jacked up and blocked, or have planks or boards placed under their wheels so that they do not in any case rest upon the ground. (See par. 37.)



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*d. Separate storing of removable parts.*—All removable parts, such as spark plugs, lamps, carburetors, storage batteries, magnetos, starting motors except when integral with the engine, small tools, etc., are removed from vehicles and packed as unit equipment in a separate box for each vehicle. Each box is so marked as to identify it with the vehicle to which it belongs and is stored in a secure, closed, and guarded warehouse. (See pars. 36, 38, and 41.) All tools are removed from motor vehicles, cleaned, slushed with slushing oil, tagged, and stored in guarded buildings. All head, tail, and side lamps are cleaned and slushed with a slushing oil.

*e. Plugging of spark-plug holes and intake manifold.*—Spark-plug holes and intake manifold are plugged with wooden plugs to prevent foreign matter and moisture from getting inside the engine.

*f. Tagging of engine.*—Every engine carries a tag, securely tied at a point as high and as close to the dash as possible, on which are provided spaces for entering initials of inspectors and dates of inspection and any information concerning the engine which is likely to be desired. (See par. 34*h*.)

*g. Inspections and manner of storing.*—When motor vehicles are stored in salt air or in localities where, owing to the consumption of large quantities of fuel, gas fumes are present in the atmosphere, corrosion of metal parts is accelerated. To obviate deterioration of such parts, frequent inspection is made and prompt remedial action taken. Every engine and vehicle stored in the open or under sheds is inspected every 30 days. Engines are cranked slowly by hand to make sure that pistons are not stuck, care being taken to remove wooden plugs which have been placed in spark-plug holes and intake manifold. All motor vehicles placed in storage in the open, under sheds, or in buildings are positioned horizontally in order that the engine may be turned over by hand long enough to distribute the oil in the bearings, etc., and also to enable periodical inspection to be made. A light-grade mineral lubricating oil is kept in the water pump to prevent corrosion, especially if the pump is made of cast iron.

*h. Draining of gasoline tank and cooling system.*—The gasoline tank is drained, and measures are taken to prevent moisture from entering the tank and the feed system. The cooling system is completely drained, irrespective of the time of year when the vehicle is put into storage. All drain cocks, whether beneath the pump or at lowest point in cylinder jacket, are opened, and a wire or suitable instrument is pushed into them to insure that a complete draining has not been prevented by an accumulation of sediment.



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*i. Slushing of metal surfaces.*—Oil, grease, or graphite is placed on threads of spark-plug holes. All exposed metal surfaces of engine are slushed with suitable slushing oil, which may be sprayed on or applied with a brush.

*j. Care of electrical equipment and carburetors left in place.*—Magnetos, generators, starting motors, and ignition distributors, if left in place, are slushed, care being taken not to allow oil to enter internal mechanism or come in contact with the rubber-covered wires or other insulation. Magnetos and ignition distributors, if left in place, are covered first with a piece of paper, such as tar paper, building paper, or heavy wrapping paper, treated with oil to make it waterproof, or with oilcloth. If available, burlap or canvas is put on over the paper to protect against any mechanical injury. Carburetors, if left in place, have the float chambers and moving parts slushed with engine oil, which may be poured in, if the tops of the float chambers are readily removable, or which may be run in through the gasoline connection by means of rubber tubing.

*k. Filling of grease and oil cups.*—All grease cups are filled with clean grease and screwed down until the grease oozes out from the bearings, and all oil cups and oil wells are filled.

*l. Slushing and painting of engine, metal parts of running gear, and sheet metal.*—All metal parts of the running gear which are liable to rust, such as threaded ends, brake rods, radius rods, propeller shafts, gear-shifting rods, spark and throttle control rods, control mechanism, etc., are slushed with heavy oil, which may be sprayed on or applied with a brush. Valve cover plates are removed, the exposed valve stems, seats, and springs slushed, and the cover plates then replaced. Oil drawn from the transmission or differential, thinned down, if necessary, with engine oil, is satisfactory for this purpose. Oil is not applied to surfaces which are not perfectly dry. Springs are thoroughly coated with this slushing oil so that it works between the leaves and prevents rusting. Any metal parts which were originally painted but on which the coating of paint is not in condition to afford adequate protection are repainted if possible. If this is not possible, these parts are coated with slushing oil. A slushing oil consisting of a heavy mineral oil or grease prepared with a drying or semidrying oil is desirable for this because of its greater ability to adhere to the surface. A drying oil, however, is not recommended for use where it can work in between bearing surfaces. The hood hinges and holddown catches are thoroughly slushed with slushing oil. (See par. 41.) After all exposed metal surfaces of the engine are slushed with suitable slushing



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oil, the engine is covered with a tough waterproof paper and the fan belt is slackened. Fan bearing is well lubricated.

*m. Care of tires and rims.*—Motor vehicles equipped with solid tires are jacked up and blocked to relieve weight on tires. In case of pneumatic-tired vehicles the tires and tubes are removed for storage under proper cover. (See par. 37.) Rims are protected from rust by a coating of graphite or other rim paint or shellac, especially where rims have only a light galvanizing and have been in service.

*n. Protection of bodies.*—All metal hinges, joints, towing hooks, chains, and the interior of metal tank bodies are thoroughly slushed with a slushing oil. Emergency and discharge valves on metal tank bodies (water, gasoline, and sprinklers) are left open while in storage. Dump bodies are raised to drain water and are jacked up with a block. Driver's top is raised, and storm apron and curtains are attached and fastened. These are lashed if wind conditions make it necessary. Cushion is wrapped or covered with tough waterproof paper and tied to the back of the seat. Canvas or duck covers if left on vehicles are drawn down firmly on the bows and covered with a protective coating. (See par. 39.) All exposed wood or metal surfaces are coated with a paint or slushing oil. A good inexpensive paint to use for either wood or metal is Iron-oxide paint, which conforms to the latest United States Army specification.

*o. Special type trucks.*—Machine shop trucks, disinfectors, fire engines, laboratories, dental trucks, medical laboratories, photo laboratories, sterilizing trucks, etc., are stored under cover wherever possible. If stored in the open, all openings in the body are covered with tough waterproof paper or boards to protect inside against the weather. All metal parts are thoroughly slushed with a slushing oil. The bodies on these special type trucks are blocked to relieve weight on the truck chassis springs.

*p. Passenger cars.*—All cars with inclosed bodies are kept under cover wherever possible. Interior of all passenger car bodies is protected from rain and weather. Windows and doors of closed cars are kept closed. Tops are kept up on all passenger cars, and side curtains are attached in position.

*q. Motorcycles.*—All solo and side car machines are stored in buildings. They are jacked up and blocked; gasoline is drained off. The tires and tubes are removed for storage under proper cover. All metal surfaces of solo and side car machines are thoroughly cleaned and slushed with a slushing oil. Wherever possible solo and side car machines are covered with a tough waterproof paper, burlap, canvas, or other suitable material to keep out the dust and light.



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**34. Engines.**—*a. Manner of storing.*—An engine which is to stand for several weeks is supported by its arms, or by pieces of timber bolted to the arms, and is not allowed to rest on the floor with its weight supported by the base. Engines are placed in closed storage.

*b. Cleaning.*—Engines are thoroughly cleaned before being placed in storage. This is accomplished with kerosene, brushes, and scrapers over a drip pan and with the aid of compressed air or live steam if available.

*c. Draining of oil.*—Oil is drained from the engine base, and the base is slushed out with new oil (light grade preferred). Filter screen is cleaned, then approximately ½ pint of good, clean, heavy, mineral gas engine oil is poured into each cylinder, and enough is poured into the engine base to fill it to a safe running level. The engine is then turned over by hand long enough to distribute the oil and to insure that it gets on the valve stems and circulates through the oiling system.

*d. Electrical equipment.*—Ignition wires are removed, cleaned, wrapped in heavy paper, and tied securely to the engine in such a location as to minimize chances of loss. Magnetos, generators, starting motors, and ignition distributors, if in place, are slushed, care being taken not to allow oil to enter apparatus or come in contact with rubber-covered wires or other insulation.

*e. Carburetor.*—Carburetors have the float chamber and moving parts slushed with engine oil, which may be poured in if the top of the float chamber is readily removable, or which may be run in through the gasoline line connection with rubber tubing.

*f. Slushing of metal surfaces.*—All exposed metal surfaces of the engine not protected by a good coat of paint or enamel are slushed with a light-colored slushing oil which may be sprayed on or applied with a brush.

*g. Inspection.*—All engines are inspected every 2 or 3 months and, if necessary, are reslushed.

*h. Tagging.*—Each engine carries a tag on which is entered the following information:

(1) Name of vehicle from which engine was removed or for which built.

(2) Name of manufacturer of engine.

(3) Bore and stroke.

(4) Manufacturer's type or model symbol.

(5) Manufacturer's serial number.

(6) Government purchase number if purchased as a separate unit and not removed from a complete vehicle.



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(7) United States number of vehicle from which removed.

(8) Date placed in storage.

(9) Conditions; as new stock, rebuilt, overhauled, needs overhaul, needs repairs of _____ parts, robbed of _____ parts.

(10) If satisfactory (as new or rebuilt), initials of inspector and date.

(11) Dates of subsequent periodical inspections and initials of inspectors.

(12) Any other information likely to be desired.

**35. Axles and transmissions.**—*a. Cleaning.*—Axles and transmissions are thoroughly cleaned before placed in closed storage. This is accomplished with kerosene, brushes, and scrapers and with the aid of compressed air or live steam if available. Lubricant is drained from the case, and, if dirty, the case is flushed out with kerosene. All inside parts are thoroughly slushed with heavy transmission lubricant or other suitable mineral slushing oil, cover replaced, and cap screws, nuts, or securing devices tightened.

*b. Slushing.*—All exposed metal surfaces not protected by a good coat of paint or enamel are slushed with suitable slushing oil which may be sprayed on or applied with a brush.

*c. Inspection.*—All axles and transmissions are inspected every 2 or 3 months and, if necessary, are reslushed.

*d. Tagging.*—Each axle or transmission carries a tag on which is entered the following information:

(1) Name of vehicle from which axle or transmission was removed.

(2) Name of manufacturer.

(3) Gear ratio (if on rear axle).

(4) Manufacturer's type or model symbol.

(5) Manufacturer's serial number.

(6) Government purchase number if purchased as separate unit and not removed from a complete vehicle.

(7) United States number of vehicle from which removed.

(8) Date placed in storage.

(9) Conditions; as new stock, rebuilt, overhauled, needs overhaul, needs repairs or replacement of _____ parts, robbed of _____ parts.

(10) If satisfactory (as new or rebuilt), initials of inspector and date.

(11) Dates of subsequent periodical inspections and initials of inspectors.

(12) Any other information likely to be desired.



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**36. Electrical units.**—*a. Manner of storing.*—(1) *In building of uniform temperature.*—Magnetos, generators, starting motors, and ignition distributors are stored on shelves in a building which is dry and is maintained at a nearly uniform temperature. They are treated as follows:

If not just overhauled, put 2 or 3 drops of light oil in each oil hole and turn shaft to distribute it over the ball or bearing surfaces. Slush all finished surfaces and all parts liable to rust with light-colored slushing oil. Oil must not come into contact with rubber-covered wire or other insulation. If parts are liable to become coated with dust or sand after placing on shelves, cover with heavy wrapping paper or with cloth.

(2) *In building subject to change in temperature.*—If these parts are stored on shelves in an unheated building, in a building which is subject to considerable changes of temperature, or in a building in a warm, damp climate, they are treated as follows:

Inspect, clean, and slush. After slushing, place each magneto, generator, starting motor, or ignition distributor in an individual sack of tough paper (similar to those used in stores), which has been brushed on the outside with engine oil or with melted paraffin wax, close by folding the open end, and make secure.

*b. Tagging.*—Before the magneto, generator, starting motor, or ignition distributor is thus wrapped, attach a tag with a long string to permit its hanging on the outside of the package. This tag contains initials of inspectors and dates of inspections and any information concerning the unit which is likely to be desired.

*c. Inspection.*—All magnetos, generators, starting motors, and ignition distributors held in stock are inspected every 2 or 3 months to insure that they are in good condition. Records are kept showing the dates of inspection and the names of inspectors who pass upon the condition of these parts.

*d. Armatures.*—Exposed finished metal parts of armatures are coated with light-colored slushing oil, preferably petrolatum. No oil comes in contact with rubber or other insulation. If armatures are stored where they are subject to damp air, sudden changes of temperature, dust, or a warm climate, identification tags are attached and they are individually wrapped, the tag hanging outside the package as recommended in *b* above.

*e. Miscellaneous small repair parts.*—Small repair parts made of metal which are liable to rust are coated with light-colored slushing oil and, where possible, placed in small boxes or envelopes, properly labeled or tagged, and kept closed.



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**37. Tires and tubes.**—*a. Rubber and canvas fabric.*—Rubber deteriorates if exposed to a strong light or too high temperature, or if brought into contact with rust, grease, or most of the acids. The canvas fabric rots rapidly when exposed to dampness.

*b. Pneumatic tires and tubes.*—Keep in a cool (50° to 60° F.), dark, dry place, as even ordinary daylight through the windows is detrimental. Have all the windows heavily curtained, as the light is the agent so injurious to tires. Used casings are cleaned and repaired, where necessary, and wrapped in paper, burlap, or cloth. If tires have been in service, remove tubes from casings, deflate, clean, and repair where necessary, and roll up tubes and store in individual pasteboard cartons, loose enough so that no pronounced folds in the rubber are present. A small amount of air is left in tubes to prevent sharp creases being formed when they are in cartons or on racks.

*c. Storing of casings.*—Where room permits, casings are placed vertically side by side. Where room does not permit, they are stacked horizontaly on a wooden tray or platform a few inches from the floor, care being taken that not more than 20 of the size above 4 inches and 30 of the size below 4 inches are placed in any one stack. If possible, these numbers are reduced. A greater number than those indicated is liable to injure the side walls and tread of the lower tires. A binder stack of four to five tires is placed on the other stacks, the suggested form being to have four stacks arranged in a square with the binder stack resting on all four stacks. As far as possible, the older tires are placed on the top of each stack and the entire lot is covered to keep out the light.

*d. Pneumatic tires mounted on rims.*—The tires are deflated and the rims and tires are dismounted and cleaned. If rims are rusty, they are painted with rim paint. The tires and tubes are then placed back on the rims and stacked so that the weight rests on the rims and not on the casings. Spare rims are stacked around a form so that they do not fall down easily.

*e. Solid tires.*—If on a motor vehicle, the vehicle is jacked up and the tires are covered with tough waterproof paper or other similar material. If solid tires are not on wheels, pile them flat, with the weight resting on the steel channels. In all cases the rims are painted to prevent corrosion. Do not press off tires from rims.

**38. Storage batteries.**—*a. Removing and tagging.*—Storage batteries are removed from all motor vehicles being placed in storage. The storage battery is tagged or marked with United States vehicle number and then taken to battery storage room, or is stored in a dry place, preferably in one where the temperature never falls below 40° F.



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*b. Placing in service.*—A storage battery is fully recharged before it is again placed in service.

**39. Waterproofing of paulins and covers.**—*a.* It is well known that ordinary canvas, untreated, sheds a great quantity of water if properly suspended so that pockets are not formed. In case of paulins and covers, where it is frequently impossible to avoid water pockets, waterproofing is of much greater value. Deterioration of fabric is unquestionably reduced by thorough impregnation with a water-repelling material having the requisite physical properties. As some waterproofing materials contain solvents which are highly inflammable, it is advisable that the mixing of the compound and its application be carried on outdoors and remote from any danger of fire.

*b.* Care is exercised to guard against spontaneous ignition in the storage of fabric material coated with waterproofing compounds. Such material absorbs oxygen, heats, and when compressed in a lump and allowed to remain unmolested may, in a short time, spontaneously ignite.

**40. Waterproofing compound.**—The following paint formula is recommended: 1 gallon linseed oil, 1 pint dryer, and 1 pound dry ocher. Thoroughly mix the material and let it stand for 24 hours. Before applying this material the canvas surface receives a sizing coat of water and soft soap as thin as paint; the paint is applied while the canvas is still wet, and rubbed in briskly, using a 4-inch common paint brush. Proprietary compositions can also be purchased.

**41. Protective coatings for metal and wood.**—*a. General.*—All metals are protected, e. g., spare parts, highly finished and of small size; spare parts of large size and not highly finished; assembled engines, axle, and transmission units in storage in buildings or under open sheds; magnetos, generators, starting motors, and ignition distributors stored in buildings; motor vehicles left in the open, under open sheds, or in buildings. The protective coatings considered with these instructions are of two general types, paints or varnish and slushing oils. It is required that all metal surfaces are thoroughly cleaned before applying the coating.

*b. Linseed oil and lead.*—A linseed-oil paint of good quality when properly applied to metal gives a good protection, even when exposed to the weather for long periods of time. Steel coated with three coats of red lead in linseed oil and exposed to the weather has frequently been found in perfect condition after periods of 5 or more years, and steel coated with cheaper paints, such as iron oxide



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and linseed oil, has frequently been found in perfect condition after periods of more than 3 years.

*c. Metal coated with varnish.*—Metal coated with good spar varnish and exposed to the weather is protected for several months. The life of paint and varnish coatings when indoors and protected from the direct rays of the sun is very much longer than when exposed to the elements.

*d. Coatings for bearing surfaces and bright parts.*—For bearing surfaces and many other bright parts, paint and varnish are unsuitable for obvious reasons, and it is necessary to use materials that do not dry to hard films. On bright parts, bearing surfaces, etc., slushing compounds are used. The practical requirements for material of this class are that they can be readily applied to the surface to be protected and furnish adherent continuous coatings which remain on the surface and protect the metal from corrosion. The material itself does not injure the metal surface. The coating is readily removable by wiping with a cloth wet with kerosene. With valuable materials that are stored for a considerable time, it is desirable that the coating furnished is sufficiently transparent to permit inspection without entirely cleaning the apparatus.

*e. Painting wood.*—In painting wood all that is roughened or decayed is removed and a surface scraped down to sound wood. Cracks are filled or puttied. Specifications covering paints are obtained upon application to the Office of The Quartermaster General, Washington, D. C.

*f. Slushing compounds.*—Slushing compounds, when of a thick consistency and applied in very thick coatings, give good protection. When thin, so that coatings are comparable in thickness to paint or varnish coats, and exposed to severe weather conditions, the protection is not comparable to that offered by paint, rust frequently being apparent after a few days' exposure. In warehouses the life is much longer, and such coatings protect for 1 or 2 years, although inspection is made at least every 6 months. Slushing oils are obtained from the following sources:

(1) Oil drained from the engine.

(2) Oil drained from the axle and transmission, thinned down, if necessary, with oil drained from the engine.

(3) Oil purchased under latest revision of United States Army specification.

*g. Wrapping paper.*—Tough waterproof paper is used for wrapping and protecting electrical equipment, tires, etc.



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## SECTION VII

## STORAGE OF SUBSISTENCE

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**42. General.**—Food is, as a general rule, highly perishable, spoilage or deterioration being due to a number of causes which, to a great degree, can be prevented by special and proper care and protection. The outstanding causes of waste and loss and the means of reducing or preventing them are as follows:

*a. Rodents.*—These may cause an appreciable loss of food, especially grain. Rodents are excluded from storehouses by proper rat-proof construction. Windows near the ground are screened with heavy wire netting of about ¼-inch mesh. If temporary frame construction is used, the under side of the floor is protected with similar wire netting. Doors fit closely and have their lower edges protected with metal.

(1) Traps are recommended. The best traps are the guillotine or "break-neck" type. They are baited with a kind of food not obtainable by the rodents in the vicinity. In the forage shed use meat; in meat storage use grain, etc. A sufficient number of traps are used.

(2) Poisons are effective but are not recommended.

(3) Cats are not recommended.

(4) Gassing is in general ineffective.

*b. Insects.*—Temperature has an important relation to insect life. Temperatures below 0° F. kill many kinds of insects, but eggs have



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been known to survive prolonged exposure at 20° F. At 43° F. or lower, insects are dormant; at 60° to 70° F. they grow and multiply slowly; at 80° to 90° F. they eat voraciously, grow rapidly, and reproduce freely. At temperatures above 100° F. they are distressed. Exposure to temperatures over 120° to 125° F. kills all insects at all stages of their development. Insects are controlled by observing the following:

(1) *Cleanliness.*—Avoid broken packages, spilled foods, and litter and dirt under stacks and in unseen places. Stack supplies on dunnage high enough to permit floor brushes to be run under the stacks.

(2) *Low temperatures.*—Store in coolest available place.

(3) *Dryness.*—Select dry locations.

(4) *Inaccessibility.*—Keep packages closed and sealed until required for use.

(5) *Inspection.*—Inspect incoming stores to see that they are not infested. Make frequent inspection of supplies on hand as to cleanliness and protective measures.

(6) *Heat treatment.*—Exposure of infested articles to strong hot sunlight causes many insects to leave and may prove satisfactory if the food is to be consumed immediately. This does not get rid of eggs or pupae. Heating to 125° to 130° F. for sufficient time to penetrate to the center of the food kills all insect life. For small lots, an oven is used for this purpose, taking care that the temperature does not rise to such extent as to scorch or burn the food. For large operations, a specially constructed room or building affording plenty of heat radiation gives satisfactory results.

(7) *Fumigation.*—This means is very effective but is used only under expert supervision.

(8) *Repellants.*—Odorous chemicals and sprays which serve to drive or keep away insects rather than to kill them are of no value in a subsistence warehouse. In addition to being generally ineffective they contaminate foods with their odors.

(9) *Insecticides.*—Poisons and insect powders are not suited for use in subsistence warehouses. However, sodium fluoride mixed with three times its weight of flour is very effective in the control of cockroaches. This mixture is sprinkled liberally, care being taken to avoid sprinkling near bulk foods.

(10) *Rotation.*—If practicable, foods subject to insect infestation are not stored continuously in the same place but are shifted elsewhere periodically. If an old lot becomes infested, new lots are stored in places that are free from insects.



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(11) *Light.*—This has an effect upon many products, injuring their color and often their flavor. In general, subsistence stores in glass are kept in closed boxes and are not allowed to remain open, on shelves, for long periods of time. The storage room itself is well lighted, as darkness favors the development of micro-organisms.

(12) *Age.*—All foodstuffs are subject to a certain amount of natural deterioration. This is inherent in the food itself and is not to be confused with the action of outside agencies. Seeds, tubers, and other plant parts are alive, and although their life is almost dormant there is some respiration with other life action taking place that eventually causes loss and damage. As a rule, the oldest subsistence articles on hand are used first. There are exceptions in which newer products show signs of deterioration, while the older ones are still in good condition. Repeated inspection and thorough knowledge of the stock are necessary to locate such exceptions.

(13) *Lack of ventilation.*—The natural deterioration of products that are alive (grain, vegetables, etc.) is hastened by a lack of air. Lack of ventilation may cause "sweating" when changes of temperature occur.

(14) *Freezing.*—Fresh foods contain a large percentage of water. When this freezes, the resulting expansion ruptures the cellulose structure of the foods. Most foods do not freeze above 27° to 29° F.

(*a*) Dry products, such as grains, beans, flour, sugar, macaroni, starch, etc., are not injured to any great extent by freezing.

(*b*) In thawing frozen products, care must be taken to accomplish the task slowly and to provide ample ventilation.

(*c*) Meat, fish, and certain other foods often are preserved by freezing. This injures their flavor and quality to a slight extent. Frozen meats or fish should be thawed out gradually, then used immediately.

(*d*) If supplies are accidentally frozen, they are gradually thawed and used immediately.

*c. Micro-organisms* (*molds*, *yeast*, *bacteria*).—These organisms, especially their spores, are almost universally distributed in the soil, on the bodies of plants and animals, in the air, and in water.

(1) *Molds.*—These are the largest of the microscopic plants. They form threadlike filaments by which they are recognized. Molds are the cause of many diseases of vegetables and spread considerably in storage. Most of them are not toxic to higher animals, but they create musty odors and flavors, rendering food unfit for use. In prepared foods they are often an indication of insanitary conditions at



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the factory. Superficial mold on firm-textured products, such as canned meats, is washed off with vinegar and the product is used.

(2) *Yeasts.*—These are single-celled microscopic plants. They grow by a process of "budding," whereby new cells arise and separate from those already growing. They act upon sugar solutions. They thrive best at from 77° to 95° F. Sirup, sweet beverages, and canned fruits are the products most susceptible to spoilage by yeasts.

(3) *Bacteria.*—These are the smallest and most numerous of living plants and are the greatest cause of decay of organic matter.

*d. Factors favoring action*—(1) *Moisture.*—If excessive, moisture may destroy food. Further, it favors the growth of insects, bacteria, yeasts, and molds, chemical action (such as rusting, etc.), and enzymic action. As a rule the quantity of moisture is a matter of relative humidity. The air always contains water vapor. The quantity that it can hold is dependent on its temperature. The saturation point at any temperature is called the dew point. The relation between the quantity or percentage that the air can hold and the percentage it actually does contain is called the relative humidity. If relative humidity is high, food products absorb moisture from the air. A drop in temperature may cause settling or condensation of water. This moisture is known as dew. Food containers on which it settles are said to sweat.

(2) *Evaporation.*—Products not hermetically sealed may lose moisture due to evaporation if the relative humidity is low; i. e., if rice, beans, grain, etc., are received with 14 percent moisture, they may dry out while in dry storage to such an extent that their moisture content drops as low as 8 percent. In an extreme case this would cause a 6 percent loss in weight but no loss in food value. On the other hand, fresh products such as vegetables, fruits, and eggs wither, shrivel, or shrink, become stale, and lose flavor. It is, therefore, important that relative humidity be neither too high nor too low for such products.

(3) *Dust and dirt.*—Even if it were possible for food to be free from micro-organisms, dust and dirt would still cause loss or deterioration, for it is impossible to remove them without either destroying or injuring the food. This is particularly true of unpacked articles and of those put up in cotton sacks. Dust penetrates a flour or sugar sack and cannot be removed therefrom. When storehouses are swept, the floors are first sprinkled lightly.

(4) *Attrition.*—Grains, seeds, and tubers in bags lose small particles of dust by attrition.



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**43. Specific classes of subsistence.**—The information and instructions in paragraphs 44 to 62, inclusive, covering the several items of subsistence supplies, etc., and the tables given in connection therewith are approximate only for the reason that no two storage places are identical. It is not desirable to keep products as long as it is possible to do so without loss or even up to the limit of safe storage indicated. Measures taken to preserve the food may have been imperfectly executed; there is a certain amount of deterioration with age; some products may have been packed an appreciable length of time prior to their receipt; relative humidity and temperatures may have been higher than estimated, due to the lack of perfect measuring devices. Shifting and handling of the stock often accelerate spoilage. Consequently, a thorough and frequent inspection as to the condition of food supplies is essential. The safe storage periods given in the various tables are based on ordinary storage conditions. The use of cold storage lengthens the life of nearly all food products, while abnormal conditions, such as high temperatures and humidity, shorten the safe storage period of most food products.

**44. Flour and cereal products, rice, and dry beans.**—*a. General.*—The major problem in the storage of these products is protection against insects, dampness, and rodents. Ideal storage for this group contemplates relative humidity of not over 75 to 80 percent. Temperatures over 70° F. are not advisable. Low temperatures (32° to 43° F.) furnish protection against insect attack. In the Tropics, constant vigilance is necessary, as temperatures ranging from 80° to 90° F. accompanied by moisture favor growth and reproduction of insects and the growth of molds and bacteria.

(1) *Flour.*—It is piled on dunnage (header and stretcher system), not over six sacks high, and in fairly small units. It is necessary to give ample ventilation. Paper stuffed between sacks minimizes liability to cutting of bags by rodents. As odors affect flour it is not stored near paint, vegetables, fish, etc. If badly infested with insects it is condemned and used for target paste, etc. Flour must be protected from freezing. Ideal storage temperature is 70° F. with a relative humidity of 80 percent. (If in cold storage, raise temperature to 70° F. before using for dough.)

(2) *Cereals, breakfast* (*oatmeal, corn flakes, shredded wheat, etc.*). These may be stale when received. Packages are subject to attack by rodents and insects.

(3) *Miscellaneous cereal products* (*corn meal, macaroni, etc.*).—(*a*) Corn meal is very susceptible to insect attack, especially the



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"water-ground" (nondegerminated) type which contains oil. This product requires protection from moisture.

(*b*) Macaroni or other alimentary pastes, if dry, are excellent keepers in dry storage. Chief storage troubles are moisture and occasional insect attack. Egg noodles have comparatively poor keeping qualities.

(4) *Crackers.*—These have poor keeping qualities and are likely to become stale or soggy.

(5) *Rice.*—(*a*) Rough rice (paddy, palay) has hard outer hull and good keeping qualities.

(*b*) Partly milled rice (brown rice) has the hard outer coat and only part of the bran coat removed. It has, therefore, poor keeping qualities.

(*c*) Highly milled rice (polished rice, ordinary rice of commerce) has fairly good keeping qualities.

*1.* If rice is infested with insects, mill or remill, sieve, and heat. If very badly insect infested, it is condemned.

*2.* Considerable loss of weight, especially in the Tropics, may occur in remilling rice infested with insects, or from loss of moisture through drying in storage. Loss of moisture is greater if the rice is received shortly after harvest when its moisture content is high (14 to 15 percent).

(6) *Beans, dry.*—Navy, kidney, red kidney, pink, pinto, and lima beans all have about the same keeping qualities. If on arrival there is over 17 percent moisture, the beans are very likely to become musty. Inspect frequently for insects and mustiness or mold; mold shows first at seed scar. If musty, empty from bags and shovel over. Beans over 1 year old are liable to be hard and difficult to cook.

(7) *Safe storage periods.*

| Item | In central United States | In Tropics |
|---|---|---|
| Flour: | | |
| Wheat— | | |
| In bags | 6 to 9 months* | Not over 2 months in wet season and 3 to 4 months in dry season. |
| In barrels | | |
| In hermetically sealed tin cans. | 2 years | 18 months (if packaged free from insects). |
| Whole wheat | 3 months | 1 month. |
| Graham | do | Do. |
| Rye | 1 year | Same as flour, wheat. |
| Buckwheat | 6 months | 3 months. |
| Corn | 2 years | 9 months. |
| Oatmeal: | | |
| In bags | 4 months | 1 month. |
| In cartons | do | Do. |



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| Item | In central United States | In Tropics |
|---|---|---|
| Corn flakes, shredded wheat, etc., in cartons. | 3 months | 1 month (6 months in tin-lined cases). |
| Macaroni, in cartons | 2 years | 3 months. |
| Noodles: | | |
| Egg, in cartons | 3 months | 1 month. |
| Flour | 6 months | 2 months. |
| Hominy grits | do | 3 months. |
| Corn meal: | | |
| Granulated | 3 months | 1 month (6 months in cans) |
| Water-ground | 1 month | 1 month. |
| Wheat grits, farina, etc | 3 months | Do. |
| Flour, self-rising | 6 months | 3 months. |
| Rice: | | |
| Palay | 5 years | 2 years. |
| Partly milled | 1 year | 3 months. |
| Polished | 2 years | 6 months. |
| Beans, dry, all kinds | do | 9 months. |

* Baking quality deteriorates after 1 year; improves to 9 months.

*b. Bread.*—All items in this group are protected from moisture and odors.

(1) *Garrison bread (fresh, soft).*—After baking, place on racks; cover with light covers, allowing ventilation, but protecting from flies and dust.

(2) *Field bread.*—Placing on racks not necessary.

(3) *Hard bread.*—In cans, same as for other canned food. Air-tight packages necessary to prevent staleness and rancidity. Inspect at frequent intervals. When hard bread is packed in wooden boxes it is stored in a dry place and issued before it is 1 year old.

*c. Yeast.*—(1) *Compressed.*—Highly perishable. Store, when possible, at 40° to 50° F. Arrange for frequent deliveries. Refrigeration always essential.

(2) *Dried.*—Fairly good keeping qualities. Protect from moisture.

*d. Safe storage periods* (ordinary storage).

| Item | In central United States | In Tropics |
|---|---|---|
| Bread: | | |
| Garrison | 3 days | 2 days. |
| Field | 10 days | 5 days. |
| Hard, in cartons | 6 months | 3 months. |
| Hard, in hermetically sealed tin cans | 4 years | 3 years. |
| Yeast: | | |
| Compressed | 2 days | 2 days. |
| Dried | 3 months | 1 month. |



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**45. Packing-house products.**—*a. Beef.*—The greatest deteriorating influences of fresh beef are molds and bacteria, both of which are favored by warmth and moisture. Chilled beef, in sides, quarters, or wholesale market cuts, may be held for from 4 to 6 weeks at a temperature of 34° F. and a relative humidity of 80 percent. Higher temperature or greater relative humidity results in mold growth and sliminess in direct ratio to the rise of temperature or humidity. Ice boxes chilled by ice are always damp and are liable to result in mold and sliminess of the beef. Boxes artificially refrigerated are drier and more effective for storing beef. Fresh beef is not held in ice-cooled chill rooms for more than 10 days or in an ice box for more than 3 days. The growth of mold on fresh beef is not harmful, though it may impart a moldy flavor to the surface of the meat. The surface of moldy beef, therefore, is carefully trimmed, wiped, or washed with a mild salt brine or weak vinegar.

(1) Beef is frozen quickly in temperatures of zero or lower, then stored in a holding freezer at a temperature between 10° and 15° F. Frozen beef can be held at such temperature for 9 months with but slight change and for 12 months without appreciable deterioration.

(2) Fresh beef quarters and cuts are never piled one upon another if they are held for more than 2 or 3 days. Close piling restricts circulation of air and favors mold and bacterial growth. Fresh beef carcasses and cuts are always hung from hooks or laid on racks, so that air circulates freely about them. Hindquarters are hung by a hook through the tendon of the hock, forequarters by a hook passed between the ribs of the navel end of the plate. Wholesale cuts are hung from parts where the least injury is done to the lean meat of the cuts.

(3) Frozen beef quarters cannot be hung conveniently, and they do not need a circulation of air to keep down the growth of molds. The more compactly frozen beef is stored, the better it retains its frozen condition, and the less is the loss of moisture. Frozen beef quarters are, therefore, piled in stacks as compactly as possible. Frozen beef must be kept solidly frozen. The storage temperature never exceeds 20° F. Deterioration first occurs under the "skirt" or "hanging tenderloin."

*b. Fresh pork, veal, and mutton.*—These cannot be held for as long a time as fresh beef. They are kept under refrigeration at all times. The best temperature for pork is 32° to 34°; for mutton and veal, 36° to 38°. Fresh pork is not held at chill-room temperature for longer than 1 week. If it is necessary to hold it for longer periods, it is frozen. Veal, because of the lack of fat, dries out



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rapidly if held in chill-room temperatures. If veal and mutton are not to be used within a week, they are placed in cold storage. Fresh meat specialties, such as livers, kidneys, hearts, etc., keep in good condition for only a comparatively short time. They are never stocked beyond immediate needs unless solidly frozen. They keep for months in the frozen state.

*c. Bacon.*—(1) *Army.*—(*a*) Army bacon, in cans or in crates, has excellent keeping qualities. It keeps for as long as 5 years in cans if they remain hermetically sealed and the temperature does not go above 80° F. Higher temperatures soften the bacon fat, causing some meltage, and also hasten the breaking down of the fat into fatty acids and glycerine, which impart an acrid flavor to the bacon. Storage as near 50° as practicable is best.

(*b*) The dryness of Army bacon and the comparatively large amount of surface salt effectually prevent the growth of mold. Therefore, crated bacon need not be taken from the crates and unwrapped to prevent mold growth. The wrappings required by specifications exclude the larvae of the skipper fly. Both crate and cased bacon are stored so as to obtain good ventilation.

(*c*) With limitations, Army bacon keeps for the following periods:

| | |
|---|---|
| In crates: | |
| In northern United States | 15 months |
| In southern United States | 9 months |
| In cases: | |
| In United States | 3 years* |
| In Tropics | 2 years* |

*Will remain edible for 5 years.

(2) *Commercial.*—The two principal methods of curing commercial bacon are the dry cure and the sweet-pickle cure, each of which is a mild cure. Bacon thus cured contains a much higher percentage of moisture than does Army bacon, and for this reason its keeping qualities are reduced. Commercial breakfast bacon is not intended for long keeping. It is never stocked for more than 6 weeks; 4 weeks is much safer. Because of its moisture content and lack of surface salt this bacon molds readily and is not left wrapped. It is stripped and hung in a well-ventilated room with a temperature of 50° to 70° F. The disadvantage of this method of handling lies in the shrinkage that results. It is more satisfactory to purchase this class of bacon from week to week as needed. All windows and doors are covered with fine-meshed screening to keep out the skipper fly.



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*d. Hams, smoked.*—Smoked hams are all sweet-pickle cured, have a relatively large percentage of moisture, and little surface salt. They are, therefore, subject to mold. Hams are usually wrapped before shipment. If commercial smoked hams are held for several days, they are unwrapped and hung in a well-ventilated room under the same conditions as for bacon. While this allows the surface to dry and thus restricts the growth of mold, it results in some loss of weight. Smoked hams are not stocked in quantities of more than 1 month's supply.

*e. Canned meats and canned fish.*—(1) Canned meats contain no sugar or other preservative as do most canned fruits. Their keeping qualities depend upon hermetically sealed cans and sterilized contents. Canned meats are usually sterile, and while canned meat spoilage is occasionally traced to an insterile condition, most spoilage is traced to external conditions such as moisture and heat. On the other hand, canned fish, especially sardines, is not sterile at all times, and spoilage is frequently due to this cause. Canned meats and canned fish are never stored wet or smeared with grease. Spoilage is frequently caused by the breakage of an occasional can due to rough handling, with consequent soiling of other cans in the case. The fatty acids of the meat smearing the cans destroy the lacquer and attack the tin, resulting in early pinholing and spoilage. Such cans are not stored unless they are first thoroughly washed, dried, and, if necessary, relacquered.

