

# TM9-850

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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ABRASIVE, CLEANING,  
PRESERVING, SEALING,  
ADHESIVE, AND  
RELATED MATERIALS  
ISSUED FOR  
ORDNANCE MATÉRIEL

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DEPARTMENT OF THE ARMY

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OCTOBER 1951

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TM 9-850

*This manual supersedes TM 9-850, 5 June 1947, TB 9-850-22, 25 March 1950, TB ORD 348, 15 May 1947, SB 9-80, 10 March 1947, and those portions of TB ORD 340, 26 March 1947, pertaining to the matériel covered herein.*

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**DEPARTMENT OF THE ARMY**  
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TM 9-850 is published for the information and guidance of all concerned.

[AG 438 (5 Sep 51)]

**BY ORDER OF THE SECRETARY OF THE ARMY:**

**OFFICIAL:** J. LAWTON COLLINS  
WM. E. BERGIN *Chief of Staff, United States Army*  
*Major General, USA*  
*The Adjutant General*

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# CHAPTER I

## INTRODUCTION

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### Section I. GENERAL

#### 1. Scope

a. These instructions are published for the information of personnel whose duties require a general knowledge of the materials and methods employed in cleaning, preserving, sealing, lubricating, etc. ordnance matériel.

b. Methods pertinent to the using organizations and not covered in operator's manual are given in detail; methods pertinent to ordnance maintenance organizations are referred to specific manuals for detailed information.

c. These instructions cover most of the items in the Department of the Army Supply Catalog ORD 3 SNL K-1 and items supplied by Corps of Engineers, Chemical Corps, and Quartermaster Corps and used in cleaning and preserving ordnance matériel. For instructions on painting and painting materials, refer to TM 9-2851. For instructions on lubrication and special oils, refer to TM 9-2835.

d. This manual differs from TM 9-850 dated 5 June 1947 as follows:

(1) *Adds information on—*

- (a) New materials and methods.
- (b) Reference data.
- (c) Abbreviations.

(2) *Revises information on—*

- (a) Characteristics and units of issue.
- (b) Use and application of materials.

(3) *Deletes reference to—*

- (a) Materials not listed in Department of the Army Supply Catalog ORD 3 SNL K-1.
- (b) Pressure flushing of radiator and engine block.

## **2. Report of Unsatisfactory Materials and Methods**

Any suggestions pertaining to the improvement of materials and/or safety and efficiency of methods will be reported through technical channels, as prescribed in SR 700-45-5, to the Chief of Ordnance, Washington 25, D. C., ATTN: ORDFM, using DA AGO Form 468, Unsatisfactory Equipment Report. Such suggestions are encouraged so that other organizations may benefit.

## **Section II. STORAGE, ISSUE, AND CONSERVATION OF MATERIALS**

### **3. Storage and Issue of Materials**

*a.* **STORAGE CONDITIONS.** Whenever possible, materials should be stored in their original containers and where they will not be exposed to hot or inclement weather. This is desirable, particularly, in the case of cans packed in other containers. Where it becomes necessary to store in the open, containers should be covered with a paulin and sheltered from sand, dirt, rain, sleet, heat, etc. as completely as possible, with ample air space all around the stack. Containers should be packed, with the openings of cans or bottles upward, to prevent leakage. Drums should not be rolled over rocks or uneven surfaces where a puncture might result and, when rolled on grades, the speed should be controlled by ropes or pieces of wood. Cans should be handled with both hands, not thrown or rolled. Containers and 55-gallon drums must not be dropped from vehicles to the ground, as the shock will damage seams and permit minute leaks which may cause seepage and contamination with moisture. Drum skids or hoists should always be used. If a container is found leaking, the contents should be transferred to another container known to be tight and clean and all the identifying marks should be transferred to the new container. Before removing the plug or cap from any opening, all adjacent surfaces should be carefully cleaned of any dirt, snow, or other contaminating material. Do not open more containers than can be used promptly. The storage of cartons containing metal or glass containers or nonrigid materials should be controlled so that the stacks will not be beyond the safe limit and will not crush the bottom cartons. Box pallets should be used for storing cartons. For the same reason, it is important that the bottom cartons should not be dampened with water or softened by the collection of moisture during a rainy season or under conditions of high humidity. Storage conditions may also be controlled or

affected by the fire hazards that exist; in this case, local fire precautions and regulations should be observed.

*b.* **STORAGE LIFE.** With few exceptions, most of the materials listed in this technical manual have an indefinite storage life and, unless otherwise stated, it is assumed that this is one of the characteristics of the material. In cases where it is known that an undesirable reaction occurs when the material is stored under specific conditions, these conditions are explained under the "Characteristics" of the material. For example, the storage life of desiccants is indefinite providing the material is kept hermetically sealed to keep out moisture.

*c.* **ISSUE OF MATERIALS.**

- (1) Stocks of materials authorized for using organizations are computed from the tables of allowances given in section II of Department of the Army Supply Catalog ORD 3 SNL K-1. These are based on the quantity and types of items to be serviced and the type and size of organization responsible for their use and maintenance. The amounts given are the estimated stocks required for a 30-day period in the combat zone.
- (2) Replenishments are obtained by requisition from the nearest ordnance depot. Every effort should be made to maintain a firm level of these materials based on the quantities listed in the tables and such other materials as may be authorized to suit individual requirements.

## **4. Conservation of Materials**

Conservation of materials is a command responsibility. Adequate quantities should be used as required, but extreme care and precautions must be exercised to avoid wastage and unauthorized use. Even though most of the materials in this manual have an indefinite storage life, old stocks should be issued and used first. Unused portions in containers should be carefully recovered to prevent contamination or spillage. Strict adherence to this procedure will prevent an accumulation of old stocks of materials. The age of the materials can be determined approximately from the procurement order number which is stenciled or printed on each container and outer packing box or crate. For example, in the procurement order number (28-024)51-43132, the last two numbers, 51, in the first group indicate that the material was purchased in the fiscal year of 1951; the numbers (28-024) in the first group identify the organization that made the purchase; the second group of numbers, 43132, is the identifying number for this particular purchase.

# CHAPTER 2

## CORROSION

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### Section I. PRINCIPLES OF CORROSION

#### 5. General

a. The term "corrosion" is used to denote the deterioration and destruction of metals and alloys under the influence of environments such as air, moisture, gases, solutions, and fungi.

*Note.* Rust is a common term used to denote corrosion.

b. There are various theories of corrosion, but it seems well established now that, in most cases, corrosion is an electrochemical reaction. While the exact chemical reactions which take place in a specific situation may be complicated, the fundamental action is dependent on the presence of metal, air, and moisture. The rate of corrosion depends on various factors such as chemical composition, physical structure, and surface condition of the metal and nature of environments such as atmospheric conditions, temperature, and type of corroding medium.

c. Ordnance matériel, like other metal equipment, is subject to corrosion unless protected. In addition, ordnance matériel has characteristic sources of corrosion such as—

- (1) Accumulation of powder fouling (primer salts) in bores of guns absorbs moisture and accelerates corrosion.
- (2) The disintegration of rubber packings and gas check pads liberates acidic compounds, sulfur, or chlorine which attack the metal.
- (3) Greases may absorb moisture and decompose, in time, forming acidic compounds, which start corrosion.

d. The corrosion usually considered may be termed "atmospheric corrosion," because it takes place under ordinary atmospheric conditions and is nearly universal. The rate of corrosion varies with the temperature and the humidity. A salty or acidic atmosphere accelerates this condition. It is very slight in the dry, arid sections even with high temperatures. The rate is very high in the humid sections, and especially in the warm, humid regions. High humidity is therefore considered to be the most important single factor in the development of corrosion. The ex-

clusion of air from metal surfaces does not always guarantee freedom from corrosion. Both water and oxygen are universally present, being dissolved in liquids, greases, etc., in sufficient quantities to cause corrosion.

*e.* The formation of corrosion is due basically to the electrolytic action set up in the minute particles of the metal. This is caused by the presence of dissimilar particles between which minute electrical currents are set up just as between dissimilar or opposite poles of batteries. This constitutes a galvanic cell and corrosion proceeds with flow of current in a manner analogous to the way current is generated in a primary cell or in a storage cell on discharge. On a large scale, this process occurs when dissimilar or different metals are in contact or in close proximity to each other; for instance, bronze pistons stored in cylinders and separated from steel surfaces by only a small clearance. In such cases, corrosion may take place even though the metals are separated by oil or grease.

## **6. Types of Corrosion**

*a.* DISCOLORATION. In a good reflecting light, this type of corrosion appears as a gray, black, or reddish film or surface rust on ferrous metals and in varied color formations on nonferrous metals (blue-green of copper, bronze, and brass, etc.). It is readily removable and does not project beyond the surface. Pitting will not be visible under such corrosion.

*b.* DEVELOPED RUST. This type of corrosion has developed to such a stage that pitting has occurred but rust patches do not appear to be caked.

*c.* CAKED RUST. This type of corrosion projects beyond the surface in such compact growth as to present a caked appearance and indicates pitting beyond the stage of fine pits.

*d.* PITTING. This type of corrosion exists when the holes in the surface are visible to the eye, usually about 0.001 inch deep and not more than 0.010 inch in diameter.

*e.* ETCHING. This type of corrosion exists where the original surface has been partially or wholly disintegrated but in which no pits are visible to the eye.

*f.* FUNGUS GROWTH. This type of corrosion usually exists on materials of an organic nature such as leather, wood, plastics, textiles, and includes mold (mildew) growth. Occasionally such growths also appear on inorganic materials such as glass, metals, and other nonporous surfaces. Fungus growth is usually combated by the addition of a fungicide to the preservative or sealing material.

## 7. Rusting of Iron and Steel

*a.* **BLACK RUST.** Black rust, chemically known as ferrous-ferric oxide ( $\text{Fe}_3\text{O}_4$ ) is formed by the action of steam, air, or carbon dioxide on iron and steel. It is also the black coating produced on iron or steel which has been cut or welded with an acetylene torch. It does not progress under ordinary conditions.

*b.* **RED RUST.** Red rust, chemically known as ferric oxide ( $\text{Fe}_2\text{O}_3$ ) and/or ferric hydroxide ( $\text{Fe}(\text{OH})_3$ ), is formed by the action of air and moisture on iron and steel. This rust forms a porous and mechanically weak film which soon rubs off, exposing metal beneath to further corrosion. Thus, red rust progresses as an infection and must be completely removed and the surface coated with preservatives.

## Section II. INSPECTION AND REMOVAL OF CORROSION

### 8. Inspection for Corrosion

*a.* For prevention of rust, it is highly essential that the methods of inspecting metal surfaces be such as to detect rusting in the initial stages. A plain metal surface, after thorough cleaning, can best be examined under a strong light so reflected to the eye that the details of the surface are well defined. Light discoloration or minute isolated particles of rust are difficult to detect. If discoloration is noted, minute corrosion is present and can be examined by the use of a good magnifying glass.

*b.* No rust-preventive compound has been developed that will stop corrosion indefinitely. Careful periodic inspection is necessary to determine the effective life of any corrosion-preventive film.

*c.* In the preparation of a surface for minute examination for corrosion, it must be thoroughly cleaned with an authorized cleaning agent, such as dry-cleaning solvent or volatile mineral spirits paint thinner, and then wiped off with a clean cloth. The use of gasoline is prohibited. Kerosene may only be used as an emergency substitute. Abrasives or polishing materials may remove the evidence of corrosion and therefore will not be used for inspection purposes.

### 9. Removal of Corrosion

*a.* Rust is not rendered inactive by the application of grease, paint, or other rust preventives and, if present, hinders the adhesion of the grease, paint, or rust preventive to the surface of the metal, thus preventing the protection of the metal surface.

Rust can be removed by mechanical rubbing or sandblasting with an abrasive or by chemical means. In the latter case, it is most essential that the chemicals be removed, completely neutralized, and the surfaces thoroughly dried before coating with preservatives or painting.

b. Mild abrasives, such as pumice, rottenstone, silica, fine-textured sandpaper, chalk, rouge, and steel wool, are often used to rub rough surfaces to a smooth finish and, although they are mild abrasives, they are sometimes considered in the category of cleaners or polishers. Such abrasives have only limited value as removers of corrosion.

c. When selecting one of the abrasives described in this technical manual (sec. I, ch. 3), it is necessary to consider the degree of corrosion to be removed, the type of material to be abraded, and the conditions that exist, such as the hardness of the surface to be abraded, the type or shape of object to be treated, etc.

d. When removing corrosion by means of sandblasting, it is important that this form of abrasion be resorted to only in cases where there is no possibility of the abrasive getting into the moving parts during or after the blasting operation. It must not be used on bearings, bearing surfaces, or finely machined, close-fitting parts. Compressed air should be used to remove sand left after the sandblasting operation, if necessary. The matériel should *not* be dipped in water to rinse off the sand.

## **Section III. PROTECTION AGAINST CORROSION**

### **10. General**

It is impossible to stop corrosion completely. Rate of corrosion can be reduced by the use of preservative materials, paint finishes, and metal finishes for different conditions of storage, shipping, and handling.

### **11. Preservative Materials**

a. Paint is the material chiefly used for protection of metal against rust and wood against decay. However, it is impractical to paint all parts of an item to protect against attack by rust. Therefore, the use of various types of preservatives (sec. III, ch. 3), together with various barrier materials and packaging, are provided for the protection and preservation of matériel for the different conditions of storage, shipping, and handling.

b. Packaging methods and storage conditions must be regulated so as to eliminate every possible source of moisture which might

gain access to the matériel. Elasticity and flexibility of wrapping and packing materials must be sufficient to withstand temperature changes, shifting in transit, and handling. Barrier material must be used to separate ferrous metal when in contact with wood, particularly green wood.

c. Gloves must be worn to protect clean, finished surfaces against acid stains from perspiration.

d. Preservatives must be applied as soon as possible after cleaning operations are completed and, if application is by dipping, it must be in a manner to avoid formation of air bubbles as these points may commence to rust at once.

e. Care must be taken to remove all condensation or sweating which occurs when a metal is brought into a heated room from outdoors. This is particularly emphasized in arctic weather areas. Protective coatings must not be applied until the metal has reached room temperature and is completely dry.

f. The metal surface must be clean, dry, and free of all traces of corrosion. The best preservative is practically worthless when applied on a dirty surface. To obtain maximum or even reasonable benefits from various preservative coatings, there must be no dirt or other foreign matter under the coatings which may cause corrosion. Such residues are usually present on parts unless definite preventive precautions are taken during processing.

g. There is no universal corrosion preventive. To obtain maximum benefits from careful cleaning and processing before preservation, selection and application of the correct preservative coating must be performed as carefully as the cleaning. The type of preservative prescribed depends upon the following points:

- (1) Composition of part to be preserved.
- (2) Nature and function of the surfaces of the part.
- (3) Complexity of construction.
- (4) Type of exposure and degree of preservation required.
- (5) Other functions expected of preservative.
- (6) Nature of packing, if any, to be used over preservative.
- (7) Ease of removal, or necessity for removal of preservative from parts prior to use.
- (8) Availability of preservative material.
- (9) Availability of heating or preheating equipment.
- (10) Difficulties of application.

h. Preservatives such as lubricating oils and greases must *not* be applied to parts fabricated of rubber, leather, cork, paper,

fabric, or plastic material. Instructions for the preservation of such parts are covered in the manual for the pertinent major item.

*i.* The various types of preservatives available for the protection of matériel against corrosion are described in chapter 3, section III. Preservatives for ordnance matériel are normally specified in publications covering storage, packaging, and/or shipping of the matériel.

*j.* The preservative materials listed in this manual are intended primarily to protect matériel from corrosion during periods of storage or shipment. They have no lubricating qualities and must not be used during active service unless otherwise indicated.

## **12. Paint Finishes**

Instructions for the preparation of matériel for painting and for the proper selection and use of paints, paint oils, lacquers, and varnishes are contained in TM 9-2851.

## **13. Metal Finishes**

Additional means of applying preservative finishes on metal surfaces, other than paint and lacquer, and preserving compounds, oils, grease, etc., are provided by the following processes:

- a.* Oxide coatings (pars. 142 and 143).
- b.* Phosphate coatings (pars. 146 and 147).
- c.* Plating (zinc, cadmium, lead, nickel, copper, and chromium).
- d.* Chromate coatings on zinc.
- e.* Chromate-phosphate coatings on aluminum.

# CHAPTER 3

## MATERIALS

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### Section I. ABRASIVE MATERIALS

#### 14. General

*a.* Abrasives are substances used for surfacing and finishing metals, stone, wood, glass, and other materials by cutting or rubbing action. The term embraces a variety of natural and artificial materials the grains or grits of which may be either bonded to a flexible backing such as paper or cloth ("coated abrasives") or bonded together in the form of disks, wheels, or other shapes.

*b.* Natural abrasives include diamond, emery, corundum, sand, garnet, tripoli, and quartz. Artificial abrasives are marketed under many trade names but are, in general, either silicon carbide or aluminum oxide; of the two, aluminum oxide is the more widely used. The most commonly known of all coated natural abrasives is flint paper, which is the "everyday" product, commercially available, and commonly known as "sandpaper." This is the oldest type in general use. Garnet and emery are other natural abrasives which are used rather extensively and can be purchased locally as "emery cloth."

*c.* The quality of an abrasive is determined by the following:

- (1) Its effectiveness as a surfacing and finishing tool.
- (2) Its ability to stand up under continuous abrading action.
- (3) Its ability to fracture or break down in such a fashion that it is abrading instead of dulling the surface which is being abrading. Silicon carbide, for instance, is an exceptionally fine abrasive from the standpoint of cutting power and its ability to fracture so that new cutting faces are formed. However, being brittle, it does not stand up well under heavy grinding. Aluminum oxide, on the other hand, fractures into particles a little more blocky, and as a result, is not quite as effective in cutting action. However, due to its extreme toughness, this mineral is the most extensively used of all abrasives in the grinding and finishing of metals.

d. Abrasive grains are sized through carefully made sieves. Standard sieve sizes are 8, 10, 12, 14, 16, 20, 24, 30, 36, 46, 70, 80, 90, 100, 120, 150, 180, 220 and 240 from coarse to fine.

*Note.* Finer "flours" are prepared by hydraulic classification.

The screen sizes indicate the meshes per lineal inch of the sieves over which the grains are passed. For example, screen size 24 indicates 24 meshes or openings per lineal inch (576 openings per square inch). The screen size is used to indicate the grain size or grit number. For example, grain size 30 or grit No. 30 indicates that the grains or grits will pass through a size 30 sieve and will be retained on the next finer sieve (in this case, size 36 sieve).

e. Coated abrasives are designated by grain size or grit number, grain symbol, or both.

*Note.* Grain symbols are used commercially as the equivalent of the grain size.

A list of grain sizes or grit numbers, with their equivalent grain symbols, is given in table I.

*Table I. Grain Sizes and Grain Symbols*

Grain symbol	Grain size or grit No.
3½	20
3	24
2½	30
2	36
1½	40
1	50
½	60
0	80
2/0	100
3/0	120
4/0	150
5/0	180
6/0	200
7/0	240
8/0	280
9/0	320
10/0	400
11/0	500
12/0 . .	600

## 15. Cloth, Abrasive, Aluminum Oxide, Closed Coat

a. CHARACTERISTICS. A natural emery or artificial aluminum oxide abrasive cemented on cotton drill cloth or jeanscloth. Various sizes of grain are available as listed below. The grain symbol representing the grain size (table I) is usually marked on the back of the cloth. It is commonly called emery cloth.

b. UNITS OF ISSUE.

- (1) pkg : sheets, 9 x 11 in ; sleeve of 50 sheets.
  - (a) gr size 180 (fine).
  - (b) gr size 150.
  - (c) gr size 120 (med).
  - (d) gr size 100.
  - (e) gr size 80 (coarse).
  - (f) gr size 60.

*Note.* Stocks on hand packaged in quires will be so issued until the supply is exhausted (ORD 3 SNL K-1).

- (2) ea : roll, 50 yd, widths : 1, 1½, and 2 in.
  - (a) gr size 150.
  - (b) gr size 100.
  - (c) gr size 50.

c. USES.

- (1) *Grain size 100 and higher.* Used for polishing, cleaning, and removing rust from finished iron and steel surfaces in ordinary machine work, the finest sizes (gr size 150 and finer) being used for the more highly finished surfaces. Properly qualified ordnance personnel may use grades as coarse as 100 for removal of burs from threads of breechblocks and breech recesses, gas-check split rings, gas-check seats, steel shanks of sight mountings, bearing sleeves of range finders, and battery commander's telescope tripods. No abrasive cloth coarser than 100 is permitted for work on breech mechanisms. To prevent unnecessary wear, crocus cloth must be used on these mechanisms, when possible.
- (2) *Grain size 80 and under.* Used generally for removing rust, burs, and other defects from unfinished iron and steel surfaces and in preparing such surfaces for painting. These coarse sizes must never be used on highly finished surfaces. Grain size 100 may be used on nonbearing finished surfaces where slight removal of metal does not affect proper fit.
- (3) *Rolls.* This type of aluminum oxide abrasive cloth is particularly adaptable for use on matériel being rotated in a lathe and for other uses involving reciprocating motion where the cloth is required to be in long strips.
- (4) *All grits.* Aluminum oxide abrasive cloths must never be used on soft bearing metal such as brass and babbitt, as such surfaces become statically charged with the abrasive which thereupon rapidly wears any contacting metal. Whenever there is reason to suspect that emery or alumi-

num oxide abrasive has entered any bearing, disassemble it immediately and clean it thoroughly. Never use this abrasive cloth to polish commutators of generator or starter armatures, since the abrasive grit will cause short circuits and ruin the brushes. Flint paper may be used for this purpose, if the commutator is not too deeply ridged or worn.

## 16. Cloth, Crocus

a. CHARACTERISTICS. A mild abrasive of fine, soft, red or reddish-brown tripoli or iron oxide powder cemented on cotton drill or jeanscloth.

b. UNIT OF ISSUE. pkg: sheets, 9 x 11 in., sleeve of 50 sheets.

*Note.* Stocks on hand packaged in quires will be so issued until the supply is exhausted (ORD 3 SNL K-1).

c. USES.

- (1) Used for cleaning and polishing finely finished surfaces such as rifle parts, breechblocks, gun slides, etc.
- (2) Organizational maintenance personnel will use nothing coarser than crocus cloth for removing rust stains from highly finished surfaces.
- (3) Whenever rusting or scoring is of such character that it cannot be removed with crocus cloth, ordnance personnel must be notified.

## 17. Compound, Valve-Grinding

a. CHARACTERISTICS. A compound composed of artificial abrasives mixed in a mineral-lard oil or cup-grease lubricant. The abrasive material consists of silicon carbide, aluminum oxide, or a mixture of both. The compound will withstand exposure to the atmosphere without excessive drying and is not adversely affected by exposure to temperatures from  $-35^{\circ}$  to  $140^{\circ}$  F. The compound is of the consistency of a nonflowing paste, i.e., not too dry nor too fluid under use. Valve-grinding compounds are available in two degrees of fineness, i.e., grit No. 150 and No. 220; they are commercially known as medium and fine, respectively.

b. UNITS OF ISSUE.

- (1) ea: 2-oz. can, medium or fine.
- (2) ea: 1-lb. can, medium or fine.

c. USE. Grinding valves and valve seats of internal combustion engines and as a lapping compound for certain types of work.

## 18. Disk, Sanding, Alundum Cloth, "R"

a. CHARACTERISTICS. A cloth disk with an abrasive cemented to one side. It is 20 inches in diameter and has a 6-inch hole. It was previously known as "DISK, sanding, special."

b. UNITS OF ISSUE.

(1) ea: No. 30 grit.

(2) ea: No. 40 grit.

c. USE. Used with a power-driven sanding machine for surface sanding.

## 19. Disk, Sanding, Open and Closed Coat

a. CHARACTERISTICS. Of the four important commercial types, two are available for issue, as follows: Type B, aluminum oxide, closed coat, synthetic resin bond with vulcanized fiber backing, unslotted, and type C, aluminum oxide, open coat, glue bond, with vulcanized fiber and cotton-drill backing, unslotted. For closed type of disks, the abrasive grit is so applied as to completely cover the surface of the backing. For open types of disks, only 50 percent of the backing is covered by abrasive grit. Abrasive-coated disks are marked on the back with the manufacturer's name or trade mark, the name or trade mark of the abrasive grain, and the grit number.

b. UNITS OF ISSUE. ea (as follows):

(1) *Closed coat.*

Type	OD (in)	Arbor hole diam (in)	Grit No.
Type B	7	1/2	24 (coarse)
Type B	7	1/2	36 (medium)
Type B	7	1/2	80 (fine)
Type B	9 1/8	1/2	24 (coarse)
Type B	9 1/8	1/2	36 (medium)
Type B	9 1/8	1/2	80 (fine)

(2) *Open coat.*

Type	OD (in)	Arbor hole diam (in)	Grit No.
Type C	7	1/2	16 (coarse)
Type C	7	1/2	24 (coarse)

c. USE. For general use on disk-type sanding machines. The closed coat type is used for general conditioning or grinding of metal surfaces. The open coat type is used for the removal of old paint and rust.

d. APPLICATION. Each disk of both types is equipped with a 1/2-inch arbor hole. This enables the disk to be clamped to the rotat-

ing element of a motor-driven sander. To obtain the best results with these sanding disks, the angle between the disk and the work being ground should not exceed 9°. Likewise, best results are obtained by a steady, firm pressure of 5 to 10 pounds.

## 20. Paper, Abrasive, Aluminum Oxide, Open Coat

*a.* CHARACTERISTICS. This is similar to aluminum oxide abrasive cloth, except that it has a special construction and type of grain to provide more rapid cutting action. The paper is waterproof and unaffected by cleaning solvents. The grain or grit size is stamped on the back of each sheet. The weight of the paper backing is 90 pounds per ream of 480, 24- x 36-inch sheets.

*b.* UNITS OF ISSUE.

(1) pkg: sheets, 9 x 11 in, 120 gr, sleeve of 100 sheets.

(2) pkg: sheets, 9 x 11 in, all other gr, sleeve of 50 sheets.

*Note.* Stocks on hand packaged in quires will be so issued until stocks are exhausted (ORD 3 SNL K-1).

*c.* GRAIN SIZES. The paper is available in three different grain sizes as follows:

<i>Grain size</i>
120 (medium)
80 (coarse)
60 (coarse)

*d.* USE. The papers are used principally for wet-sanding of bare metal using dry-cleaning solvent or volatile mineral spirits paint thinner prior to applications of paint on motor vehicles and artillery matériel.

## 21. Paper, Abrasive, Silicon Carbide, Waterproof

*a.* CHARACTERISTICS. Silicon carbide abrasive on a strong, waterproof, flexible paper backing, principally of finer grains than aluminum oxide abrasive cloths, and may be used wet.

*b.* UNIT OF ISSUE. pkg: sheets, 9 x 11 in, all grain sizes, 50-sheet sleeve.

*Note.* Stocks on hand packaged in quires will be so issued until supply is exhausted (ORD 3 SNL K-1).

*c.* GRAIN SIZES. 320A, 220A, 100, 80.

*d.* USE. Used for wet-sanding of metal surfaces where fine finishes are desired and where it is necessary to use water in connection with sanding operations. Also used to feather-edge an old paint film when spot priming.

## 22. Paper, Flint (Sandpaper)

a. CHARACTERISTICS. An abrasive composed of hard quartz, quartzite, or flint cemented on a backing of rope paper or kraft paper.

### b. UNITS OF ISSUE.

(1) pkg: sheets, 9 x 10 in; 36 gr, class B, sleeve of 50 sheets.

*Note.* An additional 36-grain size, class B is issued in sheets, 9 x 11 inches, in packages of 1 sleeve until stock is exhausted (ORD 3 SNL K-1).

(2) pkg: sheets, 9 x 10 in, all other gr sizes, sleeve of 100 sheets.

*Note.* Stocks of 9 x 11 paper on hand packaged in quires will be so issued until the supply is exhausted (ORD 3 SNL K-1).

### c. GRAIN SIZES.

(1) 100

(2) 80

(3) 60

(4) 50

(5) 40

d. USES. For smoothing surfaces preparatory to painting and for metal surfaces where aluminum oxide abrasive cloth cannot be used. Typical uses are as follows:

(1) *Grain size 100.* Sanding wood surface such as rammer staves and plotting boards for varnishing; cleaning and smoothing generator and starter commutators.

(2) *Grain size 60.* Rubbing down under-coats of paint and varnish in preparation for the final coat. This is the coarsest grain allowed for rubbing down wooden stocks and hand guards of small arms.

(3) *Grain size 50 to 36.* For rubbing down old coats of paint preparatory to repainting. The finer grains are used where an old coat is in fair condition; the coarser grains are used where the old paint is in bad condition and must be removed before repainting.

## 23. Polish, Abrasive, Steel and Hard Metal

a. CHARACTERISTICS. A fine abrasive powder prepared from aluminum oxide.

b. UNIT OF ISSUE. ea: 21 gr (aprx. three-quarter oz in screw-cap bottles).

c. USE. Used for lapping and polishing of staking tool die plates, punches, stumps, and chucks. Listed in ORD 6 SNL F-272.

## 24. Polishing Abrasive, Rare Earth Oxide (for Optical Glass)

*a.* CHARACTERISTICS. A fine-grain powder consisting of the compounds containing the rare earth group of elements.

*b.* UNIT OF ISSUE. ea: 4-oz jar.

*c.* USE. To polish optical glass by mild abrasion when mixed with distilled water and to remove leach stains from optical elements.

*d.* GRAINS.

(1) A—90 percent shall not exceed 6 microns and 10 percent shall not exceed 12 microns.

(2) B—90 percent shall not exceed 20 microns and 10 percent shall not exceed 40 microns.

*Note.* Replaces ROUGE, polishing, when present stocks are exhausted.

## 25. Pumice, Ground, Abrasive

*a.* CHARACTERISTICS. A fine, gray, abrasive powder used for polishing. It contains no volcanic ash, sand, quartz, flint, or other hard materials. Its abrasive action is manifested by its ability to polish, but not to scratch, glass. Chemically, it is a complex form of aluminum silicate.

*b.* UNITS OF ISSUE.

(1) ea: fine (FFF), 1 lb. (98 percent passes through a 200-mesh screen and 38 percent through a 325-mesh screen).

(2) ea: med (0-1/2), 1 lb. (98 percent passes through an 80-mesh screen and 31 percent through a 325-mesh screen).

*c.* USE. When mixed with light lubricating oil to the consistency of a thin paste, it makes a satisfactory lapping compound for mating brass or bronze gears to steel gears. It may also be used for polishing metal, plastics, hard rubber parts, etc., and for finishing of glass, mirrors, furniture, etc.

## 26. Rouge, Jeweler's, Polishing

*a.* CHARACTERISTICS. A fine grade, brick red molded stick composed principally of ferric oxide.

*b.* UNIT OF ISSUE. ea: stick, for use on gold and silver.

*c.* USE. For polishing gold and silver. Listed in ORD 6 SNL F-272.

## 27. Rouge, Optical Polishing

*a.* CHARACTERISTICS. A high-grade, brick red powder composed of ferric oxide. It contains no abrasive material that will scratch

optical glass. The particle size is extremely fine since a minimum of 99.6 percent will pass through a 325-mesh screen.

b. UNIT OF ISSUE. ea: 4-oz glass jar.

c. USE. For polishing optical glass and to remove leach stains from optical elements.

*Note.* When present stocks are exhausted, POLISHING ABRASIVE, rare earth oxide (for optical glass), will be used.

## 28. Rouge, Red Polishing

a. CHARACTERISTICS. A high-grade, brick red molded bar composed principally of ferric oxide.

b. UNIT OF ISSUE. ea: 1½-lb bar.

c. USE. For polishing surfaces of silver, platinum, gold, brass, and stainless steel.

## 29. Sand, Cleaner, Spark Plug

a. CHARACTERISTICS. A graded quartzite, garnet, or other abrasive material resembling sand, with most of the fine dust eliminated. Its hardness and abrasiveness is controlled so as not to produce excessive cutting of spark plug insulators during the cleaning operation. The grains have distinct, sharp cutting edges.

b. UNIT OF ISSUE. ea: 3-lb. metal can.

c. USE. In spark plug cleaning machines to clean electrodes and interiors of spark plugs.

*Caution:* Ordinary fine sand is not acceptable for this purpose since it has an excessive abrasive effect on spark plug porcelain insulators.

## 30. Silicon Carbide, Powder (Gr Size 120)

a. CHARACTERISTICS. An artificial, hard, sharp-grained abrasive powder.

b. UNIT OF ISSUE. ea: 50-lb. and 100-lb. containers.

*Note.* 50-lb. units will only be issued until present stocks are exhausted.

c. USE. For machine-grinding the edges of nonferrous metals, glass, and other nonmetallic items.

## 31. Wool, Copper, Fine

a. CHARACTERISTICS. A wool-like mass composed of long turnings or threads of copper.

b. UNIT OF ISSUE. ea: 1-lb. pkg.

c. USE. For use in cleaning out fuze-well cups of bombs and artillery ammunition.

## 32. Wool, Steel

*a.* CHARACTERISTICS. A fluffy or wool-like mass of steel turnings or strands having sharp, smooth cutting edges. The finely divided nature of steel wool makes it particularly susceptible to rusting and consequent crumbling, after which it cannot be used for its intended purposes. Care must, therefore, be taken to store it in a dry place, protected from the elements. Steel wool is commercially available in the following grades: grade No. 0 (fine), grade No. 1 (medium), and grade No. 3 (coarse).

*b.* UNITS OF ISSUE.

- (1) ea: 1-lb. roll, No. 0.
- (2) ea: 1-lb. roll, No. 1.
- (3) ea: 1-lb. roll, No. 3.

*c.* USES.

- (1) Grade No. 0 is a mild abrasive for rubbing down and smoothing wood, steel, and prepared coated surfaces prior to a second coat of varnish, shellac, or paint.
- (2) Grade No. 1 is slightly coarser than grade No. 0 and is used for the removal of light rust, paint, and varnish from motor vehicles, gun carriages, etc. It is further used to smooth surfaces prior to the application of fillers or first coats to wood.
- (3) Grade No. 3 is used for the removal of rust, paint, etc., under conditions requiring the use of a coarser grade of steel wool.

## Section II. CLEANING MATERIALS

### 33. Acetone, Technical Grade

*a.* CHARACTERISTICS. A clear, colorless, highly volatile and very flammable liquid. It has a mild mintlike odor. It is also known as dimethyl ketone.

*b.* UNITS OF ISSUE.

- (1) ea: 1-gal. rect can with screw-cap closure.
- (2) ea: 5-gal. rd can with screw-cap closure.

*Note.* CmlC issue when present stocks are exhausted.

*c.* USES.

- (1) To remove gummy, varnishlike deposits from engine parts such as valves, valve stems, carburetor parts, and fuel pumps.
- (2) Acetone is the principal solvent in watch crystal cement and in natural plastic wood substitute; it can be used to

soften the latter as well as to waterproof cement and to clean brushes used in the application thereof.

- (3) Acetone is an important ingredient of some paint and varnish removers.
- (4) As an emergency cleaner for paint spray equipment and brushes.
- (5) Used with dry ice for decementing lenses bonded with thermosetting cement (TM 9-1501).

**Caution:** Highly flammable and very poisonous. A red label is required for ICC shipments. Personnel using acetone in a room must wear respirator approved for such vapors.

### 34. Acid, Boric, Crystals, ACS

a. CHARACTERISTICS. Colorless crystals which appear white when finely divided or powdered. It is soluble in water and alcohol.

b. UNIT OF ISSUE. ea: 1-lb. bottle with screw-cap closure.

c. USE. With sulfuric acid for decoating optical elements composed of barium crown and dense barium crown glass. Prepare a solution of one (1) teaspoon of boric acid to each 150 cc of sulfuric acid. Place elements in solution at room temperature, heat to 250° F., and allow to cool to room temperature. Remove elements from solution and dip in pure alcohol bath.

*Note.* There must be absolutely no water rinse prior to the alcohol bath.

This method will also remove all types of cement from decemented optical elements. This solution can also be used on all types of glass except those composed of rare element glass; however, it will not remove all types of coatings. Barium crown and dense barium crown glass may be identified on Ordnance drawings by the abbreviations "B.C." and "D.B.C." respectively.

### 35. Acid, Nitric, Technical Grade

a. CHARACTERISTICS. A clear, colorless to light brown, fuming, suffocating, caustic and highly corrosive liquid having a characteristic pungent odor. On exposure to light, especially in partly filled containers, it becomes yellow to yellowish-brown due to the formation of oxides of nitrogen. However, the development of color does not change the properties of the acid. The acid dissolves most metals with the evolution of brownish-red fumes. It also stains and destroys woolen fabrics and human skin. Commercially, this strength of nitric acid (61 percent) is known as 40° Baumé (app. III).

b. UNIT OF ISSUE. ea: 1-lb. glass-stoppered bottle.

c. USES.

- (1) Pickling and bright-dipping stainless steel, copper alloys,

aluminum, and nonferrous metals. A satisfactory pickle for copper and its alloys is made by mixing 100 parts concentrated sulfuric acid (1.835 sp gr) and 75 parts of nitric acid. The addition of one part by weight of common salt per 100 parts of the bath produces a solution that will provide a lustrous finish on copper alloys.

- (2) Etching steel, bronze, and brass.
- (3) Decoating optical elements (TM 9-1501).
- (4) Photoengraving and lithographic processes.
- (5) For dichromating zinc-base die castings.

**Caution:** Nitric acid is a highly corrosive liquid and should be stored in glass containers and handled with care. The fumes must not be inhaled. Operators must wear goggles and rubber gloves when using strong nitric acid solutions. Large volumes of water should be used to flush acid from the skin after which the skin can be washed with an alkaline solution, preferably sodium bicarbonate (baking soda), to neutralize any residual acid. Nitric acid should be kept in a cool place but storage at temperature below 0° F. must be avoided.

### **36. Acid, Phosphoric, Metal Conditioner, Concentrated (Wash-off Type)**

**a. CHARACTERISTICS.** This is a concentrated, homogeneous liquid which contains a minimum of 68 grams of free orthophosphoric acid per 100 milliliters of undiluted solution. It also contains a minimum of 16 percent by volume of water-soluble, organic, nontoxic, grease solvents. Sometimes it contains a wetting agent. It was previously known as CONDITIONER, metal, rust remover, wash-off type.

**b. UNIT OF ISSUE.** ea: 5-gal. carboy.

*Note.* For issue to shops, depots, and arsenals only.

**c. USES.**

- (1) For cleaning metal surfaces by removing rust and/or grease deposits. (Heavy coatings of grease should be removed by solvent degreasing.)
- (2) As a derusting solution in tanks, preferably applied hot (140° to 160° F.), in cases of severe rust.

**d. APPLICATION.** Dilute one part (by volume) of acid with three parts of water.

**Caution:** Pour acid into water, do not pour water into acid. Brush this diluted mixture on the metallic surface. Scrub the wet surface with a brush, steel wool, or abrasive cloth until the rust

and grease are dissolved. Wash off the residue with water, preferably hot. If the phosphoric acid has dried, brush on a fresh mixture before washing it off. Wipe off the metal with dry cloths after washing. This metal conditioner may also be used as a derusting solution in tanks, preferably hot (140° to 160° F.), for conditions of severe rust (TM 9-1861).

**Caution:** The treated metal must be painted or coated with a rust-preventive compound as soon as possible. Do not use this acid on electrical wiring, coil steel springs, or other spring steel.

### **37. Acid, Phosphoric, Metal Conditioner (Wipe-off Type)**

*a. CHARACTERISTICS.* This is a concentrated, homogeneous liquid which contains between 20 and 25 grams of free orthophosphoric acid per 100 milliliters of undiluted solution. It also contains not less than 25 percent by volume of water-soluble organic grease solvents. Sometimes it contains a wetting agent. It was previously known as CONDITIONER, metal, rust-remover, wipe-off type.

*b. UNITS OF ISSUE.*

- (1) ea: 1-gal. bottle.
- (2) ea: 5-gal. carboy.

*c. USE.* For swab or brush application for rust removal and preparation of iron and steel surfaces prior to painting.

*d. APPLICATION.* Dilute one part (by volume) of acid with three parts (by volume) of water.

**Caution:** Pour acid into water; do not pour water into acid. May be applied as dipping solution in dip tanks or by brushing. It does not need to be washed off, but can be immediately wiped off with a clean cloth.

**Caution:** The treated parts must be painted or coated with a rust-preventive compound as soon as possible. This acid is not to be applied on electrical wiring, coil steel springs, or other spring steel.

### **38. Alcohol, Denatured**

*a. CHARACTERISTICS.* A clear, colorless, volatile, flammable, poisonous liquid. Must be kept in tightly sealed containers.

*b. UNITS OF ISSUE.*

- (1) ea: 1-gal. can.
- (2) ea: 5-gal. can.
- (3) ea: 55-gal. drum.

*c. USES.*

- (1) Emergency antifreeze agent for automotive cooling sys-

tems when regular antifreeze compounds are not immediately available (table II). Determine the lowest temperature likely to be met during the operation of the vehicle. Multiply the number of pints of denatured alcohol per gallon for the specified temperature in column 2 by the total number of gallons of coolant in the system. This gives the amount of antifreeze solution of desired strength which is to replace an equal amount of water. For example: To protect a cooling system having a capacity of 12 quarts (3 gal.), including heaters, etc., against a temperature as low as  $-50^{\circ}$  F., prepare  $16\frac{1}{2}$  pints of antifreeze solution ( $5\frac{1}{2}$  pints denatured alcohol in col. 2 multiplied by 3 gal.). This will replace  $16\frac{1}{2}$  pints of water to be drained from the cooling system.

*Table II. Guide for the Preparation of Emergency Antifreeze Solutions*

1	2
Protection to —	Pints of alcohol to be included in 1 gallon of emergency antifreeze solution
20° F.	1½
10° F.	2¼
0° F.	2¾
—10° F.	3¼
—20° F.	3¾
—30° F.	4½
—40° F.	5
—50° F.	5½
—60° F.	6¼

- (2) Preparation of paint and varnish remover.
- (3) Brush cleaning agent for shellac varnishes.
- (4) Thinning shellac varnish.
- (5) To prevent ice formations from condensate in fuel tanks, pumps, and lines. In cold weather, add 1 pint alcohol to each 10 gallons of gasoline in the vehicle tank. Add in same proportion upon tank refill.
- (6) When mixed, three volumes alcohol to one volume of 80-octane gasoline forms an emergency automotive fuel, called "Alcogas."
- (7) For cleaning hydraulic mechanisms such as brake systems.

**Caution:** Highly flammable and poisonous.

### 39. Alcohol, Ethyl, USP, 95 Percent

a. CHARACTERISTICS. A clear, colorless, volatile, and flammable liquid which is not denatured. (Issued only for uses described in c below.)

b. UNITS OF ISSUE.

(1) ea: 1-gal. can.

(2) ea: 5-gal. can.

c. USES.

(1) For cleaning of optical parts by field and depot maintenance shops.

(2) In the manufacture of mercury fulminate, smokeless powder, and small arms primers.

*Caution:* Flammable.

### 40. Ammonia, Aqua, ACS (Ammonium Hydroxide) 28 Percent

a. CHARACTERISTICS. A practically colorless, volatile solution. The fumes have a strong, penetrating, and pungent odor. Chemically known as ammonium hydroxide.

b. UNIT OF ISSUE. ea: 4-lb. bottle with leakproof, screw-cap closure.

c. USE. Mixed with pure soap and distilled water to form a solution for cleaning optical lenses (see lens-cleaning liquid detergent).

*Caution:* Avoid inhalation. Bottles should be stored in a cool, dark place since rapid evaporation may cause the stopper to blow out or the bottles to explode. The fumes are very irritating to the throat and lungs and may cause vomiting. Fresh air is the proper antidote. Ammonia on the skin causes smarting and a mild burning sensation. It may be relieved by washing with water and coating with a light emollient such as petroleum jelly.

### 41. Benzol, Technical Grade

a. CHARACTERISTICS. A clear, highly volatile, toxic and narcotic, flammable, organic solvent. It is the commercially available hydrocarbon benzene ( $C_6H_6$ ) which crystallizes at 32° F. and melts at 42° F.

b. UNITS OF ISSUE.

(1) ea: 1-gal. can.

(2) ea: 5-gal. can.

*Note.* QMC issue when present stocks are exhausted.

c. GRADES.

- (1) *Grade I.* Industrial-grade benzene. This should be specified where high purity is a requirement.
- (2) *Grade II.* Industrial 90 benzene (90 percent pure).

d. USES.

- (1) To thin oil-resistant synthetic rubber cement.
- (2) Used to cement optical prisms to their mountings.
- (3) For removing gum formations from fuel tanks.

**Caution:** Liquid and vapors are extremely poisonous and highly flammable. When used indoors, have room well ventilated. Keep away from open flame.

## 42. Burlap, Jute, 8-oz.

a. CHARACTERISTICS. A coarse-thread, plain-weave jute cloth, having a width of 40 inches and weighing 8 ounces per lineal yard. There are 10 to 12 threads in each direction of the cloth. It is a grade which is commercially known as "firsts."

b. UNIT OF ISSUE. yd: 40 in. wide.

*Note.* QMC issue when present stocks are exhausted.

c. USE. For cleaning and drying bores of weapons when scrubbed with rifle bore cleaner.

## 43. Calcium Carbonate, Precipitated Chalk, USP

a. CHARACTERISTICS. A finely powdered chalk free of undesirable impurities. It is softer than glass and will not scratch when applied to optical lenses.

b. UNIT OF ISSUE. 1-lb. sifter top can.

*Note.* Will replace PAD, cleaning, precipitated chalk, when present stocks are exhausted.

c. USE. For polishing and cleaning optical lenses and prisms prior to coating. The fine abrasive quality of the chalk will remove any substance remaining after use of the detergent. For issue only to shops using optical coating equipment listed in ORD 6 SNL F-272.

## 44. Carbon Tetrachloride, Technical Grade

a. CHARACTERISTICS. A colorless, nonflammable, volatile, poisonous solvent with an aromatic odor similar to chloroform. It is much heavier than water in which it is only slightly soluble. The vapors are heavier than air. The freezing point is  $-9^{\circ}$  F. A mixture of 30 percent trichlorethylene mixed with 70 percent carbon tetrachloride will prevent freezing at ambient temperatures as low as  $-65^{\circ}$  F. It is an excellent solvent for oils, fats, and greases

and mixes in all proportions with cleaning solvents, acetone, alcohol, etc. It is a nonconductor of electricity. (Issued only for the uses described in *c* below.)

*b.* UNITS OF ISSUE.

- (1) ea: 1-lb. bottle.
- (2) ea: 1-qt. can.
- (3) ea: 1-gal. can.

*c.* USES.

- (1) To clean wiring and electrical mechanisms and metal surfaces which must not be cleaned with other cleaning solvents due to the fire hazard and their harmful effect upon rubber, fiber, etc.
- (2) Emergency use in hand-pump or bomb-type fire extinguishers in tanks and automotive vehicles.

*Note.* Carbon tetrachloride for use in fire extinguishers is the responsibility of the Corps of Engineers.

**Caution:** Vapor and liquid are poisonous if taken into the body. Avoid prolonged inhalation of vapor, both prior to and after contact with flame. Headache, nausea, and anesthesia, followed by inflammation of the liver and kidneys, unconsciousness, and death may result. Provide adequate ventilation both during and after use. In contact with skin, it may cause irritation. When splashed into the eye, it will cause considerable pain and watering. If an accident occurs, the eyes must be washed immediately with large amounts of clean water. When used on fires, the very poisonous gas phosgene is formed. Gas will be most noticeable on the floor or lower parts of a building for some time after the use of carbon tetrachloride. Avoid working beneath vehicles until building has been ventilated. Do not heat carbon tetrachloride or allow it to come into contact with heated surfaces.

## 45. Cheesecloth, White, Bleached

*a.* CHARACTERISTICS. An open-mesh cotton cloth made of material which is commercially known as "firsts." The mesh is 44 by 40.

*b.* UNIT OF ISSUE. ea: 38½ in x 5 yd, in wtrprf envelope.

*Note.* QMC issue when present stocks are exhausted.

*c.* USES.

- (1) Issued for the cleaning and drying of optical lenses and prisms of fire control instruments during coating operations (TM 9-1501).
- (2) Used as a strainer in renovating antifreeze compound for reuse.