(2) High storage temperatures further the disintegration of the fats in canned meats by the releasing of fatty acids that attack the tin. Ideal storage temperatures for canned meats run from 50° to 60° F. At such temperatures, sterile canned meat in hermetically sealed cans should remain in almost perfect condition for from 1 to 3 years and continue edible for 4 or 5 years. The life of canned meats decreases in proportion to temperatures above 60° F.

*f. Safe storage periods.*

| Item | Safe storage period in central United States | Defects particularly applicable to the item | Cause of defect and remarks |
|---|---|---|---|
| Corned beef | 2 to 3 years | Darkening of surface of meat in can. Swells. | Age. Action of fatty acids upon tin. Insufficient sterilization, leaking cans. |
| Corned-beef hash | 1 year to 15 months. | Yellowing. Blackening of surface of product. | Age. Action of fatty acids on tin. |



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| Item | Safe storage period in central United States | Defects particularly applicable to the item | Cause of defect and remarks |
|---|---|---|---|
| Vienna-style sausage. | 1 to 2 years | No important storage defects. | |
| Fresh roast beef | 1 year to 15 months. | Darkening and softening. "Sloppy" if stored in warm temperatures. | Age. |
| Fresh pork sausage. | do | No important storage defects. | |
| Veal loaf | 2 years | Discoloration | Color likely to be very bad on tin. |
| Potted meats | 1 year | No important storage defects. | |
| Tongues | do | do | |
| Sliced dried beef | 2 to 3 months | Old flavor | Age. |
| Sliced bacon | do | Yellowing of fat. Old or acrid flavor. | Do. |
| Salmon | 2 years | No important storage defects. | Improves up to 15 months. |
| Sardines | 6 months to 1 year. | Swells | Insufficient processing. |
| Shrimp | do | Blackening | Formation of iron sulphide. |
| Oysters and clams | 1 year | No important storage defects. | |
| Lobster | 2 months | Blackening | Formation of iron sulphide. |
| Crab | 1 year | Darkening | |
| Tuna and fish flakes. | 2 years | No important storage defects. | |

**46. Fish, fresh.**—No attempt is made to hold or store fish that are not frozen. Frozen fish are held at temperatures below 20° F. for not over 3 months.

**47. Sugars, starches, and sirups.**—These products are almost pure carbohydrates. Insects do not live in them. They are very attractive to ants, roaches, and flies. In the presence of moisture and warmth, sugars and sirups ferment. Sugars absorb odors.

*a. Brown sugar.*—(1) Owing to presence of impurities, this is a poor keeper. The only effective means of preservation is maintenance at temperatures below 68° F.

(2) Relative humidity for all sugars and starches is below 76 percent.



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*b. Sirups.*—Commercially packed sirups and molasses depend for preservation on plasmolysis; i. e., their thickness is so great that micro-organisms live only with difficulty. For preservation they are in hermetically sealed cans, as air and moisture in contact with these products cause fermentation. As most commercial containers are not hermetically sealed, frequent inspection for fermentation is necessary. Corn sirup and refiners sirup have had most organic impurities removed in manufacture; therefore, they are better keepers than sorghum sirup, cane sirup, or maple sap sirup, which are boiled down saps that retain natural organic impurities and a considerable percentage of protein. Corn sirup is the best keeper owing to its heavy consistency.

*c. Safe storage periods* (ordinary storage).

| Article | Safe storage period | | Cause of spoilage | Remarks |
|---|---|---|---|---|
| | In central United States | In Tropics | | |
| Sugar: | | | | |
| Granulated | 5 years | 2 years | Dampness; dust. | Hard cake may form on outside; this does not injure sugar. |
| Brown | 6 months | 3 months | Sugar mite; heat; moisture. | Becomes hard. |
| Powdered | do | do | Moisture | Cakes, destroying its particular usefulness; keep dry. |
| Cut loaf | 4 years | 2 years | do | Keep dry. |
| Cube | do | do | do | Do. |
| Starch, any kind | 5 years | 3 years | do | |
| Tapioca | 4 years | 2 years | Moisture; dust. | |
| Sago | do | do | do | |
| Sirup: | | | | |
| In hermetically sealed cans (maple sorghum, cane). | 9 months | 4 months | Heat | Fermented cans will swell. |
| In friction top cans (maple, sorghum, cane). | 3 months | 1 month | do | Do. |



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| Article | Safe storage period | | Cause of spoilage | Remarks |
|---|---|---|---|---|
| | In central United States | In Tropics | | |
| Sirup—Contd. | | | | |
| Corn and refiners, in hermetically sealed cans. | 1 year | 6 months | Heat | Fermented cans will swell. |
| Corn and refiners, in friction top cans. | 3 months | 1 month | do | Do. |
| Corn, in hermetically sealed cans. | 15 months | 9 months | do | Do. |

**48. Cocoa, chocolate, and candy.**—*a.* Cocoa and chocolate are good keepers. They are dry, and cocoa fat rarely becomes rancid.

(1) *Cocoa.*—Protect from moisture and heat. Moisture may cause lumpiness. Any temperature below 70° F. preserves this product if protected from moisture and insects.

(2) *Chocolate.*—Protect from moisture and heat. Temperatures above 70° F. and moisture cause separation of cocoa fat, resulting in a white "bloom" or white spots on surface. Such chocolate is edible and should not be condemned. The ideal storage temperature is 32° F., with relative humidity of 75 to 80 percent, but any temperature below 65° preserves the product. If in cold storage, remove small quantities at a time, as sweating may occur with attendant fat separation.

*b. Candy.*—Same storage rules as for chocolate, except that candy containing nuts is a poor keeper. The nuts readily become infested with insects and their fat becomes rancid.

*c.* Safe storage periods (ordinary storage).

| Item | Safe storage period in central United States | Causes of spoilage | Remarks |
|---|---|---|---|
| Chocolate: | | | |
| Plain | 2 years | | Must be kept below 65° F. |
| Sweet | 18 months | Milk fat becomes rancid. | |
| Milk | 3 months | do | |



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| Item | Safe storage period in central United States | Causes of spoilage | Remarks |
|---|---|---|---|
| Cocoa | 2 years | May become lumpy | |
| Candy: | | | |
| Hard— | | | |
| Pure sugar | 1 year | | In Tropics, 6 months. |
| Glucose | do | Becomes sticky | Do. |
| Creams | 3 months | | |
| With nuts | 2 months | Nuts become insect infested. | |
| Chocolate boiled. | 6 months | Likely to have stale flavor. | |
| Uncooked | 1 month | | |

**49. Pickles, sauerkraut, and green olives.**—*a. General.*—These products are the result of lactic acid fermentation and keep well as long as the brine is concentrated and the lactic acid remains. In preparing for market, however, most of the original brine containing the lactic acid is replaced by either a vinegar, sirup, or light brine, so that the keeping qualities of the product are reduced. Sweet pickles contain practically as much acid as do sour pickles and, therefore, affect cans in the same manner. Exposed surfaces of these products are subject to yeast growth. This can be skimmed off, but after repeated skimming the flavor and quality are severely injured.

*b. Safe storage periods* (ordinary conditions).

| Item | Safe storage period in central United States | Causes of spoilage | Remarks |
|---|---|---|---|
| Pickles: | | | |
| Salt, stock | 5 years | | Improves with age to 4 years. |
| Sour— | | | |
| In cans | 6 months | Action of acid on cans. | 3 months in Tropics. |
| In kegs | 6 to 9 months | Become soft, may leak; yeast. | |
| In glass | do | Light; become soft | 6 months in Tropics. |
| Sweet | 6 to 12 months | | Subject to same factors as sour pickles. |
| Dill— | | | |
| Genuine | Till Mar. 15 | Brine is not strong | A seasonable product. |



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| Item | Safe storage period in central United States | Causes of spoilage | Remarks |
|---|---|---|---|
| Pickles—Con. | | | |
| Imitation— | | | |
| In glass | 6 to 9 months | | Same factors as sour pickles. |
| In cans | 1 year | | |
| Olives: | | | |
| Green— | | | |
| In original liquid. | 3 years | | |
| In glass | 18 months | Additional fermentation; blowing caps; corroded caps; light. | White deposit is not injurious; it is merely lactic acid bacteria. |
| Sauerkraut: | | | |
| In bulk | Till Mar. 15 or 10 days after opening. | Yeast | |
| In cans | 9 months | | 4 months in Tropics. |

**50. Coffee, tea, spices, and condiments.**—The constituents which give these products their desirable qualities are not subject to the same spoilage as other foods. Some of them improve with age up to certain limits.

*a. Coffee.*—(1) *Green.*—All green coffees, with the exception of Brazilian Santos, improve with age under proper storage conditions up to 5 years; after that they become "woody." New crop Santos coffee is better than old crop. Green coffee requires a dry storage with free air circulation. Dampness softens the beans and they become "pithy," lessening body, aroma, and flavor. To assure free circulation, stacks of green coffee are not over ten bags high, with aisles for every two rows of bags. Bags are stacked on dunnage that is at least 4 inches above the floor. Green coffee easily absorbs contaminating odors, such as those of paint, oils, soap, fruits, and vegetables. Green coffee is sometimes attacked by insects.

(2) *Roasted.*—When coffee is roasted the cells are "popped," the flavoring constituents (which are volatile) are released and begin to dissipate. Grinding makes the dissipation even more rapid; the more surface exposed to air the more quickly the aroma is lost.

(*a*) *Bags.*—Roasted coffee is not stored in bags for more than 45 days. The storage is dry, as roasted coffee picks up moisture and becomes "woody," with consequent loss of strength.



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(*b*) *Metal containers.*—Roasted coffee in metal containers that are practically airtight may be stored for a period of 75 days without serious loss of aroma or strength.

(3) *Roasted and ground.*—(*a*) *Bags.*—Roasted and ground coffee packed in bags is not stored for more than 15 days. After that length of time it loses most of its aroma and bouquet, and at 30 days it develops staleness. Bags are not stored near paints, oils, vegetables, etc., as the coffee absorbs the odors of these items.

(*b*) *Metal containers.*—Roasted and ground coffee in 25 or 50 pound metal containers that are practically airtight remains in good condition for a period of from 45 to 60 days. After that period of time it loses its flavor and aroma, and the coffee begins to acquire a metallic taste from the container.

(*c*) *Vacuum cans.*—Roasted and ground coffee packed in vacuum cans remains in first-class condition for a period of 3 months if the seal is not broken. It deteriorates very rapidly once it is opened. Monthly purchases of sales coffee packed in vacuum cans are advisable.

(4) *Safe storage periods.*

| Item | Safe storage period | Spoilage | Remarks |
|---|---|---|---|
| Coffee: | | | |
| Green | 4 years | Becomes woody | Damp seacoast climate will cause this to happen quickly. Will keep 4 years but not to advantage. |
| Green, Santos | 2 years | do | |
| Roasted— | | | |
| In bags | 60 days | Dead, flat, woody | |
| In tins | 75 days | do | May pick up metallic flavor. |
| Roasted and ground— | | | |
| In bags | 15 days | Loses bouquet and aroma. | |
| In tins | 45 to 60 days | Loses bouquet | Becomes metallic or tinny. |
| In vacuum. | 90 days | Flavor and aroma quickly dissipate on opening. | Do. |



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*b. Tea*—(1) *General.*—Tea is stored on dunnage in dry rooms with a relative humidity of not over 75 percent. Tea is not stored in proximity to fruits, oils, vegetables, pepper, soap, etc. Dampness causes it to become musty, sour, and unfit for use. Very high temperatures tend to destroy the flavor. Rough handling breaks up the leaves and produces dust.

(2) *Safe storage periods.*

| Item | Safe storage period under proper storage |
|---|---|
| Tea: | |
| Green | 12 months. |
| Black India and Ceylons | 24 months. |
| Black: | |
| China | 18 months. |
| D. E. I. | Do. |
| Oolong | 15 months. |
| Blended | 12 months. |

*c. Spices.*—(1) *General.*—These are very good keepers if kept dry for the reason that they contain little moisture; some have antiseptic qualities. Spices, because of their oil content, are kept in tin containers; paper cartons are not used because they absorb the oil. In the ground state they gradually lose some strength.

(2) *Safe storage periods.*

| Item | Safe storage period | Cause of spoilage | Remarks |
|---|---|---|---|
| Allspice: | | | |
| Whole | 5 years | Mold | Has preservative action. |
| Ground | 2 years | do | Do. |
| Capsicum: | | | |
| Cayenne pepper. | 6 months | Readily attacked by insects. | Spice men keep under refrigeration. |
| Red pepper | | | |
| Paprika | | | |
| Cassia | 10 years | Mold | Has preservative action. |
| Cinnamon | do | | |
| Ground | 2 years | | Do. |
| Cloves: | | | |
| Whole | 25 years | | |
| Ground | 1 year | | Will lose some oil. |
| Coriander: | | | |
| Whole | 6 months | Readily attacked by insects. | Spice men keep under refrigeration. |
| Ground | | | |



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| Item | Safe storage period | Cause of spoilage | Remarks |
|---|---|---|---|
| Ginger: | | | |
| Whole | 5 years | Insects; mold | Has preservative action. |
| Ground | 1 year | Cakes | |
| Mace: | | | |
| Whole | 2 years | Fades with age and loses strength. | |
| Ground | 1 year | | |
| Mustard seed | do | Insects will attack | |
| Mustard, prepared | 6 months to 1 year. | Injured by light and favors black surface. | The moisture however, develops preservative action and while after 6 months it may be unsightly, it is fit to eat. |
| Nutmegs: | | | |
| Whole | 25 years | Mold, unless lined | Has preservative action. |
| Ground | 2 years | | Do. |
| Pepper: | | | |
| Whole | 15 years | | |
| Ground | 2 years | | |

*d. Flavoring extracts.*—These are alcoholic solutions and therefore excellent keepers. They are injured by light and evaporation. So-called flavoring powders, emulsions, etc., readily lose their strength and are of little or no value at the end of 3 or 4 months.

*e.* (1) *Vinegar.*—If sterile when packed and hermetically sealed so as to prevent contamination, it does not spoil. In fact, it is a preservative agent. It is, however, subject to certain peculiar defects in unsterilized lots. Vinegar is also subject to freezing, leakage, and evaporation.

(2) *Mother of vinegar.*—If a small quantity of air reaches vinegar, a gelatinous mass (colony of bacteria embedded in a mucilaginous or jellylike substance) forms. This is called mother of vinegar and is removed.

(3) *Vinegar eel.*—This is a long, slender, eellike parasite, threadlike in diameter and $\frac{1}{25}$ inch long, that lives only in acetic acid.

(4) *Mother of vinegar and vinegar eels.*—Both of these are removed by filtering; the vinegar is then pasteurized by heating to 145° F. for 30 minutes and hermetically sealed in sterilized containers.



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*f. Condiments other than spices (mayonnaise, salad dressing, Thousand Island dressing, tomato catsup, chili sauce).*—(1) High temperatures cause rancidity in all dressings made from oil. Freezing causes a separation of oils and other ingredients. Rough handling causes separation of mayonnaise. Salad dressings, being cooked, are better keepers than mayonnaise; salad dressings and Thousand Island dressings are not stored in excess of 30 days.

(2) Tomato catsup and chili sauce in glass remain in good condition for 15 months. These products are stacked upside down to keep them airtight. It is not advisable to store tomato catsup and chili sauce in No. 10 tin cans in southern and tropical stations, but they are safely stored for 4 months at other posts.

*g. Coconut, shredded.*—Although a dried product containing added sugar, it readily spoils, owing to the fact that it contains a high percentage of vegetable oil. It is not stored for over 2 months.

**51. Dairy products.**—*a. Butter and oleomargarines.*—(1) *General.*—They must be kept under refrigeration at all times. Butter keeps well for from 1 to 2 months at a temperature of 40° F. If kept for longer periods, it is held in a sharp freezer, preferably at 5° below zero. The storage qualities of butter depend upon the quality of the product before being placed in storage. Mold is the greatest foe of butter. Too much moisture, warm temperatures, nonsterile packages, paper, and salt are all favorable to mold growth. The more light and air are excluded, the better and longer the keeping qualities. The best butter for storage is that made from cream that has never reached a high percentage of acid. Acid cream is responsible for a great many of the storage flavors of butter, such as metallic, fishy, cheesy, etc. Butter is packed compactly; the larger the package, the better. Carton butter does not store well, as too much surface is exposed to the air. Coolers where butter is kept are comparatively dry and absolutely free from odors. Humidity above 80 percent favors mold growth.

(2) *Animal oleomargarine.*—This is quite similar to butter with respect to storage. Oleomargarine, however, has a tendency to break down faster, lose color, and take on a strong flavor more quickly than butter. There is no necessity for storing oleomargarine for long periods. Unlike butter, it is procurable in almost any quantity at any season of the year. Nut margarines have very limited keeping qualities and must be consumed within 3 weeks after manufacture. They require refrigeration at all times. While they appear firmer when chilled than animal oleomargarines or butter, they melt at



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lower temperatures and soon become off-flavored. They must never be allowed to become soft.

*b. Cheese.*—(1) Cured cheese stores best at about 35° F. Green cheese cures more rapidly at higher temperatures. If the temperature exceeds 60° F., however, undesirable flavors are apt to develop, owing to growth of flavor producing bacteria. Freezing breaks the grain of cheese, leaving it crumbly. In this country, most cheese is marketed quite green. Practically all cheese is paraffined to prevent loss of moisture, cracking of the rind, and ingress of molds and insects. The growth of mold on the surface of well-paraffined cheese with unbroken rind is not harmful. Cheddar cheese is stored in cheese boxes, with scale board separating the cheeses in the box. Cheese storage rooms are protected against the cheese skipper. The best method is to maintain a temperature below 43° F. or to screen all openings with fine-meshed screening. Whole cheese of good quality may be stored for a year or more at temperatures around 40° F. The flavor usually improves during the storage period.

(2) Pasteurized or processed cheese has greater keeping qualities than whole cheese, because it has been subjected to temperatures sufficient to destroy practically all bacteria present. While it does not require refrigeration if it is to be held for only a few weeks, it is stored in temperatures below 50° if it is to be held for longer periods.

*c. Milk.*—(1) *Fresh.*—Unless pasteurized, fresh milk is held at a temperature not above 40° F. Any higher temperature furthers the growth of bacteria, resulting in increasing acidity of the milk. Pasteurized fresh milk remains sweet for about a week at 40° F. If it is desired to keep fresh milk for longer periods, it must be frozen solid, in which condition it can be held for months.

(2) *Unsweetened (evaporated).*—This milk, canned, has excellent keeping qualities if not exposed to temperatures above 60° F. This product is far from being an imperishable one. A temperature of 90° causes spoilage. Canned evaporated milk must not be stored near steam pipes, furnaces, or other heat. In a temperature of 60° or lower, canned evaporated milk keeps well for at least a year. The cans are kept dry to prevent rusting. Separation of butterfat, a common storage defect, may in a measure be retarded or prevented by turning the cases over every 2 weeks.

(3) *Sweetened condensed.*—This requires the same storage conditions as the unsweetened. Temperature above 70° brings about changes in the consistency and the color of the milk. Turning over the cases occasionally retards separation and settling of sugar.



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(4) *Powdered.*—Skim milk powder is an excellent keeper and is not adversely affected by high or low temperatures to such an extent as are other milk products. Powdered whole milk, on the other hand, must not be stored in a temperature above 70°. Higher temperature hastens the breaking down of the butterfat. Dryness is the greatest essential in the storage of powdered milk. Powdered milk must be protected against the absorption of moisture from humid air. If it is to be stored for a period of several weeks, it is packed in tin cans or other containers that are resistant to moisture.

**52. Fruits, fresh, dried, and frozen.**—*a. Fresh.*—These must be protected from freezing, high temperatures, and excessive moisture.

(1) *Apples.*—Following is the usual storage limit, in cold storage, of important varieties:

(*a*) December 1, Greening, Arkansas Black, Snow.

(*b*) January 1, Northern Spy, Spitzenberg, York Imperial, Delicious, McIntosh Red, Jonathan.

(*c*) May 1, Ben Davis, Baldwin, Rome Beauty, Winesap.

(2) *Lemons.*—Lemons with buttons missing are poor keepers.

(3) *Ideal storage temperatures.*—The temperatures given below for storage of fresh fruits may be varied, but the temperature is never allowed to go below 30° F. Fresh fruits are well preserved at temperatures up to 43° F.

| Article | Degrees Fahrenheit | Remarks |
|---|---|---|
| Apples, fresh | 30–32 | |
| Bananas | 56 | For holding when ripe. |
| Do | 58 | For holding when green. |
| Do | 60 | For slow ripening. |
| Do | 62–66 | For normal ripening. |
| Do | 68 | For fast ripening. |
| Berries, fresh | 32–36 | Short periods (blackberries, raspberries, strawberries, etc.). |
| Cranberries, fresh | 33–35 | 2 months. |
| Grapes, fresh | 33–35 | Do. |
| Grapefruit | 38–40 | 3 months. |
| Lemons | 38–40 | Do. |
| Oranges | 38–40 | Do. |
| Cantaloupes | 38–40 | 3 weeks. |
| Honeydew and Casaba melons | 38–40 | Do. |
| Watermelons | 32–35 | 2 weeks. |
| Peaches | 32–35 | Do. |
| Pears: | | |
| Green | 38–40 | 6 months. |
| Ripe | 32–35 | 1 week. |



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*b. Dried.*—These are protected from moisture, insects, and heat. Keeping qualities are dependent on percentage of moisture present in the fruit. The usual commercial practice is to have about 24 percent moisture.

(1) Prunes become "sugared" with age. This condition is often mistaken for mold. Mold has a fuzzy or threadlike form by which it can be distinguished. It is sometimes necessary to use a reading glass to determine a moldy condition. If moldy, they are destroyed. If sugared, dip in boiling water, wash boxes, repack, and issue. The boiling-water treatment removes and kills insects.

(2) Cut fruits that have become infested with insects cannot be reconditioned.

(3) Ideal storage is 33° to 40° F. with relative humidity of 80 to 85 percent.

(4) *Safe storage periods.*

| Item | Under ordinary storage, central United States | Under cold storage, 33° to 40° F. | In Tropics, ordinary (in boxes) storage |
|---|---|---|---|
| Prunes, dried, in boxes | 6 months | 15 months | 2 months. |
| Raisins: | | | |
| Whole | do | do | Do. |
| Seeded | do | 12 months | 1 month. |
| Peaches, dried | do | do | Do. |
| Apricots, dried | do | do | Do. |
| Apples, dried | do | do | Do. |
| Other dried fruits: | | | |
| Whole | do | 15 months | 2 months. |
| Cut | do | 12 months | 1 month. |

*c. Frozen.*—These must be protected from temperatures above 18° F. Mold grows at 26° F. In 20 or 30 pound containers, allow 24 hours at ordinary room temperatures to thaw for use. In 1-pound cartons, they thaw for use in about 1 hour. All frozen fruits keep indefinitely at temperatures below 18° F. After thawing, frozen fruits must be used immediately, as fermentation and mold growth start on thawing.

**53. Vegetables, fresh.**—*a. General.*—(1) Fresh vegetables are plants or parts of plants that are still alive when in storage. In their life process they continue to breathe in oxygen and give off moisture and carbon dioxide. In so doing they are using up the food stored within themselves, and the extent to which they consume this food is in proportion to the storage temperature. With storage temperatures



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of from 33° to 45° F. the process is retarded to the minimum, and fresh vegetables keep in good condition for from 10 to 15 days. The storage space must, however, be comparatively dry. Excessive moisture causes "sliminess" with subsequent decay, especially of leaf vegetables. All fresh vegetables are marketed in open crates or baskets and are not packed tightly when stored, as they spoil from suboxidation.

(2) At isolated posts, where the markets do not afford a constant supply of fresh vegetables and sufficient refrigerated storage is not available it may be necessary to have outside pit storage in order to maintain a supply of fresh vegetables.

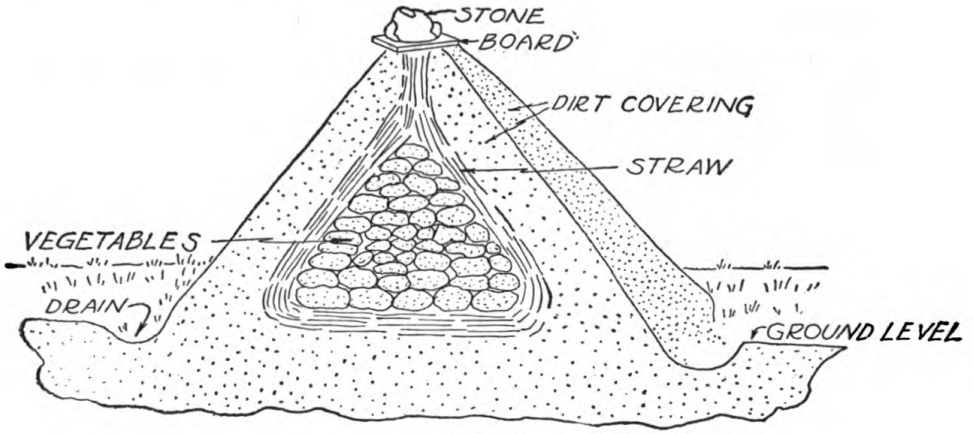



FIGURE 7.

(*a*) To make a pit, dig a shallow circle 2 or 3 inches deep and line it with hay or straw. Pile the vegetables on this so as to form a conical mound, covering the whole with several inches of hay (or straw), then with 2 or 3 inches of earth alternately to a total thickness (in extremely cold climates) of 12 inches. This method may also be resorted to in posts where organizations cultivate gardens and have a supply of vegetables for storage. (See fig. 7.)

(*b*) For Irish potatoes the outdoor mound must be in a well-drained location. Cornstalks or similar material is piled over the mound. The straw, coming to the top, affords ventilation. The opening is covered for protection from rain.

(3) Where refrigerated storage is not available, the storage period is governed by the following table:



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| Item | Ordinary storage | Remarks |
|---|---|---|
| Lettuce (head) | 24 to 36 hours | Becomes slimy. |
| Cabbage | 15 days | |
| Tomatoes (ripe) | 12 hours | Overripe and soft. |
| Peas | 24 hours | Tough. |
| Celery | 4 days | Becomes wilted and stringy, with large waste. |
| Beans (green or wax) | 24 hours | Wilted and tough. |
| Spinach | 24 to 36 hours | Slimy and wilted. |
| Corn | 48 hours | Becomes tough and hard. |
| Asparagus | 4 days | Wilts and gets tough. |
| Turnips | 10 days | Become wilted and pithy. |
| Carrots | do | Become wilted and woody. |
| Radishes | 4 days | Do. |
| Cauliflower | do | Darkens and decays. |
| Eggplant | 6 days | Becomes tough. |
| Peppers | do | Soften and decay. |

*b. Potatoes.*—(1) During storage, the life processes of the potato continue in what is practically a dormant state. If there is sufficient warmth and moisture, this dormant life is hastened so that eventually sprouts appear. However, a potato that has been recently dug does not sprout as readily as an old one, even though the storage conditions are the same. Sprouting in time is likely to occur if the soil is not well cleaned from the potato.

(2) In the life processes, part of the potato starch is broken down into carbon dioxide. Therefore, over a period of time, considerable shrinkage takes place. Thus, if kept over 1 year, even in cold storage, potatoes become shrunken, shriveled, and undesirable. If the storage room is unduly dry, shrinkage is pronounced owing to evaporation. The ideal storage temperature is, therefore, just enough above the freezing point to be safe and avoid suboxidation (about 33° F.), yet not warm enough for the tuber to respire freely (about 40° F.). The relative humidity must be high enough to prevent evaporation and low enough to avoid any condensation of moisture (85 to 90 percent). Experiments have shown that potatoes held for 150 days (fall to spring) at 39° F. shrink 2.58 percent; those held at 48° F. shrink 7.18 percent; and those held at 60° F. shrink 11.56 percent.

(3) Ventilation or aeration is essential so as to supply oxygen and remove the carbon dioxide given off by the potatoes during respiration. Piles of potatoes in bulk, sacks, or crates are not unduly large; no dimension is over 10 feet. In order to avoid undue weight on the lower strata, the height of piles is not over 6 feet.



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(4) Light is inimical to good potato storage. Sunlight is particularly bad; even a small amount of light is injurious and, if long continued, impairs the eating qualities of the potato. The storeroom must be absolutely dark.

(5) Stock going to storage must be free from disease, especially the various forms of rot, as these spread rapidly in storage. Damp stock or mechanically injured stock also is dangerous, as it offers a fertile field for the inroads of various molds and bacteria.

*c. Sweet potatoes.*—These are unlike most perishable foods in that they require a fairly warm temperature for successful storage. When first stored after digging, sweet potatoes undergo a sweating process during which they require ample uniform ventilation and a temperature of about 85° F., with the relative humidity below 80 percent. This sweating period lasts from 10 to 20 days, and is completed when the potatoes have a velvetlike feel and an occasional sprout appears. The temperature is then reduced to about 50° F., and this temperature is maintained throughout the storage period. Sweet potatoes are a more perishable product than Irish potatoes, but under proper storage conditions they keep in good condition for 4 months from harvest.

*d. Onions.*—Fully matured, sound, clean, northern grown onions with no loose skins keep from 4 to 5 months at temperatures of from 34° to 40° F. Onions are stored in bins or crates, never in bags. The storage room must have a free circulation of air. Where cold storage is not available (as is usually the case with onions, as they cannot be stored in rooms with other articles because of their contaminating odor), onions keep for a period of 6 weeks if put in a thin layer (4 or 5 inches thick) on the floor or in bins in a dry warehouse.

**54. Fruits and vegetables, canned.**—*a.* High temperature is the chief cause of spoilage of canned food. The action of the acids (present in many types of canned goods) on the tin of the container is doubled for every rise in temperature of 18° F; e. g., spoilage from this cause is four times as great at 90° F. as at 54° F. It is impracticable to keep canned goods in cold storage; therefore, in the Tropics, or wherever high temperatures prevail, it is essential that careful attention be given to the necessary details for properly handling and storing canned foods. The higher layers of air in the storerooms are always warmer than the lower layers; therefore, cases are not stowed so high as to subject the top of the stack to excessive temperatures.

*b.* The storeroom is dry and not subject to freezing temperatures. Moisture collecting on the outside of cans causes rust and perfora-



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tions. Avoid subjecting canned goods to sudden changes in temperatures and consequent sweating. Ventilation promotes dryness and retards deposit of moisture on cans, thus lessening rusting. If cans get wet, they are wiped dry with cloths; they are never subjected to heat for the purpose of drying them. An examination of a sufficient number of cans taken at random is made upon receipt of a shipment to insure that the lot is free from rust, swells, springers, and damaged cans.

*c.* Cases are stored on dunnage and stacked on their sides. If leakers develop, they are more readily detected; this also eliminates moisture collecting in the depressions on the tops of cans where rust may develop. Frequent inspections are made for swells and leaky cans. When found, they are removed from the lot and a check made of the balance to see if the condition is general.

*d.* Freezing of most canned foods does not occur at temperatures above 28° F. Should a product become frozen, its quality may be materially affected through partial disintegration. There are, however, many articles that are but slightly injured by freezing, and it is better practice that they remain in the frozen state until required for use than to permit a recurrence, as several short freezings are more damaging than one continuous freezing. In defrosting frozen canned foods, normal temperatures are obtained through a gradual process rather than a sudden rise in the temperature of the food article. Freezing has a tendency to burst the seams of the cans due to internal expansion of the contents. A close inspection is, therefore, made of all canned foods when being defrosted.

*e.* Cans are not subject to condensation of moisture, unless temperatures are excessive, and if freezing is avoided there is little danger of spoilage during the reclamation period except for the articles listed in *f* below. Where spoiled goods are set aside for survey or reclamation, the holding space is kept as clean as practicable in order to avoid a breeding place for flies, vermin, and insects. Do not ship spoiled goods to the contractor where interstate shipment is involved, even if the contractor agrees to pay the expense. Such shipment in interstate commerce is prohibited by law.

*f.* In general, fruits containing pits, such as cherries and plums, and acid fruits, like strawberries, loganberries, apples, blueberries, and rhubarb, are poor keepers, owing to a tendency to pinhole or develop swells. They are not carried from one year to another, and acceptance in spring and summer of the pack of the preceding year is unwise except where they are consumed within 3 months from date of purchase.



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*g.* The tables in *h* below are offered only as a guide because there are so many factors that enter into "keeping quality" which can affect the safe storage period so as to make the period longer or shorter than that indicated. If proper processing temperatures have not been used and harmful bacteria have not been destroyed, deterioration is more rapid; this condition is not necessarily apparent at the time of receipt of the articles if they are opened within a few weeks after packing.

*h. Safe storage periods.*

FRUITS

| Item | Safe-keeping period under conditions set forth from date packed, central United States | Defects particularly applicable to the item | Cause of defect and remarks |
|---|---|---|---|
| Apples and applesauce. | 1 year to 15 months. | Pinholing, air in can. | Acidity. Accelerates pinholing. |
| Apricots | 1½ to 2 years | Pinholing | Acidity. |
| Blackberries | 9 months | Pinholing, swells, fading. | Acidity, hydrogen gas, swell. |
| Blueberries | 1 year | Pinholing, swells | Do. |
| Cherries: | | | |
| Sour | 9 months | Pinholing, swells, fading. | Acidity, hydrogen gas, swell. Pinholing more rapid if not pitted. |
| Sweet | 15 months | Pinholing, swells | Acidity, but not as severe as sour; hydrogen gas, swell. |
| Black | 9 months | Pinholing, swells, fading. | Acidity, hydrogen gas, swell. |
| Cranberry sauce | 1 year | do | Do. |
| Fruit salad | 9 months to 1 year. | do | Do. |
| Grapes | 9 months | do | Acidity, hydrogen gas, swell. Seeds hasten spoilage. |
| Grapefruit | do | do | Acidity, hydrogen gas, swells. |
| Peaches | 1½ to 2 years | do | Acidity. Fair keeper among fruits. |
| Pears | 2 years | Pinholing | Fairly good keeper among fruits. |
| Pineapple | 1 year to 15 months. | Pinholing, swells, loss of color. | Keep fairly cool (50° F.), if possible. Temperatures above (70° F.) destructive. |
| Plums | 9 months | Pinholing | Highly acid. |
| Rhubarb | do | Swells | Do. |



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## VEGETABLES

| Item | Safe-keeping period under conditions set forth from date packed, central United States | Defects particularly applicable to the item | Cause of defect and remarks |
|---|---|---|---|
| Assorted vegetables (vegetable salad). | 1 year | Softening | Age. Will spoil as quickly as the poorest keeping ingredient. |
| Asparagus | 24 months | Discoloration of container. | Age. |
| Beans: | | | |
| Kidney | 2 years or more. | Discoloration of beans. | |
| Lima | do | Discoloration, softening. | |
| Stringless | 2 years | Discoloration of can. | |
| Beans with pork and tomato sauce. | 2 years or more. | Softening. Attack on container by acid of tomato sauce. | Acidity. |
| Beans with pork and plain sauce. | 3 years or more. | | |
| Cabbage, cauliflower, brussel sprouts. | 18 months | Softening, discoloration. | |
| Beets | 15 months | Softening, fading, springers. | Age, acidity. |
| Carrots | 2 years or more. | Softening, fading | Age. |
| Corn | 3 to 5 years | Discoloration (sulphide of iron) where plain tins are used. | Action on tin of can. Does not swell. Avoid high temperatures (75° F.). Bacterial action. |
| Hominy | do | do | Do. |
| Sauerkraut | 9 months | Swells, softening, discoloration. | Age, acidity. |
| Okra | 1 year | Fading | Age. |
| Olive, ripe | 18 months | Softening, fading | Do. |
| Peas | 3 to 5 years | Discoloration, softening. | Age. Packed in plain tins. |
| Pickles (can) | 6 months | Fading, softening, swells. | Packed in plain tins. Acid. |
| Pumpkin (in plain tins). | 9 months | Discoloration, attack on tin. | Age. |
| Squash (in plain tins). | do | do | Do. |



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| Item | Safe-keeping period under conditions set forth from date packed, central United States | Defects particularly applicable to the item | Cause of defect and remarks |
|---|---|---|---|
| Pumpkin (in enameled tins). | 15 months | Loses flavor | Age. |
| Squash (in enameled tins). | do | do | Do. |
| Spinach | 18 months | Attack on tin | Acidity. |
| Sweet potatoes | do | Discoloration | Packed in plain tins. Cans would be better enamel lined. |
| Tomatoes | 15 months | Attack on tin, watery, breaking of pieces. | Acidity, shaking. Avoid high temperatures. |

**55. Fruits and vegetables, dehydrated.**—These are protected from insects, moisture, and air. They are the "bone-dry" dried fruits and vegetables, and keep indefinitely in hermetically sealed tin cans if they have been heat-treated at the factory to kill insects. Air causes oxidation, with darkening and loss of taste. Relative humidity must not be over 75 percent. Safe storage period in other than hermetically sealed cans is 6 months in central United States and 1 month in the Tropics.

**56. Cellar storage.**—*a. Outdoor.*—This kind or cellar makes a good storage place. In cold climates it is partially underground. A sidehill location is desirable for ease in handling the vegetables. To make such a cellar, dig an excavation and in this erect a frame by setting posts in rows near the dirt walls. Saw these posts off at uniform height and place plates on their tops. On these plates place rafters. Board up completely, with the exception of a place for the door. The whole is covered with dirt and sod, and in cold climates added protection is given by a layer of straw, fodder, or similar material. Ventilate with a flue. A dirt floor is best as some moisture is desirable. On a more pretentious scale cellars of this nature may be made of brick, stone, or concrete. Such cellars afford practically perfect storage room for potatoes, carrots, cabbages, parsnips, beets, and turnips.

(1) Figure 8 is a side view of an outdoor storage cellar, showing the details of construction. If the cellar is more than 12 feet long,



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two ventilating flues are used. If built on a sidehill, no steps are needed, making it easier to store and remove the vegetables.

(2) Figure 9 is a cross section of a concrete storage cellar, showing the arrangement of ventilators, slat floors, and bins, with provision for the circulation of air under and around the slat floors and bins. This cellar is 10 feet wide and 8 feet high, inside measurements.