## 46. Cleaner, Rifle Bore (CR)

*a.* CHARACTERISTICS. An organic soap emulsion or solution of water, paraffin oil, and solvents. The fluid is an unbalanced emulsion and is clear and transparent when viewed by transmitted light. It is a highly penetrating mobile liquid. The emulsion is free from disagreeable and offensive odors. It is usable at  $-20^{\circ}$  F. and higher temperatures. It has a minimum flash point of  $100^{\circ}$  F. It contains no materials which have a harmful effect on personnel either by inhalation or contact under the conditions of its customary employment. This fluid dissolves corrosive primer salts deposited in the bore of weapons during firing. The emulsion acts as a temporary rust preventive. Freezing point is  $-60^{\circ}$  F.

*b.* UNITS OF ISSUE.

- (1) ea: 2-oz. oval screw-cap can. Provided for carrying by the individual soldier only when equipped with hand and shoulder weapons.
- (2) ea: 6-oz. screw-cap can.
- (3) ea: 1-qt. screw-cap can.
- (4) ea: 1-gal. screw-cap can.

*c.* USE. After firing, for cleaning bores and breech and firing mechanisms of all types of small arms and artillery.

**Caution:** Not suitable for use in preparing weapons for storage.

## 47. Cleaning-liquid, Watch Rinsing (Nonflammable)

*a.* CHARACTERISTICS. A fast-drying and nonflammable solution used in the rinse-cleaning of watches. It has rust preventive qualities and will not spot or streak.

*b.* UNIT OF ISSUE. ea: 1-gal. can.

*c.* USES.

- (1) As a rinse in watch-cleaning machines following treatment with watch washing cleaning-liquid (par. 48). Ordinarily a watch washing machine uses a first and second rinse jar and one wash jar.
- (2) It cannot be used with foaming types of cleaning liquids.

## 48. Cleaning-liquid, Watch Washing (Nonflammable)

*a.* CHARACTERISTICS. A clear, nonfoaming, aqueous solution containing ammonia and a synthetic detergent. It will not rust hair springs or other steel parts.

*b.* UNIT OF ISSUE. ea: 1-gal. can.

*c.* USE. In watch-cleaning machine to remove grease, gum, and dirt, prior to rinse with watch rinsing cleaning-liquid (par. 47). Listed in ORD 6 SNL F-272.

## 49. Cloth, Batiste, White

a. CHARACTERISTICS. A fine grade, soft, lintless cotton cloth. It was previously furnished in "Rose Pattern" but is currently issued without pattern.

b. UNITS OF ISSUE.

(1) Packet: 100 pc, 4 x 6 in, in packet.

(2) Bx: 39 in x 5 yd, 1 per bx.

*Note.* QMC issue when present stocks are exhausted.

c. USE. Issued as wiping cloths to shops using optical coating equipment. It is used in places where the slightest trace of lint may cause malfunctioning. Listed in ORD 6 SNL F-272.

## 50. Cloth, Bore-cleaning

a. CHARACTERISTICS. A single-nap, unbleached cotton-flannel cloth.

b. UNIT OF ISSUE. Roll: 4-in. wide, in 50-yd. roll.

*Note.* QMC issue when present stocks are exhausted.

c. USE. Cut into swabs of suitable size for cleaning barrels of cal. .50 machine guns, 20-mm guns, and shotguns. In emergency, may be cut to substitute for 2½ x 2½-inch patches for small weapons.

## 51. Cloth, Wiping, Cotton

a. CHARACTERISTICS. A soft and absorbent cloth that is relatively free from lint. It is predominantly composed of cotton, but may consist of absorbent rayon, silk, and cotton, either knitted or woven. It contains no dust, alkali, or corrosive agents. The cloth is washed and sterilized, and is available in mixed colors (type II). These are usually comprised of light clothing rags.

b. UNITS OF ISSUE.

(1) ea: 5-lb. bag.

(2) ea: 100-lb. bale.

*Note.* QMC issue when present stocks are exhausted.

c. USES.

(1) A substitute for cotton waste for use on automotive equipment and machinery, especially when lint deposits may affect operation.

(2) A substitute for sponges for washing matériel where strong soap, lye, or other alkaline solutions are employed.

## 52. Compound, Absorbing (Oil, Grease, and Water)

a. CHARACTERISTICS. A coarse, granular mixture of minerals of the silicate type possessing a high absorption capacity for oil, grease, and water. It is dust-free.

b. UNIT OF ISSUE. lb: in 50- and 100-lb. multiwall bags.

c. USE. Issued to shops, depots, arsenals, etc., to clean horizontal surfaces such as decks and floors of accumulations of oil, grease, and water. Scattered on floor beneath vehicles to absorb drippings and make the resultant product easily removable.

### **53. Compound, Cleaning, with Inhibitor (for Engine Cooling Systems)**

a. CHARACTERISTICS. A cleaner consisting of two separated components (ALUMINUM CHLORIDE and OXALIC ACID) which are intermixed immediately prior to use. The components are packaged in a single unit container having independent compartments. An inhibitor (borax) is furnished in the same container in a third separate compartment.

b. UNIT OF ISSUE. ea: cntr of approximately 1-lb. cleaning components and 4 oz of inhibitor.

c. USE. For cleaning cooling systems of engines on motor vehicles.

### **54. Compound, Cleaning, Alkali Type**

a. CHARACTERISTICS. A granular, alkaline compound soluble in water.

b. UNITS OF ISSUE.

(1) ea: 25-lb. pail.

(2) ea: 100-lb. drum.

(3) ea: 400-lb. drum.

c. USE. In depot shops only, to remove grease, paint, tar, road dirt, etc. from metal components (TM 9-1861).

d. APPLICATION. In dip tank, solution of approximately 2 pounds to 3 gallons of water at 180° to 200° F.

### **55. Compound, Grease-Cleaning, Nonphenolic Base**

a. CHARACTERISTICS. A liquid degreasing compound soluble in kerosene, dry-cleaning solvent, or volatile mineral spirits paint thinner, the mixture of which emulsifies with water in rinsing operations. It is harmless to painted or metal surfaces.

b. UNITS OF ISSUE.

(1) ea: 5-gal. can.

(2) ea: 55-gal. drum.

*Note.* Issue until stocks are exhausted, then use SOLVENT, grease-cleaning, self-emulsifying (par. 73).

c. USE. For dissolving tar, grease, and oil from engine block exteriors, under-chassis components, and parts.

*d.* APPLICATION. The solution is made by mixing one part compound to four parts volatile mineral spirits paint thinner. Dry-cleaning solvent (QMC issue) is acceptable as a substitute in an emergency. It is then applied with a brush or spray gun, allowed to soak, and later removed by washing off with water under pressure.

## **56. Compound, Paint Stripping, Alkali Type**

*a.* CHARACTERISTICS. An alkaline compound which is soluble in water. This material is of such low alkalinity that it causes only a slight hazard to operating personnel.

*b.* UNIT OF ISSUE. ea: 400-lb. drum.

*c.* USE. To remove paint, enamel, varnish, or lacquer from metal surfaces. This compound is not to be used on wood.

*d.* APPLICATION. Three quarters of a pound to three pounds is dissolved in each gallon of hot water. It is then applied hot by flow, trickle, swab, brush, or dip tank. Steam spray or hot water spray only shall be used to rinse the surfaces clean.

## **57. Compound, Pickling, Acid**

*a.* CHARACTERISTICS. A reddish liquid which has an acid content of approximately 40 percent of commercial hydrochloric acid (muriatic acid). It is ready for use without dilution. This material contains a small amount of certain organic chemicals, the effect of which is to greatly reduce the action of the acid on clean iron or steel but not to interfere with the rust removal by the acid.

*b.* UNIT OF ISSUE. ea: 13-gal. carboy.

*c.* USES. To remove heavy rust deposits from bomb fins, engine blocks, small arms matériel, and other steel and cast iron parts where measurement tolerances are not of prime importance. This material will not cause any appreciable dimensional change in highly finished surfaces that have not been attacked by rust.

*d.* APPLICATION.

- (1) Wooden or rubber-lined steel tanks are preferred for the use of this compound. In an emergency, steel tanks may be used.
- (2) To accomplish removal of rust, the parts to be treated are submerged in the compound at room temperature (60° to 100° F.) for 5 to 30 minutes. The length of treatment depends on the amount of rust to be removed.
- (3) After completion of the treatment, the parts are rinsed in hot water. After drying, the rust-free pieces must be

phosphatized, painted, or coated with rust-preventive compound without delay.

**Caution:** Acid splashes on the clothing or skin of users must be flushed with water promptly. Splashes in the eyes must be washed out with water followed by an eye wash consisting of a dilute solution of sodium bicarbonate (bicarbonate of soda). Do not use sodium hydroxide (lye or caustic soda) solution for this purpose.

## 58. Compound, Vapor Cleaning

*a.* CHARACTERISTICS. A granular product soluble in water. The solution, when applied hot to greasy surfaces, emulsifies the greases and oils so that they may readily be removed with hot water or steam. It does not give off vapors or fumes which will have an unhealthy effect upon the operator. The vapors are free from disagreeable odor and taste and are nonflammable. This compound contains trichlorethylene.

*b.* UNITS OF ISSUE.

(1) ea: 125-lb. drum.

(2) ea: 425-lb. drum.

*c.* USES.

(1) Added to water for use in steam-cleaning appliances such as the "Jenny" steam generator, for removing readily soluble foreign matter.

(2) In cold, 4-percent weight-to-volume solution, the compound will perform satisfactorily for cleaning cement floors.

**Caution:** When using vapor-cleaning or steam-cleaning devices, protect all electrical equipment such as generator regulators, generators, starters, distributors, etc. from direct impact by the cleaning jet. Either remove the accessory or protect adequately to prevent entry of vapor, which may cause a short circuit or corrosion. Clean electrical equipment with dry-cleaning solvent or volatile mineral spirits paint thinner following exposure to these vapors.

## 59. Detergent, Lens-cleaning, Liquid

*a.* CHARACTERISTICS. The detergent is a mixture of a sulfonic acid soap (sodium alkyl sulfate), ammonia, and distilled water. At room temperatures, this is a yellow, pastelike material completely miscible with hot or cold water in all proportions. When mixed and agitated with water, it produces voluminous suds.

b. UNIT OF ISSUE. ea: 7½-lb. jar.

c. USE. For washing and cleaning optical lenses and elements by optical shops.

## 60. Napkin, Cloth (Celanese), Lintless, with Hem

a. CHARACTERISTICS. A closely woven, washable, lintless, synthetic-fiber cloth.

b. UNIT OF ISSUE. envelope: 6, 17 x 18 in., contained in wtrprf envelope. For issue only to shops using optical coating equipment listed in ORD 6 SNL F-272.

Note. QMC issue when present stocks are exhausted.

c. USE. To remove lint from optical lenses and prisms.

## 61. Oil, Fingerprint Remover

a. CHARACTERISTICS. A clear, homogeneous, stable oil free from disagreeable odor, sediment, and ingredients injurious to persons using it. It will remove fingerprint marks from polished metallic surfaces.

b. UNITS OF ISSUE.

(1) ea: 5-gal. can.

(2) ea: 55-gal. drum.

c. USE. In conjunction with regular solvent cleaning processes to remove fingerprints from finished parts, shells, and polished surfaces prior to application of preservative. It acts as a *temporary* preservative against rust but is not effective as a preservative for more than 1 to 3 days.

d. APPLICATION. If sufficient time is allowed for the remover to dry before preservative application, it need not be removed. Otherwise, it must be washed off with solvent before preservatives are applied.

## 62. Pad, Cleaning, Precipitated Chalk

a. CHARACTERISTICS. A cloth pad containing a fine grade of powdered chalk. The chalk is softer than glass, therefore will not scratch when applied to optical lenses.

b. UNIT OF ISSUE. bx: 24 pads per bx.

Note. Issue until stocks are exhausted, then use CALCIUM CARBONATE, precipitated chalk, USP.

c. USE. For polishing and cleaning optical lenses and prisms prior to coating. The fine abrasive quality of the chalk will remove any substance remaining after use of the detergent. For issue only to shops using optical coating equipment listed in ORD 6 SNL F-272.

d. APPLICATION. After optical glass has been washed and rinsed, the glass is lightly rubbed with a moistened cleaning pad. Chalk deposits may be rinsed off the lens with lukewarm water and the lens is then dried with a celanese cloth napkin.

### 63. Paper, Lens-tissue

a. CHARACTERISTICS. A white, long-fiber, Japanese-type tissue paper (type IV, heavyweight, wet strength).

b. UNIT OF ISSUE. book: 100 sheets,  $4\frac{1}{4}$  x 5 in.

Note. Stocks of 100 sheet packets of paper,  $7\frac{1}{2}$  x 11 in, or larger will be issued only until the supply is exhausted.

Note. QMC issue when present stocks are exhausted.

c. USE. For cleaning optical glass and lenses of sighting and fire control matériel.

### 64. Paper, Watch, No Lint

a. CHARACTERISTICS. A white, soft-finish tissue paper. It is free from grit and lint.

b. UNITS OF ISSUE.

(1) pkg: 1,000 sheets,  $2\frac{1}{2}$  x  $3\frac{1}{2}$  in. (for wrist watch).

(2) pkg: 1,000 sheets,  $4\frac{1}{4}$  x  $4\frac{1}{4}$  in. (for pocket watch).

Note. QMC issue when present stocks are exhausted.

c. USE. Drying and cleaning component parts of wrist and pocket watches. Listed in ORD 6 SNL F-272.

### 65. Patch, Cut, Cotton Flannel, $2\frac{1}{2}$ Inches Square

a. CHARACTERISTICS. A good grade of unbleached, single nap cotton flannel. It has similar properties to bore-cleaning cloth which may be substituted in an emergency.

b. UNITS OF ISSUE.

(1) M: 20 ea. in 50 sealed, wtrprf envelopes (for export from eastern ports) (PS-101-A).

(2) M: 20 ea. in 50 sealed, moistureproof cellophane envelopes (for export from western ports) (PS-101-B).

(3) M: 200 ea. in 5 bndls (for domestic use) (PS-101-C).

(4) M: 40,000 ea. in contr (for issue only in Con US to NG, ORC, and ROTC units).

Note. Minimum issues for items (1), (2), and (3) are 1,000 patches. Issued in multiples of 1,000.

c. USE. Cleaning of bores of small arms up to and including 20-mm guns.

### 66. Polish, Metal, Paste

a. CHARACTERISTICS. An acid-free material, with or without a

finely divided abrasive, so fine in consistency that it has only a mild abrasive action. It has good tarnish-removing and lustre-producing properties. The minimum nonvolatile content is 30 percent and the minimum flash point is 102° F.

b. UNIT OF ISSUE. ea: 1-lb. can.

c. USE. For cleaning and polishing metal surfaces such as brass, nickel, copper, chromium, etc. Not to be used on painted, varnished, or lacquered surfaces or on special finishes such as phosphatized or oxidized surfaces.

## 67. Remover, Paint and Varnish, Nonflammable (Organic Solvent Type)

a. CHARACTERISTICS. A material composed of suitable mixtures of organic solvents, with wax or other retarders of evaporation. It contains not more than 5 percent nonvolatile matter and the loss upon evaporation is not more than 25 percent by weight. The minimum flash point is 500° F.

b. UNITS OF ISSUE.

(1) ea: 1-qt. can.

(2) ea: 1-gal. can.

*Note.* ENG issue when present stocks are exhausted.

c. USE. For removing dried films of paint and varnish from surfaces such as metal, wood, plastics, etc. Should be used in places where heated pipes, live wires, and other ignition media are to be encountered. Also used for removing ignition insulation compound. Due care should be exercised when remover is used on plastics as some types are softened or attacked by the chlorinated solvents in the remover. See TM 9-2851 for further description of uses.

d. APPLICATION. Shake well and apply by brush or swab. Wash surface thoroughly with water after coating is loosened. At temperatures below 60° F., the action is slower and a longer time will be required to loosen the paint.

**Caution:** Since the volatile constituents of the remover are more or less toxic, proper ventilation is considered imperative. Avoid contact with the skin or clothing. Wash off quickly with water, if accidentally contacted.

## 68. Soap, Automobile, Liquid

a. CHARACTERISTICS. A uniform, translucent, liquid soap of a yellowish-white or brownish-yellow color. The soap is made solely from neutral vegetable oils and potassium hydroxide. There is no objectionable odor in the soap and none develops in storage

when kept in a closed container. The material contains neither solvents nor oils that will damage rubber parts and lacquered or enameled surfaces.

*b.* UNIT OF ISSUE. ea: 1-gal. can.

*Note.* QMC issue when present stocks are exhausted.

*c.* USE. Mixed with water to clean rubber parts and enameled or lacquered finishes.

*d.* APPLICATION. Two to 4 ounces per gallon of warm, soft water will give good suds. The solution is then applied by sponge. Best results will be obtained by a final, thorough rinse with warm water.

## **69. Soap, Paste, Hand Grit**

*a.* CHARACTERISTICS. A hand soap in paste or powder form made especially for use by mechanics. It contains between 25 and 50 percent of insoluble siliceous matter (gritty material such as sand, etc.). The alkaline salts content, calculated as sodium carbonate (soda ash), is not over 2 percent.

*b.* UNIT OF ISSUE. ea: 1-lb. can.

*Note.* QMC issue when present stocks are exhausted.

*c.* USE. For removing oil, grease, paint, printing ink, or any other occupational soil from the hands without harmful effect to the skin.

## **70. Soap, Saddle**

*a.* CHARACTERISTICS. A homogeneous paste consisting of soap, waxes, and oils in aqueous emulsion.

*b.* UNIT OF ISSUE. ea: 1-lb. can.

*Note.* QMC issue when present stocks are exhausted.

*c.* USE. For cleaning and preserving leather. Also for mold-proofing leather.

*d.* APPLICATION. Leather equipment is best cleaned by sponging with saddle soap and water applied with a cellulose sponge. Repeated washings will necessitate replacement of oil to prevent the leather from becoming harsh and brittle. The leather, when still moist, must be given an exceedingly light coat of neat's-foot oil by rubbing with a soft cloth moistened (not saturated) with the oil. Wipe off any excess oil that the leather does not absorb and rub to a polish, if desired, by means of a soft cloth after the leather has dried. Nearly all ordnance leather equipment is russet or fair leather, and, when these articles become soiled, they must be cleaned by carefully removing all hardened grease with a sliver of wood (not glass or knife), and washed with a sponge saturated

with a heavy lather of saddle soap and clean, tepid water. Rinse thoroughly with clean water and rub vigorously with a dry cloth until the leather is dry.

**Caution:** Do not use hot water or allow the leather to soak. Leather equipment must never be washed with a strong cleaning solution containing alkali. Leather equipment, which has become wet, must be dried in the shade.

## 71. Soda, Caustic (Lye)

a. **CHARACTERISTICS.** A highly caustic, white substance which readily dissolves in water with the evolution of a large amount of heat. It is available in flake, ground, or lump form. It contains not less than 95 percent sodium hydroxide and not more than 2 percent carbonate (calculated as sodium carbonate).

b. **UNITS OF ISSUE.**

(1) ea: 16-oz. canister.

(2) ea: 50-lb. can.

*Note.* CmlC issue when present stocks are exhausted.

c. **USES.**

(1) Primarily used as a paint and varnish remover (TM 9-2851).

(2) An antirodent admixture for target paste (TM 9-855).

(3) To quicken the action of other cleaning solutions.

*Note.* Do not use on artillery matériel or phosphate finishes of small arms.

**Caution:** Caustic soda is very destructive to the body and dissolves woolen clothing. Wear rubber apron, gloves, and goggles while handling this alkali. Special care must be taken to avoid getting any in the eyes. Precautions must be taken to prevent inhaling small particles when handling in dry form. Solutions must be kept in containers of iron, glass, or, in emergency, in a wooden container. Do not use aluminum or galvanized containers. If taken internally, give large dosage of vinegar or lemon juice, followed by butter, olive oil, or cottonseed oil. Assist vomiting by drinking large quantities of tepid water. Call a doctor. When the skin has been exposed to caustic soda, wash thoroughly with water, then with a 5 percent solution of acetic acid or vinegar. Bandage after applying an emollient similar to petroleum jelly, or olive oil.

## 72. Solvent, Carbon Remover

a. **CHARACTERISTICS.** A cleaner which includes an upper and lower liquids, with a total water content of both layers not in

excess of 40 percent of the total volume. The upper liquid is non-flammable and nontoxic. This two-phase material has a freezing point of approximately 32° F. and a pour point not higher than 10° F.

b. UNIT OF ISSUE. ea: 5-gal. can.

c. USES.

- (1) To remove gummy deposits from carburetor and injector parts, etc.
- (2) To clean fuel pumps.
- (3) To clean pistons, cylinder heads, and other parts coated with carbon and varnishlike deposits.

d. APPLICATION. Used with no stirring of the cleaner in order to allow the less volatile ingredients to remain on top and thus retard evaporation. When possible, the cleaner must be used in its original container which has a removable top rather than to pour off a portion into another container. Matériel is immersed in cold, unagitated solvent, as issued, not in excess of 16 hours.

### **73. Solvent, Grease-Cleaning, Self-Emulsifying**

a. CHARACTERISTICS. This is a degreasing, self-emulsifying solvent free of phenolic or cresylic type acids, benzene, or toluene. It has a minimum flash point of 100° F. and a maximum viscosity of 3.0 centistokes at 10° F.

b. UNITS OF ISSUE.

- (1) ea: 1-gal. can.
- (2) ea: 55-gal. drum.

*Note.* Replaces COMPOUND, grease-cleaning, nonphenolic base (par. 55) when present stocks are exhausted.

c. USES. The solvent is intended for use in removing oils, greases, asphalt, tars, and preservative type materials other than wax type from metallic and painted surfaces. The solvent is capable of application by swab, brush, spray, or soak and is to be used as received in the container.

### **74. Sponge, Animal, Unbleached (Natural, Mediterranean Honeycomb)**

a. CHARACTERISTICS. A natural, soft, light, porous, elastic material which is easily compressible. It readily absorbs liquids and expels them equally upon compression. It is an animal growth or an organism belonging to the protozoa. There are between 10 and 12 sponges to the pound.

b. UNIT OF ISSUE. ea: size B, having a perimeter between 34 in. (min.) and 37 in. (max.).

c. USE. For cleaning surfaces.

## 75. Sponge, Cellulose, Coarse-pore

a. CHARACTERISTICS. The same as natural sponge, except that it is synthetically produced. Unlike natural sponge, it is relatively stiff or rigid when dry, but assumes the characteristics of a natural sponge when wet with water.

b. UNITS OF ISSUE.

(1) ea: size 6 (medium),  $1\frac{3}{8}$  x  $3\frac{1}{4}$  x 5 in.

(2) ea: size 10 (large),  $2\frac{1}{4}$  x  $4\frac{3}{8}$  x  $6\frac{1}{4}$  in.

c. USE. For cleaning surfaces.

## 76. Thinner, Methyl Ethyl Ketone

a. CHARACTERISTICS. A clear, organic solvent free from sediment or suspended matter and having a characteristic odor. It is frequently referred to as "MEK."

b. UNIT OF ISSUE. ea: 55-gal. drum.

c. USE. As a thinner in strippable film process for matériel storage.

## 77. Thinner, Paint, Volatile Mineral Spirits (TPM)

a. CHARACTERISTICS. A light-grade, volatile, colorless, flammable liquid distilled from petroleum. It evaporates quickly without leaving a corrosion-inducing film on metal surfaces. It is a satisfactory substitute for dry-cleaning solvent. The minimum flash point is 100° F.

b. UNITS OF ISSUE.

(1) ea: 1-gal. can.

(2) ea: 5-gal. can.

(3) ea: 55-gal. drum.

*Note.* ENG issue when present stocks are exhausted.

c. USES.

(1) To clean metal surfaces and bearings.

(2) To remove oil and grease spots from motor vehicle bodies and upholstery.

(3) To clean air cleaners and breathers.

(4) To remove rust-preventive compounds, oils, and greases from guns and machine tools being deprocessed after storage.

(5) It may also be used in place of turpentine to thin oil paints, when faster drying is desired.

d. APPLICATION. Apply by cold submersion, swabbing or washing parts with cloths or rags, scrubbing with brushes, or wiping with a cloth dampened in the thinner.

**Caution:** Flammable. Continual contact with this material without the protection of gloves will dry the skin and may cause irritation. It is highly destructive to natural rubber hose, tires, and electrical insulation, and should not be used on natural rubber parts of any nature.