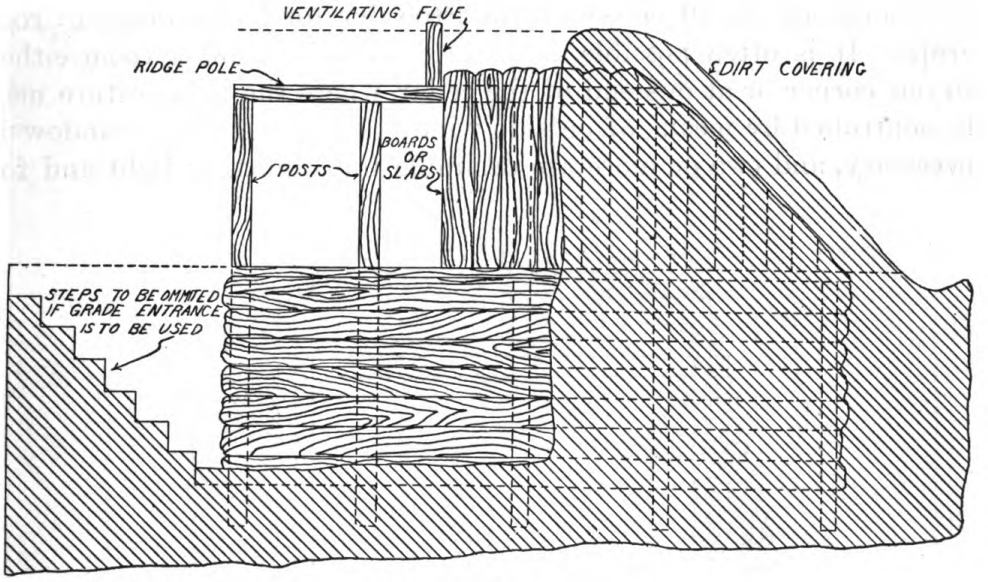



FIGURE 8.

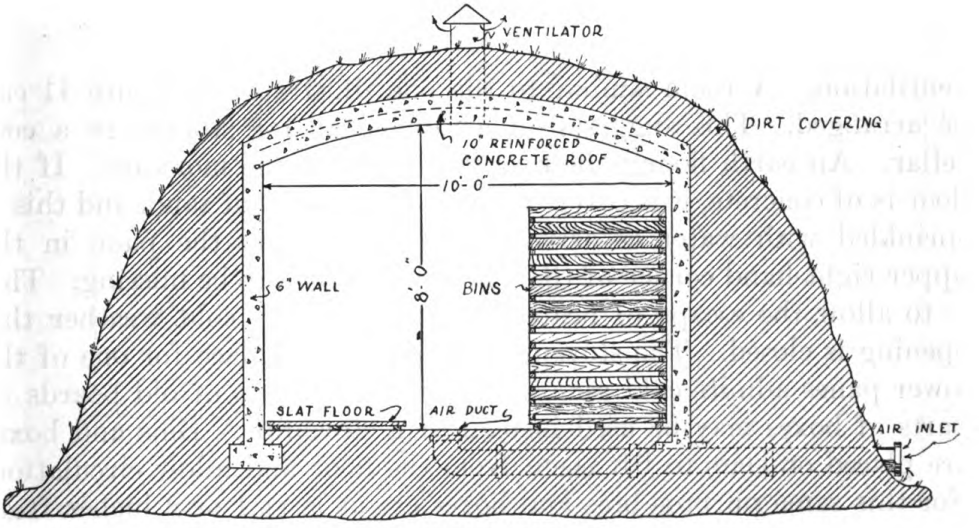



FIGURE 9.



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(3) Figure 10 is a longitudinal section of an outdoor storage cellar 12 feet long, built of concrete. The structure may be lengthened to increase the storage capacity, but if this is done additional ventilators must be provided.

*b. Indoor.*—A cool well-ventilated cellar under the warehouse offers good conditions for the storage of vegetables. Many cellars are not well suited for storing vegetables because of poor insulation or lack of ventilation. Cellars containing a furnace for heating the warehouse are usually too warm and too dry for long storage of root crops. It is often possible, however, to partition off a room either in one corner or at one end of the cellar where the temperature may be controlled by means of outside windows. At least one window is necessary, and two or more are desirable for admitting light and for

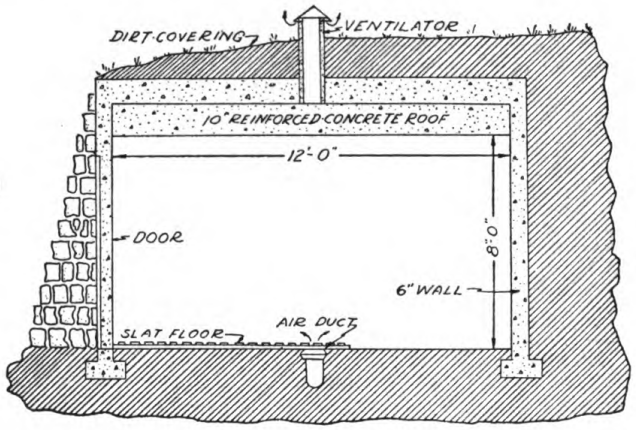



FIGURE 10.

ventilation. A room similar to the one illustrated in figure 11 can be arranged. This suggests an arrangement for storage in a cool cellar. An earth floor is best as it gives off some moisture. If the floor is of concrete, it is covered with 2 or 3 inches of sand, and this is sprinkled with water occasionally. In the figure the pane in the upper right-hand corner of the window is shown to be missing. This is to allow the escape of heated air. In severely cold weather this opening is closed. The stovepipe fitted into the place for one of the lower panes admits cold air. A wooden flue made of old boards or parts of boxes may be used instead of a stovepipe. Bins and boxes are placed on slats to lift them from the floor and allow circulation. For this same purpose bins and boxes are at least 1 or 2 inches from the wall. Air holes bored in sides and bottoms of bins and boxes help circulation. Glass jars must be protected from light.



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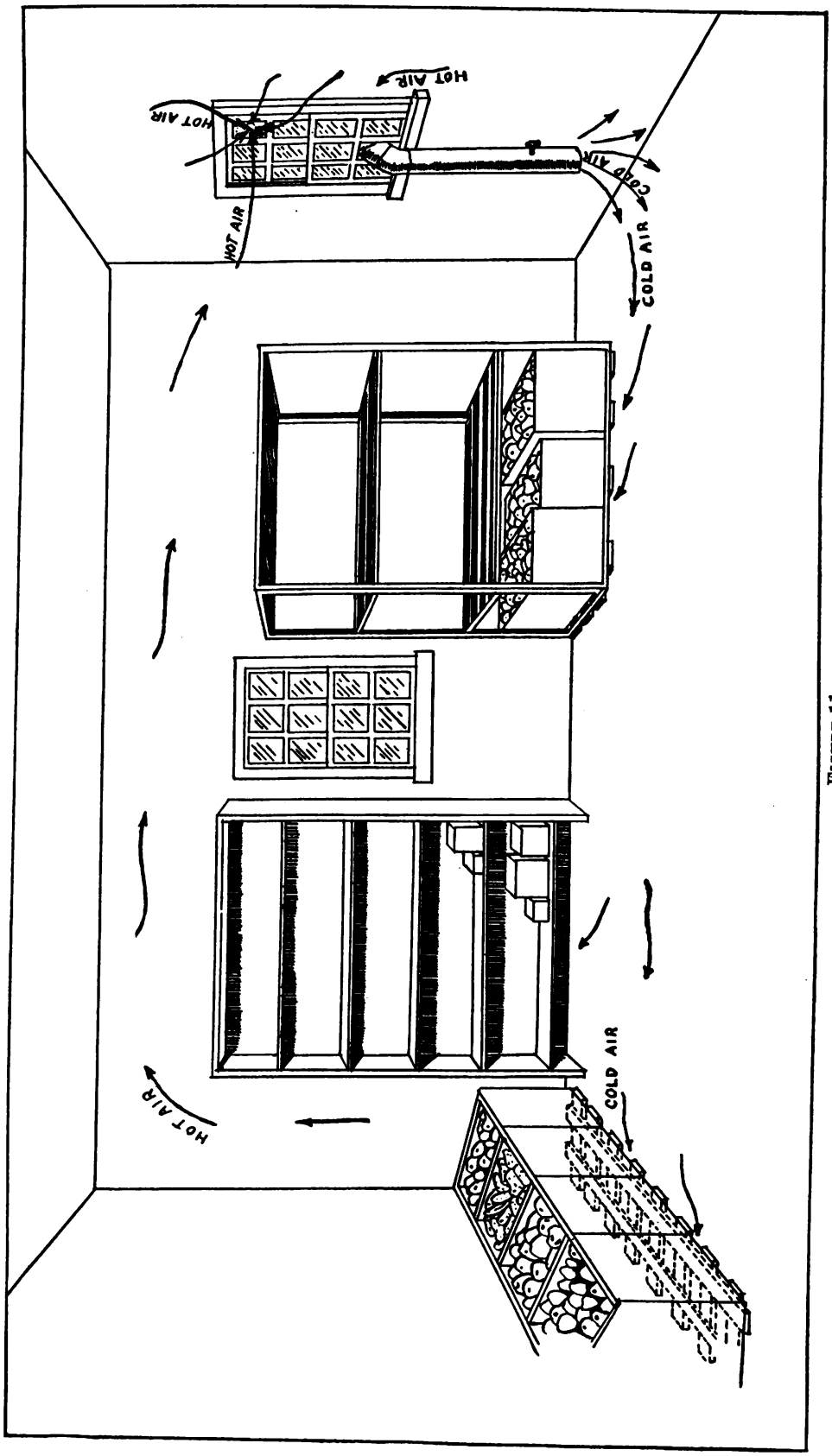



FIGURE 11.



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**57. Eggs.**—Eggs, especially if fertile, are a readily perishable product. They must be kept under refrigeration. The best temperature for egg storage is from 31° to 33° F. with a relative humidity of 82 to 85 percent. If the air of the storage room is too dry, the eggs lose moisture; if too wet, mold forms on the shell. Egg shells are porous, which permits the eggs to absorb odors from the surrounding air. Egg storage rooms are therefore kept sweet and clean. Fruits, vegetables, or other products or matter that emit odors are not stored in the same room with eggs. Facilities for a circulation of air about each case must be provided. The cases are therefore stored on dunnage and quarter-inch strips of wood placed between the layers in the pile. Egg cases, fillers, and flats for egg storage are clean. Properly stored as above, eggs remain in edible condition for from 6 to 9 months. Freezing spoils eggs. Any rise of temperature or humidity above those indicated results in more rapid deterioration. If adequate cold storage is not available, eggs are not purchased in excess of immediate needs.

**58. Barreled food.**—*a. Dry.*—Barrels containing salt, sugar, and other dry commodities are stored on end in tiers, each layer receding one-half row from the one below it, so that each barrel rests on four others. Barrels are never stored over three high. In the case of kegs this may be extended to either four or five. All barrels containing dry products are stored on dunnage, with dunnage between each tier, and kept in a very dry place.

*b. Liquid.*—Barrels or kegs containing liquids, vinegar, pickles, sirup, molasses, salt fish, etc., must be kept moist, otherwise they leak. If stored on end, the chime is filled with water. If stored on side, they are colled occasionally and left with the bung up. If liquor leaks from pickles, it can be replaced with vinegar. A slightly humid cellar is a good place for barrel storage.

*c. Safe storage periods.*

| Item | Time | Causes of spoilage | Remarks |
|---|---|---|---|
| Fish, salt | 6 months | Mold, insects, age | |
| Flour | do | do | |
| Pickles | do | Becomes soft | |
| Salt | Indefinitely | Moisture | Salt picks up moisture and cakes but is not otherwise injured. |
| Sirup | 6 months | Fermentation | |
| Sugar | 3 years | Moisture | |
| Vinegar | Indefinitely | Mother of vinegar, vinegar flies. | |



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**59. Bottled and glass-packed food.**—*a. General.*—As a general proposition, glass-packed food is not exposed to light, as loss of color and deterioration of the product result. Keep in cases until shortly before it is to be used. If wrapped in paper, leave the paper on the package until used. The weakest point about a glass container is the seal. Corks dry out and permit evaporation; metal covers often corrode or do not fit the glass well. Corked items as a rule are stored on their sides to keep cork damp. Freezing must be prevented.

*b. Safe storage periods.*

| Item | Time | Causes of spoilage | Remarks |
|---|---|---|---|
| Ammonia | 5 years | Evaporation | Cork may get loose. |
| Bacon, sliced | 3 months | Light, rancidity, loss of oil. | Should be kept cool. |
| Cherries, maraschino. | 2 years | Light, evaporation | |
| Extracts: | | | |
| Lemon | 5 years | do | Light causes cloudiness; store on side. |
| Vanilla | 3 years | do | Do. |
| Ginger ale | 6 months | Leaking of carbon dioxide. | |
| Grape juice | 2 years | Light, leakage | |
| Jellies, jams, and preserves. | do | Light, acid on lid | |
| Mustard, prepared | 6 months | Light, evaporation, black scum. | |
| Oil, olive | 1 year | Light, rancidity | |
| Olives, green | 1 to 3 years | Corrosion of caps, evaporation. fermentation. | Metal seals corrode; white deposit is not harmful; may "blow up," due to further fermentation. |
| Sauces: | | | |
| Catsup | 1 year | Color | Store on side. |
| Chili | do | do | Do. |
| Worcestershire | do | do | Do. |
| Sirup: | | | |
| Cane | do | Fermentation | |
| Maple, blended | do | do | |
| Maple | do | do | |
| Vinegar | 4 years | Mother of vinegar, vinegar flies. | If sterile when purchased should keep indefinitely. |
| Water, effervescent | 6 months | Leaking of $CO_2$ | |



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**60. Baking powder, salt, soap, soda, etc.**—This group of supplies includes items used as food which, owing to their nature, may deteriorate from chemical action. They are not, however, subject to attack by rodents, insects, or bacteria.

*a.* Baking powder is a mixture of cornstarch, sodium bicarbonate, and an acid-reacting agent. Its keeping quality depends on its degree of dryness, the exclusion of air, the percentage of cornstarch, and the kind of acid-reacting material in the mixture. This product must be thoroughly dry, packed in tin cans. Cans are packed absolutely full and the label pasted tightly around the juncture of lid and can. If baking powder is packed while damp, or if it is stored in a damp place or packed in paper cartons, or if air can reach the powder, it readily spoils.

(1) The type of acid-reacting agent in baking powder is always marked on the can. Phosphate powders keep poorly; tartaric acid powders, fairly well; mixed S. A. S. (sodium, aluminum sulphate), and phosphate powders, well; S. A. S. powders keep very well.

(2) *Safe storage periods.*

| Item | Tight cans in dry storage |
|---|---|
| Phosphate powders | 6 months. |
| Tartaric acid powders | 8 months. |
| Mixed powders | 18 months. |
| S. A. S. powders | 24 months. |

*b.* Soap does not spoil in the true sense of the word. It does, however, give off moisture, becoming hard, cracked, and misshapen, with consequent loss of weight. Colored soaps fade, and those manufactured from cottonseed oil become yellow in spots. If the humidity is high enough to prevent loss of moisture, the wrappers are likely to become unsightly through mold, etc., but they are not condemned because of appearance. It is not advisable to have soaps on hand for over 2 years.

*c.* Baking soda (bicarbonate of soda) keeps indefinitely, provided it is kept dry.

*d.* Salt keeps indefinitely. Impurities contained in salt cause it to absorb moisture, which in turn causes the salt to cake and become hard. Such salt is not spoiled. Salt can, and does, become dusty and dirty. So-called "free-running salt" has 1 percent of some filler, such as magnesium carbonate, added to the salt content to keep it from caking, but owes considerable of its "free-running" quality to



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the fact that it is packed in moisture-proof hermetically sealed cartons.

*e.* Matches must be stored in a dry place (never in any room, such as a basement, that may become damp), as they are very susceptible to deterioration through dampness. Matches are subject to attack by rats.

*f.* Tobacco products are subject to insect attack, mold, and drying out, all of which may occur regardless of whether the product is in closed boxes, cartons, or in the showcase. The quantity of tobacco products displayed in open stock is always at a minimum.

(1) Aroma is lost through exceptional dryness. Moisture is essential for boxed cigars, pipe, and chewing tobaccos held in reserve, as well as when on display. Moistened soapstone or a wet sponge in a container is at the top of the shelf space to permit the moistened air to settle around the containers.

(2) Storage and sales cases are opened for 10 minutes each working day for the purpose of ventilation.

(3) "Worms" and mold may develop in warm, moist storage, as all insect eggs and mold spores are not killed by the manufacturing process. When insects are present in the showcase, commercial preparations of carbon disulphide may be placed overnight in saucers near the top of the inside of the case. These will probably kill the insects but not all the eggs.

(4) When tobacco products are to be destroyed on an approved report of survey, application is made to the nearest branch of the Bureau of Internal Revenue for a refund of the value of the stamps. As much as 50 percent of the cost of the product is very often represented by the Government tax stamps on the packages.

*g.* Pipe stems exposed to the rays of the sun acquire an obnoxious burned taste impossible to remove.

**61. Lowest and highest temperatures to which perishable subsistence supplies may be subjected without injury.**

| Perishable goods | Lowest outside temperature | | | Temperatures above which injury occurs | Remarks |
|---|---|---|---|---|---|
| | Articles in ordinary packages unprotected | In ordinary freight cars | In refrigerator or especially prepared cars | | |
| | ° F. | ° F. | ° F. | ° F. | |
| Ale, ginger | 30 | 20 | −10 | ------ | |
| Apples, in barrels | 20 | 10 | −10 | 75 | Covered with straw. |
| Apples, loose | 28 | 15 | −10 | 75 | Packed in straw. |
| Apricots, baskets | 35 | 24 | 10 | 70 | |



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| Perishable goods | Lowest outside temperature | | | Temperatures above which injury occurs | Remarks |
|---|---|---|---|---|---|
| | Articles in ordinary packages unprotected | In ordinary freight cars | In refrigerator or especially prepared cars | | |
| | ° F. | ° F. | ° F. | ° F. | |
| Asparagus | 28 | 22 | | 70 | In boxes covered with moss. |
| Bananas | 50 | 32 | | 90 | In boxes with straw. |
| Beans, snap | 32 | 26 | | 65 | In barrels or crates. |
| Beef extract | 25 | 15 | −10 | | |
| Beets | 26 | 20 | | 70 | In crates. |
| Cabbage, early or late | 25 | 20 | 0 | 75 | Barrels or crates. |
| Cantaloupes | 32 | 25 | 10 | 80 | |
| Carrots | 30 | 25 | 20 | | |
| Catsup | 25 | 15 | −10 | | |
| Cauliflower | 22 | 15 | | 70 | In barrels with straw |
| Celery | 10 | 0 | | 65 | Packed in crates. |
| Cheese | 30 | 25 | 10 | 75 | |
| Clam broth and juice | 30 | 20 | −10 | 80 | |
| Cranberries | 28 | 20 | 0 | | |
| Cucumbers | 32 | 20 | | 65 | In boxes with moss. |
| Cymlings, or squashes | 32 | 22 | | 75 | In crates. |
| Eggs, barreled or crated | 30 | 20 | 0 | 80 | |
| Extracts (flavoring) | 20 | 15 | 0 | | |
| Fish | 10 | 0 | | 65 | In barrels always iced. |
| Fish, canned | 18 | 15 | −10 | | |
| Grapes | 34 | 20 | 0 | | Packed in cork. |
| Grapefruit | 32 | 20 | 0 | | |
| Groceries, liquid | 32 | 20 | 0 | | |
| Kale | 15 | 0 | | 65 | In boxes or crates. |
| Lemons | 32 | 20 | 10 | 75 | Do. |
| Lettuce | 26 | 15 | | 70 | Do. |
| Mandarins | 32 | 20 | 0 | 75 | In boxes. |
| Milk | 32 | 28 | 0 | 75 | |
| Mustard, French | 26 | 20 | −10 | | |
| Okra | 25 | 20 | | 75 | In baskets or boxes. |
| Olives, in glass | 25 | 20 | 0 | | |
| Onions | 20 | 10 | 0 | 80 | In boxes or crates. |
| Oranges | 28 | 20 | 0 | 80 | In baskets, barrels, or crates. |
| Oysters, in shell | 20 | 10 | −10 | 65 | In barrels. |
| Oysters, shucked | 30 | 20 | 0 | 70 | Do. |
| Parsley | 32 | 20 | | 75 | In baskets. |
| Parsnips | 32 | 20 | | 70 | In baskets or barrels |
| Pears | 32 | 20 | 10 | 80 | |
| Peaches, fresh, baskets | 32 | 20 | 10 | 80 | |
| Peaches, canned | 20 | 15 | 0 | | |
| Peas | 32 | 20 | | 80 | In baskets or barrels. |
| Pickles, in bulk | 22 | 18 | −10 | | In barrels. |



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| Perishable goods | Lowest outside temperature | | | Temperatures above which injury occurs | Remarks |
|---|---|---|---|---|---|
| | Articles in ordinary packages unprotected | In ordinary freight cars | In refrigerator or especially prepared cars | | |
| | °F. | °F. | °F. | °F. | |
| Pickles, in glass | 20 | 16 | −10 | ------ | |
| Pineapples | 32 | 25 | 0 | 75 | In barrels or crates. |
| Plums | 35 | 32 | 0 | 75 | In boxes with paper. |
| Potatoes, Irish | 33 | 25 | 10 | 80 | In barrels or baskets. |
| Potatoes, sweet | 35 | 28 | 10 | 80 | Do. |
| Preserves | 20 | 10 | −10 | ------ | |
| Radishes | 20 | 15 | -------- | 65 | In baskets. |
| Rice | 20 | 10 | -------- | 90 | In barrels and sacks. |
| Spinach | 15 | 15 | -------- | 75 | In barrels or crates. |
| Strawberries | 33 | 25 | −10 | 65 | |
| Tangerines | 25 | 15 | 0 | 70 | In boxes. |
| Tomatoes, fresh | 33 | 28 | 10 | 90 | |
| Tomatoes, canned | 28 | 25 | −5 | ------ | In boxes. |
| Turnips, late | 15 | 0 | -------- | 75 | In barrels. |
| Vinegar, barrels | 22 | 18 | −10 | ------ | |
| Watermelons | 20 | 10 | -------- | 85 | In barrels or in bulk. |
| Waters, mineral | 28 | 25 | 0 | ------ | |
| Yeast | 28 | 25 | 0 | 65 | |

**62. Icing and loading refrigerator cars.**—*a. Tanks.*—The refrigerating plant of refrigerator cars consists of ice tanks in each end of the car. These tanks are eight in number, four in each end of the car. They are placed side by side across the end of the car, in an upright position, with openings for the introduction of ice at the top and suitable drains at the bottom. Each holds approximately 700 pounds of ice or 5,600 pounds for the car. This figure represents the average amount required for cars used in the meat trade. Cars built for the provision trade have tanks of much greater capacity.

*b. Temperatures.*—Ice is the refrigerant used, to which salt is added in varying amounts, depending upon the degree of refrigeration desired, which, in turn, is dependent upon the class of meats to be transported, the season of the year, the section of the country to be traversed, etc. For transporting chilled meats, the temperature of the car is maintained at the same temperature as that of the chill rooms from which the meats are taken. Thus the car temperature for transporting fresh chilled beef, mutton, pork, and veal is from 34° to 38° F. Car temperatures for the safe transporting



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of frozen meats must be sufficiently low to maintain the product in a solidly frozen condition, that is, below the freezing point (32° F.). These temperatures are produced by varying the amount of salt added to the ice. The greater the amount of salt used, the lower the temperature obtainable.

(1) The salt used is known commercially as No. 2 rock salt. In shipping fresh meats under ordinary conditions, from 3 to 5 percent of salt is added to the ice. In very hot weather this amount is somewhat increased. To keep frozen meats in an unthawed state, from 12 to 15 percent of salt is added to the ice. The denser the brine resulting from the melting of the ice and the solution of the salt, the lower is the degree of refrigeration obtained.

(2) The ice for refrigerator cars must not be too coarse nor too fine. In the first condition it does not pack tightly enough, and in the second it packs too tightly. Best results are obtained where the pieces range in size from that of a hickory nut to that of a man's two fists. Salt to be added throughout the ice mass in the tank is added as the ice is poured in, or added to the ice before it is dumped into the tanks. In this way the salt is scattered fairly uniformly throughout the ice mass. As the ice enters the tanks it is tamped down as compactly as possible, the tanks filled to the top, and the hatches closed tightly to prevent leakage of refrigeration.

*c. Inspection.*—When passing judgment as to the fitness of a car for transporting meats or other perishable products for the Army, the inspector immediately rejects or refuses to permit loading in any car not in condition to fulfill properly the requirements of the service to be rendered. Before accepting a refrigerator car for loading with meats, the Army inspector sees that the following requirements are fully satisfied:

(1) *Sanitation.*—All interior parts of the car, floors, walls, ceiling, and equipment, such as hooks, hangers, and racks, are clean, sweet, and dry. Particular care is taken to see that the racks are in repair and that they, as well as the floor beneath, are clean and dry.

(2) *Mechanical condition.*—Car doors are properly insulated. There are no breaks in the doors or sills. All hatches are tightly and securely closed. All drain pipes are open to prevent tanks from overflowing, which would result in flooding the floor and saturating the products stowed in the floor racks.

(3) *Precooling for fresh meats (chilled).*—The cars are precooled to the temperature of the rooms from which the meat is to be taken, which should be from 34° F. to 38° F. In general, cars must be



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properly precooled by icing the day before loading with 12 percent salt, re-iced the same day with 12 percent salt, and re-iced the morning of loading with 12 percent salt. After loading, the temperature is down to 30° F. For frozen meats, the car is precooled to below freezing (32° F.); the lower the temperature, the better.

(4) *Initial icing.*—Ice is to be clean and free from foreign matter, such as straw, hay, sawdust, chips, etc. Ice is to be crushed, the pieces averaging a size slightly less than a man's fist. The required percentage of crushed No. 2 rock salt is added by uniformly mixing throughout and the whole tamped to a compact mass so as to fill the hatches completely. Hatch plugs must be tightly closed after they have been filled.

(5) *For fresh meats (chilled).*—The mixture required depends upon conditions, such as the distance the meat is to be transported, season of the year, and section of the country to be traversed. Ordinarily 3 to 5 percent of salt is required. In hot weather the percentage of salt is increased to produce the desired result (12 to 15 percent).

(6) *For frozen meats.*—Fifteen percent of salt is used under average conditions. Canvas strips may be employed to good advantage on car doors as an aid to retaining low temperatures.

(7) *Stowage.*—Carcasses (quarters), major parts, and similar packages are hung or otherwise stowed so as to insure free circulation of air. There must be ample head room and sufficient space beneath carcasses so hung. Under no circumstances do carcasses come into contact with the floor. It is customary to pile frozen quarters; therefore, floor racks are used with at least 3 inches' clearance from the floor. Frozen beef quarters are piled one upon another as tightly and as high as possible. Chilled quarters or carcasses can be stowed more compactly than can frozen quarters. In carlot shipments the quarters are usually hung in two layers, the hindquarters above on short hooks, and the forequarters swung on long hooks below. Fresh meat cannot be piled upon racks. The quarters are wedged in as tightly as possible when loading to prevent shifting of the load and chafing of the meat. Package goods are stowed on racks raised above the car floor. Fresh meats of all kinds are more perishable than cured or smoked meats, lard, etc.; therefore, highly perishable products are stowed at the bottom and ends of cars where the temperature is lowest.

*d. Re-icing.*—Shipping orders and bills of lading contain detailed icing instructions to insure proper refrigeration of the meat to its destination. These instructions require re-icing to capacity each 24 hours, whether in transit or in storage, and indicate the percent of



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salt to be used. When re-icing cars, the ice remaining in the tanks is tamped and the same proportion of salt used as in the initial icing. The excess brine, after tamping has been performed, is drawn off. One-third of the total quantity of salt to be used is added to the old ice, and the remaining two-thirds of the salt mixed with the new ice. The tanks are then filled to capacity.

*e. Reinspection.*—On receipt of a refrigerated car at destination, the condition of the interior of the car and its equipment is observed relative to its cleanliness and mechanical condition. Inspection also considers the manner in which the product is loaded. Before unloading operations are begun, the temperature of the car is ascertained and a record made on the receiving papers covering the shipment. Evidence of apparent carelessness or neglect in shipping or handling the consignment must be promptly reported. Fresh or fresh frozen beef is examined for condition at the time of receipt. To determine whether the freezing requirement has been complied with in the case of frozen beef, the inspection requires that one or more quarters be selected from each car and these quarters sawed through their thickest part, which permits determination of the degree of freezing. If thoroughly frozen, the cut surface clearly indicates this fact and is smooth and evenly cut. If unfrozen, the saw tears the flesh, making a ragged cut. Other tests to determine whether beef has been frozen solid consists in—

(1) Striking the quarter with an iron bar. If the quarter is entirely frozen, the bar has a metallic ring as if it had struck solid ice, otherwise it produces a dull thud.

(2) Boring into a quarter with a 1-inch auger. If unfrozen tissue is reached, the auger ceases to cut. An indication of insufficient refrigeration is a slimy condition, which is likely to appear first under the fore shank, beneath the skirt, in the fold of the flank, on the neck, and on cut surfaces. If beef has been placed in the car before being thoroughly chilled, it may have a wrinkled appearance. If such a condition is noted, a thorough examination with the assistance of the "meat tryer" is given toward detecting sourness or putrefaction in the deeper parts adjacent to the bone.

*f. Handling at destination.*—Refrigerated cars are unloaded as quickly as possible. If, however, it becomes necessary to delay the unloading or distribution of the refrigerated product, the cars are properly re-iced to capacity every 24 hours and the doors opened as little as possible. It is very poor practice to hold cars on tracks, under load, over 48 hours.



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SECTION VIII

# STORAGE OF COAL AND FORAGE

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**63. Storage of coal.**—*a. General.*—Fires usually start in piles where the coal is more or less separated in coarse and fine strata, the fresh air entering through the coarser strata and acting on the finer portion. Fine coal invariably is stored by itself and in such a way as to exclude as far as possible the air from entering the pile.

*b. Preparation of place.*—(1) A dry and well-drained place is selected for storage of coal. If not drained naturally, a drain is provided about the storage pile, not underneath it; a drain beneath a pile may produce an air current up through the pile and thus assist spontaneous ignition.

(2) Coal is not dumped on ground covered with ashes or refuse of any kind, because often, in addition to furnishing flues for the admission of air, such refuse contains ignitible material. Furthermore, the presence of such refuse depreciates the value of the coal when it is reclaimed from storage. The ground selected is cleared of vegetation and leveled off so that the reclaiming of the coal is accomplished as easily as possible and so that dirt and other refuse are not taken up by the shovel or by other devices used. A hard clay bottom thoroughly drained is desirable if a concrete one cannot be provided. Where possible, space is also set aside so that coal can be moved if heating occurs.

*c. Method.*—(1) Slack coal is stored successfully to the height of 8 or 10 feet by packing as hard as possible, covering the surface with the finer portion in such a manner as to exclude air and water as nearly as possible. Water entering the bottom of the storage pile is exceedingly dangerous from a firing standpoint.

(2) Many coal fires occur in storage piles where a separation of the coarse and fine coal was made by dumping the coal as unloaded on the same spot, or along the center line of the pile, the coarse coal rolling down to the side, the fine coal accumulating at the center or axis of the pile; the air, entering the pile through the coarser por-

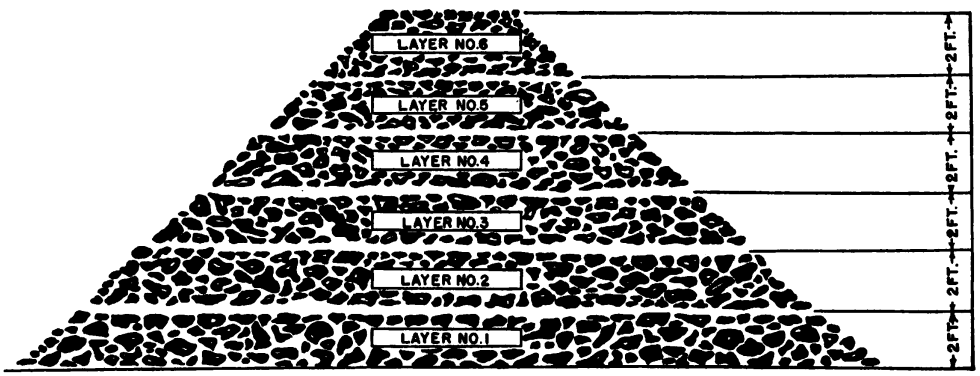


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tion and acting on the centrally located mass of fine coal, producing heat, which, on account of insufficient air circulation, is not carried off with sufficient rapidity to prevent high temperatures and spontaneous ignition. This hazard is very materially lessened if, when unloading with a clamshell bucket, the bucket is lowered to a point just above the surface of the pile before the contents are dumped. A layer of coal 2 feet in height is laid down to the full width of the base of the pile and over the entire length of the same; the second and succeeding layers, each 2 feet in thickness, are laid down in a like manner. This method of unloading eliminates the accumulation of fine broken particles in the center of the pile and, in addition, gives the coal a limited opportunity to season before being covered up by a succeeding layer.

(3) If storage is accomplished by truck, it is laid down in layers in the manner indicated when using a crane with clamshell bucket. A second layer is laid down by the truck running on top of the pile. To accomplish this, a track is built of scrap plank, the pieces of plank being kept together by pieces of old iron cable. This track may be laid down in sections 5 to 8 feet long and can be easily moved over the top of the pile. The track not only serves as a runway for the truck but also permits the pile to be compacted as the truck runs over it.

(4) Figure 12 shows method of building pyramidal pile in layers.




A SCIENTIFIC METHOD OF PILING COAL

FIGURE 12.

**64. Precautions for storing bituminous coal.**—The following suggested precautions are taken from Bureau of Mines Technical Paper 16 for storing bituminous coal. Any or all of the suggestions may prove impracticable or unreasonably expensive under certain conditions.



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*a.* Do not pile over 12 feet deep nor so that any point in the interior of a pile is over 10 feet from air-cooled surface.

*b.* If possible, store only screened lump coal.

*c.* Keep out dust as much as possible; to this end, reduce handling to a minimum.

*d.* Pile so that lump and fine are distributed as evenly as possible; do not, as is often done, allow lumps to roll down from the peak and form air passages at the bottom of the pile.

*e.* Rehandle and screen after 2 months, if practicable.

*f.* Do not store near external sources of heat, even though the heat transmitted is moderate.

*g.* Allow 6 weeks' seasoning after mining and before storing.

*h.* Avoid alternate wetting and drying.

*i.* Avoid admission of air to interior of pile through interstices around foreign objects, such as timbers or irregular brickwork, or through porous bottoms, such as coarse cinders.

*j.* Do not try to ventilate by pipes, as often more harm is done than good.

**65. Inspection of storage piles.**—Coal stored in piles is inspected frequently to insure the detection of excessive temperature. Excessive heating is recognized by its odor. Inspection consists of driving a few sharpened steel rods into the pile at frequent intervals. Any excess heat generated is detected by feeling the rod immediately upon its removal. If a hot spot is found with the rods, the temperature is carefully watched with a thermometer placed inside a pipe driven into the pile at the hot place. If the temperature of a pile reaches 140° or 150° F. and continues to rise, there is high probability that within a few days or a few weeks a destructive temperature will be reached. If the temperature reaches 160° or 180° F., there is also a certainty that a destructive temperature will be reached and that the coal must be moved.

**66. Reducing temperature in coal piles.**—The following methods are suggested for reducing the temperature of a coal pile:

*a.* The most effective method of combating a tendency to fire in a coal pile is by turning over the coal and exposing it to the air so that it becomes thoroughly cooled. Care is taken in exposing hot coal to the air for, if the temperature is too high, as soon as the hot spot is opened out, the mass bursts into flame and the fire spreads very rapidly. Therefore, if there is evidence of a high temperature, the spot is not opened out unless there are ample appliances at hand immediately to move the hot coal, or water sufficient to put out any fire that may start and to cool off the mass thoroughly.



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*b.* Whenever the fire has reached the stage where the coal is actually ablaze, it may be necessary to use water; but, in general, water is not used if it can be avoided. Water is not used upon a heating coal pile unless the pile has reached the flaming stage and not until other methods have proven ineffective.

**67. Deterioration during storage.**—In order to determine definite information for the benefit of the Government departments and of all who store coal in large quantities, a series of tests was made beginning in the fall of 1909 under the supervision of the United States Geological Survey and continued by the Bureau of Mines after its establishment in 1910. These tests were confined to determinations of the loss in heating value of coals and did not include a study of other deterioration; for example, in coking quality or the yield of byproducts in coking. A general summary of the results published in Bulletin No. 136, Bureau of Mines, states that the tests show that amount of deterioration of coal in heating value because of storage has been commonly overestimated. Except for sub-bituminous Wyoming coal, no loss was observed in outdoor weathering greater than 1.2 percent in 2 years. The Wyoming coal suffered somewhat more loss, 2 to 3 percent in the first year and as much as 5.5 percent in 3 years. Details of the tests may be obtained from the bulletin above referred to.

**68. Standard sizes of anthracite coal.**

| | Round mesh | | Square mesh | |
|---|---|---|---|---|
| | Through | Over | Through | Over |
| | *Inch* | *Inch* | *Inch* | *Inch* |
| Furnace | 4½ | 3½ | 4 | 2¾ |
| Egg | 3½ | 2½ | 2¾ | 2 |
| Stove | 2¼ | 1½ | 2 | 1⅜ |
| Nut | 2½ | ⅞ | 1⅜ | ¾ |
| Pea | ⅞ | 9/16 | ¾ | ½ |
| Buckwheat: | | | | |
| No. 1 | 9/16 | 5/16 | ½ | ¼ |
| No. 2 | 5/16 | 3/16 | ¼ | ⅛ |
| No. 3 | ⅛ | ------- | ------- | ------- |
| Barley | 3/16 | 1/16 | ------- | ------- |
| Culm | 1/16 | ------- | ------- | ------- |

**69. Cubic contents of loose coal and coke.**

| | *Cubic feet per ton* |
|---|---|
| Anthracite coal, loose | 40–43 |
| Bituminous coal, loose | 43–48 |
| Coke | 80–97 |



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**70. Storage of forage.**—*a.* All stables are provided with rooms in which hay and grain are stored. Since hay and grain are always salable they are particularly susceptible to theft. Every precaution is taken to prevent such theft. Doors are kept securely locked at all times. Windows are provided with iron gratings. No one has access to these rooms except in the presence of an officer or the stable sergeant.