## 78. Trichlorethylene, Technical Grade

**a. CHARACTERISTICS.** A clear, volatile liquid which is nonflammable at room temperature. It is not miscible with water but is miscible with alcohol, acetone, oils, and greases. In the presence of water, it gradually decomposes, especially when heated, and develops an acid reaction. To counteract this development of acid or keep it at a minimum, the material is usually supplied with an inhibitor. The vapors have a chloroformlike odor and are toxic. Freezing point is  $-35^{\circ}$  F.

**b. UNITS OF ISSUE.**

- (1) ea: 5-gal. can.
- (2) ea: 55-gal. drum.

**c. USES.**

- (1) In vapor-degreasing operations for cleaning small arms and other items having phosphate finishes where strong alkaline solutions may not be used.
- (2) As a freezing point depressant for carbon tetrachloride, usually in fire extinguishers. Used as a mixture of 30 percent trichlorethylene and 70 percent carbon tetrachloride, it is liquid down to  $-65^{\circ}$  F.

**d. APPLICATION.** See JAN-P-116, Methods of Preservation.

## 79. Trisodium Phosphate

**a. CHARACTERISTICS.** A colorless, granular, flake or crystalline phosphate compound which is soluble in water. It is used as a component of several detergent mixtures.

**b. UNITS OF ISSUE.**

- (1) ea: 1-lb. pkg.
- (2) ea: 100-lb. bag.

*Note.* QMC issue when present stocks are exhausted.

**c. USES.**

- (1) Cleaning glassware and metal parts.
- (2) Cleaning painted surfaces to remove fungi growths.
- (3) To clean cork stoppers of tannic acid.
- (4) To clean decemented optical elements (TM 9-1501).

**d. APPLICATIONS.**

- (1) *Glassware.* A mild solution of 2 tablespoonfuls of trisodium phosphate to each gallon of water.

- (2) *Painted surfaces.* Three pounds of trisodium phosphate crystals to each gallon of water. Only a small space must be cleaned at a time, and the surface must be rinsed immediately and dried with a wiping cloth, otherwise, an excessive amount of paint may be removed. As a substitute paint remover, allow solution to soak into the paint for 15 minutes, or longer, then remove with a scraper and rinse.

**Caution:** Personnel handling the solution must wear rubber gloves.

## 80. Turpentine, Gum Spirits

a. **CHARACTERISTICS.** A colorless, flammable, and volatile liquid obtained by distillation of the oleoresin (gum) from the living pine tree. It should not be confused with steam-distilled wood turpentine (ENG issue) which is obtained from the dead tree.

b. **UNIT OF ISSUE.** ea: 1-gal. can.

*Note.* ENG issue when present stocks are exhausted.

c. **USES.**

(1) For cleaning paint brushes.

(2) For use as a leather dressing when mixed with beeswax.

(3) For thinning oil paints and slow-drying enamels. It is not usually added to fast-drying enamels due to its relatively slow evaporation rate (TM 9-2851).

**Caution:** Flammable.

## 81. Waste, Cotton, Colored

a. **CHARACTERISTICS.** A textile material composed of new, dyed and undyed, soft, cotton yarns, mixed into a homogeneous mass. It may contain 10 percent slasher yarn. It has a tendency to shed lint during use, and must not be used where the lint will affect operation of the matériel. The grade is commercially known as "firsts."

b. **UNIT OF ISSUE.** ea: 100-lb. bale.

*Note.* QMC issue when present stocks are exhausted.

c. **USE.** General wiping and cleaning where a better grade of cotton waste or lintless material (wiping cloths) is not required.

## 82. Waste, Cotton, White

a. **CHARACTERISTICS.** A textile material composed of new, fine, undyed, bleached or unbleached, soft cotton yarns, mixed into a homogeneous mass. It contains not more than 10 percent slasher yarn and no rags or dirt. The grade is commercially known as "firsts."

b. UNITS OF ISSUE.

- (1) ea: 5-lb. pkg.
- (2) ea: 100-lb. bale.

*Note.* QMC issue when present stocks are exhausted.

c. USE. General wiping and cleaning where lintless material (wiping cloth) is not required.

### Section III. PRESERVATIVE MATERIALS

#### 83. Acid, Chromic (Chromium Trioxide), Technical Grade, Flake

a. CHARACTERISTICS. Reddish-brown flakes which absorb water on exposure to moist air. Dissolved in water, it forms a strong acid which is a powerful oxidizing agent, especially when combined with sulfuric acid. Chromic acid contains a minimum of 99.5 percent of chromium trioxide.

b. UNIT OF ISSUE. ea: 5-lb. airtight mtl can or bottle.

c. USES.

- (1) To apply a bright finish to cleaned nonferrous objects, such as carburetors and fuel pumps.
- (2) On phosphated surfaces, as a rustproofing process on steel parts having frictional contacts with other metal parts, such as rifle bolts.
- (3) For dichromating zinc-base die castings.
- (4) For anode-oxidation process for aluminum and aluminum alloys.

d. APPLICATION OF CHROMIC ACID FINISH.

(1) *Preparation of solutions.* The solutions described below are to be used for treating the parts for a maximum of 25 carburetors or similar assemblies and should then be discarded. New solutions must be prepared as follows:

(a) *Alkaline-cleaning solution.* This solution is prepared by adding 5 ounces of alkali-type cleaning compound to 1 gallon of water. Provision must be made for maintaining this solution at a temperature of 180° to 200° F. during the treating operation.

(b) *Acid-cleaning solution.* This solution is prepared by adding one-quarter pint (aprx. one-half cup) of sulfuric acid, specific gravity 1.280, to 1 gallon of water.

**Caution:** The mixing of sulfuric acid and water rapidly generates considerable heat. Add acid slowly to water, stirring constantly, to avoid spattering and hazard of acid burns. Do not pour water into acid.

- (c) *Chromating solution.* This solution is prepared by adding 2 pounds (aprx. one-half of 5-lb. pkg) of chromic acid flakes, one-half pound (one-half of 1-lb. bottle) of nitric acid (61 percent), and one-half pint of sulfuric acid (sp gr 1.280) to 1 gallon of water. Add the materials to the water slowly, in the order named, stirring constantly. The solutions will also attack steel or galvanized containers, and must therefore be prepared and used in an earthenware crock, a used battery case, or enameled pail. Wire hooks or racks to be used in handling parts being placed into or removed from these solutions must also be provided.
- (2) *Procedure.* In order to provide a corrosion-resistant finish, the following procedure must be followed:
- (a) Remove zinc-base die-cast parts from disassembled units, brush off dirt or paint, and rinse in dry-cleaning solvent or volatile mineral spirits paint thinner.
  - (b) Remove all nonmetallic and other removable components, and wash the die castings with carbon-remover solvent.
  - (c) Immerse the parts to be treated for 1 to 2 minutes in the alkaline-cleaning solution prepared as described in (1) (a) above and maintained at 180° to 200° F.
  - (d) Rinse parts in clear, fresh running water, if possible, or in a large container (drum) of water.
- Caution:** The solutions prepared as described above are corrosive and damaging to the skin.

## 84. Belt Dressing and Preservative

a. **CHARACTERISTICS.** A compound in stick form which retains its shape up to a temperature of 120° F. It is ready for use, of uniform consistency, and does not deteriorate with age. It has a size and shape which will allow its use against operating power belts. It not only preserves the leather, but it also increases the friction between the belt and its pulleys, thus increasing efficiency.

b. **UNIT OF ISSUE.** ea: 1-lb. stick.

*Note.* QMC issue when present stocks are exhausted.

c. **USE.** To be applied to contacting surfaces of leather belts by holding against the belt while in operation.

**Caution:** It is dangerous to hold the stick of belt dressing against a belt at points close to pulley contacts.

## 85. Capsule, Fungicidal, Aluminum, Filled

a. **CHARACTERISTICS.** A fungicidal compound in capsule form of two different types: type I, with crimped ends and type II,

the conventional two-piece capsule. Both capsules should be filled completely with the fungicidal compound and contain no air bubbles, if possible.

*b.* UNITS OF ISSUE.

- (1) ea: Cntr size 1,500 per sealed, 8-oz., screw-top cntr.
- (2) ea: Cntr size, 2,500 per sealed, 8-oz., screw-top cntr.

*c.* USES.

- (1) For the prevention of fungi growth within sealed optical and fire control instruments.
- (2) Capsule is cemented to interior of optical instruments with asphalt cement at time of rebuild, as specified in rebuild instructions.

*d.* APPLICATION.

- (1) To prevent the reflection of light rays from their aluminum surfaces, the fungicidal capsules must be completely covered with a thin coating of asphalt cement. The cement is melted in a contained over a hotplate, applied to the capsules with a small brush, and allowed to harden.
- (2) To obtain a good bond between the body of the instrument and the coated capsule, apply the cement to the selected portion of the instrument body. Reheat the cement by applying a heated iron for a short time. Then push the capsule into the heated cement while it is still warm. Allow the cement to harden by gradual cooling.
- (3) After the capsules have been cemented in position and the cement has been allowed to harden, a small hole will be punched in each capsule with a sharp pointed tool such as a scribe. Make sure that the asphalt cement has hardened, and that it will not flow over the holes and reseal the capsules, thus defeating the purpose for which they are intended. The instrument will then be resealed immediately. In certain telescopes, it will be extremely difficult to punch a hole in each capsule after cementing it in place. In these instruments, the hole may be punched in the capsule before it is cemented in position but care must be taken to keep the hole free of cement. The instruments must be resealed promptly.
- (4) To assure the effectiveness of fungicidal capsules, it is essential that all treated instruments be promptly and carefully resealed. Sealing compound for optical lenses is prescribed for resealing those portions of the instru-

ments which must be disassembled for installation of the capsules. Sealing instructions will be used as described under optical lens sealing compound (par. 184).

**Caution:** Capsules must be stored in a sealed container and handled in such a manner as to prevent volatilization of the contents.

## **86. Coating, Bituminous, Aluminum**

*a.* CHARACTERISTICS. An aluminum pigment blended into a mixture of blown asphalt, asbestos fillers, and petroleum solvents, forming a ready-mixed material similar to paint.

*b.* UNIT OF ISSUE. ea: 1-gal. can.

*c.* USE. To seal openings in combat tanks prior to storage or shipment, when using the aluminum foil method.

*d.* APPLICATION. The material is applied directly by brushing or spraying over the aluminum foil which has previously been imbedded in position in the COATING, bituminous, mastic.

## **87. Coating, Bituminous, Mastic**

*a.* CHARACTERISTICS. A black, viscous mixture of blown asphalt, asbestos fillers, and solvent. It does not harden after application.

*b.* UNIT OF ISSUE. ea: 5-gal. can.

*c.* USE. To seal openings in combat tanks prior to storage or shipment, when using the aluminum foil method.

*d.* APPLICATION. Can be applied by brush or spray. If brushed on, the aluminum foil can be imbedded in the material in approximately 10 to 15 minutes; if sprayed on, the aluminum foil can be applied immediately.

## **88. Compound, Antifreeze, Arctic**

*a.* CHARACTERISTICS. A yellow liquid composed of 47 percent anhydrous ethylene glycol, 21.4 percent beta methoxy methoxy ethanol, 29.8 percent distilled or deionized water, and 1.8 percent technical grade borax by weight. It has a minimum boiling point of 230° F., maximum freezing point of -90° F., and specific gravity of 1.082. The material comes ready for use and must not be diluted with any other liquid.

b. UNIT OF ISSUE. ea: 55-gal. steel drum (one-way shipper having sealed bung as insurance against tampering).

c. USE. In anticipated ambient temperatures 0° F. to as low as —65° F. An antifreeze solution for use in internal combustion engine cooling systems and in water-cooled machine gun jackets and water chests under arctic conditions.

d. RECLAMATION OF USED COMPOUND.

- (1) When arctic antifreeze compound is no longer required in the vehicle, the coolant will be drained into a clean container and strained through a piece of muslin or several thicknesses of cheesecloth.
- (2) Solution must have a greenish yellow color with reflected light and a pink color with transmitted light. Discard all solutions having a brown or rusty tint after straining.

e. STORAGE OF USED ARCTIC ANTIFREEZE COMPOUND.

- (1) Reconditioned 55-gallon steel drums, one-way shipping drums, or non-returnable light-iron barrels are suitable containers for storing this compound between periods of use.
- (2) Neither the army 5-gallon drums nor the 55-gallon returnable steel drums will be used for this storage.
- (3) When no suitable containers are available, they may be requisitioned with indications of their use.
- (4) Stocks of used arctic antifreeze compound meeting specified requirements and not to be used again within a short length of time will be turned in to the nearest ordnance unit for stock.
- (5) Each container will be tagged to indicate the quantity contained therein, together with date of test and name of organization.

## 89. Compound, Antifreeze, Ethylene Glycol Type

a. CHARACTERISTICS. A transparent, syrupy, usually blue-green liquid, consisting of various glycols, plus a corrosion-inhibiting compound. When mixed with water in proportions of 60 percent compound to 40 percent water, by volume, the resulting solution will not freeze at ambient temperatures as low as —62° F. This mixture produces the lowest freezing point; *stronger solutions or weaker solutions have higher* freezing temperatures. Freezing points, specific gravities, and compositions of antifreeze solutions are shown in table III.

Table III. Freezing Points, Specific Gravities and Compositions of Ethylene Glycol Type Antifreeze Solutions

Freezing point ° F.	Specific gravity at 68° F.	Composition of antifreeze solution	
		% water by volume	% antifreeze compound by volume
+32	1.000	100	0
+25	1.012	90	10
+20	1.022	85	15
+15	1.030	79	21
+10	1.036	75	25
+ 5	1.042	70	30
0	1.047	67	33
- 5	1.051	64	36
-10	1.055	61	39
-15	1.058	58	42
-20	1.062	56	44
-25	1.065	54	46
-30	1.067	52	48
-35	1.070	50	50
-40	1.073	48	52
-45	1.076	46	54
-50	1.079	44	56
-55	1.082	42	58
Below -60	1.084	40	60

**b. UNITS OF ISSUE.**

- (1) ea: 1-gal. can; domestic issue only.
- (2) ea: 1-gal. can; export shipment only.
- (3) ea: 55-gal. drum; issued to shops, depots, motor pools, and arsenals.

**c. USES.**

- (1) Water-cooled, internal combustion engine cooling systems.
- (2) Water-cooled machine gun cooling systems.

**d. PREPARATION OF SOLUTIONS.**

- (1) Determine the lowest temperature likely to be met during the operation of the vehicle.
- (2) Multiply the number of pints per gallon for the specified temperature in column 1 of table IV by the total number of gallons of coolant in the system. This gives the amount of antifreeze solution of desired strength which is to replace an equal amount of water to be removed from the system.
- (3) Example: To protect a cooling system having a capacity of 12 quarts (3 gal.), including heaters, etc., against temperatures as low as -50° F., prepare 13½ pints of

antifreeze solution (4½ pts. of antifreeze compound in col. 2, multiplied by 3 gal.). This will replace 13½ pints of water to be drained from the cooling system.

*Table IV. Guide for the Initial Preparation of Antifreeze Solutions*

1	2
Protection to -	Pints of antifreeze compound to be included in 1 gallon of antifreeze solution
20° F.	1½
10° F.	2
0° F.	2¾
-10° F.	3¼
-20° F.	3½
-30° F.	4
-40° F.	4¼
-50° F.	4½
-60° F.	4¾

**e. RECLAMATION OF USED ETHYLENE GLYCOL ANTIFREEZE SOLUTIONS.**

- (1) Reclaimed solutions must be used as far as practicable in administrative vehicles. Never use seasonally reclaimed solution in tactical vehicles.
- (2) Initial reclamation of old solutions is accomplished as follows:
  - (a) Place drum containing the old solution on a rack and install tap.
  - (b) Test for strength with an antifreeze hydrometer and discard all solutions testing above +10° F. (table V).
  - (c) Strain a sample through muslin or several thicknesses of cheesecloth into a clean glass container. Solution must be green or blue. Discard all solutions with brown or rusty tint.

**f. FORTIFYING ANTIFREEZE SOLUTION.**

- (1) If the solution tests higher than prescribed for the temperature in which the protection is required, determine the amount of new antifreeze compound (ethylene glycol type) required to reach the desired protection (table V). For example: If the solution tests suitable for +10° F. and the desired protection is -20° F., reading the table indicates that 2 pints of antifreeze compound must be added to 6 pints of reclaimed solution to make 1 gallon (8 pt.) of satisfactory antifreeze.

Table V. Pints to Be Added to Old Solution to Make 1 Gallon (8 pt.) of Reclaimed Solution

Solution strength suitable for	Pints antifreeze compound required for desired protection to:							
	10° F.	0° F.	-10° F.	-20° F.	-30° F.	-40° F.	-50° F.	-60° F.
20° F.---	1	1½	2¼	2¾	3	3½	4	4¼
10° F.---		1	1½	2	2½	3	3¼	3¾
0° F.---			¾	1¼	1¾	2¼	2¾	3¼
-10° F.---				¾	1¼	1¾	2¼	2¾
-20° F.---					¾	1¼	1¾	2¼
-30° F.---						¾	1¼	1¾
-40° F.---							¾	1¼
-50° F.---								¾

- (2) Strain the reclaimed solution through muslin or several thicknesses of cheesecloth into a clean container in which the quantities can be measured.

*Note.* The corrosion-inhibitor compound must be poured into the radiator while the engine is idling and at normal operating temperature to obtain thorough mixing. If the inhibitor compound is not immediately available, it must be added at the earliest possible moment.

#### g. STORAGE OF RECLAIMED ETHYLENE GLYCOL ANTIFREEZE COMPOUND.

- (1) Reclaimed antifreeze solutions will be stored for future use in suitable clean containers if such antifreeze solutions meet the requirements prescribed above.
- (2) Reconditioned 55-gallon drums, one-way shipping drums, or nonreturnable light iron barrels are suitable containers for storing antifreeze solutions. Neither army 5-gallon cans nor 55-gallon returnable drums will be used for this purpose.
- (3) If suitable containers are not available locally, they will be requisitioned through appropriate supply channels. All requisitions will indicate the use to be made of the containers.
- (4) Clean, used antifreeze solution meeting requirements specified above, in containers separately marked to indicate the solution strength or freezing point, will be turned in to the unit ordnance officer for storage.

## 90. Compound, Chassis-coating

a. CHARACTERISTICS. A noncorrosive, black, viscous mixture of air-blown asphalt, asbestos fillers, and solvent. The compound will show little or no settling in a freshly opened drum. The mate-

rial is free from sand and other abrasive materials and can be applied by brush or spray. A 1/16-inch coating of the material will set in 4 hours and dry to a firm plastic film in 24 hours.

b. UNIT OF ISSUE. ea: 400-lb., 55-gal., open-top drum.

c. USES.

- (1) To form a protective coating and sound deadener on the underbody parts of automotive equipment, such as undersides of hood, body, fenders, and floor boards of administrative vehicles such as sedans, metropolitan ambulances, and buses.
- (2) It is not to be applied to tactical vehicles or when such are used for administrative purposes, without specific approval.

d. APPLICATIONS.

- (1) The material comes ready for use and should not require more than 80 psi air pressure at a temperature of 60° F. Since this material becomes very viscous at lower temperatures, it is preferable that it be applied at not lower than 60° F. If applied at temperatures below 60° F., it may be desirable, in order to produce a satisfactory spray, to add a one-half gallon of dry-cleaning solvent or volatile mineral spirits paint thinner to a 10- to 12-gallon spray tank.

*Note.* Water, alcohol, benzene, or chlorinated hydrocarbons shall not be used as diluents.

- (2) For power-spray application, a 1/4-inch round nozzle type spray gun is used similar to a paint spray gun except that a coating one-sixteenth inch to one-eighth inch is delivered. Incoming air pressure of 80 psi is suitable.
- (3) An air-operated barrel pump is provided for spraying this compound from the original 55-gallon drum. It is equipped with gages to indicate and control input material and output air pressures.
- (4) For small touch-up jobs, the material may be applied with a brush.
- (5) For detailed information, refer to TB ORD 401.

## 91. Compound, Dehydrating, No. 1 and No. 2

a. CHARACTERISTICS. A granular material which contains an activated dehydrating agent with high moisture-adsorption qualities. The storage life is indefinite providing it is kept hermetically sealed. It may be reactivated by drying and heating, thus permitting it to be reused three or four times.

**b. UNITS OF ISSUE.**

(1) *No. 1 type.*

- (a) drum: 200 ea, 1/2-lb. bags.
- (b) drum: 100 ea, 1-lb. bags.
- (c) drum: 50 ea, 2-lb. bags.
- (d) drum: 20 ea, 5-lb. bags.

(2) *No. 2 type.*

- (a) drum: 300 ea, 1/2-lb. bags.
- (b) drum: 200 ea, 3/4-lb. bags.

*Note.* Both types will only be issued until stocks are exhausted. Replaced by DESICCANT, type V, grade A or B (par. 113 or 114).

**c. USES.**

(1) *No. 1 type.*

- (a) Used as a desiccant in packaging ordnance matériel except fire control equipment.
- (b) When used in lieu of silica gel, 2 pounds of No. 1 compound are required to replace 1 pound of silica gel.

(2) *No. 2 type.*

- (a) Used as a desiccant in packaging ordnance matériel.
- (b) When used in lieu of silica gel, 1 1/2 pounds of No. 2 compound are required to replace 1 pound of silica gel.

## **92. Compound, Gum-preventive**

**a. CHARACTERISTICS.** A solution of suitable oxidation inhibitors and metal deactivators in benzene (benzol) or alcohol. It prevents the formation and deposition of gum during storage for periods up to 6 months when added in specified quantities (*d*(5) below).

**b. UNITS OF ISSUE.**

- (1) ea: 4-oz. bottle.
- (2) ea: 1-gal. can.

*Note.* The gallon size is issued only to depots and arsenals.

**c. USE.** For treating the fuel systems in vehicles or other equipment powered by gasoline engines or having gasoline auxiliaries. Used when vehicles or other equipment are to remain idle for more than 30 days.

**d. APPLICATION.**

- (1) The fuel systems of equipment to be treated must be free from accumulated gum. Unless equipment is entering its first storage period, the following parts must be inspected and cleaned: fuel pumps including valves and screens, carburetors including screens, accelerator pump

plunger, venturi of carburetor throat, choke and throttle valves, float mechanism, fuel lines, fuel tank, and screens.

- (2) If gum is present in the parts listed in (1) above, it can best be removed with benzol, acetone, denatured alcohol, or a mixture of these solvents. Deposited gum is not readily soluble in fresh gasoline. When gum has dried, it may be necessary to resort to mechanical means to remove it.
- (3) Parts which cannot be thoroughly cleaned and freed from the gum deposit without damage must be replaced.
- (4) After cleaning and assembling, fill fuel tank half full with fresh gasoline which has not been long in storage.
- (5) Add gum preventive compound as follows:

Fuel tank capacity	Amount of compound
1 to 30 gal.	1 bottle (4 oz.)
30 to 60 gal.	2 bottles (8 oz.)
60 to 90 gal.	3 bottles (12 oz.)

- (6) Fill fuel tank to capacity.
- (7) Operate the equipment at least 5 minutes.

**Caution:** It is advised that gum preventive compound is a preventive measure only and not a corrective agent. It cannot, therefore, be expected to remove gum which has already deposited nor can it be expected to prevent gum deposition by gasoline which has already deteriorated as a result of storage. It is effective only as a means of improving the storage characteristics of fresh gasoline.

### 93. Compound, Inhibitor, Corrosion

**a. CHARACTERISTICS.** A powder, soluble in water, water-alcohol solutions, and ethylene glycol antifreeze solutions. Prevents or inhibits corrosion and rust. It is composed of approximately 96 percent of borax and 4 percent mercapto-benzothiazole. This material was formerly known as REINHIBITOR, borax-captax.

**b. UNITS OF ISSUE.**

- (1) ea: 2½-oz. can.
- (2) ea: 5-oz. can.

*Note.* Item (1) is used in engine cooling systems having water coolant only and will be issued until stocks are exhausted.

**c. USE.** Tests have shown that inhibitor treatment of water can reduce the rusting of iron by as much as 95 percent.

**d. ADDITIONS.**

- (1) *To new ethylene glycol antifreeze solutions.* The proper kind and amount of inhibitor is initially added to ethylene glycol antifreeze compound by the manufacturer. As a consequence, it is not necessary to add inhibitor to freshly made ethylene glycol antifreeze solution.
- (2) *To reclaimed ethylene glycol antifreeze solutions for reuse.* The initial corrosion inhibitor in antifreeze compound is weakened and finally exhausted by continued use of the solution in a cooling system. Before the solution is used for another season, it is necessary to add inhibitor at the rate of one 5-ounce can for each 4 gallons of reclaimed solution.

*Note.* In the event that denatured alcohol, diluted with water, is used as an emergency antifreeze, inhibitor will be added in the proportion given above.

- (3) *To arctic antifreeze compound.* No inhibitor will be added to arctic antifreeze compound.
- (4) *To water.*
  - (a) Inhibitor treatment is just as important during warm weather when water is used as coolant as during the winter months when there is an antifreeze solution in the radiator.
  - (b) A 5-ounce can of inhibitor is specified for each 4 gallons of water. The contents of the container should be dissolved in warm water and poured into the radiator while the engine is idling.
  - (c) Water without inhibitor protection is not a recommended coolant in either internal combustion, water-cooled engines, or in water-cooled machine guns, except in an emergency as a temporary expedient.

## **94. Compound, Insulating and Sealing, Electrical Connections**

**a. CHARACTERISTICS.** A smooth, water-repellent, nontoxic, homogeneous, greaselike material containing no abrasives. It has the appearance of a light-gray, translucent grease.

**b. UNITS OF ISSUE.**

- (1) ea: 8-oz. tube.
- (2) ea: 10-lb. can.
- (3) ea: 50-lb. drum.

**c. USES.**

- (1) As a filler to replace air on electrical connections where

condensation might occur or where air is undesirable as a dielectric.

- (2) An 8-ounce tube for components of aiming circles.
- (3) A 10-pound can and 50-pound drum for use in rubber cable sealing processes.

## 95. Compound, Insulating and Sealing, Plastic

*a.* CHARACTERISTICS. This is a dark brown, nontoxic semisolid of putty like consistency. It does not burn, has no tendency to harden or oxidize, is resistant against fresh or salt water, and is adherent to metallic and nonmetallic surfaces.

*b.* UNIT OF ISSUE. ea: 2-lb. can.

*c.* USE. For insulating high voltage systems of vehicles for amphibious operations.

*d.* APPLICATION. Applied with fingertips, knife, or spatula.

## 96. Compound, Insulation, Ignition

*a.* CHARACTERISTICS. A clear, unpigmented liquid similar to varnish which produces a waterproof coating when dry. It is a good heat conductor and does not affect the elasticity of rubber, tape, or insulation over which applied. It is easily applied with a brush or spray gun and dries to a hard, flexible finish. It dries dust-free in 15 minutes and can be handled in approximately 8 hours. It must be kept in a tightly sealed container at all times.

*b.* UNITS OF ISSUE.

- (1) ea: 2-oz. bottle.
- (2) ea: 1-qt. can.
- (3) ea: 5-gal. can.
- (4) ea: 55-gal. drum.

*Note.* Items (3) and (4) for depots and arsenals only. ENG issue when present stocks are exhausted.

*c.* USES.

- (1) Waterproofing ignition wires, battery cable terminals, panels, and other electrical parts and circuits.
- (2) Rustproofing external surfaces of engines and engine accessories.
- (3) Used on the back side of instruments or electrical panels to prevent corrosion.

*d.* APPLICATIONS.

- (1) This compound contains the correct percentage of solvent; additions of solvent will not be made.

- (2) Brush or spray gun should be cleaned immediately after use with dry-cleaning solvent or volatile mineral spirits paint thinner.

*Caution:* This flammable material is not a conductor of electricity. Do not use on disconnected battery terminals, wiring connections, ignition wire terminals, or on the contacts of distributors or similar parts where it will prevent the flow of electricity. Do not apply to hot surfaces of automobile engines.

## 97. Compound, Protective, Strippable (Hot-dipping)

a. **CHARACTERISTICS.** There are two types of this material available for use; Type I is a stable noncorrosive mixture of plasticized, thermo plastic material containing 25 percent ethyl cellulose, approximately 60 percent mineral oil, the rest being plasticizer, inhibitor, etc. The dipping temperatures for this material are 350° to 370° F. Type II is a similar thermo plastic material containing approximately 40 percent cellulose acetate butyrate, the rest being a mixture of oils, plasticizers, inhibitors, and waxes. Its dipping temperature is 325° to 350° F. Both of these materials are solid at room temperature, but comparatively thin liquids at their dipping temperatures. They form almost instantaneously strong, tough, strippable film on any object which has been dipped in the molten material, withdrawn, and allowed to cool. The material can be melted repeatedly without appreciably changing properties.

b. **UNIT OF ISSUE.** lb: Individual slabs not in excess of 25 lb.

c. **USES.**

- (1) This material is used for the preservation of spare parts and other equipment during shipment and storage, where—
  - (a) Critical functional surfaces must be kept at close tolerances.
  - (b) The nature of construction of the parts is such that they readily lend themselves to application and easy removal of a dip-type strippable compound.
  - (c) Item has been wrapped with barrier material prior to packaging.
- (2) Protection by use of this material is not universal because of one or more of the following limitations:
  - (a) Very complex or irregularly shaped parts or assemblies may not be suitably coated or readily stripped of these coatings.
  - (b) Application temperatures are relatively high.

(c) Heavy or sharp-edged parts may cut through the compound unless properly cushioned.

**d. APPLICATIONS.**

- (1) Equipment for the application of these materials consists of coating tanks of the heat transfer medium type, electrically heated, complete with insulation, thermostatically controlled oil jacket tank, and a tank for dipping and melting the compounds with automatic temperature controls. In addition, production type equipment or large size tanks have time clocks and a motor operated system for circulating and agitating the compound.
- (2) When matériel to be coated is preheated, a thin film will result which will not strip satisfactorily.
- (3) Removal of the protective coating at the point of use consists only of slitting and peeling.

**98. Compound, Protective, Strippable (Sprayable) (Type I, Class 1)**

**a. CHARACTERISTICS.** A sprayable, bridgeable, strippable, non-corrosive, and protective plastic which contains no highly toxic materials. It is sometimes referred to as "webbing agent" or "webbing solution."

**b. UNIT OF ISSUE.** ea: 50-gal. open-top drum with bolted ring seal.

*Note.* For use in depots and arsenals only.

**c. USES.**

- (1) As a protective coating for matériel in storage where specifically prescribed.
- (2) First step in "cocoon" method of preservation. (See pars. 99, 100, and 101.)

**Caution:** Flammable.

**99. Compound, Protective, Strippable (Sprayable) (Type I, Class 2)**

**a. CHARACTERISTICS.** A sprayable, bridgeable, strippable, non-corrosive, and protective plastic which contains an aluminum pigment but no highly toxic materials.

**b. UNIT OF ISSUE.** ea: 55-gal. open-top drum with bolted ring seal.

*Note.* For use in depots and arsenals only.

**c. USES.**

- (1) As a protective coating for antiaircraft matériel in storage where specifically prescribed.

- (2) Second step in "cocoon" method of preservation. (See pars. 98, 100, and 101.)

**Caution:** Flammable.

## 100. Compound, Protective, Strippable (Sprayable) (Type II)

a. **CHARACTERISTICS.** A sprayable, bridgeable, adhering, stripable, waterproof, noncorrosive, and protective plastic which contains no highly toxic materials. It is composed of asphalt and gilsonite dissolved in petroleum solvents. It is blended with suitable inorganic fillers to produce a mastic compound.

b. **UNIT OF ISSUE.** ea: 55-gal. open-top drum with bolted ring seal.

*Note.* For use in depots and arsenals only.

### c. USES.

- (1) As a top-coating over COMPOUND, protective, type I, class 1 (par. 98).
- (2) As a protective coating for matériel in storage where specifically prescribed.
- (3) Third step in "cocoon" method of preservation. (See pars. 98, 99, and 101.)

**Caution:** Flammable.

## 101. Compound, Protective, Strippable (Sprayable) (Type III)

a. **CHARACTERISTICS.** A sprayable, bridgeable, strippable, noncorrosive, and protective plastic which contains no highly toxic materials. It is composed of asphalt and gilsonite dissolved in petroleum solvents. A paste pigment containing aluminum powder is mixed with the base to provide heat-repellent properties and to prevent deterioration of materials by actinic rays of the sun.

b. **UNIT OF ISSUE.** ea: 55-gal. open-top drum with bolted ring seal.

*Note.* For use in depots and arsenals only.

### c. USES.

- (1) As a top coating over COMPOUND, protective, type II (par. 100).
- (2) As a protective coating for matériel in storage where specifically prescribed.
- (3) Final step in "cocoon" method of preservation. (See pars. 98, 99, and 100.)

*d.* **APPLICATION.** To make 1 gallon of type III compound, add 4.83 pounds of compound, as issued, to 3.40 pounds of aluminum paste pigment. This is in an approximate ratio of 5 gallons of issued compound to 3½ gallons of paste pigment (par. 149).

*Note.* One gallon equals 8.23 pounds.

**Caution:** Flammable.

## 102. Compound, Rubbing

*a.* **CHARACTERISTICS.** A stable, liquid or paste mixture containing a finely divided abrasive. It will not attack lacquered surfaces or aluminum.

*b.* **UNITS OF ISSUE.**

(1) ea: 5-lb. can.

(2) ea: 25-lb. can.

*Note.* ENG issue when present stocks are exhausted.

*c.* **USE.** For cleaning and polishing lacquered and aluminum surfaces to produce the desired gloss.

*d.* **APPLICATION.** May be applied by machine or hand.

## 103. Compound, Rust-arresting

*a.* **CHARACTERISTICS.** A compound having as its base drying and semidrying vegetable and animal oils. It does not freeze at low temperatures but forms a temporary gel.

*b.* **UNITS OF ISSUE.**

(1) ea: 1-gal. can.

(2) ea: 5-gal. can.

*c.* **USES.**

(1) To arrest further corrosion on rusted metal surfaces of amphibious matériel and ammunition as a temporary expedient when means are not available to reach or completely remove the rust prior to painting.

(2) It is not intended as a prime coat because of its softness. This compound should never be covered with primer or finish coats even after air drying for several months, as the top coat will probably crack and peel. When repainting is contemplated, the compound should be removed by wire brushing or sanding, if at all possible.

*d.* **APPLICATIONS.**

(1) Occasionally the status of amphibious matériel in use is such that, when certain parts become rusty, means are not available to get at or completely remove the rust prior to painting or retouching. In such cases the application of rust-arresting compound over the rust formations is recommended. (See TB ORD 348.)

- (2) Rust-arresting compound can also be applied to inaccessible places (rubrails, ribs, etc.), where it is impossible to reach rust formations. Such application will prevent further rusting which is experienced if normal primers are applied to rusty surfaces. It will also retard progressive corrosion action, provided the surface is adequately sealed.
- (3) Rust-arresting compound is authorized for use by organizational maintenance units as a temporary expedient.
- (4) Before application of rust-arresting compound over rusty surfaces, loose rust or scale will be removed with a wire brush or putty knife, and oil or grease will be cleaned off with dry-cleaning solvent or volatile mineral spirits paint thinner.
- (5) When surface is dry, one coat of rust-arresting compound will be applied in the same manner as paint primer and finish coats, i.e., by spray, brush, or dip.

*Note.* Do not apply the compound to bare metal or painted surfaces except to overlap.

*Note.* To reduce the prescribed 24-hour drying time and to accelerate inhibiting action, the rusty surface may be warmed with a blowtorch enough to drive out the moisture before removing loose scale and rust. This compound should not be applied under wet atmospheric conditions which prolong drying.

## 104. Compound, Rust-preventive, Heavy (CH)

*a. CHARACTERISTICS.* A dark-colored, homogeneous, stable, non-corrosive, nondrying, rosin- and abrasive-free petroleum base material with a melting point and heavy consistency somewhat harder than grease. Its consistency is stiff at moderate temperatures, and it is readily degreased by the use of vapor or solvent. It provides rust protection for long periods of exposure to weather and is resistant to impact and abrasion. The melting point is approximately 150° F.

### *b. UNITS OF ISSUE.*

- (1) ea: 5-lb. can.
- (2) ea: 25-lb. pail.
- (3) ea: 400-lb. drum.

*Note.* Item (3) is for issue to depots and arsenals only.

### *c. USES.*

- (1) On items of durable construction, on surfaces exposed to the elements, and where ambient temperatures are extremely high.
- (2) For long-term protection of unpainted metal surfaces

during storage or shipment, at temperatures not to exceed 150° F.

- (3) Protection of exterior surfaces exposed to the weather or fording operations under conditions where subsequent removal of the compound by vapor degreasing or solvent washing is practicable.
- (4) Typical applications are gun bores, hydropneumatic recoil mechanisms, exterior of breechblocks, and other parts where removal of compound will not be too difficult. (See TM 9-2854.)
- (5) To plug holes and crevices prior to coating with strip-pable protective compound.

d. APPLICATIONS.

- (1) Rust-preventive compound, heavy, is made fluid by heating to a temperature of approximately 180° F. in a shallow thermostatic-controlled vat or tank, and stirring to eliminate bubbles of air or water vapor. Presence of water will be indicated by the presence of froth on top of the compound.
- (2) Suitable for application by hot-dipping, brushing, or swabbing.
- (3) Removal is accomplished by vapor-degreasing or scrubbing with dry-cleaning solvent or volatile mineral spirits paint thinner.

**Caution:** Do not heat this compound rapidly and not higher than 210° F. Do not dilute this compound by mixing with a lighter grade compound or any other liquid. This material is not a lubricant and all traces of it must be removed from the matériel before it is placed in service.

## 105. Compound, Rust-preventive, Light (CL)

a. CHARACTERISTICS. A homogeneous, stable, noncorrosive, non-drying, rosin- and abrasive-free petroleum oil mixture containing rust inhibitors, and having an easy brushing consistency at 60° F. It provides rust protection where the preserved surfaces are not directly exposed to the elements, i.e., are wrapped and/or boxed.

b. UNITS OF ISSUE.

- (1) ea: 5-lb. can.
- (2) ea: 25-lb. pail.
- (3) ea: 400-lb. drum.

*Note.* Item (3) is for issue to depots and arsenals only.

c. USE. For protecting highly-finished metal surfaces against corrosion during shipment and for a period of approximately 1

year in indoor storage, for intricate mechanisms from which it would be too difficult to remove a heavier compound, and for temporary outdoor storage for a limited time. Typical items are breech mechanisms, small arms parts, or assemblies which are wrapped and boxed. (See TM 9-2854.) This rust preventive may be satisfactorily used for exposure to temperature not exceeding 120° F.

*d.* APPLICATION. Suitable for application by dipping, brushing, or swabbing at a temperature not over 150° F. Removal is accomplished by vapor degreasing or scrubbing with dry-cleaning solvent or volatile mineral spirits paint thinner.

**Caution:** This material is not a lubricant and it must be removed before the matériel is placed into service.

## 106. Compound, Rust-preventive, Medium (CM)

*a.* CHARACTERISTICS. A homogeneous, stable, noncorrosive, non-drying, rosin- and abrasive-free petroleum base material. It will protect highly-finished metal surfaces against corrosion for a period of approximately 1 year in indoor storage. Melting point is 140° F.

*b.* UNIT OF ISSUE. ea: 400-lb. drum.

*c.* USES.

- (1) To protect polished metal surfaces where specifically prescribed, and where all of the qualities of heavy rust-preventive compound are not required. (See TM 9-2854.)
- (2) Generally used on boxed items.
- (3) To plug holes and crevices prior to coating with strip-pable protective compound.

*d.* APPLICATIONS.

- (1) Applied by dipping (preferred), brushing, or swabbing at a temperature of approximately 160° F.
- (2) Removal is accomplished by vapor degreasing or scrubbing with dry-cleaning solvent or volatile mineral spirits paint thinner.

**Caution:** Do not heat higher than 200° F.

## 107. Compound, Rust-preventive, Soft Film

*a.* CHARACTERISTICS. A homogeneous, stable, noncorrosive, non-drying, rosin- and abrasive-free petroleum base material. Issued in two grades: grade 1, medium; and grade 2, light. The flash point should be 100° F. minimum. The film flow for medium grade should be 140° F.; for light grade 130° F.

b. UNITS OF ISSUE.

- (1) ea: 5-gal. can.
- (2) ea: 55-gal. drum.

c. USES.

- (1) *Grade 1. Medium.* Intended primarily for the preservation of critical surfaces in long-term, indoor storage of machine tools and other equipment as prescribed.
- (2) *Grade 2. Light.* Intended primarily for use in conjunction with some types of barrier-material for dipping or for spraying on critical, phosphated surfaces in long-term storage, and as a water-displacing fluid.

d. APPLICATION. Applied by brushing, dipping, or spraying with a power spray gun. Spraying is possible at 50° F.

### 108. Compound, Rust-preventive, Special

a. CHARACTERISTICS. A soft, homogeneous, stable, noncorrosive, nondrying, rosin- and abrasive-free petroleum base material.

b. UNITS OF ISSUE.

- (1) ea: 5-lb. can.
- (2) ea: 25-lb. can.

c. USE. To protect stocks of antifriction bearings not assembled in a major item against corrosion in storage or shipment.

d. APPLICATION. Applied by dipping.

**Caution:** Do not heat compound above 150° F.

### 109. Compound, Rust-preventive, Thin Film (CT)

a. CHARACTERISTICS. A soft, homogeneous, stable, noncorrosive, rosin- and abrasive-free petroleum base material. It has a maximum solvent content of 60 percent and a drying time of 4 hours or less. It is adhesive and difficult to remove. It will protect against rusting during indoor or outdoor storage for a period of at least a year.

b. UNITS OF ISSUE.

- (1) ea: 1-gal. can.
- (2) ea: 5-gal. can.
- (3) ea: 55-gal. drum.

c. USES.

- (1) Restricted to specifically prescribed uses such as on ferrous and nonferrous surfaces.
- (2) Not to be used on small arms, machine guns, breech and firing mechanisms, and similar parts where depreservation would be difficult.

- (3) Not to be used on matériel not stored in closed warehouses, excepting where specifically required.
- (4) Not to be used on matériel where degreasing operations by vapor cleaning or use of cleaning solvent is not possible.

*d.* APPLICATION. It is applied cold by dipping, brushing, or spraying. It can be applied over painted or other coated surfaces without harmful effect.

*e.* MIXING. Additional solvent must not be mixed with this compound since it already contains the correct amount.

**Caution:** Flammable. Do not heat this compound, since a pressure beyond the control of the tank safety valve may be built up and an explosion may occur. If compound is sprayed, it is important to use the correct type of spray gun.

### **110. Compound, Rust-preventive, Thin Film (Polar Type)**

*a.* CHARACTERISTICS. A soft, homogeneous, stable, noncorrosive, rosin- and abrasive-free petroleum base material. It has a maximum solvent content of 75 percent and a drying time of 24 hours or less. It will protect against corrosion, in shed storage, for a period of at least 4 months. The dried film is of such a nature that it does not become hard upon exposure to extreme cold. It is transparent but contains sufficient color to make the film discernible. The film is readily removable with suitable petroleum solvents.

*b.* UNITS OF ISSUE.

- (1) ea: 1-gal. can.
- (2) ea: 5-gal. can.
- (3) ea: 55-gal. drum.

*c.* USES.

- (1) For use on corrodible surfaces on interior of machinery stored under cover which, in normal operation, are in contact with water or steam.
- (2) For the displacement of water from instruments and equipment where prescribed.
- (3) For use in bilge pumps of amphibious vehicles except LVT's.

*d.* APPLICATION. Should be applied by pouring.

*e.* MIXING. Additional solvent must not be mixed with this compound since it already contains the correct amount.

**Caution:** Flammable. Do not heat this compound, since a pressure beyond the control of the safety valve may be built up and an explosion may occur.

## 111. Compound, Textile Preservative, Solvent-type, Pigmented, Liquid, OD

a. CHARACTERISTICS. A highly flammable, uniformly dispersed, lump-free compound containing pigments, binders, water repellents, and fungicides. Does not corrode brass or galvanized iron and does not have any deteriorating action on wood. It prevents the growth of mildew. This was formerly designated COMPOUND, retreating, water-, weather-, and mildew-resistant (for cotton duck and webbing).

b. UNITS OF ISSUE.

(1) ea: 1-gal. can.

(2) ea: 5-gal. can.

(3) ea: 55-gal. drum.

*Note.* QMC issue.

c. USE. For protection of cotton duck and webbing from deterioration by water, weather, and/or mildew.

d. APPLICATION. Applied by brushing or spraying.

**Caution:** Flammable. Compound contains strong fungicide in a solvent. Do not treat clothing to be used in intimate contact with the skin, or equipment to be used for food or drinking water containers. Keep compound off skin. Wash well after using. Use solvent spray precautions.

## 112. Cupric Carbonate, Reagent

a. CHARACTERISTICS. A poisonous green powder.

b. UNIT OF ISSUE. ea: 1-lb. bottle.

c. USE. For cold-process oxidizing of copper-base alloys.

**Caution:** Poisonous.

## 113. Desiccant, Type V, Grade A (Activated, Ungraded, High Adsorption)

a. CHARACTERISTICS. A granular type of activated dehydrating agent with high-adsorption qualities. Each metal container of desiccant contains humidity indicators. The storage life is indefinite providing the material is kept hermetically sealed. It may be reactivated by drying and heating, thus permitting it to be used three or four times.

b. UNITS OF ISSUE.

(1) drum: 100 ea, 2-oz. bags in 25-lb. sealed cntr.

(2) drum: 360 ea, 4-oz. bags in 100-lb. drum, with bolted ring cover and gasket.

- (3) drum: 200 ea, 8-oz. bags in 100-lb. drum, with bolted ring cover and gasket.
- (4) drum: 90 ea, 16-oz. bags in 100-lb. drum, with bolted ring cover and gasket.
- (5) drum: 20 ea, 5-lb. bags in 100-lb. drum, with bolted ring cover and gasket.
- (6) drum: 1,000 ea, 5-g. bags in 5-gal. sealed cntr.
- (7) drum: 500 ea, 10-g. bags in 5-gal, sealed cntr.
- (8) drum: 200 ea, 1-oz. bags in 5-gal, sealed cntr.

*Note.* Issued to packaging depots and arsenals only.

**c. USES.**

- (1) For static dehumidification of packages and closed spaces when preparing matériel and parts for oversea shipment, long-term storage, etc. to prevent corrosion, mold, and mildew.
- (2) Items (6), (7), and (8) of *b* above are used in packaging wrist watches, pocket watches, and binoculars, respectively.

**Caution:** Drums must be kept sealed. Issues to be made in original containers only.

## **114. Desiccant, Type V, Grade B (Activated, Ungraded, Medium Adsorption)**

*a.* CHARACTERISTICS. A granular type of activated dehydrating agent with medium adsorption qualities.

*b.* UNITS OF ISSUE.

- (1) drum: 1,000 ea, 7½-g. bags in 5-gal. sealed cntr.
- (2) drum: 500 ea, 15-g. bags in 5-gal. sealed cntr.
- (3) drum: 200 ea, 1½-oz. bags in 5-gal sealed cntr.
- (4) drum: 100 ea, 3-oz. bags in 25-lb. sealed cntr.
- (5) drum: 360 ea, 6-oz. bags in 150-lb. sealed cntr.
- (6) drum: 200 ea, 12-oz. bags in 150-lb. sealed cntr.
- (7) drum: 90 ea, 1½-lb. bags in 150-lb. sealed cntr.
- (8) drum: 20 ea, 7½-lb. bags in 150-lb. sealed cntr.

*c.* USE. For static dehumidification of packages and closed spaces when preparing matériel and parts for oversea shipment, long-term storage, etc. to prevent corrosion, mold, and mildew. When used in lieu of Grade A (par. 113), 1½ ounces by weight of B must be used to replace 1 ounce of A.

**Caution:** Drums must be kept sealed. Issues to be made in original containers only.

## 115. Desiccant, Type IV, Grade A (Activated, Impregnated, Medium Grain, High Adsorption)

a. CHARACTERISTICS. A granular type of activated dehydrating agent with high adsorption qualities, impregnated with a blue-colored indicator which turns pink when desiccant has adsorbed its capacity of moisture from gases or liquids.

b. UNIT OF ISSUE. ea: 5-lb. can.

*Note.* Packed loose. Not available in bags. Each can contains a humidity indicator color comparison card.

c. USES.

- (1) Used in indicator cards or humiplugs to obtain an approximate indication of the relative humidity of the surrounding atmosphere.
- (2) Used in fire control instruments.

**Caution:** Drums must be kept sealed. Issues to be made in original containers only.

## 116. Dressing, Leather, Mildew-preventive

a. CHARACTERISTICS. A stable, nonflammable, and homogeneous solution composed of an animal oil, a mineral oil, a fungicide (1.9 to 2.1 percent of paranitrophenol), and suitable solvents.

b. UNIT OF ISSUE. ea: 5-gal can.