*b.* Since all long forage is very combustible, the greatest care is exercised in handling it in order to prevent fire. Details handling forage of any description either in or out of the stable are, under no circumstances, permitted to smoke. If the electrical wiring system of the stable passes into or through the forage room, the greatest care is taken to insure that no pile of forage is in contact with any wires, even though these wires are heavily insulated.

*c.* Dampness is responsible for the early decay of forage in storerooms, even though this forage was of standard grade and condition when it was received. Hay and grain rooms require ventilation at all times. Forage is not piled on the floors nor is it so piled that it is in contact with the walls. Boards properly spaced so that the air may circulate under the pile are used as a foundation for each pile. Spaces are left between piles, and between each pile and the walls and the ceiling in order that air may circulate freely around them. That part of the roof that is over the grain room should be particularly well constructed and kept in good repair.

*d.* Rats and mice may be responsible for the destruction of large quantities of forage. As soon as their presence becomes known, steps are taken to exterminate them. Owing to danger to the public animals, poison as a means of extermination cannot be used. Traps of various patterns placed judiciously in and about the stable are the surest means of extermination.

## SECTION IX

## STORAGE OF GASOLINE

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**71. Precautions in storage and handling.**—*a.* When gasoline is stored in storage tanks, proper precautions are taken to insure the



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safety of the working personnel and to avoid accidental explosions. Gasoline must not be stowed in leaky cans. Cans of gasoline should be carefully examined upon receipt, and in every case where leaks are found the gasoline should be transferred to a tight can before being taken to the storehouse. The safest stowage for this material is in tanks buried in the ground and equipped with proper pumps so that the gasoline can be pumped into the reservoir of the apparatus in which it is to be used or into tight carrying cans. Where the quantities handled are large enough to warrant the expense, steps are taken to provide such stowage tanks.

*b.* All fire-underwriters' regulations relating to the handling and storing of gasoline are strictly observed.

*c.* Certain properties or characteristics pertaining to gasoline and special information relative thereto, knowledge of which is essential in order to guard against accidents, are as follows:

(1) At ordinary temperature gasoline continually gives off inflammable vapor. This vapor is heavier than air and in mixing with the air settles to the floor in strata form. The vapor from gasoline is especially dangerous in that it may travel a considerable distance from the gasoline and there be ignited, the flash traveling back to the container and causing the gasoline to ignite. The vapor from 1 pint of gasoline makes 200 cubic feet of air explosive. The proportion of air and vapor in the mixture determines whether the gasoline will merely burn or whether there will be an explosion.

(2) With regard to a flame, gasoline has peculiar habits. For instance, in the case of a full container of gasoline with an open top, should a match be applied to the surface of the gasoline, the fluid will flare and burn fiercely as long as the gasoline lasts. On the other hand, if a little gasoline is placed into a closed container and is allowed sufficient time to vaporize, a violent explosion will probably occur, should the vapor be ignited.

(3) In emptying tank cars or other gasoline containers, care is taken to see that all the contents are removed before the container is capped or closed. If this is not done, the small amount of gasoline left in the container will vaporize, and should this vapor come in contact with a flame an explosion will ensue. It is, therefore, considered necessary as a matter of safety that tank cars or drums, after being emptied, be left open for a short time in order to insure that the gasoline is entirely removed.

(4) Sawdust, sand, and carbon tetrachloride (the basis of "pyrene" and other ready fire extinguishers) are especially useful for putting out gasoline fires. Small fires may be extinguished by smothering them with a blanket.



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(5) The starting of fires from frictional or static electricity is a matter to be guarded against. Gasoline has been known to generate sufficient electricity (frictional), when being strained through a fabric strainer or passed through a hose, to produce an electric spark, which ignited the inflammable vapors of the gasoline with disastrous effects. In order to guard against frictional electricity, there should be provided a good metallic connection between the storage tank and the container that is being filled, so that the electricity is grounded as soon as generated.

(6) Under no circumstances is gasoline handled in a closed room. If it becomes necessary to handle gasoline in a building, the windows are opened and care is taken that no fires or other naked lights are near. After handling, the windows remain open for a sufficient length of time to allow any vaporized gasoline to escape.

**72. Receipt of gasoline.**—*a.* When gasoline is received in tank cars or tank wagons, a test is made to determine whether or not the gasoline actually received equals the amount called for in the delivery order.

*b.* When the temperature of the gasoline received is different from the temperature specified in the purchase order, the quantity of the gasoline actually received is converted to its equivalent quantity at a temperature of 60° F. (See par. 76.) Adjustment is made for temperature differences and wastage from evaporation when transferring the gasoline from tank cars or trucks to the underground storage tanks. In commercial practice, when 700 gallons are transported by tank truck from tank car to storage tank, approximately 5 gallons are allowed for wastage owing to evaporation.

*c.* In order that all gasoline drains from the tank car at the unloading point, it is necessary that the rails on which the car rests be in a level horizontal plane. The necessary action is also taken to see that the tank car rests in a level plane on the car trucks.

*d.* To determine the presence of water in the tank car, a narrow piece of testing paper (litmus paper) is attached with two thumb tacks to the side of the gage stick at the bottom, so that when the gage stick is inserted in the tank it shows whether or not there is any water in the bottom of the tank. After leaving this testing paper in the tank for 2 or 3 minutes, it changes color if there is water in the tank. If there is water in the tank car, the amount can be determined by draining off through the outlet valve before making connections for filling the storage tanks.

*e.* In order to prevent leakage from the tank cars after being spotted by the railroad company, an inspection is made to see that the mushroom valve at bottom center of the car seats properly to



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prevent leakage into the outlet chamber below. In freezing weather, water seeping from the gasoline into the outlet chamber and freezing therein forces off the screw cap on the bottom of the chamber and springs open the mushroom valve, allowing the gasoline to escape from the car in large quantities.

**73. Storage tanks.**—*a.* To determine if any leakage has occurred, the storage tank is gaged at the close of business each Saturday and again gaged the following Monday morning before opening for business. The storage tank is gaged with an 8-foot gage stick inserted into the tank slowly. Do not drop the stick against the bottom of the tank. The stick is held perpendicularly to the bottom of the tank, and the tank is always gaged on the same side of the fill pipe. The black side of the gage stick is kept out so that the marks are not scratched. Because gasoline creeps, the gage stick must be pulled out quickly and the stick wiped dry after each reading. Great care is exercised in the proper gaging of tanks.

*b.* The storage tanks are tested for water with testing paper once a week, immediately after heavy rains, and daily during periods of melting snow. The same method is used as described in paragraph 72 for tank cars. A little grease placed on the threads of the fill pipes after each delivery of gasoline aids in keeping water from working past the threads into the fill pipe. Fill caps of all tanks are kept closed at all times except when deliveries are being made or inventory is being taken.

*c.* The storage tank is inspected to determine if it is exactly horizontal. Any deviation from the horizontal affects the accuracy of the inventories when using the measuring rod.

*d.* Records are kept to show the average temperature for each month of the gasoline in the storage tanks. Over, short, and damaged (O. S. and D.) reports are made monthly to correct any shortage due to differences in temperature.

**74. Gasoline pumps.**—*a.* Clear all quantity stops on the blind pump after each delivery. If the pump is of a visible type, care is exercised in shutting off the flow on the exact lines indicating even gallons. When using meter pumps, the gasoline is delivered until the black pointer points to zero. After making a delivery, the dial must be immediately cleared by setting both pointers back to zero. Care is taken to avoid overflowing of the tank. Some cars do not take gasoline as quickly as others. Overrunning the tank and spilling gasoline causes losses and also creates a fire hazard.

*b.* All pumps are tested once a week, preferably on Monday mornings. The test is accomplished by using a 5-gallon test bucket as follows:



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(1) Pump 1 gallon five times.
(2) Pump 1 gallon three times and 2 gallons once.
(3) Pump 1 gallon twice and 3 gallons once.
(4) Pump 1 gallon once and 4 gallons once.

The necessary adjustments are made to correct errors found.

*c.* Oil the gasoline pumps once a week. The gland and packing nuts on gate valves must be kept oiled and screwed tight to prevent any leakage in the gasoline lines or pumps.

*d.* A daily record in permanent form is kept at the gas station. This record shows in appropriate columns the following information:

(1) Date.
(2) Previous day's balance on hand.
(3) Amount of gas received from railroad tank cars or any other source.
(4) Amount of gas issued on day of entry.
(5) Amount of gas sold on day of entry.
(6) Meter reading at beginning of day.
(7) Meter reading at close of day.
(8) "Over" or "short": A check of (4) plus (5) against (7) minus (6).
(9) Balance on hand at close of day.
(10) Physical inventory.

All of the above postings can be made in a ledger in which the 10 columns have been ruled. Entries 1 to 9, inclusive, are made daily. The physical inventory of gasoline on hand is made weekly by the man in charge and monthly by the responsible officer.

**75. Table for determining contents of storage tanks.**—*a. Horizontal storage tank (flat end).*—(1) Square the diameter in inches and multiply by the length in inches; multiply by 0.0034; the result is the capacity in gallons.

(2) Divide the number of inches which the gage shows to be in the tank by the diameter in inches to find the percentage of the diameter which the gage equals. Multiply the total capacity of the tank by the decimal shown opposite such percentage in the table in (3) below; the result is the contents in gallons.

(3) If the percentage of diameter be other than even, determine the proper decimal by proportion. Example, percent equals 3921; take the decimal for 39 percent and add to it twenty-one one-hundredths of the difference between the decimal for 39 percent and 40 percent.



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*Percent of decimal*

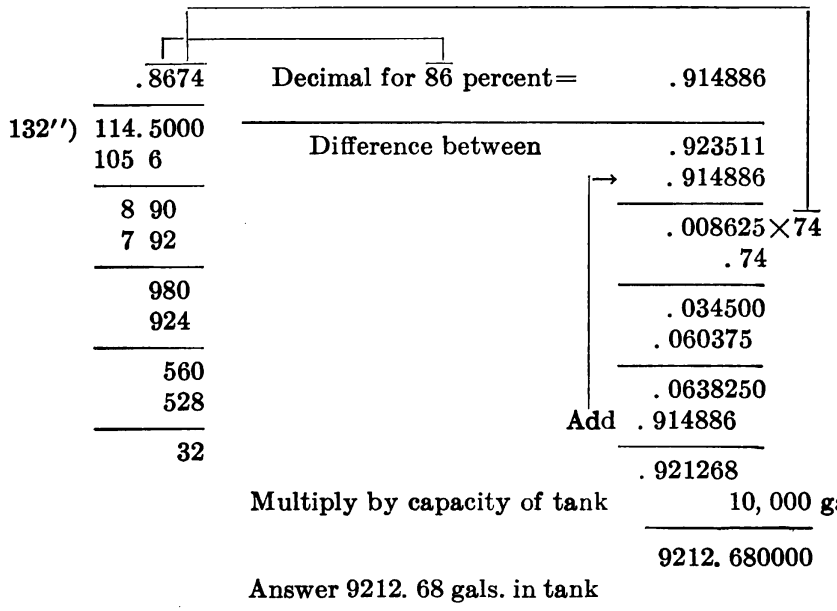
| | | | | | |
|---|---|---|---|---|---|
| 1 | 0.001759 | 35 | .311926 | 68 | .724271 |
| 2 | .004799 | 36 | .324061 | 69 | .736004 |
| 3 | .008782 | 37 | .336340 | 70 | .747702 |
| 4 | .013480 | 38 | .348667 | 71 | .759367 |
| 5 | .018665 | 39 | .361035 | 72 | .770805 |
| 6 | .024509 | 40 | .373539 | 73 | .782208 |
| 7 | .030795 | 41 | .385998 | 74 | .793498 |
| 8 | .037501 | 42 | .398525 | 75 | .804499 |
| 9 | .044627 | 43 | .411154 | 76 | .815534 |
| 10 | .052025 | 44 | .423749 | 77 | .826268 |
| 11 | .059832 | 45 | .436401 | 78 | .836923 |
| 12 | .067979 | 46 | .449132 | 79 | .847362 |
| 13 | .076489 | 47 | .461863 | 80 | .857654 |
| 14 | .085114 | 48 | .474560 | 81 | .867707 |
| 15 | .094065 | 49 | .487268 | 82 | .877579 |
| 16 | .103234 | 50 | .500000 | 83 | .887281 |
| 17 | .112719 | 51 | .512732 | 84 | .896766 |
| 18 | .122421 | 52 | .525440 | 85 | .905935 |
| 19 | .132293 | 53 | .538137 | 86 | .914886 |
| 20 | .142346 | 54 | .550868 | 87 | .923511 |
| 21 | .152638 | 55 | .563599 | 88 | .932021 |
| 22 | .163077 | 56 | .576251 | 89 | .940168 |
| 23 | .173732 | 57 | .588846 | 90 | .947975 |
| 24 | .184466 | 58 | .601475 | 91 | .955373 |
| 25 | .195501 | 59 | .614002 | 92 | .962499 |
| 26 | .206502 | 60 | .626461 | 93 | .969205 |
| 27 | .217792 | 61 | .638965 | 94 | .975491 |
| 28 | .229195 | 62 | .651333 | 95 | .981335 |
| 29 | .240633 | 63 | .663660 | 96 | .986520 |
| 30 | .252298 | 64 | .675939 | 97 | .991218 |
| 31 | .263996 | 65 | .688074 | 98 | .995201 |
| 32 | .275729 | 66 | .700238 | 99 | .998241 |
| 33 | .287711 | 67 | .712289 | 100 | 1.000000 |
| 34 | .299762 | | | | |



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(4) Sample problem for measuring gasoline in horizontal cylindrical storage tanks when only tank capacity and diameter of tank are known:

*Example:* 9 feet 6½ inches gasoline in tank—114.50 inches (depth of gasoline by vertical red measure in horizontal cylindrical tank).
Capacity of tank 10,000 gallons.
Diameter of tank 132 inches.




Answer 9212. 68 gals. in tank

*b.* The capacity of a horizontal, cylindrical, convex end equals the square of the diameter in inches times the length in inches times 0.0034 plus the diameter in inches cubed times 0.0004666.

*c.* The contents of either straight end or convex end tanks are determined as follows: Divide the liquid depth in inches to two decimal places by the diameter in inches. This equals the percent of the total depth represented by the liquid depth.

**76. Conversion factors for temperature adjustment.**—(Gravities 51.0 to 63.9—Coefficient 0.0006.) Multiplying any quantity of gasoline by the following factors converts the quantity from the applicable degree of temperature to 60°:

*Actual temperature*

| | | | | | |
|---|---|---|---|---|---|
| 0 | 1. 0361 | 4 | 1. 0337 | 8 | 1. 0313 |
| 1 | 1. 0355 | 5 | 1. 0331 | 9 | 1. 0307 |
| 2 | 1. 0349 | 6 | 1. 0325 | 10 | 1. 0301 |
| 3 | 1. 0343 | 7 | 1. 0319 | 11 | 1. 0295 |



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| | | | | | |
|---|---|---|---|---|---|
| 12 | 1.0289 | 58 | 1.0012 | 104 | .9732 |
| 13 | 1.0283 | 59 | 1.0006 | 105 | .9726 |
| 14 | 1.0277 | 60 | 1.0000 | 106 | .9720 |
| 15 | 1.0271 | 61 | .9994 | 107 | .9714 |
| 16 | 1.0265 | 62 | .9988 | 108 | .9708 |
| 17 | 1.0259 | 63 | .9982 | 109 | .9702 |
| 18 | 1.0253 | 64 | .9976 | 110 | .9696 |
| 19 | 1.0247 | 65 | .9970 | 111 | .9690 |
| 20 | 1.0241 | 66 | .9964 | 112 | .9684 |
| 21 | 1.0235 | 67 | .9957 | 113 | .9678 |
| 22 | 1.0229 | 68 | .9951 | 114 | .9672 |
| 23 | 1.0223 | 69 | .9945 | 115 | .9666 |
| 24 | 1.0217 | 70 | .9939 | 116 | .9660 |
| 25 | 1.0211 | 71 | .9933 | 117 | .9654 |
| 26 | 1.0205 | 72 | .9927 | 118 | .9647 |
| 27 | 1.0199 | 73 | .9921 | 119 | .9641 |
| 28 | 1.0193 | 74 | .9915 | 120 | .9635 |
| 29 | 1.0187 | 75 | .9909 | 121 | .9629 |
| 30 | 1.0181 | 76 | .9903 | 122 | .9623 |
| 31 | 1.0175 | 77 | .9897 | 123 | .9617 |
| 32 | 1.0169 | 78 | .9891 | 124 | .9611 |
| 33 | 1.0163 | 79 | .9885 | 125 | .9605 |
| 34 | 1.0157 | 80 | .9879 | 126 | .9599 |
| 35 | 1.0151 | 81 | .9873 | 127 | .9593 |
| 36 | 1.0145 | 82 | .9867 | 128 | .9587 |
| 37 | 1.0139 | 83 | .9860 | 129 | .9581 |
| 38 | 1.0133 | 84 | .9854 | 130 | .9575 |
| 39 | 1.0127 | 85 | .9848 | 131 | .9569 |
| 40 | 1.0121 | 86 | .9842 | 132 | .9562 |
| 41 | 1.0115 | 87 | .9836 | 133 | .9556 |
| 42 | 1.0109 | 88 | .9830 | 134 | .9550 |
| 43 | 1.0103 | 89 | .9824 | 135 | .9544 |
| 44 | 1.0097 | 90 | .9818 | 136 | .9538 |
| 45 | 1.0091 | 91 | .9812 | 137 | .9532 |
| 46 | 1.0085 | 92 | .9806 | 138 | .9526 |
| 47 | 1.0079 | 93 | .9800 | 139 | .9520 |
| 48 | 1.0072 | 94 | .9794 | 140 | .9514 |
| 49 | 1.0066 | 95 | .9788 | 141 | .9508 |
| 50 | 1.0060 | 96 | .9782 | 142 | .9502 |
| 51 | 1.0054 | 97 | .9776 | 143 | .9496 |
| 52 | 1.0048 | 98 | .9769 | 144 | .9490 |
| 53 | 1.0042 | 99 | .9763 | 145 | .9483 |
| 54 | 1.0036 | 100 | .9757 | 146 | .9477 |
| 55 | 1.0030 | 101 | .9751 | 147 | .9471 |
| 56 | 1.0024 | 102 | .9745 | 148 | .9465 |
| 57 | 1.0018 | 103 | .9738 | 149 | .9459 |

**77. Approximate weight of petroleum products.**—In the United States, petroleum and its products are measured by bulk not weight. Whether handled in containers or without them, the quantities are customarily reduced to the equivalent of barrels of



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42 United States gallons (barrel thus equals 158.984 liters). In many foreign countries these commodities are measured by weight. The specific gravity of the different grades of crude petroleum and of the finished products varies materially. On the basis of approximate averages, the Department of Commerce, in converting foreign weight statistics to gallons or barrels of 42 gallons, used the factors shown in the following table:

| | Weight of United States gallon | | Weight of barrel of 42 gallons | |
|---|---|---|---|---|
| | Pounds | Kilograms | Pounds | Kilograms |
| Crude petroleum | 7. 3 | 3. 311 | 306. 6 | 139. 07 |
| Lubricating oils | 7. 0 | 3. 175 | 294. 0 | 133. 36 |
| Illuminating oils (kerosene) | 6. 6 | 2. 994 | 277. 2 | 125. 74 |
| Gasoline and related products (motor spirit, benzine, etc.) | 6. 1 | 2. 767 | 256. 2 | 116. 21 |
| Fuel and gas oils | 7. 7 | 3. 493 | 323. 4 | 146. 69 |

## SECTION X

## STORAGE OF LEATHER EQUIPMENT

| | Paragraph |
|---|---|
| Care and preservation of leather equipment | 78 |
| Leather and leather equipment in storage | 79 |
| New leather and leather equipment | 80 |
| Used leather equipment | 81 |
| Metal parts | 82 |
| Other equipment | 83 |
| Leather and leather equipment in use | 84 |

**78. Care and preservation of leather equipment.**—Because of the value of leather equipment and its rapid deterioration if neglected, the proper care of this material is of utmost importance.

*a.* Two agents are essential to the proper care of leather equipment—a cleaning agent and an oiling agent. The cleaning agent is white soap; the oiling agents are neat's-foot oil, neat's-foot substitute, saddle soap, and harness soap.

(1) The white soap has cocoanut oil as one of its ingredients. This yields a free lathering soap with no harmful effect on leather. It removes dirt, sweat, and other matter which normally accumulate in the surface pores of the leather.

(2) Neat's-foot oil has been found by long experience to be the most satisfactory oiling agent for leather. It penetrates the pores



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and saturates the fibers, making them pliable and elastic. Dry leather is brittle; leather oiled excessively soils the clothing and accumulates dirt. The condition to be desired is leather treated with sufficient oil to be soft and pliable without excess.

*b.* When leather is washed with any soap, some of the surface oil is always removed. This leaves the surface hard, dry, and likely to crack. If this surface oil is replaced by direct application of neat's-foot oil, it is very difficult to avoid use in excess. This has led to the development of saddle soaps which contain a small percentage of neat's-foot oil, so that the surface of the leather after washing is not deprived of its oil. It is essential that the saddle soap used does not contain an excessive percentage of oil, otherwise the use of saddle soap produces objectionable conditions. The saddle soap issued does not contain any ingredients harmful to leather.

*c.* Oil penetrates more uniformly into leather when applied from the flesh side. Dry leather absorbs oil like blotting paper, while a more uniform distribution of oil is obtained if the leather is damp. New equipment is moistened, as in washing, before it is oiled. The application of too much oil upon leather equipment is as harmful as not applying enough oil. Dry all leather, wet from whatever cause, in the shade; never dry leather in the sun or close to a steam radiator, furnace, or boiler.

**79. Leather and leather equipment in storage.**—*a.* All leather or leather equipment in storage and such as is not in actual use is kept in a cool, dry place and inspected periodically as follows:

(1) At temperate northern stations, leather in sides is inspected three times a year, once during the winter and twice during the summer months; equipment is inspected one or more times a year, dependent upon excessive rainfall or extreme aridity.

(2) At semitropical and tropical stations (except in the Philippine Islands), leather in sides is inspected five times a year; equipment, two or more times a year, dependent upon excessive rainfall or extreme aridity.

(3) At stations in the Philippine Islands, leather in sides is inspected once a month during the rainy season and at other times every 2 months; equipment is inspected three or more times a year, dependent upon excessive rainfall or extreme aridity.

*b.* Where inspections disclose the following-named conditions, the procedure is as shown in connection with the respective conditions:

(1) *Dampness.*—Hang or place the damp article in a dry place and allow it to dry thoroughly, but do not leave exposed after dampness is completely absorbed.



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(2) *Mold.*—Remove all mold immediately by thoroughly wiping with a moist cloth, and allow the article to dry by exposure to the air before returning to storage.

(3) *Oil on leather.*—Wipe off all oil that appears on the surface or exuding from the pores of the leather. Leather equipment in storage should not contain as much oil as equipment in use, because mold growths occur more frequently on oily leather.

(4) *Leather too dry.*—Never allow leather to dry out entirely. When found to be too dry, give the article a light application of dubbin (par. 81*a*). Wipe off any oil that the leather has not absorbed by the time it is to be repacked.

**80. New leather and leather equipment.**—When new leather or leather equipment is received it is unpacked as soon as practicable, examined for the conditions named in paragraph 79*b*, and treated as outlined therein. Particular attention is given to mold or dampness.

**81. Used leather equipment.**—Used leather equipment turned in for storage is thoroughly inspected and given any necessary repair, cleaning, and oiling before storing. In order to facilitate the cleaning and oiling of harness or other leather equipment, a rack is provided on which to hang such articles. The procedure for cleaning and oiling various articles of equipment is as follows:

*a. Articles of black leather.*—Remove all hardened grease with a thin piece of wood. Do not use knife or glass. Dampen a sponge in clean, lukewarm water (hot water must never be used nor the leather allowed to soak in any water) and pass sponge over the article until all dirt and sweat have become soft. Rinse the sponge often and replace dirty water with clean water frequently. Obtain a good lather by applying sufficient harness soap to sponge and give the article a heavy coating of lather, continually rubbing the article until all dirt and sweat are removed. Rinse well, and when leather is nearly but not entirely dry apply dubbin made according to the following formula:

50 percent pure neat's-foot oil.
50 percent beef tallow (usually obtainable locally from beef used at posts).

Heat the ingredients about 15 minutes to mix them thoroughly. Apply dubbin, lukewarm, to article with a small sponge, first spreading it quickly over the entire surface and then rubbing it in well.

*b. Articles of russet leather.*—Proceed as outlined for black leather, but use saddle soap. Russet-leather equipment requires more frequent oiling than black leather, but too much oil is detrimental to it as well as to black leather. Hence, instructions are strictly observed



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with regard to the requirements that all leather be examined before storage and that any oil on the surface or exuding from the pores of the leather be wiped off.

**82. Metal parts.**—To clean, wipe well with a cloth slightly moistened in oil, or wash with warm water to remove hardened saliva, sweat, mud, etc. The bits, chains, and spurs may be polished, but parts that are issued dark are kept in that condition.

**83. Other equipment.**—The leather parts of equipment containing wool, felt, or hair are cleaned and oiled as necessary; cloth or hair parts are brushed, washed, and dried accordingly; and that which is stored is packed in boxes well-lined with wrapping paper and having an additional lining of moth-proof paper of a grade that will not stain the equipment. Not less than ¼ pound of naphthalene flakes per box is sprinkled on the equipment after it is placed in the boxes. Saddle blankets, hair cinches, and like articles are individually wrapped and naphthalene sprinkled in the articles as well as in the box.

**84. Leather and leather equipment in use.**—*a.* Leather equipment in use is wiped off daily with a damp cloth to remove mud, dust, or other foreign substances. Under no conditions is it cleaned by immersion in water or in running water. Daily care is necessary to maintain the appearance of the equipment but alone is insufficient to preserve it properly. At intervals of from 1 to 4 weeks, depending upon circumstances, it is essential that the equipment be thoroughly cleaned. When cleaning, separate all parts, unbuckle straps, remove all detachable parts, loops, etc., when possible.

*b.* Wipe off all surface dust and mud with a damp (not wet) sponge. Rinse out the sponge and make a lather by rubbing it vigorously on white soap. The sponge must not contain an excess of water if a thick lather is desired. When a creamy lather is obtained, clean each piece of equipment, taking care that no part is neglected. To remove the dirt and sweat from the leather, each strap is drawn its entire length through the lathered sponge. Rinse the sponge again, make a thick lather with saddle soap, and go over each separate piece with the same care as before. Allow the leather to become partially dry and then rub it vigorously with a soft cloth. The equipment should now have a neat, healthly appearance.

*c.* If the foregoing instructions are carefully followed, the leather should be soft and pliable and no further treatment is necessary. At certain intervals, however, it is necessary to apply a small amount of neat's-foot oil. No general rule with regard to the frequency of oiling can be prescribed, because different conditions of climate and service are factors which have to be taken into consideration. Ex-



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perience has shown that during the first few months of use a set of new equipment requires at least two applications of neat's-foot oil per month. Thereafter, it is entirely a matter of judgment, as indicated by the appearance and pliability of the leather. Frequent light applications of oil are much more valuable than infrequent heavy applications.

*d.* New leather equipment is always given a light application of neat's-foot oil before it is put into use; cleaning with soap is unnecessary because the equipment is clean.

*e.* The oil is applied whenever possible to the flesh side of the equipment after the leather has been cleaned and has partially dried (about one-half dry). The oil is applied with an oiled rag or cotton waste by long, light, quick strokes in order to obtain a light, even distribution.

*f.* The oiled leather equipment is placed, if practicable, in a warm, dry place for 24 hours. Any unabsorbed oil on the surface is then removed with a dry cloth.

## SECTION XI

## CHECKING AND TALLYING

| | Paragraph |
|---|---|
| Checking and tallying | 85 |
| Model tally sheets | 86 |

**85. Checking and tallying.**—*a. General.*—Accurate records are kept of all supplies received and shipped. The quantity and quality of supplies in storage must at all times be known. Such supplies are stowed so that they are thereafter handled with the minimum amount of labor and are available for ready inventorying. In order to assure the accuracy of the record of stock received and shipped, a uniform system of checking or tallying is adopted in every warehouse. The result of such a check is made a matter of permanent record to provide a means for the settlement of claims which might arise at a later date.

*b. Checking.*—(1) Checking, as applied to warehousing, is the process of comparing the quantity and quality of supplies as shown on a statement, such as an invoice, with the supplies involved. After supplies are received and stowed, the identity of each individual shipment is lost. It is therefore essential that the checking of such shipment be done immediately upon its receipt and before stowing. In the case of an outgoing shipment the reverse is true. Checking of such a shipment is accomplished at the last possible moment before the supplies are turned over for transportation. A check of an out-



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going shipment made too far in advance of the time such shipment leaves the warehouse loses much of its value because of the possibility of changes in the quality or quantity of such supplies subsequent to the time of the check. Usually a check of supplies is made both as to quantity and quality. This is especially true when the goods received are of such a nature as to require a special check or inspection as to their condition or quality. It is a fundamental rule of good warehousing that when separate checks of this character are required, they be as nearly coincident as practicable. An invoice specifies a certain quantity or quality of an item. The goods when received are checked and found to be according to the invoice. The time and place of occurrence of loss or damage subsequently discovered are readily fixed. If, however, a considerable delay is allowed to occur before the shipment is checked, and if at the time of this check some of the articles are noticed to be in a damaged condition, it is difficult to fix definitely the time and manner of the occurrence of such damage and responsibility therefor.

(2) To be of value a check must be accurate. In order to assure such accuracy, it is often necessary to make a double or even a triple check of supplies. In unloading a car of goods each article is checked out of the car and at the point of storage. A third check may be made when the supplies are stowed and the amount entered on bin or pile cards, when such cards are used. This method insures an accurate record of the quantity received from the transportation agency and also that actually received at the warehouse. A single check made at any one place shows only the condition at that point. There is no assurance in this case that the quantity received from the car is the same as that finally received at the warehouse.

(3) Another method often adopted to guarantee accurate checking is that requiring two parallel checks to be made at the same time and place; for example, as goods are being unloaded from the car. In this method, two men make independent checks of the articles being unloaded. The result of each of these independent checks is later compared with the other and with the invoice. If the result obtained in each instance is the same, the check is probably accurate. The individual who makes a check is never required to compare the result of such check with the invoice, manifest, or similar document. If such a procedure is allowed, it is likely to result in inaccuracies because, should there be a discrepancy, the checker is tempted to adjust the record of his check to show the same quantity as that on the invoice, etc., instead of making a recheck of the shipment. For the same reason a check is never made directly from the invoice. It has been



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found that the checker will anticipate the quantity of a certain article received if he has seen that quantity written on the invoice. The invoice may read 20 boxes. If only 19 boxes, are received, the checker is likely to enter the shipment as 20 boxes, because he has the number 20 in his mind. Occasionally, also, a checker may, through mere laziness, fail to make the count if he has knowledge of the quantity shown on the invoice; he takes the number shown on the invoice as final. This system of checking encourages dishonesty.

*c. Tallying.*—This is the recording of the result of a check. In making his tally the checker stands at such a point as will permit him to observe readily each article handled. He observes carefully each item as it passes him and places a tally upon the sheet for each package or unit of each item. He enters his tallies in groups of five, the fifth tally running diagonally across the others, thus: 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 II. This tally indicates the receipt of 32 units. The checker notes the condition of the containers in which the goods are packed at the time he makes his tally. Leaky barrels, broken packages, swelled cans, torn sacks, and similarly damaged articles are watched for especially and when discovered are placed to one side and never stowed until a detailed inspection is made. In checking and tallying it is common practice to have two men working as a team. One counts the packages, boxes, etc., and calls them off to the other, who makes the necessary notations on the tally sheet. The advantage of this method is that the attention of neither man is distracted from the particular duty which he is performing. The likelihood of accuracy is thus greatly increased.

**86. Model tally sheets.**—*a.* A checker uses W. D., Q. M. C. Form No. 489 (Tally Sheet Incoming) or W. D., Q. M. C. Form No. 490 (Tally-Out). These sheets can be conveniently handled by being attached to a clip board. One or more tally sheets are provided for each car, motor truck, or other convenient unit. Upon the completion of the checking and tallying of such unit, the sheet is totaled and signed by the checker. A new sheet is then prepared for the next unit to be unloaded. When the checking of a shipment has been completed, the tally sheet is delivered by the checker to the office of the warehouse, where the quantities shown on such sheet are compared with those on the bill of lading, invoice, manifest, and other documents involved in the shipment.

*b.* The use of these forms at point of shipment and at destination is illustrated as follows:



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WAR DEPARTMENT
Q. M. C. Form No. 490
(Revised February 8, 1938)

# TALLY-OUT
(Packing or Loading List)

Serial No. 9872
Req. No. QM 135-65-40
No. of sheets 1
Sheet No. 1

Q.M.S.O. New York General Depot
(Station)

Warehouse 7-B — Date March 7, 1940

Consignee The Quartermaster, Fort School — Carrier Penna. R. R.

Destination Philadelphia, Pa. — B/L No. WQ 764211

Routing Penna. Railroad — Car No., Initials, PR-7642
Seals No. QM 125-126

Date shipped March 7, 1940 — Authority Shipping ticket #9950

| U. S. NOS. ON PACKAGES | NUMBER AND KIND OF PACKAGES | CONTENTS | GROSS WEIGHT (Pounds) Unit | GROSS WEIGHT (Pounds) Total | CUBIC MEASURE |
|---|---|---|---|---|---|
| U S 4565 to 4814 | 250 | Lockers, trunk 26-L-294 | lbs. | 10000 | (a) |

(a) Filled out only for water shipments.

(b) Filled out only when used as a packing list.

(c) Filled out only when used as a loading sheet as for truck shipment.

K. H. L.
Checker.

(b)
(c)
Packer.
Shipper.

Received the above articles in apparent good order and condition (except as noted) this date .....

(c)
(Signature)

(c)
(Designation)

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Q.M. C. Form No. 469
WAR DEPARTMENT
Revised June 20, 1938

# TALLY SHEET
## INCOMING

Tally-in No. 787
Sheet No. 1
Number of Sheets 1

Station Fort School, Pa. Warehouse No. 2 Date received 3/9/40

Consignor Q.M.S.O. N.Y.G. Depot Car No. PR-76428 Car Seals No. QM 125-126

Via Penna. R. R. (Rail, truck, boat, parcel post, mail) Requisition, Purchase Order, or Shipping Ticket S. T.

No. 9950 Bill of lading No. WQ 76421

Contents of packages { have / have not } been verified (strike out words not applicable)

| U. S. Nos. on Packages | Number and Kind of Packages | CONTENTS | Gross Weight (Pounds) Unit | Gross Weight (Pounds) Total |
|---|---|---|---|---|
| U.S. 4565 | 250 | Lockers, trunk #26-L-294 | (a) | (b) |
| to | | | | |
| 4814 | | ////////////

INSTRUCTIONS TO TALLY CLERK

Mark heavy circle on other side of this sheet around numbers of damaged packages and list them below, with full information as to condition in which they are received. This is of the utmost importance, as claims will be made on the basis of this information.

PACKAGES RECEIVED IN DAMAGED CONDITION

| PACKAGE NO. | WEIGHT | ARTICLES | EXTENT OF DAMAGE TO CONTENTS |
|---|---|---|---|
| U.S. 4670 | 25 | 1 locker | broken hinge on locker lid. |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Above facts have been reported to Transportation Officer, who states that notation thereof {has / ~~has not~~} been made on B/L prior to surrender to carrier and that carrier's agent {does not / acknowledge(s)} liability for damage.

L. S. O.
*Receiving Clerk.*

U. S. GOVERNMENT PRINTING OFFICE 3—10543

## SECTION XII

## INVENTORIES

| | Paragraph |
|---|---|
| Schedule | 87 |
| Periodical | 88 |
| Progressive | 89 |
| Checking | 90 |
| Methods of taking | 91 |
| Model inventory cards | 92 |

**87. Schedule.**—*a. Responsibility.*—The senior quartermaster on duty at a depot, post, or station is responsible for the taking of inventories of both standard and nonstandard stock at the prescribed time. He designates an officer to supervise the inventory and details the necessary personnel.

*b. Purpose.*—The purpose of an inventory is to compare the quantity of each item in storage with the quantity which the stock record



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card of the item indicates is in storage, and thus to correct the stock record card balance. Inventories are invariably taken by classes; thus, the inventory of each class is complete in itself without reference to any other class. In order to assure an expeditious and accurate inventory, it is essential that stock be carried by correct nomenclature and stock numbers for standard stock (also by stock numbers for nonstandard stock if stock numbers are used), both in storehouse and on stock record cards, and that it be systematically arranged by classes in alphabetical order, regardless of whether it is standard or nonstandard stock.

*c. When taken.*—At each depot, post, and station a complete inventory of all stock on hand in each storage class is taken during the months specified in the following schedule (annual physical inventory of obsolete and nonstandard stock at motor transport depots not required):

| Month | Classes |
|---|---|
| January | 6, 9, 12, 19, 21, 22, 23, 30, 32, 33, 39, 44, 45, 46, 47, 48, 50, 58, 59. |
| February | 63, 64, 65. |
| March | 34, 69, 70. |
| April | 31, 38, 40, 42, 43, 62. |
| May | 10, 11, 13, 15, 17, 41, 60, 66. |
| June | 7, 67, 68. |
| July | None (summer training camp season). |
| August | Do. |
| September | 18, 35, 53, 54, 57, 61. |
| October | 55, 71, 72, 73. |
| November | 5, 24, 26, 27, 29, 36, 37, 74. |
| December | 8, 14, 51, 52. |

*d. Exempted activities.*—The following activities are exempted from the requirement that each station take inventories at the time stated in the schedule of inventories:

(1) Recruiting stations.
(2) Remount purchasing and breeding headquarters.
(3) Posts on caretaking status.
(4) Air fields with garrisons of less than 25 men.
(5) Ordnance depots and arsenals on an inactive status.