*Note.* For issue to ordnance maintenance units only. QMC issue when present stocks are exhausted.

c. USE. To prevent growth and propagation of mildew on leather and leather products which are not to be used in prolonged, intimate contact with the skin. The dressing will also improve the resistance of the leather to cracking and to the deleterious effect of water.

*Note.* Treating of leather articles with this compound will be accomplished by ordnance maintenance personnel only. Leather articles located in, or to be shipped to, tropical areas will receive this treatment. In other areas, the treatment will be applied only on special instructions.

d. APPLICATIONS.

- (1) Prior to treating, the leather articles must be cleaned with saddle soap. The compound must be heated to obtain the necessary penetration into the leather, but the container must not be directly exposed to open flame. A 5-gallon can with top removed, or a 55-gallon drum cut in half, may be utilized as a dipping vat. The preferable method of heating is to place the vat in a vessel of hot water, thus producing a double-boiler effect.
- (2) The treating and drying procedures are then accomplished by filling the vat with sufficient compound to completely cover the largest leather article to be dipped.

Heat the solution, using steam or hot water, to 113° F. The solution must not be heated above 122° F. Maintain the bath at 106° to 115° F. during treatment. Immerse items for 10 minutes. The solution must be agitated continuously during treatment, and items must be placed so that no air pockets are present. Remove items and drain.

- (3) The solvents in the treating compound are injurious to equipment such as optical equipment, etc. It is important, therefore, that the leather articles be thoroughly dried after the treating process.
- (4) Treated items may be satisfactorily dried if suspended in freely circulating air for at least 48 hours. The drying time may be reduced by placing them in a hot box or forced draft oven, at 122° to 131° for 15 to 20 hours. Such a hot box must be well ventilated to remove the vapors given off during drying. When the leather articles are thoroughly dry, remove the excess wax from the surfaces by wiping lightly with a dry cloth.
- (5) Treated articles must be cleaned when possible with a clean, dry cloth or a cloth dampened with water. Repeated use of saddle soap will remove the treating compound and necessitate re-treating to obtain the desired protection.
- (6) Dry-cleaning solvent or volatile mineral spirits paint thinner must never be used to clean treated articles under any circumstances, as it will quickly remove the protective compound.

**Caution:** This treating solution is flammable and care must be taken during all steps of the treatment, as it contains highly volatile components which rapidly evaporate when exposed to the air. Containers must be kept securely covered when not in use and stored in the coolest location available. In the event a container is left uncovered for an extended period of time, the contents must be discarded, as loss of the volatile constituents will destroy the protective qualities of the compound. Only sufficient dressing to treat each batch of articles should be withdrawn from a container. Any excess must be discarded, as it cannot be saved for future use.

## 117. Dressing, Vulcanizer Mold, Stick

- a. CHARACTERISTICS. A dressing compound in stick form.
- b. UNIT OF ISSUE. Stick.

c. USE. For use in cable repair kits listed in ORD 6 SNL F-272. (See TM 9-1649 for full descriptions of cable repair methods.)

## 118. Grease, Aircraft and Instruments (For Low and High Temperatures)

a. CHARACTERISTICS. The grease is a smooth homogeneous mixture, consisting essentially of a gelling agent and a low temperature liquid lubricant. The grease is free from abrasive or otherwise undesirable fillers or impurities and does not contain extreme-pressure or special antiwear additives. Previously known as GREASE, lubricating, instrument (GL).

b. UNITS OF ISSUE.

- (1) ¼-oz. tube (for ENG surveying equipment).
- (2) ea: 8-oz. tube.
- (3) ea: 1-lb. can.

*Note.* QMC issue when present stocks are exhausted.

c. USE. This grease is intended for use in ball, roller, and needle bearings, gears, and on sliding and rolling surfaces of such equipment as instruments, cameras, electronic gear, and aircraft control systems. It is particularly suitable for equipment which must operate at both very low and high temperatures. Its extremely low volatility is of advantage in preventing oil fogging in optical instruments.

## 119. Grease, Automotive and Artillery

a. CHARACTERISTICS. This is a smooth, homogeneous mixture of mineral or synthetic oil or combination thereof, with a suitably stabilized gelling agent and free from abrasives or otherwise undesirable fillers or impurities.

b. UNITS OF ISSUE.

- (1) ea: 1-lb. cntr.
- (2) ea: 5-lb. cntr.
- (3) ea: 10-lb. cntr.
- (4) ea: 25-lb. cntr.

*Note.* QMC issue.

c. USE. For lubrication of automotive and artillery matériel under all conditions of service where ambient temperatures range from  $-65^{\circ}$  to  $125^{\circ}$  F.

*Note.* Replaces GREASE, lubricating, general purpose, No. 0 (CG), No. 1 (CG-1), and No. 2 (WB) and GREASE, lubricating, ORD Dept. No. 0 (OG-0) and No. 00 (OG-00) when present stocks are exhausted.

## 120. Grease, Graphite, Soft (GG)

a. CHARACTERISTICS. A smooth, homogeneous mixture of min-

eral oil, graphite, and pure, odorless lime soap. It resists removal from surfaces under storage conditions.

b. UNIT OF ISSUE. ea: 1-lb. can.

*Note.* "Grade I" on label indicates "Grade A." QMC issue when present stocks are exhausted.

c. USES.

- (1) For coating springs in recoil mechanisms and equilibrators, and other large springs on artillery, when prescribed, as a preservative.
- (2) For uses as a lubricant (TM 9-2835).
- (3) Not used on antifriction bearings or between other rubbing surfaces for which it is not prescribed as a lubricant.

## **121. Grease, Lubricating, General Purpose, No. 0 (CG)**

a. CHARACTERISTICS. A smooth, homogeneous, especially compounded grease with corrosion-inhibiting properties having a melting point of 300° F. It is composed of mineral oil and metallic soaps.

b. UNITS OF ISSUE.

(1) ea: 1-lb. can.

(2) ea: 25-lb. can.

*Note.* QMC issue. When present stocks are exhausted, use GREASE, automotive and artillery, QMC issue (par. 119).

c. USE. As a chassis grease on automotive equipment in temperature range of +40° F. to -10° F.

## **122. Grease, Lubricating, General Purpose, No. 1 (CG-1)**

a. CHARACTERISTICS. A smooth, homogeneous mixture of refined mineral oil and metallic soaps. It contains a minimum of 85 percent mineral oil and has corrosion-inhibiting properties.

b. UNIT OF ISSUE. ea: 5-lb. can.

*Note.* QMC issue. When present stocks are exhausted, use GREASE, automotive and artillery, QMC issue (par. 119).

c. USE. As a chassis grease on automotive equipment at temperatures above +32° F. Also suitable for the lubrication of other machinery equipped with pressure grease fittings where excessive moisture is not encountered.

## **123. Grease, Lubricating, General Purpose, No. 2 (WB)**

a. CHARACTERISTICS. A smooth, homogeneous mixture of mineral oil and metallic soaps. It contains a minimum of 82 percent mineral oil and has corrosion-inhibiting properties.

b. UNIT OF ISSUE. ea: 1-lb. can.

*Note.* QMC issue. When present stocks are exhausted, use GREASE, automotive and artillery, QMC issue (par. 119).

**c. USES.**

- (1) Primarily used as a wheel-bearing lubricant above  $-10^{\circ}$  F.
- (2) Used for lubricating clutch pilot and release bearings of general purpose vehicles, and as a lubricant for distributor shafts.

## **124. Grease, Lubricating, ORD Dept, No. 0 (OG-0)**

**a. CHARACTERISTICS.** A smooth, homogeneous mixture of mineral oil and soap, free of abrasives, fillers, and impurities. It contains a rust-inhibitor of the polar type.

**b. UNITS OF ISSUE.**

- (1) ea: 1-lb. can.
- (2) ea: 25-lb. can.

*Note.* When present stocks are exhausted, use GREASE, automotive and artillery, QMC issue (par. 119).

**c. USE.** For lubrication of artillery at temperatures above  $32^{\circ}$  F. Also used to protect against corrosion or pitting of ferrous and nonferrous metals.

## **125. Grease, Lubricating, ORD Dept, No. 00 (OG-00)**

**a. CHARACTERISTICS.** A smooth, homogeneous mixture of mineral oil and soap, free of abrasives, fillers, and impurities. It contains a rust-inhibitor of the polar type.

**b. UNITS OF ISSUE.**

- (1) ea: 1-lb. can.
- (2) ea: 25-lb. can.

*Note.* When present stocks are exhausted, use GREASE, automotive and artillery, QMC issue (par. 119).

**c. USE.** For lubrication at temperatures below  $32^{\circ}$  F. Also used to protect against corrosion or pitting of ferrous and nonferrous metals.

## **126. Grease, Lubricating, Primer Seat**

**a. CHARACTERISTICS.** A noncorrosive lubricant which is water-repellent.

**b. UNIT OF ISSUE.** ea: 1-lb. metal bx.

*Note.* QMC issue when present stocks are exhausted.

**c. USE.** An antiseize compound to prevent galling of metal surfaces of primer seats after exposure to high firing temperatures.

## **127. Grease, Silicon, Medium (SI)**

**a. CHARACTERISTICS.** A jellylike, noncorrosive material which is nonreactive with rubber. It does not harden at low temperatures.

*b.* UNIT OF ISSUE. ea : 8-oz. tube.

*Note.* For use until stock is exhausted, then use COMPOUND, insulating and sealing, electrical connections.

*c.* USE. For moistureproofing and fungusproofing of electrical connections on heavy antiaircraft artillery. Used for sealing aiming circle M1 and other fire control matériel as prescribed. Also used on gear mechanisms and adjacent parts.

## **128. Inhibitor, Corrosion, Volatile Type (Crystals)**

*a.* CHARACTERISTICS. Volatile crystalline corrosion inhibitor for ferrous metals.

*b.* UNIT OF ISSUE. ea : 1-lb. metal cntr.

*c.* USE. For inhibiting corrosion on ferrous metals where specifically prescribed.

*d.* APPLICATION. As prescribed.

## **129. Lubricant, Chain, Exposed-gear and Wire-rope (CW)**

*a.* CHARACTERISTICS. A viscous, asphaltic lubricant with good adhesive qualities. The material is an excellent rust preventive, since it adheres to metal surfaces and acts as a protective coating. Protective type II is issued in grades A, B, and C, the viscosities of which are, respectively, 25-55, 75-125, and 140-250 Saybolt at 210° F. Previously known as "OIL, lubricating, chain and wire-rope, grade 2." Also known as cable or wire-rope preservative, wire-rope dressing, wire-rope grease, wire-rope compound, and gear shield.

*b.* UNIT OF ISSUE. ea : 5-lb. can.

*Note.* QMC issue when present stocks are exhausted.

*c.* USES.

- (1) Lubrication and protection of gear chains, wire cables and ropes, slow-moving, exposed, heavy spur gears, and metal parts submerged in water or exposed to outside weather conditions in service.
- (2) Grade A is for use in cold weather, grade B in warm weather, and grade C in hot weather.
- (3) It is not a satisfactory lubricant for close fitting mechanisms or gears.

*d.* APPLICATION. It is usually heated before applying.

## **130. Oil, Clock and Watch**

*a.* CHARACTERISTICS. A homogeneous, stable, noncorrosive, nonspreading transparent lubricant free of abrasives, sediment,

dyes, and turbidity. It has a viscosity which permits it to provide satisfactory lubrication between temperatures of  $-22^{\circ}$  and  $140^{\circ}$  F.

b. UNIT OF ISSUE. 5-cc bottle equipped with fine dropper.

*Note.* QMC issue when present stocks are exhausted.

c. USE. For the lubrication of clocks, watches, transits, chronometers, etc.

### **131. Oil, Engine, Preservative, SAE-10 and SAE-30 (PE-10 and PE-30)**

a. CHARACTERISTICS. A blended, highly refined mineral lubricating oil with rust inhibitor, having a minimum effect on all metals which may be included in an engine assembly. Light grade (PE-10) is equivalent in viscosity to SAE-10 engine lubricating oil. Medium grade (PE-30) is equivalent in viscosity to SAE-30 engine lubricating oil. This oil is a satisfactory temporary lubricant for spark ignition and Diesel types of internal combustion engines. The additives have gum and varnish solvent actions and neutralize acids which cause corrosion of the internal surfaces of an engine.

b. UNITS OF ISSUE.

(1) ea: 5-gal. can.

(2) ea: 55-gal. drum.

c. USES.

(1) Protects against high humidity and moisture condensation and has the ability to neutralize acidic products of combustion within an internal combustion engine.

(2) As a preservative of internal combustion engines during shipment and limited storage.

(3) Medium grade (PE-30) is used in moderate ambient temperature areas.

(4) Light grade (PE-10) is used in cold or arctic temperature areas.

(5) It may be used as a lubricant for a distance up to 500 miles.

### **132. Oil, Hydraulic, Petroleum Base**

a. CHARACTERISTICS. This oil consists of the products of pure petroleum with not more than 10 percent by weight of additives to improve the viscosity-temperature characteristics, not more than 2 percent by weight of oxidation inhibitors, and 0.4 to 0.5 percent by weight of tricresyl phosphate as an antiwear agent.

b. UNIT OF ISSUE. ea: 1-qt. cntr.

c. USE. In recoil mechanisms at all temperatures; in other mechanisms, as prescribed.

### 133. Oil, Insulating

a. CHARACTERISTICS. A highly refined oil consisting of pure petroleum hydrocarbons, free from water, corrosive compounds, and sediment. It has a maximum pour point of  $-40^{\circ}$  F. and a minimum flash point of  $270^{\circ}$  F.

b. UNITS OF ISSUE.

(1) ea: 1-gal. can (MD).

(2) ea: 5-gal. can.

(3) ea: 55-gal. drum.

*Note.* MD and QMC issue.

c. USE. As an insulating and cooling medium in oil-immersed transformers, oil switches, and oil circuit breakers.

d. APPLICATION. Pouring in to the level prescribed.

### 134. Oil, Linseed, Kettle Boiled

a. CHARACTERISTICS. A yellow to greenish brown vegetable oil obtained by expression from the seeds of the flax plant. It is raw linseed oil that has been heated in the presence of metallic drying compounds such as resinates, linoleates, and naphthenates of lead, manganese, and cobalt.

b. UNIT OF ISSUE. ea: 1-gal. can.

*Note.* ENG issue when present stocks are exhausted.

c. USE. Used for the same purpose as raw linseed oil where a faster drying material is desired.

**Caution:** Linseed oil in any form should be used with care in conjunction with wiping cloths or any textile fabric to prevent fire resulting from spontaneous combustion. If any type of cloth or fabric contains any amount of linseed oil, it should either be destroyed after use or hung up to dry in a well ventilated area, thus reducing the fire hazard.

### 135. Oil, Linseed, Raw

a. CHARACTERISTICS. A yellow to greenish brown vegetable oil expressed from the seeds of the flax plant. When a film of the oil is exposed to the atmosphere, it gradually darkens and thickens to form a tough and flexible film. The oil has a characteristic odor. It is generally considered the most important and most widely used oil for general painting purposes.

b. UNIT OF ISSUE. ea: 1-gal. can.

*Note.* ENG issue when present stocks are exhausted.

**c. USES.**

- (1) For the preservation of wooden gun stocks and similar wood items. To prepare preservative for wooden gun stocks, mix the following ingredients:

1 gallon of volatile mineral spirits paint thinner.

6 gallons of linseed oil containing 2 percent of a fungicide.

- (2) Treating the inner packing of some chests and lockers in hot, humid, and dry areas.
- (3) In the manufacture and thinning of paints, varnishes, etc.

**Caution:** Linseed oil, in any form, should be used with care in conjunction with wiping cloths to prevent fire resulting from spontaneous combustion. If any type of cloth or fabric contains any amount of linseed oil, it should either be destroyed after use or hung up to dry in a well-ventilated area, thus reducing the fire hazard.

### **136. Oil, Lubricating, Preservative, Medium (PL-MED)**

**a. CHARACTERISTICS.** A highly refined, nonhardening, thin film, mineral lubricating oil, containing a rust-inhibiting additive. It is readily removable by washing with dry-cleaning solvent or volatile mineral spirits paint thinner. The viscosity is 185 to 250 Saybolt at 130° F. The maximum pour point is 20° F.

**b. UNITS OF ISSUE.**

- (1) ea: 2-oz. can.
- (2) ea: 1-qt. can.
- (3) ea: 5-gal. can.
- (4) ea: 55-gal. drum.

*Note.* Item (4) is issued to shops, depots, and arsenals only.

**c. USES.**

- (1) For use in ambient temperatures above 32° F. as prescribed in lubrication orders for preservation as well as lubrication of highly finished, critical, or operating surfaces of artillery, small arms, etc., when these surfaces are in such a position as to prevent proper removal of a heavier preservative, specifically, respirator for hydro-pneumatic recoil mechanism.

*Note.* For temperatures below 32° F., use "OIL, lubricating, preservative, special (PL-SPECIAL)."

- (2) For preservation of small arms in temporary storage and during amphibious operations.

**d. APPLICATION.** By wiping with oil-saturated cloth and by oiler. Can also be sprayed, dipped, or brushed without heating or use

of solvent. Also used when matériel has sufficient outer wrapping and packing to add the necessary protection for prolonged storage or shipment.

### **137. Oil, Lubricating, Preservative, Special (PL-SPECIAL)**

*a.* CHARACTERISTICS. A highly refined, light, very low pour point mineral oil, containing a rust-inhibiting additive and removable by washing with dry-cleaning solvent or volatile mineral spirits paint thinner. The maximum pour point is  $-70^{\circ}$  F.

*b.* UNITS OF ISSUE.

- (1) ea: 2-oz. oblong, screw-top can.
- (2) ea: 4-oz. oblong can, with spout.
- (3) ea: 1-qt. can.

*c.* USES.

- (1) It should be depended upon only for day-to-day preservation of matériel.
- (2) Used as a penetrating oil in lieu of engine lubricating oil.
- (3) For lubrication and protection against corrosion of small arms and aircraft guns in ambient temperatures below  $32^{\circ}$  F., as prescribed on lubrication orders and during temporary storage or amphibious operations.

*Note.* For temperatures above  $32^{\circ}$  F., use preservative lubricating oil, medium (PL-MED).

- (4) Oiler lubrication of automotive and artillery matériel.
- (5) Used in Diesel engine injector pump and injector mechanisms after draining Diesel fuel from injectors and filters. Applied after fuel supply is cut off.

### **138. Oil, Neat's-foot**

*a.* CHARACTERISTICS. A clear, pale-yellow oil of varying composition obtained by boiling calves' or sheep's feet and shinbones. It is free of rancidity and the odor is not objectionable.

*b.* UNIT OF ISSUE. ea: 1-qt. can.

*Note.* QMC issue when present stocks are exhausted.

*c.* USE. Used for the softening and preserving of leather holsters, gun slings, and other leather equipment, except harness. It is not a satisfactory lubricant for any purpose.

*d.* APPLICATION.

- (1) Leather must first be cleaned with saddle soap and thoroughly dried.
- (2) In cold weather, heat the oil until lukewarm but not hot. Rub oil well into the leather and allow it to be absorbed.

### 139. Oil, Potentiometer

*a.* CHARACTERISTICS. A very light, clear, highly refined petroleum product comparable in viscosity to kerosene. It contains no fatty materials, acids, resins, soaps, moisture, or foreign matter. Minimum flash point is 170° F. and the pour point is —20° F.

*b.* UNIT OF ISSUE. ea: 1-gal. can.

*c.* USES.

- (1) For potentiometer baths of certain anti-aircraft directors; and for computers and radar matériel.
- (2) For servicing anti-aircraft battery equipment (Signal Corps).

### 140. Oil, Recoil, Light (RL)

*a.* CHARACTERISTICS. A refined mineral oil free from resins, soaps, unrefined oils, and other injurious ingredients which may affect the proper functioning of the oil in recoil mechanisms. It has a maximum pour point of —50° F. and a minimum flash point of 175° F.

*b.* UNITS OF ISSUE.

(1) ea: 1-qt. can.

(2) ea: 1-gal. can.

*c.* USES. For recoil and other mechanisms, as prescribed.

### 141. Oil, Recoil, Special (RS)

*a.* CHARACTERISTICS. A specially refined mineral oil with an unusually high viscosity index which results in minimum tendency to become thinner at high temperatures and pressures, or to congeal at extremely low temperatures. It has a clear, bright-green color for easy identification. The maximum pour point is —50° F., and the minimum flash point is 210° F.

*b.* UNITS OF ISSUE.

(1) ea: 1-qt. can.

(2) ea: 1-gal. can.

*c.* USE. For recoil and other mechanisms, as prescribed.

### 142. Oxidizing Material, Black Finish (for Copper-base Metals)

*a.* CHARACTERISTICS. A treatment for copper and copper-base alloys based on a reaction with chlorite and sodium hydroxide.

*b.* UNIT OF ISSUE. ea: 2-lb. bottle.

*Note.* Issued only to depots and arsenals.

*c.* USE. For black-finishing of copper and copper-base alloys. For details, see TM 9-1861.

### **143. Oxidizing Material, Black Finish (for Ferrous Metals)**

a. CHARACTERISTICS. A white, alkaline, crystalline material.

b. UNIT OF ISSUE. ea : 100-lb. drum.

c. USES.

(1) Used in Pentrate process for refinishing exterior metal surfaces of small arms.

(2) Used to produce a black, nonmetallic, corrosive-resistant finish on ferrous metals.

d. APPLICATION. For details of method of application, see TM 9-1861.

### **144. Paint, Acid Resisting, Black**

a. CHARACTERISTICS. A black paint manufactured from one or more grades of natural or petroleum asphalt without the use of drying oils, resins, or pigments. It contains a volatile petroleum thinner and contains no benzol (benzene) or other toxic materials.

b. UNIT OF ISSUE. ea : 1-gal. can.

*Note.* ENG issue when present stocks are exhausted.

c. USES.

(1) For preserving exterior of wooden storage battery cases and the interiors of storage battery compartments.

(2) For preserving wooden acid-handling equipment and fixtures.

*Caution:* Flammable.

### **145. Paraffin (Wax), Fully Refined**

a. CHARACTERISTICS. A colorless, white, translucent, fully refined, commercial petroleum wax, free from animal and vegetable waxes or other adulterants. It is available in grade A, melting point 130° to 132° F. and grade C, melting point 120° to 122° F.

b. UNIT OF ISSUE. ea : 1-lb. bx.

*Note.* QMC issue when present stocks are exhausted.

c. USE. For lining molds and in the sealing of certain types of ammunition.

### **146. Phosphatizing Material, Black Finish, Manganese Phosphate Type**

a. CHARACTERISTICS. A balanced manganese acid phosphate containing nitrates and an accelerating agent.

b. UNIT OF ISSUE. ea : 550-lb. bbl.

*c.* **USE.** Used to produce type II, class A finish as specified in 57-0-2C where a nongalling finish is desired. The finish is applied in either gray or black color; it provides moderately good corrosion and abrasion resistance, and has excellent wear-in and oil-retaining qualities. Its use is recommended for weapons to be placed in storage and for those to be reissued. The coating is a nonmetallic, nonreflective crystalline layer which is chemically combined with the ferrous metal of the base. The dimensional build-up varies from 0.0001 to 0.0005 inch but can be reduced as much as 75 percent by buffing individual parts or exercising assembled weapons. The phosphate finish itself is of little value in corrosion resistance unless it is treated with engine preservative oil SAE 10 (PE-10) or SAE 30 (PE-30). (See TM 9-1861.)

### **147. Phosphatizing Material, Black Finish, Manganese Phosphate Type**

*a.* **CHARACTERISTICS.** A yellowish-white, water-soluble powder which produces a nonreflective, nonmetallic, crystalline, corrosion-resistant coating.

*b.* **UNIT OF ISSUE.** ea : 250-lb. bag.

*c.* **USES.**

- (1) Used to produce type II, class B finish, as specified in 57-0-2C, to give to steel or cast iron a nonmetallic, corrosion-resistant phosphate coating that absorbs and retains oil.
- (2) Used for applying type II, class B finish. (See TM 9-1861.)
- (3) Phosphate finish is of little value in corrosion resistance unless additionally treated with lubricating preservative oils.
- (4) Used on nonmoving parts only.