Exempted activities will take inventory of all classes during the month of December.

**88. Periodical.**—The first step taken is that of fixing a specific day and hour upon which all calculations must be based. Goods received after the time specified for the inventory are disregarded. Goods shipped out after the hour specified are considered as on hand



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and are included in the inventory. The usual commercial practice is to suspend receipts and shipments during the time required for inventorying the supplies in storage. This method eliminates much confusion in making an accurate count and simplifies checking of the inventory with the stock records. The force assigned the task of taking the inventory is divided into "inventory teams." Each team is made up of two or three men. Each warehouse is laid out in sections for inventorying. Each section is assigned to one of the inventory teams. Upon completion of the count of all articles stored in a section, the recorder of the team submits the figures resulting from his count to the warehouse foreman or other designated person. The reports submitted by all teams assigned to a warehouse are then consolidated. The result is a complete inventory of material stored in that warehouse. In taking an inventory of this type, a sufficient number of teams is employed to insure completion of the inventory in a very short time, usually within 24 hours. Experience has shown that an inventory requiring a much greater time in the taking is of little practical use. It is seldom practicable to suspend current business for a longer time, and if material is being stowed or shipped while the count is being made, numerous errors are bound to appear. The computations necessarily made in reconciling or checking the inventory with the stock records are greatly increased in number and complexity, when the length of time taken in inventorying prohibits the suspension of the transaction of current business.

**89. Progressive.**—This type of inventory is taken progressively; i. e. the count of every item of one article stored in a warehouse is completed before the count of another article is begun. When this method of inventorying is adopted, the number of inventory teams employed is limited to that necessary to complete a cycle in a designated time. The time so designated is usually from 6 months to 1 year. During that time every article carried in storage must be counted. Upon the completion of the count of each article the result is turned over to a designated person to be checked with the stock record of that article. When the adoption of this method of inventorying is practicable, the stock record of each article is checked and adjusted, if necessary, once during the period.

*a.* The taking of either of the two types of physical inventory is comparatively simple in a warehouse in which are employed scientific methods of piling. When the numeral system of piling cases not of uniform size is employed, the label of each case, crate, or similar package is exposed on an aisle. This label bears the name of the article and the quantity contained in the package. One member of the inventory team calls the contents of each package. Another member records



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on paper the amount called. After the amount of the contents of all packages of the article has been called, these amounts are totaled and the total is entered on the inventory.

*b.* When the block system of warehousing has been used, it is a simple mathematical problem to determine the number of items in a block when all of the factors are known, i. e., the number of items in each package and the size of the block expressed in number of packages in depth, width, and height.

*c.* When an article, such as shoes, packed in uniform packages according to size, is being inventoried, entries of the various sizes are placed on the margin of the tally sheet. Each case as called is tallied opposite the appropriate entry. The necessity for a separate sheet for each size is thus eliminated. The number of pairs of shoes is then arrived at by multiplying the number of cases tallied by the number of pairs contained in a case.

*d.* Spare parts and similar articles stored in bins may be given a double check with little loss of time. It is necessary to remove such articles from the bin for accurate counting. They may be counted as they are being so removed and again counted as they are being replaced. In the storage of such items a double-bin system is sometimes adopted.

*e.* Deteriorated or damaged stores are watched for when an inventory is being taken and when discovered are set aside from the serviceable articles. They are included in the count. A report of the quantity and location of the damaged articles is made to the foreman of the warehouse to enable him to make proper disposition of such articles.

**90. Checking.**—An inventory is of no value unless it serves a definite purpose. The usual purpose of a physical inventory is that of verifying the stock records and reconciling such records with the stock in the warehouse. Before this can be accomplished all tally sheets must be assembled, the total on each extended, and the whole consolidated. When this has been accurately done, the inventory is ready for checking with the stock record or paper inventory. If the transaction of current business has been suspended during the taking of the inventory, the checking process is not complicated. The totals shown on the inventory and those appearing on the stock record should agree. If a discrepancy appears, the item involved is at once rechecked. If the inventory is found to be correct, steps must be taken to adjust the stock records. When the transaction of business has been carried on during the taking of the inventory, the checking becomes far more complicated. The inventory can then be employed only as a starting point. All property received and all



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shipments made during inventory must be considered as must also all transactions in work, i. e., entered on the stock record but not actually consummated in the warehouse. Great care must be taken in making adjustments under such conditions to guard against the many possibilities of errors in the computations.

**91. Methods of taking.**—The senior quartermaster on duty at a depot, post, or station prescribes the method to be used in taking the inventory. At some places a card system may work to advantage, while at other places it may be more advantageous to use a sheet system (several articles listed on one page with columns for stock number, name of article, quantity found at inventory, quantity on memorandum receipt, and total, with additional columns to show shortages or overages, etc.). The important thing is to obtain an accurate inventory and to make the proper adjustments on stock record cards. There are numerous methods that have been found satisfactory, each of which has seemed best to fit the peculiar conditions for which adapted. These methods are as follows:

*a. Method A.*—In this method, there are inventory groups consisting of at least two individuals who do the counting, an individual who records, and several individuals who perform the work of rechecking. Under this method, the counters call off the result of their count, and this is noted by the recorder on an improvised form or card.

(1) When the total count of any article has been completed, it is compared with the stock card balance of that article; and, if the two agree, after considering any of the articles that may be out on memorandum receipt, the amount found is entered on the stock card in red ink "as per inventory," with the date of the inventory shown in the date column of such stock record card. The counters proceed then to the next article. If they do not agree, the article is rechecked by a rechecker and the warehouseman. If this recheck count agrees with the original count, or in any case if the recheck does not agree with the stock record card balance, the red ink entry is given a serial voucher number. This same number is shown on all vouchers required to correct the discrepancy.

(2) The inventory slips or memoranda of the results of the actual physical count, which are prepared in ink or indelible pencil, and from which are taken the red-ink inventory figures entered on the stock record cards, are each signed by the person or persons who made the count of the articles listed thereon, except that when a separate card is used for each article such cards may be authenticated by the initials or other duly assigned symbols identifying the persons making the count. All these slips, memoranda, or cards



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are retained, carefully assembled, and filed in the office of the accountable property officer, and are available for examination by the inspector and property auditor. After having served the purposes of the inspector and the auditor, and when all discrepancies disclosed by the next audit of the stock record account have been satisfactorily adjusted, the inventory slips, memoranda, or cards may be destroyed.

(3) This method is best where there are large stocks and many items. It permits as many groups as are necessary or available to count different items simultaneously and thus complete the count as quickly as possible and cause the least possible interference with normal activities. A description of a set-up of this kind follows:

(*a*) At the beginning of the inventory, the officer in charge of the inventory takes physical possession of all stock record cards of the class about to be inventoried and of the account of property on memorandum receipt; he retains them in his possession until the count is completed. During the count, the regular work of receipt and issue is suspended, except for urgent issues that cannot be postponed; and no member of the stock section responsible for the custody of the stock, or of the stock record section responsible for accounting for the stock, is concerned in any way with the first count of the stock. The stock record cards and account of property on memorandum receipt are retained by the officer in charge until adjustment vouchers are prepared, but access to them is permitted after quantities on hand as shown by actual count are entered in red ink.

(*b*) The inventory force is so organized that the actual count of stock consumes not more than 1 day. If more than 1 day is required to count the stock of any class, the stock record cards are divided into sections and no more articles included in any section than can be completely inventoried in 1 day.

(*c*) Sufficient inventory groups are assigned to a class to complete the count of that class in 1 day; but the rechecking, if differences develop between the amount of stock found on inventory and that carried on stock cards may take longer. Counters, having completed their original count, do not have to await the finish of a recheck before starting on a new class or subdivision of a class. A group of three counters and one recorder should be able to count from 300 to 500 items in 1 working day.

(*d*) The officer in charge or chief recorder designates the exact place at which each counter begins his work, in both retail bins and in bulk stock, and explains to each counter the section that he is to cover. Each counter must understand not only where his



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allotment of items begins but also where it ends. The starting point for each group in both retail bins and bulk stock is the corresponding first number of each group. When there are two counters of bulk stock, the first counter starts with the corresponding first number of his group and works forward; the second counter starts with the last number of his group and works backward. If more than two counters for bulk stock of a class are required, one starts at the beginning and one at the end of the group, working away from each other. No difficulty is thereby experienced because, if stock cards and stock articles are arranged so as to be in agreement, the inventory cards, upon reaching the recorders, can be sorted and arranged as easily as in any numerical card index file. Inventory cards are turned in by each counter to the recorder of his group. Each retail counter should, when he has completed count, assist the bulk counter until the count is completed, or vice versa.

(*e*) Inventory cards are 3 by 5 inches of any quality of cardboard or heavy blank paper of any light color. Inventory cards in two colors for use with bulk stock and retail stock facilitate rechecks and assist in locating differences in count.

(*f*) Separate cards are used for each item counted. If several groups of the same item are counted, additional cards are used as needed. The counter puts his number on each card in the upper right-hand corner, blocked off by a diagonal line, and the unit of issue in the upper left-hand corner, also blocked off by a diagonal line. The stock number is written in the upper third of the card. The quantity of the article as found by actual count is written in the lower two-thirds of the card. Entries are not totaled by counters. When the count of stock of any article is completed, the counter writes "last card" below the quantity entries. This information enables the recorder to total the cards and compare the total with the stock record card balance.

(*g*) Adding machines using tape may often be used. The amount on each package is called to the recorder at the adding machine. Totals are taken, entered on the card, and the tape attached thereto.

(4) The recorders of each group receive and check the inventory cards turned in by the counters of that group in the following manner:

(*a*) The quantities of an item of bulk stock are totaled and transferred to the retail card with the same stock number, and the grand totals obtained.

(*b*) The retail card, which now shows the total quantity of the item found by actual count, is then compared with the stock record card balance.



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(*c*) If the quantity of any item found by actual count does not agree with the stock record card balance, after deducting the quantity on memorandum receipt, if any, that item is reinventoried by the recheckers of the corresponding group.

(*d*) When the recount of an item is ordered, the recorder and the stock record clerk responsible for the stock record card verify all entries made on the card since the last inventory and correct such errors as may be found.

(5) If a recount of an item is ordered, the warehouseman responsible for the custody of the stock accompanies and assists the rechecker to assure himself that the exact quantity of stock recorded as on hand is actually physically present. When the rechecker and the warehouseman agree upon the actual quantity found, that quantity is entered on the original inventory card (is initialed by the rechecker and the warehouseman) and accepted as the correct count.

*b. Method B.*—In this method the count of many articles in small quantities is entered by the counters on one sheet. It is quick and accurate when small quantities are involved.

(1) Wherever possible, two persons independently make a count, compare results, and, if they agree, that figure is entered as the quantity found.

(2) If they do not agree, an immediate recheck is made; and when an agreement as to the amount is reached that amount is listed as the amount found.

(3) This result is posted to the stock record account, the same as for method A; discrepancies are adjusted in the same manner.

*c. Other methods.*—Any other methods, or a combination of the two cited above, may be used where conditions warrant. The method used must be one that results in an accurate inventory.

**92. Model inventory cards.**

EACH 5*

Bulk

Hammers, carpenter, claw, 1#

41-H-187

24

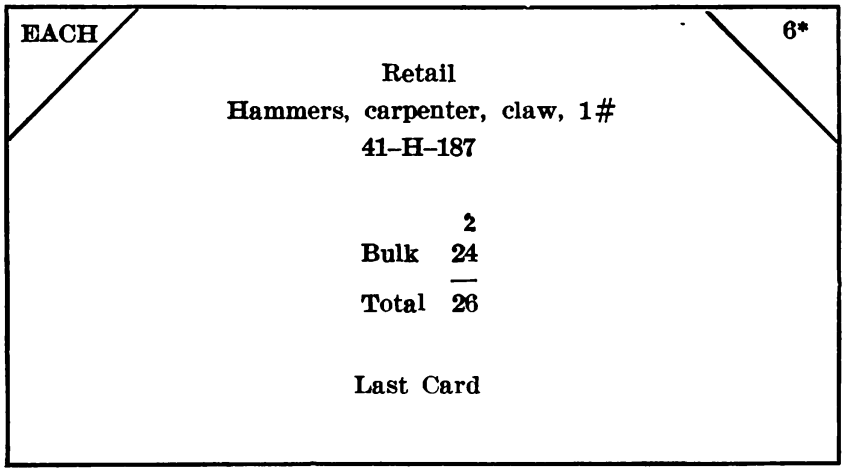
Last Card

*Checker's number.



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Total carried to retail card below:




*Checker's number.

## SECTION XIII

## REPORT OF STOCK

Paragraph
By all stations except depots in continental United States ..... 93
By depots in continental United States ..... 94
Model report ..... 95

**93. By all stations except depots in continental United States.**—*a. When prepared.*—Upon completion of the inventory of each storage class, post and station quartermasters (except depots in the continental United States) submit W. D., Q. M. C. Form No. 481 (Report of Stock) for all articles of Quartermaster Corps property of the particular classes listed in paragraph 87*c* then under consideration.

*b. When and how forwarded.*—Post and station quartermasters forward reports of stock, in duplicate, to corps area and department quartermasters within 10 days from completion of each inventory. The corps area or department quartermaster indicates any articles or quantities reported excess that are required for transfer to other stations within the corps area or department and forwards the original report to The Quartermaster General, retaining one copy for his files. The reporting activity retains a copy of the report. As these reports are used as the basis for the preparation of circular letters advertising supplies available for free issue, it is essential that corps area and department quartermasters exercise care in reporting to The Quartermaster General as excess only those supplies not required within the corps area or department. Otherwise, supplies which are required and should be used within the corps area are advertised in



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circular letters issued by that office as available for transfer to other corps areas.

*c. Instructions for preparation.*—The following instructions govern the preparation of reports of stock:

(1) *Submitted regardless of whether or not any items of a class are on hand.*—The report is submitted for all classes listed in paragraph 87*c*, regardless of whether or not any articles pertaining to a class are carried on the property account of the accountable officer. A separate report is submitted, when due, for each class, except that one form may be used to list the classes scheduled to be inventoried that month of which there are no articles on hand, and the report must plainly show that no articles are on hand, either in stock available for issue or on memorandum receipt.

(2) *Nomenclature and stock numbers.*—For classes inventoried subsequent to the receipt of the Quartermaster Corps Standard Stock List (advanced mimeographed copy of Quartermaster Corps Supplement), use the nomenclature and stock numbers listed therein for all standard stock, and for articles not listed therein (nonstandard stock) give complete description and stock number if stock numbers are used for nonstandard stock. For classes inventoried prior to receipt of the revised Quartermaster Corps Standard Stock List, use Federal Standard Stock Catalog nomenclature and stock numbers.

(3) (*a*) *Column 1* (Stock No.).—Enter proper stock number, if any.

(*b*) *Column 2* (Article).—Enter name and description of article. (See (2) above). List all articles for which accountable, regardless of whether or not there is any quantity to be reported excess.

(*c*) *Column 3* (Unit).—Enter unit.

(*d*) *Column 4* (Unit price).—Need not be entered.

(*e*) *Column 5* (On hand).—Enter quantity on hand at inventory, separated so as to show—

*1.* Quantity in storage available for issue, exclusive of any items on memorandum receipt.

*2.* Quantity, if any, on memorandum receipt account.

The entry of quantity on memorandum receipt account is preceded by the letter M so as to distinguish it from the quantity in storage available for issue. (The quantity, if any, on memorandum receipt account is reported only by the accountable officer. No report is made by the responsible officer.)

(*f*) *Column 6* (Issues in past 12 months).—Enter total quantity issued during the past 12 months. Include actual issues only. Exclude transfers of excess stock from one station to another.



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(*g*) *Column 7* (Quantity reported excess).—Enter quantity to be reported excess, which is the quantity for which there is no probable use at the post submitting the report.

(4) *Serviceable items reported.*—Only serviceable items are reported.

(5) (*a*) *Sizes.*—Articles, except those shown on memorandum receipt, are reported by sizes in the three columns "On hand," "Issues in past 12 months," and "Quantity reported excess" in all cases where sizes are applicable.

(*b*) *Articles on memorandum receipt.*—Articles on memorandum receipt may be shown as assorted, if desired, in which case a separate line is used for that purpose.

(*c*) *Uniform try-on sets.*—Uniform try-on sets may be listed as such without showing sizes.

(*d*) *Report to be signed.*—The report is signed at the bottom by the accountable officer.

*d. Use of excess at station.*—The reporting activity may use stock reported as excess but must notify the Office of The Quartermaster General through the corps area when such supplies are used. Excess stock that has been declared surplus can be withdrawn for use only as prescribed in Circular No. 1–9, OQMG.

*e. Transfer of excess.*—Subject to the limitations prescribed in paragraph 5, Circular No. 1–4, OQMG, corps area and department quartermasters take steps to transfer excess stock at posts and stations within the jurisdiction of their respective commands to apply on requisitions received from other posts and stations where it can be used. The office of The Quartermaster General takes such action to dispose of remaining excess stock, where practicable, as circumstances may warrant.

*f. Reports by certain activities.*—Reports of stock as prescribed above are submitted by the following activities promptly upon completion of inventories taken during the month of December:

(1) Remount purchasing and breeding headquarters.
(2) Posts on caretaking status.
(3) Air fields with garrisons of less than 25 men.
(4) Ordnance depots and arsenals on an inactive status.

No reports are required from recruiting stations.

*g. Necessity for reports.*—Reports of stock are used by The Quartermaster General for compiling consolidated stock reports with a view to determining what stocks are excess that can be distributed to stations where needed, and what stocks are obsolete or surplus. In order that accurate reports may be compiled in The Quartermaster



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General's Office, and to obviate the necessity of returning reports for correction, all reporting agencies are enjoined to give careful attention to the preparation of their reports and to submit them on time.

*h. Reports not required.*—No reports of stock are required for the following:

(1) Subsistence stores.

(2) Articles purchased from subsistence funds for resale purposes, irrespective of the class or classes to which such articles pertain.

(3) Matches, toilet paper, and soap purchased for resale purposes from the appropriation "Regular supplies of the Army."

(4) Blank forms.

(5) Supplies for which separate stock record accounts are kept as prescribed in AR 20–35 and AR 35–6520 (for Citizens' Military Training Camps, Reserve Officers' Training Corps, etc.).

(6) Supplies on hand at recruiting stations.

**94. By depots in continental United States.**—*a.* The quartermaster supply officer of a general depot and the commanding officer of a quartermaster depot submit, in triplicate, in typewritten form, to reach The Quartermaster General not later than February 1, a stock report for each class of Regular Army supplies as of December 31 of each year, showing the following information:

(1) *Column 1.*—Stock number, if any.

(2) *Column 2.*—Name and description of article.

(3) *Column 3.*—Unit.

(4) *Column 4.*—Quantity at hand.

(5) *Column 5.*—Due in on requisitions, contracts, or manufacturing orders.

(6) *Column 6.*—Issues during past 12 months to own distribution area, including oversea departments, but excluding issues to the Civilian Conservation Corps.

(7) *Column 7.*—Due out on requisitions or manufacturing orders.

(8) *Column 8.*—Excess, which should be as follows:

(*a*) For standard stock items, quantity over and above 2 years' requirements, based on issues during past 12 months.

(*b*) For nonstandard stock items, quantity which is not required for depot use.

*b.* As these stock reports are necessary for use in the preparation of estimates for funds for submission to the Congress, it is essential that they reach The Quartermaster General's Office as soon as practicable after January 1 and not later than February 1.



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## 95. Model report.

WAR DEPARTMENT
Q. M. C. Form No. 451
Approved May 14, 1931

### REPORT OF STOCK

Class No. 41

POST OR STATION Ft. School, Phila., Penna. DATE May 15, 1940

| STOCK NO. | ARTICLE | UNIT | UNIT PRICE | ON HAND | ISSUES IN PAST 12 MONTHS | QUANTITY REPORTED EXCESS |
|---|---|---|---|---|---|---|
| 41-A-181 | Anvils, Blacksmith 100# | ea. | | 9 M-3 | 12 | - - |
| 41-B-1121 | Blades, Saw, Compass, 12" | ea. | | 348 | 48 | 300 |
| 41-B-1892 | Brace, ratchet, 10" sweep | ea. | | 7 | 7 | - - |
| 41-H-187 | Hammers, carpenter, claw, 1# | ea. | | 26 | 26 | - - |

B,
Captain, Q. M. Corps,
Quartermaster.

NOTE: All the articles in this class are listed on this report regardless of whether or not they are in excess of requirements. For purposes of illustration only four articles are shown.

U. S. GOVERNMENT PRINTING OFFICE 2—9246

## SECTION XIV

## ALLOWANCES

| | Paragraph |
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| Budget credits | 97 |

**96. Allowance tables.**—*a.* Allowances of quartermaster supplies are prescribed by the War Department. These allowances are stated



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in Tables of Organization, Tables of Allowances, Tables of Basic Allowances (a separate one for each using arm or service), and in various Army Regulations for special articles such as fuel, forage, and electric current, and for supply of auxiliaries such as Reserve Officers' Training Corps and Citizens' Military Training Camps.

(1) Tables of Organization show, for purpose of information, the authorized allowances of transportation, both animal and motor, and principal items of equipment for the unit to which each table pertains.

(2) Tables of Basic Allowances prescribe the authorized allowances of equipment for individuals and units. The Table of Basic Allowances for the Quartermaster Corps lists the allowances of chemical warfare, engineer, medical, ordnance, quartermaster, and signal equipment required by individuals and units of the Quartermaster Corps.

(3) Circular 4, OQMG, lists and illustrates the components, spare parts, accessories, and contents of chests, kits, and sets, and other items of quartermaster property.

(4) Tables of Allowances prescribe allowances for troops and individuals while at posts, camps, or stations, and these allowances are in addition to those published in Tables of Basic Allowances. The items listed in Tables of Allowances are not ordinarily taken into the field or on change of station of units or individuals.

*b.* The various tables must be consulted to determine the exact allowances prescribed. Questions and answers on the use of these tables are shown in appendix I.

**97. Budget credits.**—*a.* The nature of certain classes of supplies is such that rigid fixed allowances in kind may interfere with prompt and efficient discharge of public business and the proper care of Government equipment and supplies. However, to insure economy in the consumption of such supplies and to effect an equitable distribution of available assets (stocks and funds), the issues of such classes of supplies are controlled by means of a budget system of money value credits. Issues of items chargeable against budget credits are regulated by commanding officers, and the total value of supplies (*f* below) issued during any one fiscal year to the posts, camps, and stations within a corps area does not exceed the total budget credit set up at the issuing depot for that class of supplies for the particular corps area. Post commanders may prescribe such allowances of all items chargeable against their budget credits as best meet their individual needs. Budget credits for any increase or decrease in the troop strength of posts during the fiscal year which do not increase or decrease the total strength of the corps area are adjusted by the corps area commander.



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Any material change in the troop strength of a corps area as a whole is reported to The Quartermaster General for necessary adjustment of budget credits. The total value of budgeted items under each table which a post may draw during any one fiscal year must not exceed the budget credit established for that particular class of supplies. Any balances unobligated at the end of the fiscal year are canceled automatically.

*b.* Estimates showing requirements for the succeeding fiscal year are submitted in triplicate by corps area commanders direct to The Quartermaster General so as to reach his office not later than March 1 preceding the fiscal year to which the estimate pertains, the money value only to be shown in the estimate and stated separately for each of the classes. Each estimate shows the proportion of the total credit to be established at the depot or depots to which the corps area is assigned for supply, and the proportion which is allotted to the corps area for local procurement of such supplies as can be so procured to better advantage. Care is exercised that estimates state the minimum credits considered necessary and do not include requirements of the civilian components or stationery and office supplies required for post schools and libraries and printing plants.

*c.* All supplies issued under these budget credits, except those enumerated in *f*(1)(*d*) below, and china and glassware as prescribed in *d* below, are dropped from accountability when issued to unit supply officers or officers in charge of offices or activities.

*d.* (1) Allowances of china and glassware for use in barracks are fixed by post commanders in accordance with *a* above, and within the allowances contained in Table of Allowances—Equipment for Posts, Camps, and Stations, and are issued to organizations on memorandum receipt. Subsequent issues of china and glassware required to replenish the allowance due to breakage are dropped from accountability upon issue; but the organization commander remains responsible on memorandum receipt, and the quartermaster retains accountability for the full allowance fixed by the post commander which is kept intact by replenishment. Any increase or decrease in the allowance fixed by post commanders is added to or deducted from the memorandum receipt account of the organization commander, and maintenance of such allowances is under the budget credit procedure.

(2) In the event of an increased troop strength at any post, camp, or station during a fiscal year which increases the total troop strength of the corps area, the necessary initial issue of chinaware, glassware, and tableware is approved by The Quartermaster General upon receipt of request from the corps area concerned, without charge against the budget credit. The corps area in turn approves such initial issues



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to the post, camp, or station affected without charge against its budget credit.

*e.* Funds appropriated for the procurement of stocks or supplies for the exclusive use of the Regular Army may not lawfully be expended for expenses incurred in the training of the Officers' Reserve Corps, Organized Reserves, Enlisted Reserve Corps, Reserve Officers' Training Corps, or Citizens' Military Training Camps without reimbursement from the appropriations made for the support of these components. All stationery, office supplies, office equipment, and other supplies procured for the training of the components named above, including extension courses for the Officers' Reserve Corps, Organized Reserves, and Enlisted Reserve Corps, and all advertising, recruiting, establishing, and maintaining activities connected with the Citizens' Military Training Camps, are paid for from funds appropriated for such components or, if supplied from Regular Army stocks, are issued subject to reimbursement in accordance with such instructions as may be issued by the chiefs of the supply arms or services concerned.

*f.* The following tables (see AR 30–3010) give lists of the principal authorized classes of supplies which are controlled by budget credits:

(1) *Table I.*—(*a*) Miscellaneous items for care and protection of regular supplies.

(*b*) Stationery and office supplies.

(*c*) China and glassware.

(*d*) Certain miscellaneous items of regular supplies listed in table I, D—project 8.

(2) *Table II.*—Expendable items for care and protection of clothing and equipage.

(3) *Table III.*—(*a*) Expendable items for care and protection of animal transportation.

(*b*) Leather for repair of harness, saddlery, and pack equipment.

*g.* The current itemized lists of articles included in budget credits must be consulted to determine exact application. Questions on and an example of a budget calculation are shown in appendix II.

## SECTION XV

## REQUISITIONS

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**98. General.**—*a.* Quartermaster supplies are issued to the Army on properly approved requisitions within the limits of allowances prescribed in Tables of Organization, Tables of Basic Allowances, Tables of Allowances, and other War Department orders and regulations.

*b.* Organizations, offices, and individuals at posts and stations obtain supplies required for the equipment and maintenance of troops, such as subsistence, forage, clothing, equipage, cleaning and preserving materials, stationery and office supplies, mess and barrack furniture, and similar supplies, on requisitions submitted to post or station quartermasters.

**99. Definition.**—A requisition is a request for supplies. It is prepared on W. D., Q. M. C. Form No. 400 (Requisition), irrespective of the source from which the property is to be obtained or the character of the property requisitioned, except where other specific blank forms are prescribed for requisitioning particular classes of property. The authorized exceptions to the foregoing rule are as follows:

*a.* W. D., Q. M. C. Form No. 402 (Requisition for Clothing and Equipage) is used at posts and stations in making requisitions for clothing and equipment for stock.

*b.* W. D., A. G. O. Form No. 35 (Individual Clothing Slip) is used in making requisitions for clothing to be issued to individual enlisted men.

*c.* W. D., Q. M. C. Form No. 409 (Requisition and Receipt for Clothing in Bulk (charged to clothing allowance)) is used in making requisitions for clothing in bulk.

*d.* W. D., Q. M. C. Forms Nos. 411 (Requisition and Receipt for Brooms, Brushes, Matches, Mops, Toilet Paper, Soap, etc.), 412



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(Requisition and Receipt for Stationery and Office Supplies), 413 (Requisition and Receipt for Cleaning and Preserving Materials), and 414 (Requisition and Receipt for China and Glassware) are used in making requisitions for all items listed thereon which are stored and issued by the Quartermaster Corps.

**100. By posts and stations.**—*a. Standard stock.*—Standard stock supplies not procured locally from available funds are obtained by posts and stations on requisitions submitted at 3-month intervals, mailed so as to reach the offices of the corps area and department quartermasters not later than the 10th of the months shown below, except that requisitions for supplies listed below are submitted as directed therein, and requisitions for motor transport supplies are submitted as directed in paragraph 118.

| Months | Classes | Period of supply |
|---|---|---|
| January | 26, 34, 53, 54, 69, 70. | April, May, and June. |
| April | | July, August, and September. |
| July | | October, November, and December. |
| October | | January, February, and March. |
| February | 14, 27, 29, 38, 41, 42, 51, 52, 55, 71, 72, 73, 74. | May, June, and July. |
| May | | August, September, and October. |
| August | | November, December, and January. |
| November | | February, March, and April. |
| March | 5, 24, 31, 36, 37, 63, 64, 65. | June, July, and August. |
| June | | September, October, and November. |
| September | | December, January, and February. |
| December | | March, April, and May. |

*b. Nonstandard stock.*—Requisitions for nonstandard stock supplies required by posts and stations, except those procured locally from available funds, are submitted to corps area and department quartermasters from time to time as necessity for such supplies arises.

*c. Special requisitions.*—Special requisitions may be submitted at other times when necessity therefor arises, in which case a statement of the unforeseen conditions accompanies the requisition.

*d. Extract requisition.*—An extract requisition is a request for the supply of such articles on an original requisition as the recipient of the original requisition is unable to furnish. In its preparation the appropriate form is used and the complete heading, together with a full description of the articles extracted and the supporting data as shown on the original requisition, is entered thereon.

**101. Preparation.**—*a. Grouping supplies.*—(1) Supplies are divided for requisition purposes into storage classes as shown in paragraph 14.



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(2) Separate requisitions in quintuplicate are prepared for each supply point.

(3) Separate sheets are used for each storage class.

(4) Separate requisitions are prepared for items of standard stock and for items of nonstandard stock, and in no case should a requisition for standard stock cover items of nonstandard stock.

(5) Separate requisitions are prepared for motor-transport supplies. (See par. 118.)

*b. Basis of issue.*—In all cases the basis for the requisition is indicated, i. e., strength of command, number of animal-drawn and motorized vehicles, number of desks, typewriters, officers' mess outfits, and other such data, upon which the allowance is based, and which are required by approving authorities to edit the requisition properly.

*c. Quantities.*—The columns "On hand and due" and "Consumed" are filled in to show the status of each article listed on the requisition. The period covered by the requisition is shown, and the amounts shown in the "Consumed" column are for the preceding period, equivalent to the period covered by the requisition, i. e., a requisition for the first quarter shows consumption for the last preceding first quarter, etc. Where no fixed allowance exists, or if the quantity called for exceeds the past consumption of any article, the necessity for supply is explained by appropriate remarks. In submitting requisitions for replenishment of stock, except uniform clothing and equipment, multiples of standard commercial packages are ordered whenever practicable. For example, if an article is commonly packed 1 dozen to a package, orders are in multiples of 12, regardless of whether the quantity on hand plus the quantity ordered exceeds the maximum stock fixed for that particular article. To this extent the maximum stock figure is more or less variable. Requisitions for articles of uniform clothing and equipment are stated in the exact quantities required.

*d. Stock number and description of articles.*—Each article of standard stock called for is clearly described under the headings "Stock number" and "Articles" to enable ready identification. If listed in the Quartermaster Supplement to the Federal Standard Stock Catalog, the stock number and description contained therein are used. Each article of nonstandard stock is fully described. Articles are arranged alphabetically with the descriptive noun first, and such number of lines are used as are necessary to show the size, kind, and description of each article requested. When a particular brand, make, or equal of an article is desired or preferred, it is so stated or described in detail. Whenever possible, reference is made to the trade catalog, page, and number showing the article desired.



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If deemed advisable, a drawing or sketch showing the dimensions and other details accompanies the requisitions. If the names of the articles are not printed on the form, all items are doubled spaced.

*e. Purpose and code number.*—The purpose and appropriation code number applicable as shown by the appropriation analysis code (see Finance Circulars D–1, D–3, and D–4) is entered immediately above each item or group of items. If an item is properly chargeable to two or more appropriations, the quantity or percentage chargeable to each appropriation is clearly indicated. For example, kitchen and dining-room equipment may be procured under Purpose No. 13–3015, "Army Transportation—Water," and also under Purpose No. 12–3015, "Regular Supplies of the Army."

*f. Local purchase information.*—Requisitions for subsistence, forage, fuel (except coal), gasoline, and other supplies which are not carried in stock by depots, but which are purchased locally or by depots for delivery direct to consuming stations, are accompanied by a list of the names and addresses of dealers who can furnish the supplies and the estimated prices at which such can be obtained.

*g. Numbering.*—Requisitions are numbered serially at point of origin in one continuous series for each fiscal year, beginning with the first requisition submitted on or after July 1 of each year. The number consists of the letters "QM," the station number as published in finance circulars, the serial number of the requisition, and the last two figures of the fiscal year, each separated by a dash. Requisitions from those activities which have not been assigned station numbers by the Finance Department are not numbered by the requisitioning office. Upon receipt at corps area headquarters, a number is assigned to such a requisition by the corps area quartermaster, using the number assigned to corps area headquarters in the same manner as if the requisition were submitted by his office. This number is also entered on the copy of the requisition which is returned to the requisitioning office which enables it to connect shipments received and shipping tickets with the requisition.

*h. Signature and approval.*—The original requisition is signed by the requisitioning officer in the space provided for signature and by the local commanding officer in the space "Approved by." Copies of requisitions are not signed, but the names of the requisitioning and approving officer are typed in the places provided for signature.

*i. Routing.*—(1) The original and three copies of each requisition are forwarded to the corps area or department quartermaster, and one copy is retained by the requisitioning officer. After approval by the corps area or department quartermaster, the original and one copy are forwarded to the depot designated to fill the requisition, one copy is



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returned to the requisitioning officer as advice of action taken, and one copy is retained by the corps area or department quartermaster.

(2) If the requisition is to be filled in part by the transfer of excess stock from some other post in the corps area, an extract requisition is prepared and forwarded to the designated post for supply.

(3) If the requisition is to be filled wholly or in part by local purchase, that fact is noted on the copy of the requisition returned to the requisitioning officer showing action taken.

(4) If the approval of The Quartermaster General is required before the requisition can be filled, the corps area or department quartermaster forwards the original and one copy to The Quartermaster General with an expression of opinion or recommendation shown on the face of the requisition.

**102. Editing.**—Upon receipt of a requisition by a corps area or department quartermaster, it is carefully edited by personnel who are thoroughly familiar with supplies and the regulations governing their issue and use. Nomenclature and descriptions of articles are reviewed and corrected, if necessary, to insure that the articles desired by the requisitioning officer are supplied. The quantities called for, consumed, due, and on hand are checked against past issues and authorized maximum stock requirements with a view to preventing the supply of or an accumulation of unnecessary or unauthorized articles at posts and stations. Unauthorized articles and quantities in excess of maximum stock requirements are not approved for supply unless a reasonable explanation showing the necessity is submitted with the requisition. The quantity approved for supply is entered on all copies of the requisition in the proper column. A complete statement of action taken to effect supply is placed on the retained copy of the requisition.

**103. Action taken by depots.**—*a.* A requisition received by a depot is filled from stock or by purchase. Depots make every effort to supply articles as called for and approved by corps area quartermasters, bearing in mind that suitable substitutions are made where possible to utilize stocks on hand.

*b.* If a requisition calls for articles which are not assigned to the depot for supply and the articles asked for are not on hand in stock, or if the requisition is from a station outside of the distribution area of the depot, it is forwarded to the proper supply point, and the requisitioning officer notified through his corps area quartermaster of the action taken.

*c.* When the depot is unable to ship the articles called for on a requisition from the office of The Quartermaster General, the original



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copy of the requisition is returned by indorsement to the office of The Quartermaster General, stating reason for nonsupply. If partial shipment is made, an extract covering the articles not supplied is prepared and forwarded, with notation that these articles cannot be supplied and the reason therefor. In either case, the articles not supplied are considered by the depot as canceled and require no further action.

**104. Follow-up.**—If, within 10 days after submitting a requisition, a requisitioning officer has not received advice of the action taken by the corps area or department quartermaster on the requisition, or if within a reasonable time after receipt of such advice of action taken he has not received advice from the designated point of supply of action taken to fill the requisition, he institutes a tracer and forwards it through the same channels as the requisition. All officers concerned are charged with the necessary follow-up to assure efficient supply.

**105. Subsistence.**—Requisitions for subsistence stores and subsistence supplies are submitted as follows:

*a.* Perishables and other stores required to be replenished monthly, 45 days in advance of the month for which required.

*b.* Nonperishable stores, except canned tomatoes, canned corned beef, and bacon, dry salt-cured, in 12-pound cans (for the Hawaiian, Philippine, and Panama Canal Departments), quarterly, so as to reach the procuring agency 75 days in advance of the quarter for which required. Corps area and department quartermasters determine the period or periods in advance within which requisitions for nonperishable subsistence stores must reach their headquarters in order to effect compliance with the above.

*c.* Canned tomatoes, annually, so as to reach the procuring agency on June 15, and canned corned beef and canned corned-beef hash, annually, so as to reach the procuring agency on July 15. Depots do not store these articles unless requested to do so by a corps area or department quartermaster. When storage space does not exist at a consuming station suitable for a year's supply of these articles, or the climatic conditions do not permit their storage for 1 year, the corps area or department quartermaster may arrange for an automatic supply by submitting to the designated supply point a schedule of shipments desired.

*d.* (1) Bacon, dry salt-cured in 12-pound cans, is purchased annually by the Chicago Quartermaster Depot for the Hawaiian, Philippine, and Panama Canal Departments on requisitions submitted in duplicate by those departments through distributing depots so as



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to reach the Chicago depot not later than September 15. Shipments are made on schedules requested by the department quartermaster.

(2) Bacon, breakfast, for posts and stations in the continental United States (including Alaska and Puerto Rico) is of the commercial type and is procured locally in the same manner as fresh beef is now procured.

*e.* (1) Separate requisitions for issue flour are submitted quarterly so as to reach the supplying depot 75 days in advance of the quarter for which required, the time in which requisitions shall be submitted by posts to be determined as in (2) above. Issue flour is purchased by the Chicago and San Francisco depots for direct delivery to consuming stations.

(2) Sales flour in 5-pound and 24½-pound sacks, purchased under Federal Specification N–F–481 for sales purposes, is procured by depots supplying nonperishable subsistence stores to posts and stations within their respective distribution areas.

*f.* Exceptional articles as required.

*g.* Yeast, yeast food, and malt sirup are purchased annually by the Chicago Quartermaster Depot, for delivery to consuming stations as desired, on requisitions submitted by corps area and department quartermasters so as to reach that depot April 1.

*h.* Subsistence supplies, such as paper bags, wrapping paper, twine, and similar supplies required in connection with the care, issue, and sale of subsistence stores, quarterly, so as to reach the procuring depot 75 days in advance of the quarter for which required, the time in which requisitions will be submitted by posts to be determined as in (2) above.

*i.* Ice for issue to troops and for preservation of subsistence stores is, where practicable, purchased on annual contracts.

*j.* Purchases of brands of subsistence articles listed in purchase notice argeements, office of The Quartermaster General, are made as prescribed in the purchase notices publishing these agreements. Requisitions on purchasing depots or purchasing agencies for these brands are prohibited. Purchase orders are issued locally for these brands. The following notation is placed on all such purchase orders:

(1) Applicable contract number quoted in purchase notice agreement is placed on upper right-hand corner of purchase order.

(2) Under "Method of purchase" it is stated that purchase is made in accordance with purchase notice No. ——.

**106. Forage.**—*a.* Requisitions, except in unusual cases, call for forage in general terms, such as hay, feeding; hay, alfalfa; oats; corn;



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bran; bedding; etc., and indicate whether the standard ration or one of the authorized variations is desired.

*b.* In order to inform the corps area quartermaster as to local conditions, there is noted on the requisition—

(1) Local prices of forage.
(2) List of local dealers.
(3) Amount of storage space available.
(4) How deliveries are to be made.
(5) Number of animals at post, by weight and class.

If local procurement is deemed advisable, a statement to that effect with reasons therefor is shown on the face of the requisition.

**107. Fuel.**—Requisitions for fuel (defined as coal, charcoal, steam, wood, coke, fuel oil, kerosene, gasoline, gas (manufactured and natural), except for motor vehicles, and electricity required to provide heat, light, or power), except for ocean-going Army transports, are submitted in triplicate annually through corps area or department quartermasters so as to reach the office of The Quartermaster General by December 31. After approval, the sheets pertaining to coal are forwarded to the proper depot for supply. The requisitions for the other commodities are returned to the corps area or department quartermaster showing the quantities approved and the probable amount of funds to be allotted for the purchase thereof during the next fiscal year. Requisitions are prepared so that only one class or kind of fuel appears on any particular sheet; for example, if a station requires coal, electricity, and gas, three separate requisition sheets are submitted. Requisitions for anthracite and bituminous coal indicate the quantities and sizes desired.

**108. Typewriters.**—Requisitions for typewriters submitted to The Quartermaster General will include no other items. Such requisitions show the total number of machines on hand, number in each class, authorized allowance, and basis upon which such allowance is predicated.

**109. Envelopes.**—Corps areas and departments must anticipate their requirements for envelopes for all purposes and submit requisitions for them quarterly to the depot designated to supply the area (Circular 1–4, OQMG) 90 days prior to the beginning of the quarter in which the envelopes are required. Issuing depots forward such requisitions promptly to the Washington Quartermaster Depot so that that depot may have sufficient time to call upon contractors and obtain delivery of envelopes for the period required.

**110. Calcium hypochlorite.**—Due to the perishable nature of calcium hypochlorite, care is exercised to prevent accumulation of stocks of this item, with resulting loss through deterioration. Ordinar-



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ily requisitions are submitted 60 days in advance and do not exceed probable requirements for the period covered by the requisitions.

**111. Heating stoves, ranges, ovens, and warehouse equipment.**—*a.* Annual requisitions for the following items are submitted to The Quartermaster General on December 31 of each year to cover all requirements therefor for the coming fiscal year:

(1) Stoves, heating and laundry, and parts therefor.

(2) Fire screens.

(3) Andirons.

(4) Fire sets.

(5) Post bakery equipment, including bake ovens, dough mixers, molders, etc., and parts.

(6) Ranges, cooking (domestic and heavy duty), and parts therefor.

(7) Warehouse equipment, including trucks, trailers, tractors, etc., and parts.

(8) Watchmen's clocks and parts.

(9) Tools and coal bags for handling fuel.

(10) Machinery and equipment for handling fuel.

*b.* The allotment of funds for the purchase or repair of such equipment from funds allotted for the purpose is based upon such requisitions. Requisitions show the type of equipment, number in use, age, and complete description of the machinery or equipment for which parts are required; and also the approximate cost of the repair parts and the length of time the equipment or machinery has been in use, as well as the quantity of repair parts on hand or due.

*c.* Requisitions calling for heating stoves, post bakery equipment, and cooking ranges specify the kind of fuel which is to be burned therein, i. e., whether natural or manufactured gas, wood, oil, or coal; and, in the event coal is to be used, whether it is anthracite or bituminous, and its size.

*d.* (1) Requisitions for electric, gas, and oil-burning ranges show the building numbers and type of the quarters for which they are required; whether required for new installations or replacement, and if for replacement, the type of ranges previously installed, and whether such ranges are unserviceable. Requisitions also indicate the number of right-hand and left-hand oven types for domestic ranges and whether hot top, open top, or other type for heavy-duty service; if for gas ranges, whether fuel used is natural or manufactured gas.

(2) Requisitions for heavy-duty ranges, in addition to information called for in (1) above, show the following data:



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(*a*) If for installation in barracks, the organizations for which required, and the average and maximum strength of each mess to be served.

(*b*) If for installation in hospital, the number of personnel in the detachment serving the hospital; the average and maximum number, separately, of patients and of enlisted men to be served. If more than one mess is operated, state that fact.

(*c*) If for installation in officers' mess, the average and maximum number of persons to be served.

**112. Refrigerators, wall lockers, and heavy furniture.**—*a.* Requisitions for refrigerators, wall lockers, and heavy furniture are submitted annually to The Quartermaster General on December 31. The quantities called for are in accordance with the allowances authorized at the time the requisition is submitted, and the following information is shown on the requisition blanks:

(1) Quantity of each size and type received at the station during the current fiscal year.

(2) Quantity and size of each type received during the preceding calendar year.

(3) Quantity and size of each type expected to be received between January 1 and June 30, current fiscal year.

(4) Quantity and size of each type required in accordance with authorized allowances to meet the shortage existing at the station on January 1.

*b.* Requisitions for office furniture are submitted semiannually to reach the office of The Quartermaster General not later than May 15 and November 15. The items and quantities called for are as authorized in Tables of Allowances. A statement is included for each item indicating whether it is for replacement or initial issue. These requisitions include such items as "Clocks, office," and "Seals, official." Corps area quartermasters edit these requisitions before forwarding, indicating in the appropriate columns the quantities approved within the corps area credit established for procurement of office furniture.

**113. Machinery and electrical equipment.**—*a. New installation.*—New installation of machinery and electrical equipment is not made without the prior approval of the The Quartermaster General. Requests for authority to install machinery and equipment are accompanied by a full and complete description of the conditions which make the installation necessary or desirable. If it is to be operated by energy supplied by electricity, steam, gas, water power, gasoline, or fuel oil, the increased cost to the Government or any saving to be effected on account of its operation must be shown.



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*b. Repair parts.*—Repair parts for installed machinery and electrical equipment, except spare parts required for plants and systems in the Philippine Islands, are procured from annual repair funds.

*c. Spare parts for plants and systems in the Philippine Islands.*—Funds are allotted to the Philippine Department for the maintenance and repair of Quartermaster Corps plants and systems, including the local purchase or purchase in the United States of spare parts. The procedure of submitting requisitions for spare parts is as follows:

(1) The engineer in charge of the plant or system prepares his requisition and submits it to the station quartermaster.

(2) The station quartermaster prepares requisition, states the necessity fully, and has it checked and signed by the plant engineer before it is forwarded to the department quartermaster.

(3) The department quartermaster supplies the parts he has in stock and rules out such parts on the requisition. The original requisition number is ruled out, and the requisition is given the department quartermaster's number. It is then checked and initialed by the technical representative of the office of the department quartermaster and forwarded with recommendations direct to The Quartermaster General. The department quartermaster certifies on this requisition that funds are available and quotes the procurement authority that is to be used by the depot in making purchase.

(4) The office of The Quartermaster General gives the requisition a technical edit and forwards it for purchase to a supply depot, which is usually either the one at San Francisco or New York. At the same time the department quartermaster is furnished a copy of the action taken, together with any other pertinent information.

*d. Incandescent electric lamps.*—Requisitions for incandescent electric lamps required for lighting buildings and grounds under jurisdiction of the Quartermaster Corps are submitted annually on December 15. They are forwarded to The Quartermaster General through corps area and department quartermasters, who transmit them in groups containing all stations within respective corps areas or departments. The Quartermaster General checks all requisitions, prepares schedules, and transmits the same, accompanied by funds, to the Washington Quartermaster Depot for completion of action in connection with procurement and distribution directly to stations. The following information is shown on requisitions:

(1) Quantity and wattage of each size and type of lamps received at station during current fiscal year.

(2) Quantity and wattage of each size and type of lamps received during the preceding calendar year.



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(3) Quantity and wattage of each size and type of lamps on hand December 15.

(4) Estimated quantity and wattage of each size and type of lamps to be issued from January 1 to June 30, current fiscal year.

(5) Estimated quantity and wattage of each size and type of lamps to be required in ensuing fiscal year.

(6) Required voltage rating of lamps. The lamp wattages considered standard are: 15, 25, 40, 50, 60, 75, 100, 150, 200, 300, 500, 750, 1,000, and 1,500 for multiple service; and 1,000-2,500 lumen (100-250 candlepower), 6.6 amperes, series incandescent, for street lighting. If other types are required they are considered special, and requisitions therefor must be accompanied by specific reasons. Requisitions should include the desired voltage rating, which is 110, 115, 120, and 125 volts. The average socket voltage at the post or station governs the selection. Where the average socket voltage falls between any of the above ratings, the higher rating is selected in order to secure maximum life from the lamps.

*e. Electric current data.*—All requisitions or requests for electrical equipment, whether for new installations or for repairs or replacements, include complete statement of the current characteristics involved.

**114. Operating supplies.**—*a.* Requisitions for supplies required in the operation of steam heating and power plants, electric generating plants, ice and refrigeration plants, water pumping, treating, and filtration plants, sewage pumping and disposal plants, incinerators, fire apparatus, and power plants for modern batteries (except as noted in *b* below) are submitted annually on December 31 and forwarded to The Quartermaster General through the corps area or department quartermaster. The following information is shown on these requisitions:

(1) Quantity of each supply actually consumed at each of the various plants during the preceding fiscal year.

(2) Quantity of each supply actually consumed at each of the plants during the 6-month period, July 1 to December 31, of the current fiscal year.

(3) Quantity of each supply at each of the plants estimated as required for the ensuing fiscal year.

(4) Quantity of each supply on hand in stock that can be used for each of the plants at the time the requisition is prepared.

*b.* Special lubricating oils for crank-case lubrication of 25-kilowatt gasoline-electric generating sets, G-E, type G-M, 12, required in the operation of power plants at modern batteries, are not quartermaster



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supplies. These special lubricating oils are furnished by the Chief of Engineers, and requisitions for these supplies are prepared by the coast-defense engineer.

**115. Fire apparatus.**—Fire engines, hose, extinguishers, axes, and like equipment are requisitioned annually on regular requisition blanks on December 31 and forwarded to The Quartermaster General through the corps area or department quartermaster, except that fire extinguishers required for use on motor vehicles are procured locally under the General Schedule of Supplies or under indefinite quantity contract by the Holabird Quartermaster Depot. The following information is shown on requisition blanks:

*a.* Number received during current fiscal year.

*b.* Number received during preceding fiscal year.

*c.* Number on hand and in service December 31.

*d.* Estimated number to be required in ensuing fiscal year.

**116. Construction and repair material.**—*a.* Funds for the maintenance, repair, and operation of buildings and utilities are allotted to corps area and independent station quartermasters. A post, camp, or station quartermaster in need of such materials can, therefore, either procure them locally from available funds or request the nearest depot to procure them, in which case the cost thereof is charged by the local quartermaster against his procurement authority. Corps area quartermasters issue instructions covering the procurement of supplies for these purposes to local quartermasters under their jurisdiction.

*b.* Supplies for the maintenance, repair, and operation of buildings and utilities are not ordinarily maintained in stock at depots. There are, however, on hand at nearly all depots excess supplies not authorized in Tables of Basic Allowances which can be utilized for these purposes. Depots are authorized to issue such supplies on properly approved requisitions subject to the limitations prescribed by paragraph 5, Circular No. 1-4, OQMG, and such issues do not constitute a charge against procurement authorities issued to corps area, department, and independent station quartermasters. Depots advise corps area, department, and independent station quartermasters from time to time of the articles of this kind on hand in order that stocks may be absorbed by issues.

**117. Supplies for water-transport activities.**—*a.* Separate stock of supplies for Army transports, harbor boats, and other water-transport activities is not maintained at depots unless requested by corps area or department quartermasters or superintendents of the Army Transport Service, in which event they are procured from



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funds suballotted by these officers; but all supplies on hand at a depot are available for the filling of requisitions for water-transport activities, the necessary adjustment of funds to be made as indicated in *c* below.

*b.* Requisitions for water-transport supplies are forwarded through prescribed channels, except by the superintendents of the Army Transport Service at New York and San Francisco, who forward requisitions direct to the quartermaster supply officers of these depots. Local purchase is authorized when, in the judgment of corps area or department quartermasters, the supplies are readily procurable by the requisitioning office and no price advantage exists by having the supplies purchased by a depot, bearing in mind transportation costs and depot overhead.

*c.* Upon receipt of requisitions at depots they are filled from stock if available, and the remaining supplies are purchased, payment to be made from funds indicated by the procurement authority quoted on the requisition. One copy of all purchase orders and shipping tickets applying on such requisition is furnished the office holding the procurement authority against which the cost of supplies is chargeable, in order that the proper adjustment of funds is made. Shipping tickets for supplies furnished from stock show separately the articles which are issued without charge and those for which reimbursement is required. Supplies issued from excess stock, which does not require replacement, and supplies which have been purchased for depot stock from water-transportation funds are issued without charge. The cost of all other supplies furnished from stock to fill such a requisition is charged against the procurement authority involved. Upon receipt of the shipping tickets, a subprocurement authority in favor of the depot furnishing the supplies is prepared by the office holding the procurement authority against which the cost of supplies is chargeable, showing the value of the supplies issued from stock which require reimbursement. This subprocurement authority is forwarded to the depot furnishing the supplies, and the funds covered thereby are available to replace such supplies.

*d.* When it becomes necessary to dispatch river and harbor boats and coast artillery boats away from their home stations, the quartermaster of the home station secures from the corps area or department quartermaster a procurement subauthorization of the necessary funds and furnishes the commanding officer of the vessel, if there be one, or the master of the vessel a letter authorizing him to requisition on quartermasters at ports of call for such supplies as he may require in



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connection with the operation of his boat. This letter cites the procurement authority against which supplies, when furnished, are to be charged, and the procurement authority number is quoted on all requisitions submitted by the commanding officer of the boat, or the master thereof, to quartermasters at ports of call for supplies for the operation of his boat. A copy of each such requisition submitted is furnished to the quartermaster of the home port of the boat. The quartermasters filling these requisitions forward one copy of all purchase orders and shipping tickets applying on such requisitions to the quartermaster of the home port of the boat, indicating on each shipping ticket the procurement authority and the money value of the supplies furnished. One copy of each shipping ticket is forwarded to The Quartermaster General by the quartermaster issuing the supplies to enable the adjustment of funds.

*e.* When it is necessary to replace supplies which are issued from stock at posts and stations to fill these requisitions, the issuing quartermaster includes the necessary amounts in his next requisition and indicates on such requisition the articles, quantity, and value which are necessary for replacement of supplies issued and a brief statement of the facts relating to the issue.

**118. Motor-transport supplies.**—*a. Requisition.*—(1) Requisitions for motor vehicles are submitted only as directed by The Adjutant General.

(2) Except as specified in (14) below, posts, camps, stations, and other activities submit requisitions for motor-transport supplies so as to reach the offices of corps area and department quartermasters 15 days prior to the date the supplies are needed.

(3) Requisitions for replacement units and parts specify each part listed thereon by the manufacturer's part number in numerical sequence, name of part, and the make and model of the vehicle for which required, as shown in parts book. If no parts book is on hand, a request for one is made to the corps area or department quartermaster. Parts for more than one type of vehicle are not listed on the same sheet.

(4) Tires and tubes are requisitioned separately, requirements for all types of vehicles being consolidated on one requisition.

(5) Miscellaneous supplies and parts common to all types of vehicles, such as spark plugs, nuts, bolts, cotter pins, etc., are consolidated on one requisition, a separate sheet being used for each storage class.

(6) Separate requisitions are submitted for gasoline, lubricants, and antifreeze solutions for motor transportation. The quantities



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required for quartermaster transportation, for sales, and for tactical purposes are listed separately.

(7) Separate requisitions are submitted for cleaning and preserving materials, a separate sheet being used for each storage class.

(8) Requisitions for machine and hand tools and all other motor-transport repair equipment, except the initial equipment for motor vehicles, are forwarded to The Quartermaster General for approval prior to issue. Articles requisitioned must conform to description and to limitations on allowances prescribed in existing approved tables of equipment for the various echelons of maintenance, and for the particular echelon for which the equipment is required. Requisitions for unauthorized articles contain a statement as to the necessity for such equipment and the reason the unauthorized article, if any, is not suitable for the use required. Initial tool equipment for motor vehicles is issued with the vehicles and accounted for as prescribed in AR 35–6520.

(9) All requisitions for motor-transport supplies for use of educational and recreational activities are forwarded to The Quartermaster General.

(10) Certificates required by War Department regulations are placed on requisitions for motor-transport supplies in accordance with such regulations.

(11) Each requisition shows in the space "Basis for requisition" the number of the particular type of vehicles on hand authorized for operation for which unit assemblies, parts, tires and tubes, and other supplies are requested, and the quantities of such items on hand and on unfilled requisitions. Other vehicles are not shown on the requisition.

(12) Requisitions indicate the period of time for which the supplies called for are required, and the consumption over the previous similar period. The quantity of any article requisitioned is the actual requirement, and does not in any case exceed the previous average consumption for 3 months in the continental United States, and 6 months for oversea departments without an explanation of such increases. Requirements not contained in periodical requisitions are covered by special requisitions submitted when the necessity arises. When necessary for immediate repairs they may be submitted by radio.

(13) The hoarding of supplies is contrary to the best interests of the service, and is not tolerated. When for any reason supplies are on hand in excess of current requirements, they are reported through channels to The Quartermaster General for disposition.



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(14) (*a*) Requirements for the following items are properly anticipated, and consolidated requisitions submitted quarterly by corps areas, departments, and independent stations direct to the Holabird Quartermaster Depot, Baltimore, Md., at least 30 days prior to the beginning of the period for which the supplies are required in the case of activities within the continental United States, and 6 months prior to the beginning of the period for which the supplies are required in the case of activities within oversea departments:

*1.* Truck covers and end curtains.
*2.* Fire extinguishers, 1 quart, carbon tetrachloride.
*3.* Bows and ridge poles.
*4.* License plates for passenger-carrying vehicles.

(*b*) The quantity of truck covers and curtains, bows, and ridge poles for each separate make and model of vehicle are indicated, together with information as to the dimensions of articles required. Procurement authorities chargeable with the cost of the supplies and their transportation are indicated on the requisition.

*b. Action by depots.*—(1) The requisition received by a depot is carefully checked with the vehicles shown as the basis of the requisition, and, if the quantities called for, including those on hand, are in excess of allowances, or where there are no Tables of Allowances, if they are in excess of requirements based on previous experience, or if they are contrary to the principles of the unit repair system, they are reduced accordingly, and the requisitioning officer is notified. If there is any doubt as to the reasonableness of the request, supply of the requisition is suspended and the requisitioning officer is called upon to furnish data to substantiate the request.

(2) If requisitions for motor-transport supplies received by a depot cannot be filled from stock, the unfilled portion is extracted to The Quartermaster General for supply from some other depot or by purchase, but no extracts are forwarded for supplies which are in depot stock or which can be purchased from funds available or obtained from salvage or reclaimed supplies on hand.

**119. Manila rope.**—Requisitions for manila rope are submitted quarterly in time to reach the depot designated to supply the area (Circular 1–4, OQMG) 75 days prior to the beginning of the quarter in which the article is required. The requisition shows the applicable purpose and appropriation code number to which the items are chargeable. Depots make quarterly purchases of this article, which is inspected by the purchasing depot prior to shipment to requisitioner.

**120. Model forms.**—Model forms of requisition for special commodities are shown in appendix III.



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## SECTION XVI

# ISSUE OF SUPPLIES

Paragraph
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**121. Types of issues.**—A post or station quartermaster may be called upon to make any or all of the following types of issues:

*a.* Issue of supplies to troops, individuals, or to officers with the accountability as follows:

(1) Accountability remaining unchanged.

(2) Accountability passing to a regimental or other unit supply officer.

(3) Accountability for the article ceasing at the time of issue.

*b.* (1) Articles of a nonexpendable nature authorized for issue by the terms of Tables of Allowances for posts, camps, and stations are made on memorandum receipt with a transfer of responsibility but not of accountability.

(2) Articles of a nonexpendable nature authorized by the terms of a Table of Basic Allowances are ordinarily covered by a transfer of accountability as well as responsibility to a unit supply officer by means of shipping tickets.

*c.* Articles of an expendable nature authorized by the terms of a Table of Basic Allowances or Table of Allowances are dropped from accountability when receipted for by an authorized agent.

*d.* Articles consumed in the maintenance and operation of the regular post activities are dropped from accountability monthly on the certificate of the quartermaster approved by the commanding officer.

*e.* Fuel and forage are issued as required and dropped from accountability monthly on a monthly abstract of issues.

**122. Accounting for issues.**—Detailed instructions as to the making of accounting records to adjust the accountability and responsibility when issues are made are found in TM 10–310.

**123. Model forms.**—Model forms of issues are shown in Appendix IV.



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## APPENDIX I

## QUESTIONS AND ANSWERS TO BRING OUT THE APPLICATION OF TABLES OF BASIC ALLOWANCES FOR QUARTERMASTER CORPS, AND TABLES OF ALLOWANCES (EQUIPMENT FOR POSTS, CAMPS, AND STATIONS)

1. *Q.* What is prescribed by Tables of Basic Allowances?—*A.* Tables of Basic Allowances prescribe authorized basic allowances of organization and individual equipment with the exception of—

*a.* Equipment required for temporary use or for special purposes.

*b.* Component parts, spare parts, accessories, and expendable supplies listed in supply catalogs.

*c.* Recruit clothing and equipment and Alaskan clothing.

*d.* Equipment authorized in Tables of Allowances and which is in addition to that authorized in Tables of Basic Allowances.

2. *Q.* Define the term "equipment."—*A.* The term equipment is defined as applying to the supplies issued to individuals, organizations, and activities for the performance of their specific functions.

3. *Q.* Allowances are, in some cases, authorized on the basis of the squad, company, battalion, and regiment. What are these terms understood to include?—*A.* The squad refers to the lowest tactical unit. The company is understood to include the lowest administrative unit by whatever name it is known, such as remount troop or light maintenance company. The battalion includes the smallest unit composed of two or more of the lowest administrative units or equivalent thereto, such as the quartermaster squadron, cavalry division, or quartermaster battalion (wagon). The regiment is understood to include all units composed of two or more battalions or equivalent thereto.

4. *Q.* Define "individual equipment."—*A.* Individual equipment consists of those articles required by and authorized for an individual to enable him to perform the duties of a soldier. It consists generally of clothing, pack equipment, shelter half tent, cartridge belt with accessories, mess equipment, individual weapons, intrenching tools, and similar articles.

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5. *Q.* Define "organizational equipment."—*A.* Organizational equipment consists of those articles common to all organizations, such as mess and office equipment, tentage, etc., and in addition, equipment such as pack equipment for pack trains, wagon equipment for wagon trains, etc., necessary to permit organizations to function as parts of their particular arms or services.

6. *Q.* Define the term "supplies" as used in Tables of Basic Allowances.—*A.* Supplies are under two general headings: general supplies and cleaning and preserving material. General supplies are those required by most organizations for their maintenance, such as forage, stationery, fuel, etc. Cleaning and preserving material is that material required to keep organizational and individual equipment in good condition.

7. *Q.* How do using organizations obtain the articles of equipment and supply listed in the various tables?—*A.* Tables of Basic Allowances and Tables of Allowances are in themselves the authority for using organizations to obtain by requisition the articles listed therein.

NOTE.—These allowances are subject to the restrictions as to budgeted funds.

8. *Q.* Is the issue of supplies to organizations restricted to that listed in the various tables?—*A.* Yes. Articles not listed in the Tables of Allowances are not issued without prior approval of the War Department. However, during operations in the field against armed forces, the commanding general may authorize special issues, and articles in process of development or in an experimental state, which are not listed in these tables, may be issued.

9. *Q.* Certain articles listed in the tables are expendable articles. How are they indicated?—*A.* Expendable articles are marked with an asterisk (*).

10. *Q.* What circulars issued by The Quartermaster General are supplementary to the Tables of Basic Allowances, Quartermaster Corps, and list the expendable articles and allowances that may be issued?—*A.* Circular 1-10 and, during mobilization, Circular 1-18, OQMG.

NOTE.—Circular 1-18, restricted to war planning purposes, is no longer used as a basis for allowances of expendable supplies but comes into effect immediately on mobilization. These allowances are now fixed by the local commanding officer on the basis of the funds allowed under the budget.

11. *Q.* What circular issued by The Quartermaster General lists component parts, spare parts, accessories, and contents of chests, sets, kits, and outfits authorized for issue in Tables of Allowances, Tables of Basic Allowances, and Tables of Organization?—*A.* Circular No. 4, OQMG.



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12. *Q.* If it becomes necessary to requisition for any of the component parts of the sets, chests, etc., listed in Circular No. 4, OQMG, how are the correct nomenclature and stock numbers found?—*A.* By taking the names of the parts as listed in Circular No. 4, OQMG, and finding the class to which each part belongs as shown in paragraph 14 (this manual), and by reference to that class in the Quartermaster Corps Supplement to the Federal Standard Stock Catalog, the nomenclature and stock numbers are found. Sets, kits, etc., as a complete article have one stock number, while all the component parts have separate stock numbers, possibly in a different class, which are used when parts are required.

13. *Q.* The Table of Basic Allowances, Quartermaster Corps, is arranged so that the body of the table consists of five columns. Column 1 shows the items of equipment listed alphabetically. What is the application of the figures shown in column 2?—*A.* In this column there are given the basic allowances for mobilization. Equipment not taken in the field is designated under "Remarks."

14. *Q.* What is the application of the figures shown in column 3?—*A.* In this column there are given the basic allowances for organizations at posts, camps, and stations in time of peace and which are taken with the organization upon change of station. These allowances are not to be confused with those prescribed in Tables of Allowances.

15. *Q.* For what purpose is column 4 left blank?—*A.* The fourth column is left blank for use in computing totals for any particular organization under any particular circumstances.

NOTE.—The use of this column is not to be neglected by organizations that have a definite set-up as to personnel and equipment, for example, a pack train. This organization has a definite number of men and animals assigned to it. By using the blank column 4, the computed requirements can be instantly available at all times and, upon sudden orders for field service, a quick check between the equipment at hand and the amount shown in column 4 as needed enable the organization commander to take immediate steps in bringing the equipment up to the required amount.

16. *Q.* What information is published under column 5?—*A.* In the fifth column, headed "Basis of issue and remarks," appear the remarks necessary to establish definitely, in conjunction with the numbers appearing in the second or third column, the basis of issue for each item. Notations in Army Regulations, references to supply catalogs, circulars, etc., of the supply arms or services, or any other remarks that may be necessary to clarify the table are also entered in this column.



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17. *Q.* Why are there but three columns in the Table of Allowances (Equipment for Posts, Camps, and Stations)?—*A.* The allowances shown in this table are for garrison duty, in peace or war, when available. Hence, column 2 in the Table of Basic Allowances showing the requirement for mobilization is not needed nor is column 4, as the allowances are not based on definite organizations.

18. *Q.* Are the Tables of Basic Allowances which are applicable to regular troops also applicable to auxiliaries; if not, where are tables applying to auxiliaries found?—*A.* Tables of regular organizations are not applicable to auxiliaries. Allowances for auxiliaries are found in the following publications:

| | |
|---|---|
| Organized Reserves | AR 140–5 |
| Reserve Officers' Training Corps: | |
| Institutions | AR 145–20 |
| Training Camps | AR 145–30 |
| Citizens' Military Training Camps | AR 350–2200 |
| Schools and colleges | AR 350–3300 |
| Promotion of rifle practice | AR 850–100 |
| Enlisted Reserve Corps, active duty training | AR 150–5 |

19. *Q.* How much of the clothing listed under "Individual equipment" must be in possession of each enlisted man at all times?—*A.* There are now no specific regulations stating the exact amount of clothing that must be in a soldier's possession at all times, except for the lists in Tables of Basic Allowances.



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## APPENDIX II

## QUESTIONS AND ANSWERS ON BUDGET ITEMS

1. *Q.* When budget credits are set up, how are the amounts stated with respect to the several classes of supplies covered? *A.* The budget credits are stated separately for each table and each appropriation and are subdivided by purpose numbers.

2. *Q.* May savings made at a post in any one class be used to augment the available amount of the supplies of any other class? *A.* No. Instructions state specifically that "the total value of budgeted items under each table which a post may draw in any one fiscal year must not exceed the budget credit established for that particular class of supplies."

NOTE.—*a.* Table I lists "miscellaneous items for care and protection of regular supplies, stationery and office supplies, china and glassware," and note 1 infers that the nonexpendable supplies listed therein are also to be included in the budget credit for table I.

*b.* Table II includes items for care and protection of clothing and equipage only.

*c.* Table III includes items for care and protection of animal transportation, and also leather for repair of harness, saddlery, and pack equipment.

*d.* Table IV includes items for care and protection of motor transportation and for operation of same.

3. *Q.* Are funds budgeted for the support of the Regular Army organizations available for the supply of any of the civilian components of the Army? *A.* No; but issues may be made to the civilian components of the army from Regular Army stocks when reimbursement, in accordance with such instructions as are issued by The Quartermaster General, is to be secured.

4. *Q.* Explain briefly how this system of budget credits for the supplies concerned is established at a post or station, assuming that the post commander receives notice from the corps area commander that the allowance for his post for the fiscal year is a certain stated amount. *A. a.* The notice of the amount available is forwarded to the post quartermaster. To this amount is added the value of the supplies of the various classes on hand which are available for issue. This total sum is then divided among the organizations and headquarters of the posts in accordance with their respective strength



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and equipment. A tentative post budget is prepared and forwarded to the post commander for approval. Upon approval, this becomes the basis for all issues of these classes of supplies in the post. A record is kept of all organizations given an allowance under this budget and as they requisition for and draw supplies the value of such supplies is charged against their credit. When the credit is exhausted, no more issues are made.

*b.* The determination of the breakage allowance for china and glassware is a subject for speculation, as no settled practice has developed since this class of supplies is under budget restrictions. AR 35–6620 no longer sets up any stated percentage, but merely directs that "commanding officers of all posts and of all organizations supplied with tableware and kitchen utensils will exercise rigid supervision and economy in the care and preservation of all such articles, and any lost, destroyed, damaged, or broken through carelessness will be charged against the person or persons responsible It is assumed that a stated part of the credit allowed under table I is set aside for china and glassware. This amount is divided by the total value of china and glassware in the hands of the post organizations, and the quotient is the tentative breakage allowance. If this allowance proves insufficient at, for example, the end of the third quarter, and if any credits remain in other divisions of the total under table I, the breakage allowance for the 4th quarter may be increased. If the reverse proves true, the allowance for the 4th quarter may be reduced and the balance used for stationery, office supplies, or regular supply items for care and protection.

5. *Q.* How is the account maintained between the post quartermaster and the corps area quartermaster or supply depot?—*A.* Each requisition submitted for any of the classes of supplies budgeted must show the total credit allowed under any project, total cost of supplies already furnished on previous requisitions, and total cost of the supplies called for on the present requisition. This record is also kept in the office of the post quartermaster. When a requisition is filled, the amount of the shipping ticket is checked against the amount estimated or computed when the requisition was submitted and the account corrected by any savings or excess cost above the amount as estimated on the requisition. Statements, for purposes of comparison, are furnished from the corps area quartermaster's office showing the account as it stands on its books. The account is thus watched, and any savings made during the first three quarters of the year may be used to obtain needed supplies on the requisition for the 4th quarter. (See par. 6.)



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6. *Exercise.—a.* The commanding officer at Fort School, Pa., has received from the corps area commander notice that the credits to be allowed Fort School for the fiscal year are as follows:

TABLE I

| | | | |
|---|---|---|---|
| QM 200 P 2–0200 | A 226–7 | | |
| P 2–0202 | | $600.00 | |
| P 7–0205 | | | |
| P 7–0282 | | 400.00 | |
| P 8–0205 | | | |
| P 8–3057 | | 260.00 | |
| P 12–3015 | | 199.92 | |
| | | | $1,459.92 |

TABLE III

| | | |
|---|---|---|
| QM 200 P 3–0205 A 211 "A"–7 | $160.00 | |
| P 3–1280 | 350.00 | |

*b.* Based on the following data, prepare tentative budget credit for the offices and organizations of the post. Credits are allotted according to the percentage table given below:

TABLE I

| | P 2–0200; P 2–0202 | P 7–0205; P 7–0282 | P 8–0205; P 8–3057 | P 12–3015 |
|---|---|---|---|---|
| Post headquarters | 0.20 | 0.05 | 0.04 | |
| Regimental headquarters (1) | .10 | .04 | .04 | |
| Companies, each (12) | .03⅓ | .05 | .06 | 0.08⅓ |
| Quartermaster office | .13 | .04 | .03 | |
| Hospital | .08 | .20 | .11 | |
| Signal office | .05 | .04 | .03 | |
| Ordnance office | .04 | .03 | .03 | |

TABLE III

| | P 3–0205 | P 3–1280 |
|---|---|---|
| First Infantry | 0.25 | 0.375 |
| Quartermaster corral and stables | .25 | |
| Quartermaster storehouse for storage classes 34 and 69 | .125 | |
| Tenth Wagon Company | .375 | .625 |



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*c.* (1) The budget credit is as follows:

TABLE I

| | Project A | | Project B | |
|---|---|---|---|---|
| | P 2-0200; P 1-0202 | P 7-0205; P 7-0282 | P 8-0205; P 8-3057 | P 12-3015 |
| Post headquarters | $120.00 | $20.00 | $10.40 | |
| Regimental headquarters | 60.00 | 16.00 | 10.40 | |
| Companies, each $20 | 240.00 | 240.00 | [1] 15.60 | [1] 16.66 |
| | | | 187.20 | 199.92 |
| Quartermaster office | 78.00 | 16.00 | 7.80 | |
| Hospital | 48.00 | 80.00 | 28.60 | |
| Signal office | 30.00 | 16.00 | 7.80 | |
| Ordnance office | 24.00 | 12.00 | 7.80 | |
| | 600.00 | 400.00 | 260.00 | 199.92 |

TABLE III

| | P 3-0205 | P 3-1280 |
|---|---|---|
| First Infantry | $40.00 | $131.25 |
| Quartermaster corral and stables | 40.00 | -------- |
| Quartermaster storehouse for classes 34 and 69 | 20.00 | -------- |
| Tenth wagon company | 60.00 | 218.75 |

(2) Credits are allocated for the entire fiscal year but limited to use by quarters. Any balance remaining at the end of a quarter may be carried forward and used during subsequent quarters of the same fiscal year.

(3) Quarterly credits are usually allowed: First quarter, 50 percent; second quarter, 20 percent; third quarter, 20 percent; fourth quarter, 10 percent.



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# APPENDIX III

# REQUISITIONS

## 1. Requisition Register (W. D., Q. M. C. Form No. 479).

WAR DEPARTMENT
Q. M. C. Form No. 479 (old No. 68)
Revised August 9, 1924

### REQUISITION REGISTER

*Station*_____ *Fiscal year*_____

| DATE RECEIVED | REQUISITION NUMBER | ROUTED TO | REMARKS | COMPLETED |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | A requisition register is maintained by each quartermaster | | | |
| | who receives requisitions for supplies. This register is | | | |
| | necessary so that the status of requisitions may be known at | | | |
| | all times. | | | |
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**2. Forage.**—*a.* At the proper time a quartermaster prepares a requisition for forage requirements (standard ration) for his post for the fourth quarter, F. Y. _____. The requisition is the ninety-second issued during the fiscal year and calls for standard ration.