### **148. Phosphatizing Material, Gray Finish, Zinc Phosphate Type**

*a.* **CHARACTERISTICS.** A colorless solution of zinc dihydrogen phosphate and a nitrate accelerator.

*b.* **UNIT OF ISSUE.** ea : 625-lb. bbl.

*c.* **USES.**

- (1) To produce type II, class B finish as specified in 57-0-2C.
- (2) Used for initial makeup liquid and replenishing liquid.
- (3) Used to produce a smooth corrosion resistant finish on the exterior surfaces of small arms.

*d.* **APPLICATION.** See TM 9-1861.

## 149. Pigment, Paste, Aluminum

a. CHARACTERISTICS. A commercially pure aluminum in fine flake form mixed with a volatile paint thinner and a fatty lubricant to form a thick paste.

b. UNIT OF ISSUE. ea : 5-gal. (50-lb. pail).

c. USES.

(1) For use in type III, sprayable, strippable, protective compound coating operations.

(2) Mixed with water-resisting, clear, spar varnish.

*Caution:* Avoid storing aluminum paste pigment in places of high temperature, as heat (particularly with moisture) will affect its leafing tendency and cause separation of the pigment.

## 150. Polish, Automobile, Liquid

a. CHARACTERISTICS. This polish is a combination polish and cleaner containing a wax. It is a free-flowing, stable, aqueous emulsion having a finely divided but mildly abrasive material in suspension. The polish spreads readily to form a thin film, and the polished surfaces are not affected by water. A dried film of the material on smooth metal, lacquered or enameled surfaces produces a polished appearance when rubbed with a clean, dry, soft cloth, using only moderate pressure. The polish contains no free caustic alkali nor any volatile, organic matter having a boiling point below that of water. The odor is not objectionable. It is free from greasiness, tackiness, and scratching properties.

b. UNITS OF ISSUE.

(1) ea : 1-qt. can.

(2) ea : 1-gal. can.

c. USE. To produce polished surfaces, particularly on baked synthetic enamel and lacquers such as those used to protect automotive bodies. It is not to be used on lusterless finishes such as those used on military motor vehicles.

d. APPLICATION. The can should be shaken before use as a small amount of abrasive may settle out. Pour a small amount of polish onto a soft cloth. Apply the material to the surface to be polished by means of the cloth. Rub the film of polish with the application cloth, using only moderate pressure. A thin even film should thus be obtained over the entire surface. After the film is dry, polish the surface with a clean, dry, soft cloth.

## 151. Wax, Automobile, Paste

a. CHARACTERISTICS. Consists of a combination of hard waxes dispersed in a volatile solvent.

b. UNIT OF ISSUE. ea : 1-lb. can.

c. USES.

(1) To increase luster of enamel or lacquer finishes.

(2) To protect bright finish of metal parts such as chrome or nickel in storage or during shipment.

d. APPLICATION. Applied either manually by a flannel cloth or by motor-driven polishing machine.

## Section IV. ADHESIVE AND SEALING MATERIALS

### 152. Canada Turpentine (Canada Balsam)

a. CHARACTERISTICS. A yellow-to-greenish, transparent, non-crystalline cement with a pinelike odor. It is the oleoresin exuded by the balsam fir or allied species. It is sometimes incorrectly referred to as "Balm of Gilead" or "Balsam Fir."

b. UNITS OF ISSUE.

(1) ea : dissolved in xylene, in 2-oz. bottle.

(2) bx : 6 sticks per bx, one-half in. diam. x 3 in. long.

*Note.* Item (1) will be issued until stocks are exhausted.

c. USE. A thermoplastic optical cement for cementing lenses only in cases where CEMENT, optical (par. 161) is not available. (See TM 9-1501.)

### 153. Cement and Filler, Brake Lining

a. CHARACTERISTICS. A quick-drying cement for application between brake shoe and lining to fill up air spaces.

b. UNITS OF ISSUE.

(1) ea : 1-qt. can.

(2) ea : 1-gal. can.

c. USE. To provide a better bond and to fill irregularities between brake shoes and linings in order to deaden vibration, eliminate squeals, and prevent "spongy" brake pedal action.

### 154. Cement, Asphalt

a. CHARACTERISTICS. A high-melting point, black, bituminous material.

b. UNIT OF ISSUE. ea : 1-lb. can.

c. USE. To cement fungicidal capsules into optical instruments.

d. APPLICATION. Heated by means of a hotplate or a soldering iron.

## 155. Cement, Gasket, Liquid Type

a. CHARACTERISTICS. A nondrying, elastic, heat-resisting, semi-fluid adhesive. It is suitable for use after exposure to a maximum of 90° F. for periods up to 6 months when kept in closed original container.

b. UNIT OF ISSUE. ea : 1-pt. can, with brush.

c. USES.

- (1) For assembling fuel line connections, particularly pipe fittings at fuel pumps and carburetors.
- (2) For use on threads and metal-to-metal joints.
- (3) Used on uncoated gaskets on certain types of matériel as specified in the manual for the matériel.
- (4) As specified for installation of items in winterization kits.

*Note.* Not to be used as a substitute for antiseize compound (par. 174).

## 156. Cement, Gasket, Plastic Type

a. CHARACTERISTICS. A soft, plastic, nonhardening, gasket-sealing material.

b. UNIT OF ISSUE. ea : 8-oz. tube.

c. USES.

- (1) For coating gaskets of engine accessories, gear housings, flanges, etc., where high temperatures are encountered.
- (2) For sealing magnetic needle assembly in aiming circle M1, in lieu of optical lens sealing compound.

## 157. Cement, Glass (Nonhardening)

a. CHARACTERISTICS. A viscous, air drying cement which, upon setting, retains rubberlike characteristics.

b. UNIT OF ISSUE. ea : 1-pt. can.

c. USE. For sealing windshield, door, and similar glasses in their metal frames.

## 158. Cement, Iron Oxide (Pettman)

a. CHARACTERISTICS. A waterproof, reddish brown, puttylike cement of iron oxide 47 to 53 percent, alcohol 18 to 22 percent, pine tar 10.5 to 13.5 percent, and shellac 16 to 20 percent.

b. UNIT OF ISSUE. ea : 1-gal. can.

c. USE. As a waterproof cement in the loading and assembly of ammunition.

*Caution:* Flammable.

## 159. Cement, Jewel, Shredded

*a.* CHARACTERISTICS. These are brownish threads approximately 1 inch long. The material is easily fused at low temperatures.

*b.* UNIT OF ISSUE. ea: vial.

*c.* USE. For sealing pallet and roller jewels of watches.

## 160. Cement, Liquid, Butyl, Tent-patching, Waterproof

*a.* CHARACTERISTICS. A volatile solvent solution of synthetic butyl rubber, pigmented with carbon-black to produce a black cement. When applied, the solvent volatilizes at normal temperatures and leaves a flexible, water insoluble film that is not affected by normal temperature changes. One medium application will provide a strong, adherent, flexible and waterproof bond.

*b.* UNIT OF ISSUE. ea: 1-pt. can.

*c.* USE. For patching canvas material of all types, such as paulins, tents, and protective covers.

*d.* APPLICATION. To be applied with a small, stiff-bristled brush to the patch and to the section of canvas to be patched. Approximately 15 minutes drying time must be allowed before the patch is applied. The cement will be allowed to set for approximately 24 hours at normal temperatures. This cement may be applied at temperatures as low as  $-10^{\circ}$  F.

## 161. Cement, Optical

*a.* CHARACTERISTICS.

- (1) This cement is of the thermosetting type and consists of two separately bottled liquids: the polymerizable resin mixture (40 percent styrene and 60 percent polyester by weight) and the catalyst (tertiary butyl perbenzoate) amounting to 1 percent by weight of the cement. The purpose of the catalyst is to accelerate the conversion of the resin mixture from the liquid to the solid state.
- (2) This thermosetting cement becomes solid upon the application of heat. Once the cement sets, it will not melt again, no matter how it is heated. In this respect, thermosetting cement differs from thermoplastic optical cement (Canada turpentine) (par. 152) which can be made to flow again upon the application of heat.
- (3) The uncatalyzed cement may be stored ready for use for a period of 1 to 2 years after the date of manufacture shown on the container, when stored at room temperature. Storage in a cool place ( $40^{\circ}$  to  $50^{\circ}$  F.) retards the

slow polymerization that takes place even in the uncatalyzed material.

- (4) Catalyzed cement will still be satisfactory for use after a period of 30 to 60 days, depending on the temperature to which it has been exposed.

b. UNIT OF ISSUE. ea: 4-oz. dark glass bottle, with foil-lined screw cap and attached vial containing tertiary butyl perbenzoate catalyst.

*Note.* For issue only to arsenals, depots, etc.

c. USE. To cement compound lenses (TM 9-1501).

## 162. Cement, Porcelain, Liquid

a. CHARACTERISTICS. A viscous, pastelike material which dries to a hard white substance.

b. UNIT OF ISSUE. ea: 1/2-pt. can.

*Note.* Issued only to shops using optical coating equipment listed in ORD 6 SNL F-272.

c. USE. For cementing porcelain insulators (TM 9-1501).

## 163. Cement, Rubber, Natural, Nonvulcanizing

a. CHARACTERISTICS. A liquid consisting of a rubber compound mixed with volatile solvents. The solvent volatilizes at normal temperatures to form a smooth, hard, nontacky bond between metal and natural rubber.

b. UNITS OF ISSUE.

(1) ea: 2-oz. tube.

(2) ea: 1-pt. tube.

(3) ea: 1-qt. can.

c. USE. For cementing natural rubber to metal.

d. APPLICATIONS.

(1) The surfaces of the metal and the rubber must be cleaned thoroughly by washing with clean unleaded gasoline or carbon tetrachloride.

(2) Smooth rubber surfaces must be scuffed to permit a better bond between the rubber and metal.

(3) One coat of the cement will be applied uniformly with a brush to both the rubber and metal surfaces, and allowed to dry for not more than 20 minutes. When the cement film becomes tacky, the surfaces must be pressed firmly together, and allowed to set for approximately 48 hours at room temperature.

*Caution:* This cement is unsatisfactory for bonding metal to synthetic rubber, such as Neoprene or Buna N.

## **164. Cement, Rubber, Natural, Vulcanizing, Hot-process, Fast-drying, Black**

*a.* CHARACTERISTICS. A vulcanizing cement containing a minimum of 0.55 pound of crude rubber per gallon, with no reclaim. The storage life up to a temperature of 90° F. is not less than 18 months.

*b.* UNITS OF ISSUE.

(1) ea : 5-gal. can.

(2) ea : 50-gal. drum.

*c.* USE. For tire recapping, retreading, sectional repairing, and tube repairing.

## **165. Cement, Rubber, Synthetic**

*a.* CHARACTERISTICS. A light-brown, air-curing liquid cement with a bonding range of 5 to 15 minutes.

*b.* UNIT OF ISSUE. ea : 2-oz. tube.

*c.* USE. For cementing synthetic rubber to metal.

## **166. Cement, Rubber, Synthetic, Nonvulcanizing**

*a.* CHARACTERISTICS. A black, water-resistant, viscous rubber cement, self-curing at low temperatures.

*b.* UNIT OF ISSUE. ea : 8-oz. tube.

*c.* USES.

(1) For waterproofing and for other uses where heat for vulcanizing is not practical.

(2) Used with deep-water fording kits as prescribed. (See TM 9-2853.)

## **167. Cement, Rubber, Synthetic, Oil-resistant**

*a.* CHARACTERISTICS. A liquid cement free from crude rubber, soluble in benzol, and providing a flexible film that is insoluble in water or gasoline. It will not gel in storage after being subjected to 120° F. for a period of 20 days.

*b.* UNIT OF ISSUE. ea : 1-pt. can.

*c.* USE. For cementing optical prisms to opposite faces of an aluminum shelf as used in fire control instruments.

## **168. Cement, Rubber, Uncured**

*a.* CHARACTERISTICS. A solution of rubber in a volatile solvent which requires vulcanizing to cure.

*b.* UNIT OF ISSUE. ea : ¼-pt. can.

c. USE. Used in anti-aircraft cable repair kits listed in ORD 6 SNL F-272. To provide or restore a continuous rubber coating on cables (TM 9-1649).

## **169. Cement, Rubber, Vulcanizing, Quick Cure, Cold Process, Gray**

a. CHARACTERISTICS. A gray, liquid rubber cement which is air-curing and does not require vulcanizing.

b. UNITS OF ISSUE.

(1) ea: 1-qt. can.

(2) ea: 1-gal. can.

(3) ea: 5-gal. can.

*Note.* Items (2) and (3) will be issued only until the stocks are exhausted.

c. USE. Suitable for repairing or patching rubber goods where it is not practical to vulcanize.

## **170. Cement, Sealing or Plugging**

a. CHARACTERISTICS. A pliable, surface-hardening sealing compound available in four colors. Its principal constituents are ethyl cellulose, alcohol, and toluene.

b. UNITS OF ISSUE.

(1) ea: class A, 4-oz., screw-top can, metallic red.

(2) ea: class B, 4-oz., screw-top can, yellow.

(3) ea: class C, 4-oz., screw-top can, black.

(4) ea: class D, 4-oz., screw-top can, olive drab.

*Note.* Cans are painted olive drab, labeled to indicate color, stock number, specification number, etc.

c. USE. For sealing and plugging set screws, etc., in instruments, particularly field glasses, binoculars, and telescopes.

## **171. Cement, Watch Crystal**

a. CHARACTERISTICS. A clear liquid cement which dries to a light-yellow finish.

b. UNIT OF ISSUE. ea: Needle-point tube, one-half in diam x  $3\frac{1}{2}$ .

*Note.* Issued only for use with watch repair tool set (junior and senior) listed in ORD 6 SNL F-272.

c. USE. For cementing watch crystals or glass.

## **172. Cement, Waterproof**

a. CHARACTERISTICS. This cement is resistant to the action of water, sea water, at high or low temperatures and to accelerated aging. The material will not blur marking or stencil ink. The dried

film of adhesive has no obnoxious or objectionable odor. It may be softened or thinned with acetone.

*b.* UNIT OF ISSUE. ea : 5-gal. can.

*Note.* For issue only to arsenals, depots, etc.

*c.* USE. This adhesive paste is used for the application and protection of labels on wooden surfaces.

**Caution:** Flammable.

### **173. Clay, Plastic, Modeling**

*a.* CHARACTERISTICS. A puttylike compound which does not harden with age. Formerly called "Plasteline."

*b.* UNIT OF ISSUE. ea : 1-lb. pkg.

*Note.* Issued only until stocks are exhausted. Substitute natural plastic wood substitute.

*c.* USE. For filling in over countersunk head screws etc.

### **174. Compound, Antiseize, Mica-base**

*a.* CHARACTERISTICS. A noncorrosive mixture of viscous petroleum oil and finely-ground flake mica. It is a nonconductor of electricity and resists heat up to 850° F.

*b.* UNIT OF ISSUE. ea : 1-lb. can.

*c.* USE. For spark plug threads, flange bolts and nuts, hot surfaces, etc., to prevent seizing and to facilitate subsequent disassembly. Due to its insulating properties, this compound should not be used where mating parts are required to be in good electrical contact.

### **175. Compound, Caulking**

*a.* CHARACTERISTICS. A gray or black plastic material similar in consistency to soft putty except that it is slow-drying.

*b.* UNIT OF ISSUE. ea : 1-gal. can.

*c.* USE. For caulking openings during strippable film type preservation of matériel in storage.

*d.* APPLICATION. Applied by means of a caulking gun.

### **176. Compound, Caulking, Knife-grade**

*a.* CHARACTERISTICS. A buff, gray or black plastic material similar in consistency to soft putty except that it is slow-drying. It is suitable for application with a putty knife at temperatures above 40° F. It is noncorrosive, permanently elastic, and free from volatile solvents and oxidizing material.

**b. UNITS OF ISSUE.**

(1) ea: 1-lb. can.

(2) ea: 10-lb. can.

*Note.* Issued only for use by depots and arsenals.

**c. USE.** For sealing glass windows in metal frames on fire control matériel to insure a watertight joint.

**Caution:** This material must be applied to clean and dry surfaces. Plasticity of the compound is affected by cold temperatures. Soften by warming the container in a vessel of tepid water. Modification of the compound by the addition of thinners, oils, or dry powder is not permitted.

## **177. Compound, Joint-sealing**

**a. CHARACTERISTICS.** A waterproof, nonhardening sealing compound.

**b. UNIT OF ISSUE.** ea: 1-lb. can.

**c. USE.** For sealing bolted and riveted surfaces and under bolt and rivet heads on tanks or tanklike vehicles to insure watertight hulls.

## **178. Compound, Luting**

**a. CHARACTERISTICS.** A sealing compound composed of kaolin, petrolatum, and castor oil. It has a minimum softening point of 203° F.

**b. UNIT OF ISSUE.** ea: 5-lb. can.

**c. USE.** For sealing metal-lined boxes in the packing of ammunition.

## **179. Compound, Sealing and Filling, Black**

**a. CHARACTERISTICS.** A flexible, black, asphaltic, pothead compound. One gallon of this material weighs 8 pounds. The flow point is 221° to 230° F., and the pouring temperature is 266° F.

**b. UNIT OF ISSUE.** ea: 1-qt. can.

**c. USE.** For remote control systems.

## **180. Compound, Sealing (Diesel Fuel Pumps)**

**a. CHARACTERISTICS.** A noncorrosive, nondrying, nonhygroscopic compound having the consistency of putty.

**b. UNIT OF ISSUE.** ea: 1-pt. can.

**c. USE.** In sealing end plates and plugs in base of Diesel fuel injection pumps.

## 181. Compound, Sealing, Dip-coating

a. CHARACTERISTICS. A grade of high-melting-point, amorphous, noncorrosive wax which resists flaking at low temperatures.

b. UNIT OF ISSUE. ea : 70-lb. box.

*Note.* QMC issue when present stocks are exhausted.

c. USE. Suitable for sealing of wrappings or packages by dip-coating for storage and shipping.

## 182. Compound, Sealing (Glazing)

a. CHARACTERISTICS. A noncorrosive, nondrying, nonhygroscopic, top and drip molding compound, permanently soft and of the consistency of putty. It sets quickly and remains elastic and pliable indefinitely.

b. UNIT OF ISSUE. ea : 1-gal. (15-lb.) can.

c. USE. For setting and sealing plate glass in window frames.

## 183. Compound, Sealing, Heavy

a. CHARACTERISTICS. A light-colored, jellylike material.

b. UNIT OF ISSUE. ea : ¼-lb. jar.

*Note.* Issued only to shops using SET, optical-coating, cleaning and preserving materials, listed in ORD 6 SNL F-272.

c. USE. For sealing bell jar and other components of the optical-coating machine to prevent loss of vacuum.

## 184. Compound, Sealing, Optical Lens

a. CHARACTERISTICS. A black, waxy, pitchlike, plastic material. It is homogeneous, nontoxic, stable, and noncorrosive. It contains an inhibitor to prevent mold, fungus growth, and attack by mites. This material replaces black sealing compound (Navy).

b. UNIT OF ISSUE. ea : 2-oz. can.

c. USES.

(1) For setting optical elements in their cells.

(2) When properly applied, this material will insure satisfactory adhesion to optical parts with no leakage of air or moisture, over a wide range of temperatures.

*Note.* Not to be used for sealing magnetic needle assembly in aiming circle M1. (Use plastic-type gasket cement.)

d. APPLICATION.

(1) Work the compound until it is soft and pliable and roll it into a thread, normally about the thickness of a pencil lead. The thickness of the thread will vary with the location for which it is intended, as it must be sufficient to

give a complete seal with a minimum of excess compound to be cleaned off after the cover, cell, or optical element is pressed or screwed into place. The thread must be made up as it is needed, because it will dry and harden very rapidly. (In the event that some thread is inadvertently allowed to harden, it must be heated until it again becomes soft.) When covers or large sections of bodies are to be sealed, and it is not practical to use the compound in thread form, the compound should be heated until it has the consistency of soft putty and should then be applied with a spatula.

- (2) Whenever screws are to be resealed, a drop of instrument lubricating grease (GL) should be placed on the threads, a drop of shellac varnish should be placed under the screw heads, and the entire heads should be covered with sealing or plugging cement (par. 170) and spot-painted. If screws do not affect the sealing of the instrument as a whole, they should be covered with plastic modeling clay (par. 173) or wood substitute (par. 253).

## **185. Compound, Sealing, Storage Battery**

*a.* **CHARACTERISTICS.** A black adhesive material, insoluble in sulfuric acid. When applied to a hard surface such as hard rubber or glass, the compound will not shrink, crack or separate, and will adhere sufficiently to maintain an acid-tight joint at temperatures between  $-40^{\circ}$  and  $160^{\circ}$  F.

*b.* **UNIT OF ISSUE.** ea : 25-lb. slab.

*c.* **USE.** For sealing over the top covers of cells in storage batteries.

*d.* **APPLICATION.** Removal of hardened compound is accomplished by a warmed knife blade. Application is by pouring the compound after heating to a melted state at a temperature of approximately  $350^{\circ}$  F.

## **186. Compound, Sealing (Synthetic Rubber Adhesive)**

*a.* **CHARACTERISTICS.** A general purpose, thermoplastic, adhesive material available as type I (high solids content) and type II (low solids content.)

*b.* **UNIT OF ISSUE.** ea : 1-gal. can.

*c.* **USE.** For use in strippable film processing for matériel in storage. It may also be used as a general purpose adhesive for use in bonding metal, wood, plastic, fabric, ceramic, glass, rubber, paper, and leather parts to themselves and to each other.

### **187. Compound, Sealing, with Brush (for Height Finders)**

*a.* CHARACTERISTICS. A liquid, homogeneous, stable, noncorrosive cementing material, impervious to helium. It has a minimum softening point of 170° F.

*b.* UNIT OF ISSUE. ea : 8-oz. can, with brush.

*c.* USE. For use on gaskets sealing helium-filled compartments of height finders and other fire control instruments.

### **188. Compound, Sealing, Tape**

*a.* CHARACTERISTICS. A black, viscous composition to be applied over pressure-sensitive, water-resistant tape.

*b.* UNITS OF ISSUE.

(1) ea : 1-gal. can.

(2) ea : 5-gal. can.

(3) ea : 55-gal. drum.

*c.* USE. Applied over tape to protect the tape from direct action of the elements during storage or shipment.

### **189. Compound, Top-coating, Bituminous**

*a.* CHARACTERISTICS. A mixture of asphalt, fiber-asbestos, and solvent with ability to form a waterproof coating over a range of temperatures from 0° to 140° F. It is sufficiently flexible to maintain a waterproof film over openings caused by wood shrinkage or movement of the sheathing boards.

*b.* UNITS OF ISSUE.

(1) ea : 5-gal. can.

(2) ea : 55-gal. drum.

*c.* USE. For waterproofing the tops of nailed wooden crates and boxes.

*d.* APPLICATION. A 1/8-inch coating of the material will "set" within 18 hours so that the surface is dry to handle. (See TM 9-2854.) Applied as a continuous coating at a rate of approximately 3 pints (3 lb.) per square yard results in a coating of approximately 1/8-inch thickness.

### **190. Glue, Animal, Flake**

*a.* CHARACTERISTICS. A medium-grade glue of animal origin in flake form.

*b.* UNIT OF ISSUE. ea : 1-lb. can.

*Note.* QMC issue when present stocks are exhausted.

*c.* USE. For general use in cementing wood joints.

*d.* MIXING. One pound of flake glue and one-half pint of glycerin is added to sufficient water to make 1 gallon of glue. The mixture is stirred and allowed to soak, preferably overnight. It is then

heated in a double boiler to brushing consistency. Mixed with glycerin to serve as a plasticizer.

### **191. Glycerin, USP**

*a.* CHARACTERISTICS. A heavy, colorless liquid which mixes readily with water. Also known as glycerol.

*b.* UNITS OF ISSUE.

(1) ea : 4-oz. bottle.

(2) ea : 1-gal. can.

*c.* USE. For making litharge-glycerin cement. Also used with glue where it serves as a plasticizer.

### **192. Grease, Asbestos (GK)**

*a.* CHARACTERISTICS. A waterproof grease containing asbestos fibers. Its cohesive and adhesive properties are such as to permit its being spread evenly on surfaces, worked into cracks, and molded around spark plugs and other projecting parts.

*b.* UNIT OF ISSUE. ea : 25-lb. can.

*c.* USES.

(1) As a sealing compound with deep-water fording kits where excessive heat is not encountered (TM 9-2853).