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(15 days are allowed for requisition to reach procuring agency. Forage is standard stock, class 67.) Animals to be supplied at Fort School are as follows:

| | Horses | | Mules, draft |
|---|---|---|---|
| | Riding | Draft | |
| | *1,150 lbs.* | *Over 1,150 lbs.* | |
| With 4th Brigade | 23 | 2 | 13 |
| With 70th Infantry | 130 | ---- | 415 |
| With 35th Field Artillery | 228 | 388 | 32 |
| With 45th Cavalry | 446 | 8 | 34 |
| With Quartermaster Corps | 6 | ---- | 28 |

There will be on hand (estimated Jan. 1, —)—

1,631,155 pounds ---------- oats
2,350,308 pounds ---------- hay
822,175 pounds ---------- straw

All previous requisitions for forage and bedding have been completely filled. Consumed during fourth quarter, fiscal year—

1,590,000 pounds ---------- oats
2,250,000 pounds ---------- hay
745,000 pounds ---------- straw

Space is available at Fort School, Pa., for storage of 90 days' supply. Shipments may be made by railroad or by motor truck.

The quartermaster asks for—

Oats.
Hay, feeding.
Straw, bedding.

Deliveries to commence March 16, —, and continue at a rate not to exceed two carloads of each item per day, except Sunday, until completed.

The following local dealers are interested in the supply of forage at Fort School:

Smith Forwarding Co., 122 North First Street, Philadelphia, Pa.
Black Grain Co., 18 South Delaware Avenue, Philadelphia, Pa.
J. D. Rowe & Co., 482 Spruce Street, Philadelphia, Pa.

Local prices:

Oats, No. 2 white, in sacks ---------- $40.00 per ton of 2,000 pounds
Hay, No. 1, baled ---------- $22.50 per ton of 2,000 pounds
Straw, oats, No. 1, baled ---------- $10.00 per ton of 2,000 pounds



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*b.* A requisition for forage and straw (1 copy) for Fort School, Pa., for the 4th quarter, fiscal year —, is shown below:

WAR DEPARTMENT
Q. M. C. Form No. 400
Revised Apr. 6, 1921

## REQUISITION

To: Quartermaster, Third Corps Area, Baltimore, Maryland — No. of Sheets 2 — Sheet No. 1
Requisition No. QM 135-92-39 — Date Dec. 31, — Period 4th Qtr.F.Y. ____
SHIP TO Quartermaster, Fort School, Pa.

| Requisitioned By (show Signature, Rank, Organization, Destination. If different from "ship to" include address): | Approved By: |
|---|---|
| J. B. WORKS<br>Major, Q.M.Corps<br>Quartermaster | I. M. HARDY<br>Colonel, Infantry<br>Commanding |

| STOCK No. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | LOCAL PURCHASE<br>1. It is recommended that this office be authorized to purchase locally the forage covered by sheet No. 2 of this requisition.<br>2. Local dealers are to make deliveries by motor truck direct to warehouse, thus effecting a saving of handling costs incident to unloading from cars to trucks and trucking from cars to warehouse. Estimated saving, $3,000.00.<br>3. If local purchase be authorized, funds should be allotted this office in the amount of $61,000.00 under Appn. R.S., F.Y. ____ P 5-0250 A 0510-9. | | | | | |

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WAR DEPARTMENT
Q. M. C. Form No. 401
Revised April 6, 1931

# REQUISITION
(EXTRA SHEET)

No. QM 135-92-39
Sheet No. 2

| STOCK NO. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | Number of Animals at Post by Weight and Class: | | | | | |
| | 833 horses, riding, light, 1150 lbs., or less;<br>398 Horses, draft, heavy, more than 1150 lbs.;<br>522 mules, draft. | | | | | |
| | R.S. F.Y. ____ P 5-0250 A 0710-9<br>Standard Garrison Rations | | | | | |
| | | | | 1-1-40<br>Estimated | | |
| | 67-F-261 Oats | lbs. | | 1,631,155 | 1,590,000 | 1,532,906 |
| | 67-F-3070 Hay, feeding | " | | 2,350,308 | 2,250,000 | 2,163,632 |
| | 67-F-5350 Straw, bedding | " | | 822,175 | 745,000 | 764,290 |
| | NO SAVINGS ANTICIPATED. | | | | | |
| | Allowances as authorized in AR 30-480 | | | | | |
| | Local prices: Oats, #2 white, in sacks $40.00 per ton of 2,000 lbs. | | | | | |
| | Hay, #1, baled $22.00 per ton of 2,000 lbs. | | | | | |
| | Straw, oat, #1, baled $10.00 per ton of 2,000 lbs. | | | | | |
| | List of local dealers: | | | | | |
| | Smith Forwarding Co., 122 N. 1st St., Phila., Pa. | | | | | |
| | Black Grain Co., 18 S. Delaware Ave., Phila., Pa. | | | | | |
| | J. D. Rowe & Co., 462 Spruce Street, Phila., Pa. | | | | | |
| | Storage space available: For 90 days' supply. | | | | | |
| | Deliveries: To commence March 16, ____ and continue at the rate of two cars of each item per day, except Sundays until completed. | | | | | |

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*c.* The following computation shows how quantities on the face of the requisition are determined:

*Hay*

833+522=1,355 1,355×14=18, 970
398 (heavy draft)×15= 5, 970

24, 940 allowances for 1 day.
Number of days from January 1 to June 30, —=181.
181×24, 940=4, 514, 140 pounds required.
On hand January 1 2, 350, 308 pounds.

2, 163, 832 pounds to be requisitioned.

*Straw*

Total animals: 1,753×5=8,765 pounds (allowances for 1 day).
8, 765×181=1, 586, 465 pounds required.
On hand January 1 822, 175 pounds.

764, 290 pounds to be requisitioned.

*Oats*

Light horses: 833×10 = 8, 330 pounds (allowance for 1 day).
Heavy horses: 398×12½= 4, 975 pounds (allowance for 1 day).
Mules: 522×8 = 4, 176 pounds (allowance for 1 day).

17, 481 pounds, total for 1 day.
17, 481×181=3, 164, 061 pounds required.
On hand January 1 1, 631, 155 pounds

1, 532, 906 pounds to be requisitioned.

**3. Fire apparatus.**—*a.* The quartermaster at Fort School, Pa., desires to submit a requisition for fire apparatus for the fiscal year 1940. The requisition is numbered QM 135–160–39 and dated December 31, 1938. His requisition is based on the following data:

| | |
|---|---|
| **Extinguishers, fire, soda and acid type, 2½ gallons, complete with hooks and hangers (stock No. 58–E–220, unit, each):** | |
| Received September 2, 1938 | 12 |
| Received September 3, 1937 | 6 |
| On hand December 31, 1938 | 24 |
| Required for fiscal year 1940 | 6 |
| **Extinguishers, fire, foam, 2½ gallons, complete with hooks and hangers (stock No. 58–E–212, unit each):** | |
| Received during 1937 | 0 |
| Received during fiscal year 1939 | 0 |
| On hand December 31, 1938 | 12 |
| Required for fiscal year 1940 | 12 |



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Hose, fire, cotton, rubber lined, double jacketed, inside diameter 2½ inches, 50-foot lengths, with couplings (stock No. 33-H-273, unit, feet):

| | |
|---|---|
| Received October 4, 1937 | 200 |
| Received during fiscal year 1939 | 200 |
| On hand December 31, 1938 | 400 |
| Required for fiscal year 1940 | 400 |

Nozzles, hose, fire, 1 piece, type C (stock No. 33-N-97, unit, each):

| | |
|---|---|
| Received during fiscal year 1939 | 0 |
| Received during calendar year 1937 | 0 |
| On hand December 31, 1938 | 4 |
| Required for fiscal year 1940 | 2 |

*b.* A requisition for fire apparatus is shown below:

WAR DEPARTMENT
Q. M. C. Form No. 400
Revised Apr. 4, 1921

## REQUISITION

To: The Quartermaster General, Washington, D. C. Thru: Q.M. 3d Corps Area, Baltimore, Md. No. of Sheets 2 Sheet No. 1

Requisition No. QM 135-160-39 Date December 31, 1938 Period F.Y. 1940

SHIP TO The Quartermaster, Fort School, Pa.

| Requisitioned By (show Signature, Rank, Organization, Destination. If different from "SHIP TO" include address): | Approved By: |
|---|---|
| J. B. WORKS<br>Major, Q.M. Corps<br>Quartermaster | I. M. HARDY<br>Colonel, Infantry<br>Commanding |

| STOCK No. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | Appropriation: B. & Q. P 23-3054 A 0535-0<br>Basis: See page 10, Table of Allowances, Posts, Camps, and Stations, and chart herewith. | | QUANTITY | | | |
| | | | Rec'd. F.Y. 1939 | Rec'd. Calendar Year 1937 | On Hand Dec. 31, 1938 | Required F.Y. 1940 |
| 33-H-273 | Hose, fire, cotton, rubber lined, double jacketed, inside dia. 2½", 50' lengths, w/couplings, ft. | | 200 | 200 | 400 | 400 |
| 33-N-97 | Nozzle, hose, fire, 1 piece, Type "C" | each | 0 | 0 | 4 | 2 |



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WAR DEPARTMENT
Q. M. C. Form No. 401
Revised April 6, 1931

**REQUISITION**
(EXTRA SHEET)

No. QM 135-160-39
Sheet No. 2

| STOCK NO. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | Basis: See Note 2, pages 14 and 15, Table of Allowances, Posts, Camps, and Stations. | | | | | |
| | | | QUANTITY | | | |
| | | | Rec'd. F.Y. 1939. | Rec'd. Calendar Year 1937. | On Hand Dec. 31, 1938. | Req'd. F.Y. 1940. |
| 58-E-212 | Extinguishers, fire, foam, 2½ gal., complete w/hooks and hangers, each | | 0 | 0 | 12 | 12 |
| 58-E-220 | Extinguishers, fire, soda and acid, 2½ gal., complete with hooks and hangers, each | | 12 | 6 | 24 | 6 |

Note: Requisitions for fire apparatus require a basis for each class of equipment to be shown separately. For fire hose, it is normally the kind and capacity of pumps, distance of hydrants from various buildings, etc.

For fire extinguishers, it is the number of buildings of the kind listed in Note 2, Table of Allowances, Posts, Camps, and Stations; their size in square feet of floor space; and anything else that enables the corps area quartermaster to compute accurately the post allowances as prescribed in Note 2, referred to above.

Funds: Funds for this class of supplies may be furnished from corps area reserve, from post B. & Q. money, or from The Quartermaster General's reserve for independent stations. Each corps area has instructions covering this and and these instructions are checked and observed in preparing a requisition.

Attached hereto is a chart showing the status of fire-fighting apparatus at Fort School, Pa.

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## 4. Heavy furniture.

WAR DEPARTMENT
Q. M. C. Form No. 400
Revised Apr. 6, 1931

### REQUISITION

To: Q.M.G., Wash., D. C. (Through C.A. Q.M.). No. of Sheets 5 Sheet No. 1

Requisition No. QM 135-166-40 Date Dec. 31, 1939 Period F. Y. 1941

SHIP TO Quartermaster, Ft. School, Pa.

| REQUISITIONED BY (show Signature, Rank, Organization, Destination. If different from "SHIP TO" include address): | APPROVED BY: |
|---|---|
| B,<br>Captain, Q.M.C.,<br>Quartermaster. | K,<br>Colonel, Infantry,<br>Commanding. |

| STOCK No. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | Appn.: B. & Q. P 21-3010 A 0535 | | | | | |
| | HEAVY FURNITURE | | | | | |
| | Basis of Reqn.: Table of Allowances, Equipment for Posts, Camps, and Station, 1/10/39. | | | | | |
| | 20 Married officers' qtrs. below grade of field officers and warrant officers' qtrs. | | | | | |
| | 8 Field and general officers' qtrs. | | | | | |
| | 10 Bachelor officers' qtrs. | | | | | |
| | 3 Bachelor officers' messes (8 or less). | | | | | |
| | 25 Married non-commissioned officers' qtrs. | | | | | |

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WAR DEPARTMENT
Q. M. C. Form No. 601
Revised April 6, 1931

**REQUISITION**
(EXTRA SHEET)

No. QM 135-166-39
Sheet No. 2

| STOCK NO. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | | | QUANTITY | | | |
| | | | Rec'd. Cur. F.Y. 7/1 to 12/31/39. | Rec'd. Calendar Year 1938. | Expected 1/1 to 6/30/40 | Required to Meet Shortage as of 1/1/40. |
| | MAHOGANY | | | | | |
| 26-C-2660 | Chiffonier | | 0 | 0 | 0 | 0 |
| 26-B-1290 | Bureaus w/mirror | | 0 | 0 | 0 | 6 |
| 26-T-230 | Dressing table w/seat & mirror | | 0 | 0 | 0 | 14 |
| 26-T-650 | Table, side | | 0 | 0 | 0 | 0 |
| 26-D-515 | Desk, falt top | | 0 | 0 | 0 | 0 |
| 26-S-7510 | Sideboard (none built in) | | 0 | 0 | 0 | 0 |
| 26-T-195 | Table, dining | | 0 | 0 | 0 | 0 |
| 26-T-2105 | Chairs, arm | | 0 | 0 | 0 | 12 |
| 26-C-2625 | Chairs, side | | 0 | 0 | 0 | 24 |
| 26-T-393 | Table, kitchen | | 0 | 0 | 0 | 0 |
| | BIRCH | | | | | |
| 26-B-1260 | Bureaus w/mirror | | 0 | 0 | 0 | 25 |
| 26-C-2850 | Chiffonier | | 0 | 0 | 0 | 25 |
| 26-T-350 | Table, gateleg | | 0 | 0 | 0 | 25 |
| 26-C-2085 | Chairs, arm | | 0 | 0 | 0 | 50 |
| 26-C-2600 | Chairs, side | | 0 | 0 | 0 | 150 |
| 26-T-393 | Table, kitchen | | 25 | 0 | 0 | 0 |

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WAR DEPARTMENT
Q. M. C. Form No. 491
Revised April 6, 1931

# REQUISITION
(EXTRA SHEET)

No. QM 135-166-39
Sheet No. 3

| STOCK NO. | ARTICLES | UNIT | ON HAND AND DUE Total Expected on Hand 6/30/40 | CONSUMED Required to Complete Allowances Prescribed by Table of Allowances, W.D. 5/6/38. | REQUIRED Allowances prescribed by Table of Allowances, W.D. 5/6/38. | APPROVED |
|---|---|---|---|---|---|---|
| | Furniture, Mahogany | | | | | |
| | Chiffonier | | 46 | 0 | 46 | |
| | Bureaus w/mirrors | | 50 | 6 | 56 | |
| | Dressing table w/seat & Mirror | | 14 | 14 | 28 | |
| | Table, side | | 41 | 0 | 41 | |
| | Desk, flat top | | 38 | 0 | 38 | |
| | Sideboard (none built in) | | 31 | 0 | 31 | |
| | Table, dining | | 31 | 0 | 31 | |
| | Chairs, arm | | 132 | 12 | 144 | |
| | Chairs, side | | 164 | 24 | 288 | |
| | Table, kitchen | | 31 | 0 | 31 | |
| | Furniture, Birch | Married Non-commissioned Officers' Qtrs. | | | | |
| | Bureau w/mirror | | 0 | 25 | 25 | |
| | Chiffonier | | 0 | 25 | 25 | |
| | Table | | 0 | 25 | 25 | |
| | Chairs, arm | | 0 | 50 | 50 | |
| | Chairs, side | | 0 | 150 | 150 | |
| | Table, kitchen | | 25 | 0 | 25 | |

This recapitulation is not required, but its use is suggested as adding clarity to sheet No. 2.

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WAR DEPARTMENT
Q. M. C. Form No. 461
Revised April 6, 1921

# REQUISITION
(EXTRA SHEET)

No. QM 135-166-39
Sheet No. 4

| STOCK NO. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | Appn.: B. & Q. P 22-3051 A 0535. | | | | | |
| | Refrigerators, Electric for 110 volt A. C. | | | | | |
| | Basis of Reqn.: Table of Allowances, Equipment for Posts, Camps, and Stations, dated 5/6/30. | | | | | |
| | | Rec'd. during F.Y. 7/1 to 12/31/39 | Rec'd. during Calendar Year 1938 | Expected 1/1/ to 6/30/40 | Required to meet shortage as of 1/1/40 | |
| | Capacity 60 cu. ft. | | | | | |
| 26-R-252 | 6 large org. messes<br>1 post exchange | 1 | 0 | 0 | 0 | |
| | Capacity 40 cu. ft. | | | | | |
| 26-R-231 | 3 small org. messes | 0 | 2 | 0 | 1 | |
| | Capacity 10-12 cu. ft. | | | | | |
| 26-R-229 | 1 commanding officers' qtrs. | 0 | 0 | 0 | 0 | |
| | Capacity 7 cu. ft. | | | | | |
| 26-R-223 | 27 company & field officers' qtrs.<br>3 bachelor officers' messes (8 or less) | 2 | 4 | 0 | 7 | |
| | Capacity 5 cu. ft. | | | | | |
| 26-R-227 | 10 bachelor officers' qtrs. | 3 | 0 | 0 | 2 | |
| | 25 married non-com. officers' qtrs. | 2 | 10 | 0 | 5 | |



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WAR DEPARTMENT
Q. M. C. Form No. 401
Revised April 6, 1931

# REQUISITION
(EXTRA SHEET)

No. Qm 135-166-39
Sheet No. 5

| STOCK NO. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | Appn.: B. & Q. P 20-3010 A.0535<br>Wall Lockers<br>Basis for Reqn.: Table of Allowances, Equipment for Posts, Camps, and Station, dated 5/6/38.<br>642 enlisted men in barracks authorized strength. | | | | | |
| | | Rec'd. during F.Y. 7/1 to 12/31/39 | Rec'd. Calendar Year 1938 | Expected 1/1 to 6/30/40 | Required to Meet Shortage as of 1/1/40 | |
| | Lockers, wall, steel | | | | | |
| 20-L-297 | Single | 0 | 0 | 0 | 26 | |
| 26-L-298 | Double 1/2 per man | 0 | 0 | 0 | 30 | |



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## 5. Fuel.

WAR DEPARTMENT
Q. M. C. Forms No. 400
Revised Apr. 6, 1921

### REQUISITION

To: The Quartermaster General (Through C.A., Q.M.) No. of Sheets 6 Sheet No. 1

Requisition No. QM 135-45-40 Date October 1, 1939 Period (July 1, 1940 June 30, 1941)

SHIP TO Quartermaster, Ft. School, Pa.

REQUISITIONED BY (show Signature, Rank, Organization, Destination. If different from "SHIP TO" include address):

B,
Captain, Q. M. Corps

APPROVED BY:

K,
Colonel, Infantry,
Commanding.

| STOCK No. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED F.Y.1939 | REQUIRED Est. | REQUIRED Apvd. | APPROVED By |
|---|---|---|---|---|---|---|---|
| | Show complete details, specifications, when shipment is desired, cost, etc. | on hand as of 7/1/39 to agree w/QMC 108 | Bal. F.Y. 1940 as of 7/1/39 | & Est. F.Y.1940 | Sta. Q.M. F.Y. 1941 | C.A. Q.M. F.Y. 1941 | C.M.G. for Pur. |
| 7-C-430 | Coal, bit., lump, 5" x 2", tons 13,600 B.T.U. 6% Ash 24% Volatile 2% Moisture | 760 | 690 | 1,690 F.Y.1939 1,700 F.Y.1940 | 1738 | 1610 | 1,450 |
| | To be used as follows: | | | | | | |
| | Cooking and heating | tons | 440 | 1128 | 1128 | 1000 | 640 |
| | Harbor boats | " | 200 | 320 | 320 | 320 | 320 |
| | Sales (R.S.) (B.& Q., O.S. & U.) | " | 10 | 50 | 50 | 50 | 50 |
| | Incinerators | " | 20 | 100 | 100 | 100 | 100 |
| | Road Rollers | " | 20 | 92 | 140 | 140 | 140 |
| To be shipped in bottom hopper cars for trestle dumping at rate of 10 cars per week commencing May 1, 1940. | | | | | | | |

| Storage Facilities | | Past purchases made in F.Y. 1938 | | |
|---|---|---|---|---|
| 410 | tons in buildings | F.O.B. mine or origin | $1.92 | per ton |
| 1,700 | tons on general coal pile | F.O.B. destination | $ | per ton |
| Unloading Facilities, such as Crane, Conveyor, Steam Shovel, etc. | | Freight | $2.48 | per ton |
| Type | | Switching | $ .12 | per ton |
| Capacity | tons per day | Unloading | .60 | per ton |
| No. of men required | | | $5.12 | per ton |
| Enlisted or civilian | | Cost of handling coal from coal pile to bins in building $0.40 per ton. | | |
| Delivered to Buildings by: | | Put into Bins by: | | |
| Dump truck | | Chute | | |
| Escort wagon | | Wheelbarrow | | |
| Motor truck | | Enlisted or civilian labor | | |
| Capacity | tons per day | No. of men required | | |
| No. of men required | | | | |

(Over)



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## INSTRUCTIONS FOR PREPARATION OF REQUISITION

Space "TO."—To show the approving office to which requisition is submitted.

Space "PERIOD."—Show period for which the supplies are required.

Space "SHIP TO."—Full shipping address to be given. Where mail address is different from shipping address the former should also be shown, e. g., "Q. M., Fairfield Air Depot, Osborn, Ohio. Mail address, Fairfield." Except for established camps, posts, or stations, street or building address should be shown, e. g., "C. O. 328th Inf., National Guard, 456 Republic Bldg., Grand Haven, Mich." Where the property is to be invoiced to an organization, etc., different from that to which it is to be shipped, the required information will be shown.

Space "STOCK NO."—Show stock number listed in Federal Stock Catalogue.

Space "ARTICLES."—Include sizes required. Show purpose numbers applicable to an article or group immediately above the article or group concerned.

Space "ON HAND AND DUE."—Show the quantity on hand plus the quantity approved on previous requisitions and not yet received.

Space "CONSUMED."—Show quantity consumed during the previous period.

Space "REQUIRED."—To be the quantity asked for by the requisitionist.

Space "APPROVED."—To be the quantity approved by the approving officer.

This form may be used in lieu of Q. M. C. Forms Nos. 402, 409, and 410 by appropriate modification.

IN THE SPACE BELOW SHOW BASIS FOR REQUISITION, i. e., Strength of Command, Number of Animals, Number of Animal-Drawn and Motorized Vehicles, Armament, or such other data as may be required by instructions issued by approving authorities.

.8—0028

THIS SPACE FOR ACTION OF APPROVING OFFICER

Reduction by C. A. Q. M. based on maximum standard quantities for cooking and water heating in 10 officers' quarters.

Reduction by O.Q.M.G., based on average assumption which is 80% of maximum standard quantities.



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WAR DEPARTMENT
Q. M. C. Form No. 600
Revised Apr. 6, 1921

# REQUISITION

To: The Quartermaster General (Through C.A. Q.M.) No. of Sheets 6 Sheet No. 2

Requisition No. QM 135-45-40 Date October 1, 1939 Period F.Y. 1941 (July 1, 1940 June 30, 1941).

SHIP TO Quartermaster, Ft. School, Pa.

REQUISITIONED BY (show Signature, Rank, Organization, Destination. If different from "SHIP TO" include address):

B,
Captain, Q.M. Corps

APPROVED BY:

K,
Colonel, Infantry

| STOCK No. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED Est. Sta. F.Y. 1941 | REQUIRED Apvd. C.A. F.Y. 1941 | APPROVED By Q.M.C. for Pur. |
|---|---|---|---|---|---|---|---|
| | Show complete details, specifications, when shipment is desired, cost, etc. | On Hand as of 7/1/39 to agree w/QMC 108 | Bal. F.Y. 1940 as of 7/1/39 | F.Y. '39 & Est. F.Y. '40 | | | |
| 7-C-235 | Coal, anthracite, buckwheat 12,750 B.T.U. (minimum) 15% ash (maximum) 2,750 degrees (fusing point (minimum) | tons 0 | 0 | 210 | 210 | 210 | 21 |
| | To be shipped in bottom hopper cars at rate of 2 per week, beginning July 1, 1940. | | | | | | |
| | No previous purchase made. Accurate cost not known. | | | | | | |
| | Storage Facility 100 tons in buildings. 200 tons in storage shed. | | | | | | |
| | To be used as follows: heating ---------- ------ | 210 tons in quarters 1 to 10, incl. | | | | | |



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WAR DEPARTMENT
Q. M. C. Forms No. 400
Revised Apr. 6, 1921

# REQUISITION

The
To: Quartermaster General (Through C.A. Q.M.) No. of Sheets 6 Sheet No. 3

Requisition No. QM 135-45-40 Date October 1, 1939 Period F.Y. 1941 (July 1, 1940 June 30, 1941)

SHIP TO

REQUISITIONED BY (show Signature, Rank, Organization, Destination. If different from "SHIP TO" include address):

B,
Captain, Q. M. Corps

APPROVED BY:

K,
Colonel, Infantry.

| STOCK No. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | | APPROVED |
|---|---|---|---|---|---|---|---|
| | Show complete details, specifications, when shipment is desired, cost, etc. | On Hand as of 7/1/39 to agree w/QMC 108 | Due Bal. F.Y. '40 as of 7/1/39 | F.Y.1939 & Est. F.Y.1940 | Est. Sta. Q.M. F.Y. '41 | Apvd. C.A. Q.M. 1941 | By Q.M.G. for Pur. |
| 7-0-145 | Oil, fuel (Diesel engine). To be Diesel oil of Navy Standard or Bunker Grade "A" 28-30 Baume gal. | 16000 | 13500 | 39800<br>F.Y. 1940<br>40000 | 40000 | 40000 | 40000 |
| | To be shipped in tank cars for delivery to post storage tank at rate of one tank car (7,500 gal.) at six weeks' intervals. | | | | | | |
| | Last purchase price in F.Y. 1939. Delivered to station, $0.0715 per gal. | | | | | | |
| | Storage tank at station has capacity of 10,000 gallons. | | | | | | |
| | To be used entirely for operating electric generating plant for post light and power. | | | | | | |



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WAR DEPARTMENT
Q. M. C. Forms No. 400
Revised Apr. 6, 1921

# REQUISITION

To: The Quartermaster General (Through C.A. Q.M.) No. of Sheets 6 Sheet No. 4

Requisition No. Qm 135-45-40 Date October 1, 1939 Period F.Y. 1941 (July 1, 1940 June 30, 1941)

SHIP TO Quartermaster, Ft. School, Pa.

| Requisitioned By (show Signature, Rank, Organization, Destination. If different from "ship to" include address): | Approved By: |
|---|---|
| B,<br>Captain, Q. M. Corps. | K,<br>Colonel, Infantry,<br>Commanding. |

| STOCK No. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | | APPROVED |
|---|---|---|---|---|---|---|---|
| | Show complete details, specifications, when shipment is desired, cost, etc. | On Hand as of 7/1/39 to agree w/QMC 108 | Due Bal. F.Y.1940 as of 7/1/39 | F.Y.1939 & Est. F.Y.1940 | Est. Sta. Q.M. F.Y. 1941 | Apvd. C.A. Q.M. F.Y. 1941 | By Q.M.G. for Pur. |
| 7-W-95 | Wood, hard Cords | 10 | 20 | 32<br>F.Y. 1940<br>32 | 30 | 30 | 30 |
| | To be seasoned. Any green wood to be rejected. | | | | | | |
| | To be shipped entirely by August 15, 1940. | | | | | | |
| | Last purchase in F.Y. 1939 cost--at station $11.50 per cord. | | | | | | |
| | To be used as follows: | | | | | | |
| | Cooking and heating | | 12 | 22 | 20 | 20 | 20 |
| | Incinerators | | 4 | 5 | 5 | 5 | 5 |
| | Road rollers | | 4 | 5 | 5 | 5 | 5 |

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WAR DEPARTMENT
Q. M. C. Form No. 400
Revised Apr. 6, 1933

# REQUISITION

To: The Quartermaster General (Through C.A. Q.M.) No. of Sheets 6 Sheet No. 6

Requisition No. QM 135-45-40 Date October 1, 1939 Period (July 1, 1940 F.Y. 1941 June 30, 1941)

SHIP TO Quartermaster, Ft. School, Pa.

| Requisitioned By (show Signature, Rank, Organization, Destination. If different from "ship to" include address): | Approved By: |
|---|---|
| B,<br>Captain, Q. M. Corps. | K,<br>Colonel, Infantry,<br>Commanding. |

| STOCK No. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | | APPROVED |
|---|---|---|---|---|---|---|---|
| | Show complete details, specifications, when shipment is desired, cost, etc. | On Hand as of 7/1/39 to agree w/Q.M.C Form No.108 | Due Bal. F.Y. 1940 7/1/39 | F.Y. 1939 & Est. | Est. Sta. Q.M. F.Y. 1941 | Apvd. C.A. Q.M. F.Y. 1941 | By Q.M.C. for Pur. |
| 7- | *Gas, artificial, not less than 550 B.T.U. content M cu. ft. | 0 | 620 | 860 F.Y. 1940<br>900 | 1100 | 900 | 720 |
| | To be supplied upon call.<br>Cost in F.Y. 1939 was $0.90 per M. cu. ft. (purchased rate).<br>To be used for cooking and water heating in 10 officers' quarters. | | | | | | |
| | *Electricity K.W.H.<br>To be supplied upon call.<br>Cost in F.Y. 1939 was $0.04 per K.W.H.<br>To supplement station plant generation for light and power as follows: | | 14000 | 28000 | 28000 | 28000 | 28000 |
| | Light | K.W.H. | 9000 | 16000 | 16000 | 16000 | 16000 |
| | Water pumping | " | 1500 | 2500 | 2500 | 2500 | 2500 |
| | Laundry operation | " | 1500 | 2500 | 2500 | 2500 | 2500 |
| | Power (Air Corps shops) | " | 3000 | 5000 | 5000 | 5000 | 5000 |
| | Power (Motor repair shops) | " | 1000 | 2000 | 2000 | 2000 | 2000 |
| | * On separate sheets. | | | | | | |

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(Over)



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**INSTRUCTIONS FOR PREPARATION OF REQUISITION**

**Space "TO."—To show the approving office to which requisition is submitted.**

**Space "PERIOD."—Show period for which the supplies are required.**

**Space "SHIP TO."—Full shipping address to be given. Where mail address is different from shipping address the former should also be shown, e. g., "Q. M., Fairfield Air Depot, Osborn, Ohio. Mail address, Fairfield." Except for established camps, posts, or stations, street or building address should be shown, e. g., "C. O. 328th Inf., National Guard, 456 Republic Bldg., Grand Haven, Mich." Where the property is to be invoiced to an organization, etc., different from that to which it is to be shipped, the required information will be shown.**

Space "STOCK NO."—Show stock number listed in Federal Stock Catalogue.

Space "ARTICLES."—Include sizes required. Show purpose numbers applicable to an article or group immediately above the article or group concerned.

Space "ON HAND AND DUE."—Show the quantity on hand plus the quantity approved on previous requisitions and not yet received.

Space "CONSUMED."—Show quantity consumed during the previous period.

Space "REQUIRED."—To be the quantity asked for by the requisitionist.

Space "APPROVED."—To be the quantity approved by the approving officer.

This form may be used in lieu of Q. M. C. Forms Nos. 402, 409, and 410 by appropriate modification.

IN THE SPACE BELOW SHOW BASIS FOR REQUISITION, i. e., Strength of Command, Number of Animals, Number of Animal-Drawn and Motorized Vehicles, Armament, or such other data as may be required by instructions issued by approving authorities.

•3—9923

**THIS SPACE FOR ACTION OF APPROVING OFFICER**

Reduction by corps area quartermaster, based on contemplated reduction in the garrison.

Reduction by the Office of The Quartermaster General, based on the installation of buckwheat coal-burning heating equipment, and gas-burning cooking ranges and water heaters in quarters Nos. 1 to 10, inclusive.



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## 6. Operating supplies.

WAR DEPARTMENT
Q. M. C. Form No. 400
Revised Apr. 6, 1921

### REQUISITION

To: The Quartermaster General, Washington, D. C. No. of Sheets 3 Sheet No. 1
Through: Q.M. 3d Corps Area, Baltimore, Md.

Requisition No. QM 135-163-40 Date December 31, 1939 Period F.Y. 1941

SHIP TO The Quartermaster, Ft. School, Pa.

REQUISITIONED BY (show Signature, Rank, Organization, Destination. If different from "SHIP TO" include address):

B,
Captain, Q.M. Corps,
Quartermaster.

APPROVED BY:

K,
Colonel, Infantry,
Commanding.

| STOCK No. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | Appropriation: B. & Q. P 3-0282 | A 0535 | | QUANTITY | | |
| | | Consumed F.Y. 1939 | Consumed 7/1/ to 12/31/39 | Required F.Y. 1941 | On Hand 12/31/39 | |
| | Ice Plant | | | | | |
| 14-0-2573 | Oil, lubrication, refrigeration, Navy Symbol 1075 | 200 | 120 | 200 | 80 | |
| | Pumping Plant | | | | | |
| 14-0-2768 | Oil, engine, steam cylinder compound, 50-55 gal. drum or bbl. gal. | 150 | 75 | 150 | 75 | |
| | Steam Heating Plant | | | | | |
| 14-0-2768 | Oil, engine, steam cylinder compound, 50-55 gal. drum or bbl. gal. | 50 | 20 | 50 | 30 | |

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WAR DEPARTMENT
Q. M. C. Forms No. 401
Revised April 6, 1921

# REQUISITION
(EXTRA SHEET)

No. QM 135-163-40
Sheet No. 2

| STOCK NO. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | | | | QUANTITY | | |
| | | Consumed F.Y. | Consumed 7/1/ to 12/31/39 | Required F.Y. 1941 | On Hand 12/31/39 | |
| | STEAM HEATING PLANT | | | | | |
| 27-W-334 | Waste, cotton, white, 50-lb. bale | lbs. 100 | 50 | 100 | 50 | |

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WAR DEPARTMENT
Q. M. C. Form No. 401
Revised April 6, 1931

**REQUISITION**
(EXTRA SHEET)

No. QM 135-163-40
Sheet No. 3

| STOCK NO. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | | | | QUANTITY | | |
| | | Consumed F.Y. 1939 | Consumed 7/1 to 12/31/39 | Required F.Y. 1941 | On Hand 12/31/39 | |
| | FIRE APPARATUS | | | | | |
| 51-A-1582 | Acid, sulphuric, 180-lb. carboy | lbs. * 360 | 80 | 180 | 100 | |
| 51-S-2415 | Sodium, bicarbonate, 112-lb. keg | lbs. 300 | 60 | 224 | 164 | |
| | ICE PLANT | | | | | |
| 51-A-2385 | Ammonia, anhydrous, 50-lb. cylinder | lbs. 300 | 150 | 300 | 150 | |

NOTE: Only one or two items for each of the separate operating utilities have been used to show the set-up of a requisition of this class. Each utility would probably have from ten to twenty or more items but the procedure is the same, i.e., a separate sheet or sheets for each storage class and sub-headings on each sheet for the different activities.

* A fire during the fiscal year 1939 caused the discharge of numerous extinguishers and used an unusual amount of acid and soda.



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## 7. Electric lamps.

WAR DEPARTMENT
Q. M. C. Form No. 400
Revised Apr. 6, 1931

### REQUISITION

To: The Quartermaster General, Washington, D. C. No. of Sheets 2 Sheet No. 1
(Through C.A. Q.M.)
Requisition No. QM 135-164-40 Date December 15, 1939. Period F. Y. 1941

SHIP TO The Quartermaster, Ft. School, Pa.

| REQUISITIONED BY (show Signature, Rank, Organization, Destination. If different from "SHIP TO" include address): | APPROVED BY: |
|---|---|
| B,<br>Captain, Q.M. Corps,<br>Quartermaster. | K,<br>Colonel, Infantry.<br>Commanding. |

| STOCK NO. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | Appropriation: S. & Q. P 5-0282 A 0535 | | | | | |
| | Electric Lamps | | | | | |
| | (See sheet #2) | | | | | |



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WAR DEPARTMENT
Q. M. C. Form No. 401
Revised April 6, 1931

# REQUISITION
(EXTRA SHEET)

No. QM 135-164-40
Sheet No. 2

| ARTICLES | (1) Quantity, Wattage, and Type Received During F.Y. 1940 | (2) Quantity, Wattage, and Type Received During Calendar Year 1938 | (3) Quantity, Wattage, and Type on Hand Dec. 15, 1939 | (4) Estimated Quantity, Wattage, and Type That Will Be Issued 1/1 to 6/30/40 | (5) Estimated Quantity, Wattage, and Type That Will Be Required F.Y. 1941 | (6) Quantity Approved | (7) Required Voltage Rating | APPROVED |
|---|---|---|---|---|---|---|---|---|
| 15 watts | | | | | | | | |
| 25 watts | | | | | | | | |
| 40 watts | | | | | | | | |
| 50 watts | | | | | | ALL | | |
| 75 watts | | | | | | LAMPS | | |
| 100 watts | | | | | | 110 | | |
| 150 watts | | | | | | VOLTS | | |
| 200 watts | | | | | | | | |
| 300 watts | | | | | | | | |
| 6.6 amp. 1000 lumens | | | | | | | | |
| 6.6 amp. 2500 lumens | | | | | | | | |



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## 8. Utilities supplies.

WAR DEPARTMENT
Q. M. C. Form No. 488
Revised Apr. 4, 1921

### REQUISITION

To: The Quartermaster, Third Corps Area, No. of Sheets 1 Sheet No. 1
Baltimore, Maryland.
Requisition No. QM 135-170-40 Date Jan. 1, ____. Period 4th Qtr., F.Y. ____.

SHIP TO The Quartermaster, Ft. School, Pa.

| REQUISITIONED BY (show Signature, Rank, Organization, Destination. If different from "SHIP TO" include address): | APPROVED BY: |
|---|---|
| B,<br>Captain, Q.M. Corps,<br>Quartermaster. | K,<br>Colonel, Infantry,<br>Commanding. |

| STOCK No. | ARTICLES | UNIT | ON HAND AND DUE | CONSUMED | REQUIRED | APPROVED |
|---|---|---|---|---|---|---|
| | Appn.: B. & Q., F.Y. ____.<br>P - ? - A 0535-0 | | | | | |
| | Lumber and paint | QM 22 | P 12-1200 | A 0535-0. | | |
| | Electric wire, switches, etc. | QM 22 | P 19-1290 | A 0535-0. | | |
| | Cement | QM 22 | P 12-1210 | A 0535-0. | | |
| | G.I. pipe and pipe fixtures | QM 22 | P 14-1220 | A 0535-0. | | |

After inserting the stock number and the description of the supplies wanted, including specification numbers, if covered by specifications, and/or the commercial name, commercial catalogue and page number, if used, there is placed at the end of the last page of the requisition a certificate substantially as follows:

The cost of the supplies listed on this requisition are to be charged as follows:

The supplies and services called for in this requisition are authorized by, are for the purposes set forth in, and are properly chargeable to the procurement authority or authorities enumerated hereon, the available balance of which is sufficient to cover the cost of such supplies and services not to exceed $_____.

B,
Captain, Q.M. Corps,
Quartermaster.



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# APPENDIX IV

## ISSUES

**1. Requisition and Receipt for Clothing in Bulk (W. D., Q. M. C. Form No. 409).**—Clothing issued to an organization charged to clothing allowance.

WAR DEPARTMENT
Q. M. C. FORM 409
Revised Oct. 15, 1936

Voucher No. .....
Stock Record Account

**REQUISITION AND RECEIPT FOR CLOTHING IN BULK**
(CHARGE TO CLOTHING ALLOWANCE)

No. of sheets 4
Sheet No. 1

Organization Co. "A", 75th Inf. Station Ft. School, Pa. Dated March 18, 19

| ARTICLES AND SIZE | UNIT | REQUISITIONED | ISSUED | RETURNED TO QM | NET ISSUED | UNIT PRICE | TOTALS |
|---|---|---|---|---|---|---|---|
| Class 55 | | | | | | | |
| Coats, woolen, serge, 18 oz. | ea. | | | | | | |
| Size 33L | | 10 | 10 | 1 | 9 | | |
| 34R | | 10 | 10 | 0 | 10 | | |
| 35R | | 10 | 10 | 0 | 10 | | |
| Shirts, worsted, O.D. | ea. | | | | | | |
| Size 15-33 | | 20 | 20 | 0 | 20 | | |
| 15½-34 | | 40 | 40 | 0 | 40 | | |
| 16-34 | | 8 | 8 | 0 | 8 | | |
| Trousers, serge, O.D. | pr. | | | | | | |
| Size 32-31 | | 23 | 23 | 3 | 20 | | |
| 32-33 | | 22 | 22 | | 22 | | |
| 34-31 | | 3 | 3 | | 3 | | |
| Class 72 | | | | | | | |
| Leggings, canvas, dismtd. | pr. | | | | | | |
| Size 2 | | 41 | 41 | 0 | 41 | | |
| 3 | | 18 | 18 | 2 | 16 | | |
| 4 | | 6 | 6 | 0 | 6 | | |
| Shoes, garrison | pr. | | | | | | |
| Size 6½C | | 5 | 5 | 0 | 5 | | |
| 7 | | 5 | 5 | 0 | 5 | | |

Sheet No. 1 8—10000



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| Articles and Size | Unit | Requisitioned | Issued | Returned to QM | Net Issued | Unit Price | Totals |
|---|---|---|---|---|---|---|---|
| Size 7½B | | 5 | 5 | 0 | 5 | | |
| 7½C | | 15 | 15 | 0 | 15 | | |
| 7½D | | 18 | 18 | 0 | 18 | | |
| 8B | | 10 | 10 | 1 | 9 | | |
| Class 73 | | | | | | | |
| Belts, waist, web | ea. | | | | | | |
| Size 36 | | 20 | 20 | 0 | 20 | | |
| 40 | | 25 | 25 | 0 | 25 | | |
| Caps, service | ea. | | | | | | |
| Size 6 3/4 | | 10 | 10 | 0 | 10 | | |
| 6 7/8 | | 18 | 18 | 0 | 18 | | |
| Hats, service | ea. | | | | | | |
| Size 6 3/4 | | 6 | 6 | 0 | 6 | | |
| 6 7/8 | | 6 | 6 | 0 | 6 | | |

Sheet No. 2 3—10806



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| Articles and Size | Unit | Requisitioned | Issued | Returned to QM | Net Issued | Unit Price | Totals |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

Requisitioned by: R. A. HARRINGTON
Captain, 75th Infantry
Commanding Company A

Approved by: I. M. HARDY
Colonel of Infantry
Commanding 75th Infantry

The articles enumerated in column "Issued" were received by me from Major J. B. Work,
Q. M., on March 18, 19__
R. A. HARRINGTON
Captain, 75th Infantry
(Signed by organization commander or his representative)

The articles enumerated in column "Returned to QM" were returned on March 19, 19__
R. A. HARRINGTON
Captain, 75th Infantry
(Signed by organization commander or his representative)

Issued by: J. B. WORK
Major, Q. M. Corps,
Quartermaster
(Signed by quartermaster or his representative)

Returned articles received by:
J. B. WORK
Major, Q. M. C.
(Signed by quartermaster or his representative)

Instructions in the preparation of this form and methods of issue are set forth in AR 35-6560.
For tariff sizes see AR 30-3050.
For prices see AR 30-3000.
Use Insert Form 409a for extra pages.

Sheet No. 4



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**2. Shipping Ticket (W. D., Q. M. C. Form No. 434).**—Clothing issue not to be charged to clothing allowance.

WAR DEPARTMENT
Q. M. C. Form No. 434
Revised Jan. 3, 1935

**SHIPPING TICKET**

CONSIGNOR'S VOU. No. 167
CONSIGNEE'S VOU. No. 40
NUMBER OF SHEETS 1

CONSIGNOR: Quartermaster,
Fort School, Penna.

DATE SHIPPED OR DELIVERED March 5, 19__

SHIP TO—
Regimental Supply Officer,
75th Infantry

AUTHORITY OR REQ. NO.
Approved Req.

TRANSPORTATION COST OF $..... CHARGEABLE TO
P/A No. .....

| QUANTITY ORDERED | QUANTITY SHIPPED | STOCK NO. | ARTICLE | UNIT | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|---|
| | | | Class 72 | | | |
| 50 | 50 | 72-B-1154 | Boots, rubber, hip, size 8 | pr. | | |
| 50 | 50 | 72-B-1156 | Boots, rubber, hip, size 9 | pr. | | |
| | | | Class 73 | | | |
| 50 | 50 | 73-H-50355 | Hats, oilskin, size 7 | ea. | | |
| 50 | 50 | 73-H-50358 | Hats, oilskin, size 7 1/8 | ea. | | |

ARTICLES LISTED IN COLUMN "ORDERED" HAVE BEEN RECEIVED UNLESS OTHERWISE NOTED IN COLUMN "SHIPPED." ••• 68—9120

R. A. HARRINGTON (NAME) Captain (RANK) 75th Infantry (ORGANIZATION)



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## 3. Requisition and Receipt for Cleaning and Preserving Materials (W. D., Q. M. C. Form No. 413); budget data.

WAR DEPARTMENT
Q. M. C. Form No. 413
Revised May 14, 1931

Voucher No. .....
STOCK RECORD ACCOUNT

**REQUISITION AND RECEIPT FOR CLEANING AND PRESERVING MATERIALS**
4th Quarter, F.Y. 19

**QUARTERLY ALLOWANCE**

Basis: X Sets, harness, double; X Sets, mess and personal equipment; X Sets, riding or pack equipment; X Bicycles; X Motorcycles; X Passenger cars; X Trucks, 2-ton or less; X Trucks, over 2 tons; X Trailers, cargo; X Trailers, kitchen; X Trucks, machine shop; X Ambulances, motor driven; 66 4-wheel animal-drawn vehicles; X 2-wheel animal-drawn vehicles.

To: The Quartermaster, Ft. School, Penna.

| REQUISITIONED BY: | APPROVED BY: |
|---|---|
| A,<br>1st Lt., Q.M. Corps,<br>for the 10th Wagon Co., Q. M. C. | K,<br>Colonel, Infantry,<br>Commanding, |

| STOCK No. | ARTICLES | UNIT | REQUIRED | ISSUED | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|---|
| | **Class 14** | | | | | |
| 14-C305 | Compound, rust-preventive, heavy | Pound | 8 | | .20 | |
| 14-G630 | Grease, lubricating, axle | Pound | 150 | | .06 | |
| 14-O—— | Oil, lubricating | Gallon | | | | |
| 14-O—— | Oil, lubricating | Gallon | | | | |
| 14-O—— | Oil, lubricating | Gallon | | | | |
| 14-O—— | Oil, neat's-foot | Gallon | | | | |
| | **Class 27** | | | | | |
| 27-W—— | Waste, cotton | Pound | | | | |
| 27-W—— | Waste, rags | | | | | |
| | **Class 34** | | | | | |
| 34-S—— | Skins, chamois | No. | | | | |
| | **Class 38** | | | | | |
| 38-B3630 | Brushes, scrubbing, hand | No. | 48 | | .12 | |
| 38-B2585 | Brushes, paint, chisel, 3" | No. | 64 | | .32 | |
| 38-B—— | Brushes | No. | | | | |
| | **Class 41** | | | | | |
| 41-S—— | Sponges, cleaning | | | | | |
| | **Class 42** | | | | | |
| 42-C—— | Cloth, crocus | | | | | |
| 42-C20505 | Cloth, emery, #00 | sheet | 500 | | .001 | |
| 42-C—— | Cloth, emery | | | | | |
| | **Class 51** | | | | | |
| 51-A—— | Alcohol, denatured | | | | | |
| 51-N-120 | Naphthalene, flake | Pound | | | | |
| 51-P—— | Polish | | | | | |
| 51-P-1120 | Polish, metal, liquid, 1-pint cans | No. | | | | |
| 51-S—— | Soap | | | | | |

3—9088



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| STOCK No. | ARTICLES | UNIT | REQUIRED | ISSUED | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|---|
| | **Class 51—Continued** | | | | | |
| 51-S—— | Soap | | | | | |
| 51-S—— | Soap | | | | | |
| 51-S—— | Soda-ash, powder | Pound | | | | |
| | **Class 52** | | | | | |
| 52-O—— | Oil, linseed | | | | | |
| 52-P-4705 | Paint O.D. Std. R.M. | Gal. | 64 | | .90 | |
| 52-P—— | Paint | | | | | |
| 52-P-2800 | Varnish, Spar, pt. cans | pint | 64 | | .30 | |
| 52-T-900 | Turpentine, 1-pint cans | No. | | | | |
| | | | | | TOTAL | |

OFFICE OF THE QUARTERMASTER:

_____

_____, 19_____

I CERTIFY that I have this date issued the supplies shown in column "Issued" on reverse side of this form.

_____

_____
*Quartermaster.*

_____
(Station)

_____, 19_____
(Date)

I CERTIFY that I have this date received the supplies shown in column "Issued" on reverse side of this form.

_____

_____
*Receiving Officer.*

**INSTRUCTIONS**

1. This form will be prepared in triplicate on the first of each quarter and all three copies forwarded to the Commanding Officer for approval. Upon approval, all copies will be forwarded to the Quartermaster, who, after checking quantities requisitioned against tables of allowances, will assemble supplies for issue. As soon as supplies are assembled, the officer submitting the requisition will be notified and he will be required to remove the supplies from the storehouse without delay. The Quartermaster will retain the original copy as a voucher to the property account and file the duplicate copy in the auditor's file against the organization. The triplicate copy will be returned to the requisitioning officer for his files.
2. The columns "Required" on the face of the requisition will be filled in by the officer submitting the requisition. Where supplies are asked for in excess of prescribed allowances, reason therefor will be stated in the block fixed for the signature of the requisitioning officer. The requisitioning officer will not make any entries in the column "Issued." All entries in column "Issued" will be made by the issuing officer.
3. Upon change of station or upon the relief of a responsible or accountable officer, this form may be used for any period, less than a quarter, which it is necessary to cover.

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Requisition and Receipt for cleaning and preserving material for the 4th quarter, F.Y., 19__.

Basis for requisition: 66 4-wheel animal-drawn vehicles.

| Stock # | Articles | Unit | Required | Issued | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| 14-C-305 | Compound, rust-preventive, heavy | lb. | 8 | 4-1/8 | $.20 | $.83 |
| 14-G-630 | Grease, Lubr.,axle | lb. | 150 | 99 | .06 | 5.94 |
| 38-B-3630 | Brushes, scrubbing, hand | ea. | 48 | 33 | .12 | 3.96 |
| 38-B-2585 | Brushes, paint, chisel, 3" | ea. | 64 | 33 | .32 | 10.56 |
| 42-C-20505 | Cloth, emery #00 | sht. | 500 | 396 | .001 | .40 |
| 52-P-4705 | Paint, O.D., std. RM | Gal. | 64 | 33 | .90 | 29.70 |
| 52-V-2800 | Varnish, spar | pt. | 64 | 66 | .30 | 19.80 |
| | | | | | | $71.19 |

Account as carried on the records in the Q.M. office.

Allowance of cleaning and preserving material for the 10th Wagon Co., F.Y. 19__.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1st | Quarter | $50.00 | Issued | Cre. | Vou. | #24 | $ 44.00 |
| 2d | " | 50.00 | " | " | " | #45 | 54.00 |
| 3d | " | 50.00 | " | " | " | #80 | 30.70 |
| 4th | " | 50.00 | " | " | " | #99 | 71.19 |
| | | $200.00 | | | | | $199.89 |



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## 4. Shipping ticket (expenditure voucher).

WAR DEPARTMENT
Q. M. C. Form No. 434
Revised Jan. 3, 1935

**SHIPPING TICKET**

CONSIGNOR'S VOU. No. 300
CONSIGNEE'S VOU. No. 1
NUMBER OF SHEETS

CONSIGNOR: Quartermaster, Fort School, Pa.

DATE SHIPPED OR DELIVERED April 1, 19__.

SHIP TO—
Utilities or
Utilities Officer.

AUTHORITY OR REQ. NO. Abstract from attached work orders Nos. 245 to 356 inclusive.

TRANSPORTATION COST OF $..... CHARGEABLE TO
P/A No. .....

| QUANTITY ORDERED | QUANTITY SHIPPED | STOCK No. | ARTICLE | UNIT | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|---|
| | | | The items covered by the work orders are listed below by stock number and name.<br><br>On the last page then must appear the quartermaster's certificate, substantially as follows:<br><br>I certify that the supplies listed above were consumed during March, 19__, in the maintenance and repair of public buildings and utilities at Fort School, Pa.<br><br>Note: One of the specific irregularities to be reported by auditors is the failure to have the required work orders attached to this certificate.<br><br>B,<br>Captain, Q.M.C.<br><br>APPROVED:<br><br>K,<br>Colonel, Infantry,<br>Commanding.<br><br>Note: Some quartermasters require the utilities officer to sign a copy of the shipping ticket as record of receiving the supplies, but the quartermaster as the responsible officer must sign the one presented for commanding officer's approval. | Lumber<br>Nails<br>Builders' Hdwr.<br>Electrical,<br>& Plumbing<br>Supplies | | |

ARTICLES LISTED IN COLUMN "ORDERED" HAVE BEEN RECEIVED UNLESS OTHERWISE NOTED IN COLUMN "SHIPPED." ••• 6D—9000

(NAME) (RANK) (ORGANIZATION)



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## APPENDIX V

## LIST OF REFERENCES

Paragraphs
SECTION I. General references ..... 1–7
II. Detailed references ..... 8–26

## SECTION I

## GENERAL REFERENCES

Paragraph
Army Regulations ..... 1
Circulars, War Department ..... 2
Circulars, Office of The Quartermaster General ..... 3
Federal Standard Stock Catalog ..... 4
Quartermaster Corps Supplement to Federal Standard Stock Catalog ..... 5
Tables of Basic Allowances ..... 6
Tables of Allowances ..... 7

### 1. Army Regulations.

| *No.* | *Title* |
|---|---|
| 30–5 | Quartermaster Corps, General Provisions |
| 30–455 | Branding and Registration of Public Animals |
| 30–480 | Forage for Public Animals, General |
| 30–485 | Forage at Remount Depots |
| 30–500 | Animal Transportation, General |
| 30–920 | Transportation of Individuals |
| 30–960 | Transportation of Authorized Baggage |
| 30–1620 | Standard Quantities of Heat, Light, and Electric Power |
| 30–1625 | Electric Plants and Systems |
| 30–2280 | Ice; Issues, Allowances, and Sale |
| 30–2720 | Typewriters and Similar Office Labor-saving Devices |
| 30–3000 | Clothing Money Allowance and Price List of Clothing and Equipage (effective July 1 each year) |
| 30–3010 | Items and Price List of Supplies Controlled by Budget Credits |
| 30–3020 | Price List of Vehicles, Harness, Saddlery, and Pack Equipment |
| 30–3040 | Leather and Leather Equipment |
| 30–3050 | Size Tariffs of Clothing |
| 35–6520 | Property Accountability and Responsibility |



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35–6540 Requisitioning Property
35–6560 Receipt, Shipment, and Issue of Property
35–6620 Expendable Property
140–5 Reserve Officers
145–20 Reserve Officers' Training Corps, Supply and Equipment
145–30 Reserve Officers' Training Corps, Training Camps
310–60 Tables of Organization, Tables of Basic Allowances, and Tables of Allowances
345–300 Statement of Charges
350–2200 Citizens' Military Training Camps
500–60 War Department Activities in Connection with Disaster Relief
600–375 Prisoners, General Provisions
615–40 Enlisted Men, Clothing: Allowances, Accounts, and Disposition
700–10 Storage and Issue
730–10 Fuel and Lubricants for Motor Vehicles and Equipment Used for Training Purposes.
850–15 Military Motor Vehicles.

**2. Circulars, War Department.**

| *No.* | *Title* |
|---|---|
| 17, sec. I (1939) | Allowances of Typewriters for Supply by the Quartermaster Corps |

**3. Circulars, Office of The Quartermaster General.**

| *No.* | *Title* |
|---|---|
| 1–1 | Organization |
| 1–4 | Procurement and Distribution of Supplies |
| 1–5 | Storage and Issue of Supplies |
| 1–6 | Requisitions |
| 1–7 | Supplies and Services for the National Guard, Organized Reserves, Reserve Officers' Training Corps, and Citizens' Military Training Camps |
| 1–9 | Surplus Poperty |
| 1–17 | Blank Forms |
| 1–18 | Allowances of Expendable Supplies |
| 4 | Spare Parts and Components |

**4. Federal Standard Stock Catalog.**

| *Section* | *Title* |
|---|---|
| I | General Index |
| II | Classes for Storage and Issue |
| III | Groups for Procurement |
| IV | Specifications |



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**5. Quartermaster Corps Supplement to Federal Standard Stock Catalog.**

**6. Tables of Basic Allowances.**

**7. Tables of Allowances.**

## SECTION II

## DETAILED REFERENCES

| | Paragraph |
|---|---|
| Storage of supplies, general provisions | 8 |
| Depots in zone of interior | 9 |
| Distribution of supplies | 10 |
| Classification of supplies for storage, distribution, and issue | 11 |
| Warehousing | 12 |
| Inventories | 13 |
| Tables of Organization, Tables of Basic Allowances, and Tables of Allowances; general provisions | 14 |
| Allowances for auxiliaries | 15 |
| Tables of Allowances—Equipment for Posts, Camps, and Stations | 16 |
| Component parts, spare parts, accessories, and contents of chests, kit sets, and outfits of quartermaster property authorized for issue | 17 |
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| Issue of supplies; general provisions | 24 |
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| Issue of supplies; intrapost | 26 |

**8. Storage of supplies, general provisions.**—See AR 700–10.

*a. General; statutory provisions.*

*b. Supply arms and services of the Army enumerated.*

*c. Supply establishments defined.*

(1) Depots.

(2) General depots.

(3) Arm or service depots.

(4) Area depots.

*d. Supplies defined.*

(1) Current supplies.

(2) War reserves.

*e. Unit assemblages.*

*f. Unit of equipment.*

*g. Requirements and restrictions in quantities of supplies in hands of troops.*



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*h. Disposition of supplies in excess of requirements to meet troop peacetime current requirements.*

*i. Depletion of war reserves.*

*j. Storage space.*

(1) By whom controlled.

(2) How obtained by arms and services having supply functions.

(3) By whom are storage space records kept.

(4) To whom reports rendered.

*k. Record of kind, quantity, location, and condition of supplies stored in depots.*

*l. Itemized and total value of supplies stored in depots.*

*m. Blank forms.* (See Cir. 1–17, OQMG.)

**9. Depots in zone of interior.**—See AR 700–10.

*a. Classification.*

*b. Designation.*

*c. Duties of chiefs of supply arms and services.*

(1) General.

(2) As to The Quartermaster General.

(3) Responsibilities not to be restricted.

*d. Depot commanders.*

(1) Designation.

(2) Staff.

(3) Functions and duties.

*e. Depot supply officers.*

(1) Representatives.

(2) Duties.

*f. Finance officers.*

(1) Assignment.

(2) Duties.

*g. Arm or service depots, administration of.*

*h. Area depots, by whom controlled.*

*i. Inspections.*

(1) By depot commander.

(2) By chiefs of supply arms and services.

(3) By Chief of Finance.

(4) By corps area commanders or officers of their staffs.

(5) By officers of The Inspector General's Department.

(6) By officers of the War Department General Staff.

(7) Reports.

*j. Issues and transfers from depots.* (See AR 35–6540.)



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**10. Distribution of supplies.**—See Circular 1–4, Office of The Quartermaster General.

*a. Restricted distribution.*

*b. By special supply points; distribution areas.*

(1) Philadelphia Quartermaster Depot.
(2) Boston Quartermaster Depot.
(3) Jeffersonville Quartermaster Depot.
(4) Holabird Quartermaster Depot.
(5) Washington Quartermaster Depot.
(6) Chicago Quartermaster Depot.
(7) San Francisco General Depot.

*c. Regional distribution; distribution areas.*

(1) New York General Depot.
(2) Chicago Quartermaster Depot.
(3) Eighth Corps Area General Depot.
(4) San Francisco General Depot.

*d. Oversea distribution;* distribution areas.

(1) Philippine Quartermaster Depot.
(2) Hawaiian Quartermaster Depot.
(3) Panama Pacific General Depot.
(4) Panama Atlantic General Depot.

**11. Classification of supplies for storage, distribution, and issue.**—See Circular 1–5, Office of The Quartermaster General.

*a. Basis for classification.*

*b. List of classes for storage and issue.* (See also Quartermaster Corps Supplement to Federal Standard Stock Catalog.)

*c. How class to which an item belongs is determined.* (See also preface and sec. I, Federal Standard Stock Catalog (General Index).)

*d. Nomenclature, how determined.* (See also sec. II, Federal Standard Stock Catalog.)

*e. Stock numbers, construction.* (See also sec. II, Federal Standard Stock Catalog.)

*f. Stock classified, definitions of classes.* (See also sec. II, Federal Standard Stock Catalog.)

**12. Warehousing.**

*a. Organization.* (See Cir. 1–5, OQMG.)

*b. Physical arrangement of property in storehouses.* (See AR 700–10; Cir. 1–5, OQMG.)

*c. Conditions to be fulfilled.* (See AR 700–10.)

*d. Stock tags, use.* (See Cir. 1–5, OQMG.)

*e. Warehousing terms.* (See AR 700–10.)

*f. Lay-out of storage areas.* (See Cir. 1–5, OQMG.)



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(1) Processes to be followed.
(2) Apportionment of storage space.
(3) How flexibility in arrangement obtained.
(4) Consideration to be given to floor weight-carrying capacity.
(5) Space allotted.
(6) Space to be reserved.
(7) Location charts.

*g. Aisles.* (See AR 700–10.)
(1) Main.
(2) Lateral.
(3) Connecting.
(4) Checking.
(5) Wall or fire.
(6) Blind.
(7) Boundaries, width, etc.

*h. Clearing space: Purpose; size; location.* (See AR 700–10.)

*i. Location of stock.* (See Cir. 1–5, OQMG.)
(1) Lay-out plan for each storage class. (See AR 700–10.)
(2) Arrange items in alphabetical numerical sequence.
(3) Factors determining location of an item in the storehouse.
(4) Miscellaneous general considerations to be observed in locating items.
(5) Segregation of items, regardless of class, in special place reserved in storehouse.

*j. Stowing.* (See Cir. 1–5, OQMG; sec. II, Federal Standard Stock Catalog.)
(1) Bulk stock.
(2) Retail stock.
(3) Bins, racks, and lockers.

*k. Stock tags.* (See Cir. 1–5, OQMG.)
(1) Purpose.
(2) Kinds.
(3) Information shown thereon.

*l. Platforms; uses for, in warehousing.* (See Cir. 1–5, OQMG.)

*m. Lighting.* (See Cir. 1–5, OQMG.)

*n. Issuing stock from storage; fundamentals to be observed.* (See Cir. 1–5, OQMG.)

*o. Checking and tallying.* (See Cir. 1–5, OQMG.)

**13. Inventories.**—See AR 35–6520; Circular 1–5, Office of The Quartermaster General.

*a. Who is responsible for.*

*b. Purpose of inventory.*

*c. When taken.*



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*d. Organization to take inventory, details of.* (See sec. II, Federal Standard Stock Catalog.)

*e. Inventory cards; description, use, and information entered thereon.* (See sec. II, Federal Standard Stock Catalog.)

*f. Adjustment of stock record cards.*

*g. Reports.*

(1) Report of inventory.

(2) Time report of inventory.

(3) Report of stock.

**14. Tables of Organization, Tables of Basic Allowances, and Tables of Allowances; general provisions.—See AR 310-60.**

*a.* (1) *Tables of Organization.*

(*a*) Allowances of animals and animal motor transportation.

(*b*) Show both peace and war strength.

(*c*) Arrangement of equipment in.

(*d*) By whom prepared.

(2) *Tables of Basic Allowances.*

(*a*) Prescribe what?

(*b*) How published?

(3) *Tables of Allowances.*

(*a*) Prescribe what?

(*b*) How published?

*b. Definitions.*

(1) Equipment.

(2) Auxiliaries.

*c. Allowances of equipment for—*

(1) (*a*) Regular Army.

(*b*) National Guard when called into Federal service.

(*c*) Organized Reserves when in active service.

(*d*) Posts, camps, and stations.

(*e*) General and special service schools.

(*f*) United States Military Academy.

(*g*) Disciplinary units.

(*h*) Miscellaneous special activities; and for auxiliaries are prescribed in—

Tables of Organization.

Tables of Basic Allowances.

Tables of Allowances.

(2) Organized Reserves not in active service are prescribed in Tables of Allowances.

*d. Tables as authority for issue of equipment.*

*e. Procedure as to preparation.*



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*f. Changes or revisions.*

*g. Distribution.*

**15. Allowances for auxiliaries.**—*a. Organized Reserves not in active service.* (See AR 140–5.)

(1) Office space.

(2) Automobiles.

(3) Clothing for enlisted men.

(4) Equipment for issue to reserve units.

(5) Band instruments and personal equipment for bandsmen.

(6) Office equipment.

*b. Reserve Officers' Training Corps in educational institutions.* (See AR 145–20.)

(1) Clothing.

(2) Equipment—

(*a*) Pertaining to individual student, squad, or unit.

(*b*) Common to units of more than one arm or service.

(*c*) Special for—

*1.* Infantry units.

*2.* Cavalry units.

*3.* Field artillery units.

*4.* Engineer units.

*5.* Coast artillery units.

*6.* Signal units.

*7.* Ordnance units.

*8.* Medical units.

*9.* Chemical units.

(3) Annual allowances of stationery and duplicating supplies.

(4) Expendable motor-vehicle supplies authorized for units equipped with motor vehicles.

(5) Colors and standards.

(6) Textbooks and reference books.

(7) Tabards.

*c. Reserve Officers' Training Corps in training camps.* (See AR 145–30.)

(1) Transportation to and from camps.

(2) Laundry service; articles to be laundered specified by corps area commander.

(3) Subsistence.

(4) Clothing and personal equipment.

(5) Equipment—

(*a*) Individual.

(*b*) Organizational.

(*c*) Special for individuals and organizations.



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(*d*) Camp.
*1.* China and glassware.
*2.* Tableware.
*3.* Kitchen utensils.
*4.* Mess equipment.
*5.* Office equipment and supplies, nonexpendable.
*6.* Office supplies, expendable.
*7.* Miscellaneous.

*d. Citizens' Military Training Camps.* (See AR 350–2200.)
(1) Transportation to and from camp.
(2) Transportation and burial.
(3) Subsistence.
(4) Laundry service.
(5) Clothing and personal equipment.
(6) Equipment—
(*a*) Individual.
(*b*) Organizational.
(*c*) Special for individuals and organizations.
(7) China and glassware.
(8) Tableware.
(9) Kitchen utensils.
(10) Mess equipment.
(11) Office equipment and supplies, nonexpendable.
(12) Office supplies, expendable.
(13) Miscellaneous.

**16. Tables of Allowances—Equipment for Posts, Camps, and Stations.**—See T/A, W. D., 1939.

*a. Application: articles not to be removed from stations; exceptions.*

*b. Nonexpendable quartermaster equipment.*
(1) Miscellaneous equipment.
(2) Fire equipment.
(3) Tableware, kitchen utensils, china, and glassware for use in barracks. (See also AR 30–3010.)
(4) Furniture for quarters of officers, warrant officers, noncommissioned officers, and bachelor officers' messes.
(*a*) Mahogany for officers and warrant officers.
(*b*) Birch for noncommissioned officers.
(5) Office supplies.
(6) Refrigerators.
(7) Tinners' and masons' tools.
(8) Laundry machinery and equipment.
(9) Funeral equipment.



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*c. Expendable supplies; dropped from accountability when issued.* (See AR 35–6540 and AR 35–6560.)

**17. Component parts, spare parts, accessories, and contents of chests, kit sets, and outfits of quartermaster property authorized for issue.**—See Circular 4, Office of The Quartermaster General.

*a. In Tables of Basic Allowances.*

*b. In Tables of Allowances.*

**18. Allowances, miscellaneous.**

*a. Forage.* (See AR 30–480 and AR 30–485.)

(1) Garrison.

(2) Field.

(3) Variations.

*b. Packing and crating.* (See AR 30–960.)

(1) Officers.

(2) Warrant officers.

*c. Fuel.* (See AR 30–1620.)

(1) Wood.

(2) Coal.

(*a*) Anthracite.

(*b*) Bituminous.

*d. Clothing.* (See Tables of Basic Allowances.)

(1) Issues against money allowance. (See AR 615–40.)

(2) Issues in kind, allowances. (See AR 615–40.)

(3) Tariff of sizes. (See AR 30–3050.)

(4) Price lists. (See AR 30–3000.)

*e. Typewriters; repairs.* (See Cir. No. 17, W. D., 1939; AR 30–2720.)

*f. Motor transportation.* (See Cir. No. 26, W. D., 1933.)

*g. Horses; mules.* (See AR 30–500.)

*h. Citizens' outer clothing.* (See AR 615–40.)

(1) To whom issued.

(2) When.

*i. General prisoners.* (See AR 600–375; AR 615–40; AR 615–300.)

(1) Transportation. (See AR 30–920.)

(2) Equipage—

(*a*) Toilet articles.

(*b*) Barbers' supplies.

(*c*) Tailors' materials.

(*d*) Limits in cost.

(3) Meals.

(4) Clothing.

*j. Ice.* (See AR 30–2280.)



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*k. Electric current and incandescent lamps.* (See AR 30–1620; AR 30–1625.)

*l. Blank forms.* (See Cir. 1–17, OQMG.)

*m. Gasoline and oil for motor vehicles.* (See AR 730–10; AR 850–15.)

*n. Tires and tubes.* (See AR 850–15.)

**19. Requisitions, general.**—See Circular 1–6, Office of The Quartermaster General.

*a. Definition.*

*b. Extract requisition; definition.*

*c. Requisitions for property; blank forms used.*

(1) Separate requisition prepared for each supply point.

(2) When submitted.

(3) Responsibility of the commanding officer. (See AR 35–6540.)

**20. Maintenance of stock.**—See Circular 1–5, Office of The Quartermaster General.

*a.* Responsibility for stock maintenance.

*b. Stock subject to rapid deterioration; action.*

*c. Issues, prescribed policy.*

*d. Maximum and minimum stock requirements.*

*e. Maximum stock of posts; how determined.*

*f. Minimum stock of posts; how determined.*

*g. War reserves; how stock maintained.* (See AR 700–10.)

*h. Excess stock.*

(1) Reports; preparation.

(2) When made.

(3) Disposition.

(4) How excess stock determined.

**21. Replenishment periods.**—See Circular 1–6, Office of The Quartermaster General.

*a. Standard stock, definition.* (See Cir. 1–5, OQMG.)

(1) By posts and stations.

(2) By depots.

*b. Nonstandard stock, definition by posts and stations; ice* (by annual contract).

*c. Fuel, definition.*

*d. Laundry, dry cleaning and salvage machinery and equipment.*

*e. Typewriters, adding machines, and other office labor-saving devices.* (See AR 30–2720.)

*f. Refrigerators, wall lockers, and heavy furniture.*

*g. Machinery and electrical equipment.*

(1) Repair parts.

(2) Electric, gas, and oil-burning ranges.



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(3) Incandescent electric lamps.
(4) Electric current data.
*h. Operating supplies.*
*i. Fire apparatus.*
*j. Construction and repair material.*
*k. Supplies for water; transport activities.*
*l. Motor transport supplies.*
*m. Special requisitions; conditions.*

**22. Requisitions; preparation, routing, and action.**—See Circular 1–6, Office of The Quartermaster General.

*a. Grouping supplies.*
(1) Storage classes.
(2) Separate sheet for each group.
(3) Separate requisitions for items of standard and nonstandard stock.
*b. Basis for issue.*
*c. Quantities; maximum stock figure, variable.*
*d. Stock number and description of articles.*
(1) If item listed in Quartermaster Corps Supplement to Federal Standard Stock Catalog: action.
(2) Articles arranged alphabetically.
(3) Descriptive noun first.
(4) Drawing or sketch to accompany requisition when considered necessary to describe properly articles asked for.
*e. Purpose and code number.*
*f. Local purchase information.*
*g. Numbering.*
*h. Signature and approval.*
*i. Routing.*
(1) Original.
(2) Copies.
(3) Action by corps area or department quartermaster.
(4) Extract requisition.
(5) If local purchase authorized.
(6) If approval of The Quartermaster General required.
*j. Editing: by whom; processes.*
*k. Action by depot.*
*l. Follow-up.*

**23. Requisitions for supplies for auxiliaries.**—See Circular 1–7, Office of The Quartermaster General.

*a. Preparation and distribution.*
*b. Responsibility of corps area commander.*
*c. Action by corps area quartermaster.*



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*d. Action by depots.*

*e. At camps.*

**24. Issue of supplies; general provisions.**—See AR 35-6560.

*a. Responsibility for.* (See Cir. 1-6, OQMG.)

*b. How issues made to the Army.*

*c. Balanced stock; how maintained; basis for.* (See Cir. 1-5, OQMG.)

*d. Original packages not to be broken; exceptions.*

*e. Receiving officer personally to supervise check of certain commodities upon receipt.*

*f. Opening packages for the first time, contents to be verified; action when deficiency discovered.*

*g. Giving or taking of receipts in blank for public property prohibited.*

*h. Action to be taken on receipt of property at a post intended for organizations or individuals.*

*i. Issuing reclaimed and used supplies.*

*j. How property transferred from one accountable officer to another such officer.*

*k. War reserves, issue.* (See AR 700-10.)

*l. Surplus property; disposition.* (See Cir. 1-9, OQMG.)

*m. Unserviceable and obsolete stock, disposition of.* (See Cir. 1-5, OQMG.)

*n. Forage, shrinkage of.* (See Cir. 1-5, OQMG.)

*o. Care in the issue of calcium hypochloride.* (See Cir. 1-5, OQMG.)

*p. Keeping track of containers in which cement, gasoline, oil, lubricants, etc., are delivered.* (The containers, such as cloth sacks, barrels, drums, etc., remain the property of the seller and are returned to him when empty.) (See Cir. 1-5, OQMG.)

**25. Issue of supplies; civilian components.**

*a. Issues to civilian components.* (See Cir. 1-7, OQMG.)

*b. Issues of supplies for relief of civil population.* (See Cir. 1-6, OQMG; AR 500-60.)

*c. Issue or loan of supplies to organizations of war veterans.* (See Cir. 1-6, OQMG.)

**26. Issue of supplies; intrapost.**

*a. Issue of equipment at post under Table of Basic Allowances; how accomplished.* (See AR 35-6560.)

*b. Issue of expendable articles at post under Tables of Basic Allowances; how accomplished.* (See AR 35-6560.)

*c. Budget credits.* (See AR 30-3010.)

*d. Clothing.* (See AR 35-6560.)



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*e. Issues of fuel, forage, gasoline, oils, etc.; how accomplished.* (See AR 35–6560.)

*f. Citizens' outer clothing.* (See AR 615–40.)

*g. Expendable property.* (See AR 35–6620.)

*h. Issues of supplies of maintenance, repair, and operation of buildings and utilities; how made.* (See AR 35–6560.)

*i. Issues of supplies for general prisoners.* (See AR 35–6560; AR 600–375.)

*j. Issue of china and glassware to replace breakage not due to carelessness.* (See AR 35–6620; AR 30–3010; T/A, W. D., 1938.)

*k. Issues of—*

Stoves, ranges, refrigerators; furniture for officers', warrant officers', and noncommissioned officers' quarters; electric fans; wall lockers; movable equipment in bakeries, laundries, shops, etc.; incandescent lamps; movable gymnasium apparatus and equipment; garbage cans; fire-fighting apparatus; warehouse equipment; tools and accessories on motor cars and trucks; how accomplished. (See AR 35–6520.)

*l. Issues to individuals not authorized—*

Tableware, kitchen utensils, china and glassware, bed sheets, pillow cases. (See T/A, W. D., 1939.)



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[A. G. 062.11 (5-22-40).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
*Chief of Staff.*

OFFICIAL:

E. S. ADAMS,
*Major General,*
*The Adjutant General.*



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