(2) To cover sealing tape when more than a brush or spray-coating is desired.

(3) To fill the recesses around the spark plugs on certain truck engines to prevent accumulation of water during storage.

### **193. Pigment, Dry, Litharge**

*a.* CHARACTERISTICS. An amorphous powder which is light yellow to brick red in color and was formerly identified as technical lead monoxide (litharge). Litharge contains a minimum of 99 per cent lead monoxide.

*b.* UNITS OF ISSUE.

(1) ea : 1-oz. cntr.

(2) ea : 1-lb. ctn.

*c.* USE. To make litharge cement by mixing with glycerin to working consistency.

*d.* MIXING. Litharge is stirred or mullied with glycerin to form the desired consistency. Only enough is mixed for immediate use since it hardens within a short time.

### **194. Putty, Linseed Oil, White Lead-whiting**

*a.* CHARACTERISTICS. A mixture of basic lead carbonate, true chalk whiting (calcium carbonate), pure linseed oil, and drier.

It has a good plastic quality without sliminess or stickiness after thorough working with the hands.

*b.* UNITS OF ISSUE.

(1) ea: 1-lb. can.

(2) ea: 5-lb. can.

*Note.* ENG issue when present stocks are exhausted.

*c.* USE. For wood-sash glazing interior or exterior exposure. Also used to fill countersunk holes or dented imperfections in wood. Putty may be softened by adding a few drops of linseed oil while kneading with the hands.

*d.* APPLICATION. Can be readily applied with a putty knife. After molding into position, it will hold its shape and set. Putty should never be applied at temperatures below 40° F.

## 195. Sealer, Wood, Synthetic

*a.* CHARACTERISTICS. A transparent varnish based on an alkyd resin (type II) or a vegetable oil and/or resin (type III). It also contains a fungicide. The volatile portion contains a petroleum hydrocarbon having a minimum flash point of 102° F.

*b.* UNITS OF ISSUE.

(1) ea: 1-gal. can.

(2) ea: 5-gal. can.

*Note.* ENG issue when present stocks are exhausted.

*c.* USE. Used as a sealer on wood. Also used as a mildew preventive to retard or prevent the growth of the mildew organisms *aspergillus niger* and *chaetomium globosum*. Type II is used on surfaces where painting over the material is anticipated. Type III is used on surfaces where painting over the sealer is not anticipated.

*d.* APPLICATION. May be applied by spraying, brushing, dipping, or roller-coating.

## 196. Solvent, Rubber

*a.* CHARACTERISTICS. A water-white, flammable petroleum solvent which has a very fast evaporation rate. Initial boiling point is between 125° and 140° F. End point is between 210° and 225° F.

*b.* UNITS OF ISSUE.

(1) ea: 1-gal. can.

(2) ea: 5-gal. can.

(3) ea: 25-gal. drum.

(4) ea: 50-gal. drum.

*Note.* QMC issue when present stocks are exhausted.

*c.* USES.

(1) For thinning rubber cement or freshening dried stocks.

(2) To dissolve or disperse rubber.

(3) In the repair of rubber goods.

*Caution:* Flammable.

### **197. Tape, Cellulose, Transparent**

*a.* CHARACTERISTICS. A transparent, cellulose sheeting coated with water-insoluble gum. The adhesive is pressure-sensitive. The storage life is between 1 and 2 years depending on storage conditions. It loses its adhesive qualities with age. It is also known as gummed mending tape.

*b.* UNITS OF ISSUE.

(1) ea:  $\frac{3}{4}$ -in. width, 72-yd. roll.

(2) ea: 1-in. width, 72-yd. roll.

*Note.* Item (1) will be issued only until stocks are exhausted.

*c.* USE. Used in strippable film processing of matériel for storage and shipment.

### **198. Tape, Masking, Crepe-backed**

*a.* CHARACTERISTICS. This tape is backed with crepe kraft paper, which is impervious to and unaffected by paints, varnishes, and other finishes. The adhesive, containing a rubber-resin base, likewise, is in no way harmful to paints, varnishes, or other finishes. The adhesive is pressure-sensitive and requires no moisture, heat, or other manner of preparation prior to applying the tape. The storage life is between 1 and 2 years depending on storage conditions. It loses its adhesive qualities with age.

*b.* UNITS OF ISSUE.

(1) ea: 1-in. width, 60-yd. roll.

(2) ea: 2-in. width, 60-yd. roll.

*Note.* QMC issue when present stocks are exhausted.

*c.* USE. For masking prior to painting, etc.

### **199. Tape, Adhesive, Nonhygroscopic, Olive Drab**

*a.* CHARACTERISTICS. A strong, adhesive, olive drab cloth tape treated with lacquer or other suitable protective film to resist moisture penetration. The tape will not corrode polished metal surfaces, and is free from all materials which would injuriously affect dope, lacquer, varnish, paint, or other surface finishes. The adhesive is soluble in carbon tetrachloride, and is pressure-sensitive at temperatures above 32° F. The storage life is between 1 and 2 years depending on storage conditions. It loses its adhesive qualities with age.

*b.* UNITS OF ISSUE.

(1) ea: 1-in. width, 60-yd. roll.

(2) ea: 2-in. width, 60-yd. roll.

(3) ea: 4-in. width, 60-yd. roll.

- (4) ea: 6-in. width, 60-yd. roll.
- (5) ea: 2-in. width, 15-yd. roll.
- (6) ea: 4-in. width, 15-yd. roll.
- (7) ea: 6-in. width, 15-yd. roll.

*Note.* Items (5), (6), and (7) are to be issued only until stocks are exhausted. QMC issue when present stocks are exhausted.

**c. USES.**

- (1) This tape is designed primarily for application requiring high strength and maximum resistance to exposure to oil, rain, and sunlight.
- (2) It is intended for sealing equipment, such as guns, tanks, and vehicles which are shipped unboxed.
- (3) It is also intended for waterproofing operations on equipment being prepared for amphibious operations and for seals on gun and rifle muzzles.
- (4) Since it is oil-resistant, it may be coated with petroleum products to provide further protection against corrosion and moisture penetration.
- (5) Used as a substitute for "expendable muzzle cover."

## **Section V. MISCELLANEOUS OR RELATED MATERIALS**

### **200. Acid, Sulfuric, ACS, Concentrated (SP GR 1.835 at 15.5° C.)**

*a. CHARACTERISTICS.* A heavy, oily, highly corrosive, nonfuming acid, miscible with water in all proportions with evolution of heat. When properly diluted with distilled water, its chemical action on the plates of an acid-type storage battery produces electrical energy.

**b. UNITS OF ISSUE.**

- (1) ea: 1-lb. bottle with glass stopper.
- (2) ea: 75-lb. carboy (nets aprx. 5-gal).
- (3) ea: 190-lb. carboy (nets aprx. 13 gal.).

*Note.* Issued only to arsenals, depots, etc.

**c. USE.** Storage battery electrolyte when mixed with pure distilled water.

**d. DILUTION OF ACID.**

- (1) Concentrated sulfuric acid of 1.835 specific gravity at 15.5° C. is issued in encased 5- and 13-gallon carboys for preparing electrolyte of correct specific gravity.
- (2) Pure distilled water is produced in the field by ordnance units and some combat units provided with a still. It is issued to using units in any available, clean, stoppered container, usually without the formality of a requisition.
- (3) Obtain a clean, encased glass carboy and partly fill it

with pure distilled water. The amount will be determined by the amount of electrolyte of desired specific gravity (table VI and chart I). Do not fill the carboy more than half full.

- (4) Using a graduated glass, porcelain, earthenware, enamelware, or hard rubber pitcher and with the acid carboy mounted in a carboy tilting device, withdraw small amounts of sulfuric acid and pour into the carboy of distilled water. Pour the acid into the water slowly, stirring gently but thoroughly all the time. Large quantities may require hours for safe dilution.
- (5) Use only soft rain water or snow water when distilled water is not readily available. A fully charged battery will slowly discharge itself, even if pure distilled water is used in the electrolyte. If impure or hard water is used, or impurities get into the electrolyte, the rate of self-discharge increases as much as 50 percent per day.

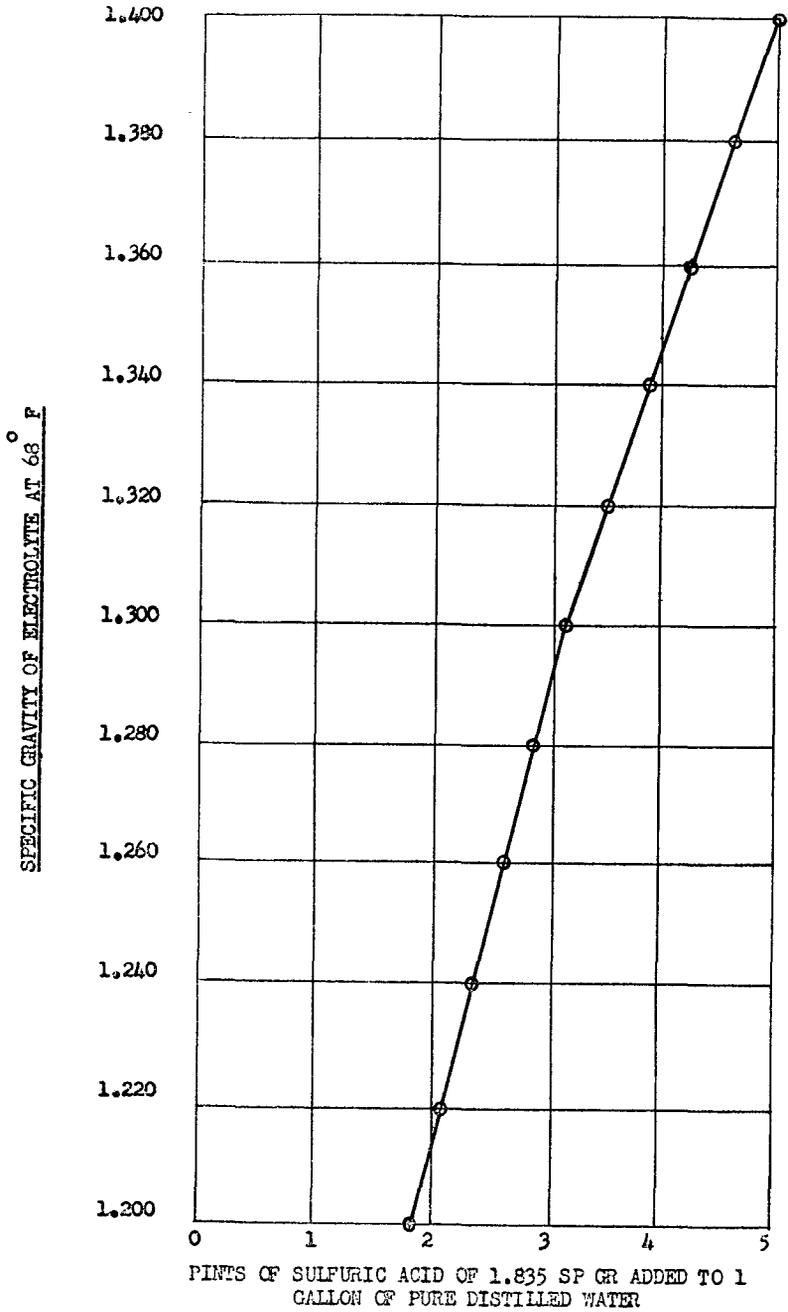
**Caution:** Never pour water into acid, as the mixture will spatter in all directions and may cause severe acid burns. Furthermore, care must be taken that the excessive amount of heat generated is dissipated fast enough to prevent cracking of the glass carboy thus eliminating the possibility of spilling the sulfuric acid. Wear rubber frame goggles, rubber apron, rubber shoes, and rubber gloves for general protection. If acid is spilled or splashed on the hands or other parts of the body, first aid may be administered by flushing with large quantities of water and following with a generous application of dry baking soda or in a solution of water (bicarbonate of soda or sodium bicarbonate).

*Table VI. Dilution of Sulfuric Acid*

Specific gravity desired	Pints of sulfuric acid, specific gravity 1.835, to be added to 1 gallon of pure distilled water	Freezing points of electrolyte (degrees F)
1.400	5.00	
1.380	4.60	
1.360	4.20	
1.340	3.80	
1.320	3.50	
1.300	3.10	—90
1.280*	2.80	—86
1.260	2.60	—75
1.240	2.30	—53
1.220	2.10	—31
1.200	1.80	—16

\*Equivalent to electrolyte in a fully charged battery, normal temperature areas.

Chart 1. Specific Gravity Range of Dilute Sulfuric Acid



## 201. Acid, Sulfuric, Dilute, Specific Gravity 1.280, Storage Battery (Electrolyte), Special

a. CHARACTERISTICS. A mixture of concentrated sulfuric acid and pure distilled water, having a specific gravity of 1.280 at 68° F. (room temperature). Its chemical action on the plates of a lead-acid storage battery cell produces electrical energy. Also commonly known as electrolyte.

b. UNITS OF ISSUE.

- (1) ea : 1-qt. bottle.
- (2) ea : 1-gal. bottle.

c. USES.

- (1) As an electrolyte in lead-acid type storage batteries when used in temperate and extreme-cold areas.
- (2) May be further diluted to suit lower specific gravity requirements when used in storage batteries in tropical-temperature areas (1.200 to 1.240) or for landing vehicles (1.200 to 1.225).

d. DILUTION OF ACID. Dilute the acid to the desired specific gravities, using proportions shown in table VII and observing the precautions outlined in paragraph 200.

Table VII. Dilution of Sulfuric Acid of Specific Gravity 1.280

Desired specific gravity	Parts of acid	Parts of water
1.275	35	1
1.270	25	1
1.200	13	1
1.250	9	1
1.240	25	4
1.230	18	4
1.225	15	4
1.220	12	4
1.210	10	4
1.200	8	4

## 202. Acid, Sulfuric, Reagent

a. CHARACTERISTICS. A highly corrosive liquid containing 50 percent pure sulfuric acid by weight. Specific gravity is 1.3951 at 68° F. The freezing point is -33° F.

b. UNIT OF ISSUE. ea : 1-pt. bottle, with glass stopper.

c. USE. Used as a control solution in phosphatizing processes.

## 203. Adapter, Ventilator, Metal

a. CHARACTERISTICS. This is a hopper-shaped adapter for installing the 3-inch orifice metal ventilator.

b. UNIT OF ISSUE. ea : 1 adapter.

c. USE. For use with VENTILATOR, metal (par. 249).

d. APPLICATION. As prescribed.

## 204. Barrier Material, Aluminum Foil

a. CHARACTERISTICS. Thin aluminum sheeting capable of being shaped without breaking or cracking, particularly when imbedded in mastic to seal openings.

b. UNITS OF ISSUE.

(1) ea : Barrier material, aluminum foil, 24 inches wide, 125-lb. roll :

Type I 0.003 caliper (aprx. 1470 lineal ft. per roll)

Type II 0.002 caliper (aprx. 2210 lineal ft. per roll)

Type III 0.0015 caliper (aprx. 2950 lineal ft. per roll)

*Note.* To be issued until stocks are exhausted.

(2) ea : Barrier material, aluminum foil, 24 inches wide, 48-lb. roll :

Type I 0.003 caliper (aprx. 565 lineal ft. per roll)

Type II 0.002 caliper (aprx. 850 lineal ft. per roll)

Type III 0.0015 caliper (aprx. 1130 lineal ft. per roll)

*Note.* To be issued when present stocks of 125-lb. rolls are exhausted.

c. USES.

(1) Types I and II are for use with COATING, bituminous, aluminum and COATING, bituminous, mastic, in the preparation of automotive matériel for storage and/or shipment where specifically prescribed.

(2) Types I, II, and III are for use in packaging Ordnance supplies when specified in current detailed packaging instructions.

## 205. Beeswax, Yellow

a. CHARACTERISTICS. A tough wax formed and secreted by honey bees. New wax is white or light-yellow but turns brown with age. The melting point usually varies between 140° and 152° F.

b. UNIT OF ISSUE. ea : 1-lb. cake.

*Note.* QMC issue when present stocks are exhausted.

c. USE. As a protective coating on metal when the matériel is being etched.

## 206. Chalk, Lump, White

*a.* CHARACTERISTICS. A high-quality chalk comprising approximately 90 percent calcium sulfate, free of grit and conspicuous air holes. It is furnished in tapered cylindrical shapes, the base diameter being approximately  $2\frac{1}{4}$  inches and the height  $1\frac{1}{16}$  inches. It is also known as carpenters' chalk and it is not coated for handling.

*b.* UNIT OF ISSUE. ea : 1-oz. hemispherical lumps.

*c.* USE. For transfer of chalk to a chalk line for snap-marking of steel, wood, concrete, and other smooth surfaces in construction work. For coating the surface of metal to provide legibility of fine layout markings. It can be converted to powder form by shaving or filing, when required, as preservation of rubber or for dusting through perforated templates.

## 207. Chalk, Railroad

*a.* CHARACTERISTICS. A high-quality chalk comprising approximately 90 percent calcium sulfate, free of grit and conspicuous air holes. It is available in blue or white colors. Railroad chalk is furnished in tapered cylindrical-crayon shape having end diameters of 1 inch and seven-eighths-inch, and a length of approximately 4 inches, with rounded tip. The crayon is coated with an enamel for cleanliness in handling.

*b.* UNITS OF ISSUE.

(1) gross : blue (10-lb.).

(2) gross : white (10-lb.).

*Note.* May be requisitioned in fractional parts of 1 gross.

*c.* USE. For marking on rough and smooth wood, stone, or metal surfaces.

## 208. Compound, Antifog

*a.* CHARACTERISTICS. A white, jellylike substance with a sweet odor.

*b.* UNIT OF ISSUE. ea : 2-oz. jar.

*c.* USES.

(1) To prevent condensation of moisture on eye and objective lenses of optical instruments, periscopes, and other glass surfaces.

(2) Antifog compound will be used only on the outer surfaces of eye lenses and objective lenses.

*d.* APPLICATION.

(1) It is applied sparingly with clean lens-tissue paper, and

care will be taken to cover the entire lens surface with a thin film of the compound.

- (2) After the compound has been allowed to dry, the lens will be polished lightly with clean, dry lens-tissue paper to remove any excess compound.
- (3) This procedure will be repeated whenever necessary, the intervals between applications varying with climatic conditions.

## 209. Compound, Water-repellent

*a.* CHARACTERISTICS. A material for treating glass and quartz which contains unhydrolyzed chlorosilanes based on the new organo-silicones. It forms a transparent film, and does not noticeably affect light transmission. Chemically, this material consists of partially hydrolyzed dimethyl dichloroethylenes.

*b.* UNIT OF ISSUE. ea: 0.5-ml glass vial with cotton applicator and polishing gauze pad in fiber tube.

*c.* USES.

- (1) Water-repellent compound is used on windshields, periscope windows, indicator windows, and similar exposed glass surfaces to improve vision, and to overcome objectionable interference caused by water adhering to the window glass during rain or during amphibious landing operations. Glass surfaces treated with this compound cannot be wet by water, which rolls off the glass in droplets.
- (2) This compound serves only as a water-repellent and its application must not be confused with the uses prescribed for antifog compound.

*d.* APPLICATIONS.

- (1) Thoroughly clean and dry surfaces before treating them with water-repellent compound.
- (2) Remove the gauze polishing pad packed with the vial.
- (3) Hold the vial with the cloth applicator end upwards. Then, using the fingers, crush the tip of the vial which is under the cloth applicator.
- (4) Invert the vial, allowing the liquid to flow into the applicator. Then use the applicator as a brush and apply a film of the compound to the surface to be treated.
- (5) Polish the surface dry, using the gauze pad issued with the vial.
- (6) The film of water-repellent compound will be applied sparingly. One vial is sufficient for coating the heads and elbows of five periscopes.

**Caution:** Extreme care must be taken to avoid contact with the skin or eyes. Do not use on metal, plastic, or coated optics.

## 210. Dye, Aniline

*a.* CHARACTERISTICS. An aniline dye soluble in water and other solvents. Comes in blue, red, and butter yellow colors.

*b.* UNIT OF ISSUE. ea: 1 gal.

*c.* USE. In strippable film processing of matériel for storage.

## 211. Filler, Graduation

*a.* CHARACTERISTICS. A compound having excellent adhesion and available in four colors. It provides maximum legibility on graduated scales. It is also known as "scale filler."

*b.* UNITS OF ISSUE.

(1) ea: 1-lb. can, black.

(2) ea: 1-lb. can, vermilion (deep).

(3) ea: 1-lb. can, white.

(4) ea: 1-lb. can, white, translucent.

*Note.* ENG issue when present stocks are exhausted.

*c.* USES.

(1) For filling in the graduation scales of fire control instruments.

(2) For small arms sight graduations where specifically prescribed.

(3) To replace a similar material which has been removed by cleaning operations.

## 212. Graphite, Lubricating, Amorphous, Powdered

*a.* CHARACTERISTICS. A natural, amorphous (noncrystalline) powder containing a minimum of 90 percent graphitic carbon. It is black or steel-gray in color, practically free from grit, abrasives, or flake graphite. It is free from powdered coal, lampblack, carbon black, oil, grease, and other adulterants.

*b.* UNITS OF ISSUE.

(1) ea: 1-lb. can.

(2) ea: Filled in graphite gun. (Issued until stocks are exhausted.)

*c.* USES.

(1) Required as a lubricant or gasket coating as prescribed in technical manuals where conditions of high temperature develop.

- (2) In ratio of one part graphite to four to five parts of sulfur where it is molded into rod-shape and used on welded seams of porous cast iron, while still hot, to fill the pores.
- (3) In hand-operated gun for application in otherwise inaccessible places such as the interior of padlocks, etc.
- (4) For coating sections of cannon bores prior to taking gutta percha or plaster-of-paris bore impressions.
- (5) For coating surfaces of molds before casting.

### **213. Graphite, Lubricating, Small Flakes**

*a.* CHARACTERISTICS. A fine grade of flake graphite containing a minimum of 90 percent graphitic carbon, free from coal, grit or other abrasive.

*b.* UNIT OF ISSUE. ea : 1-lb. can.

*c.* USES.

- (1) For preserving gerdom type gas check pads.
- (2) For same uses as specified by powdered, amorphous, lubricating graphite.

### **214. Gutta Percha**

*a.* CHARACTERISTICS. A black, low-melting compound similar to sealing wax, which becomes plastic at about 140° F., and upon hardening, retains its shape. It becomes brittle at low temperatures.

*b.* UNIT OF ISSUE. ea : 1-lb. slabs, approximately 1 inch thick.

*c.* USE. For making negative impressions of the surface of cannon bores not otherwise visible for accurate inspection. (See TM 9-1860.)

*d.* APPLICATION. Immersed in boiling water for approximately 10 minutes, it becomes soft and pliable and floats. Applied to surface to be reproduced in this molten condition, the compound will flow readily into recesses and cavities. The impression compound will set hard after cooling to approximately 70° F. and separate readily from the contacting surface. The negative impression will retain its record and shape and act as a mold for reproducing a positive impression for a period of 40 days under moderate ambient temperatures.

### **215. Gypsum, Calcined, Fine**

*a.* CHARACTERISTICS. A fine, white powder which, when mixed with water, quickly sets to a hard mass. It is also known as "plaster of paris" and patching plaster. Chemically, it is dehydrated calcium sulfate.

b. UNIT OF ISSUE. ea : 1-lb. can or bottle.

c. USES.

- (1) For setting leveling vials in fire control equipment, etc.
- (2) For making impressions of cannon bores when gutta percha is not available or desired.

## 216. Hydrogen Peroxide, Commercial, 100-volume

a. CHARACTERISTICS. A water white liquid which is a strong oxidizing agent. The term "100-volume" indicates the amount of free oxygen which is liberated. Freezing point is 30° F.

b. UNIT OF ISSUE. ea : 5-lb. dark bottle.

c. USE. To reduce the iron content in phosphatizing bath (TM 9-1861).

*Caution:* In order to preserve its strength, it is necessary to keep the material well-stoppered and in a cool, dark place.

## 217. Ink, Marking, Indelible, Waterproof

a. CHARACTERISTICS. A black indelible ink specially made for uncoated fabrics suitable for use in a power-operated laundry marking machine, with a rubber stamp or with an ordinary writing pen.

b. UNITS OF ISSUE.

- (1) ea : black, 1-gal. can.
- (2) ea : yellow, 1-gal. can.

*Note.* Issue until stocks are exhausted, then use INK, stencil, opaque (for nonporous surfaces).

c. USES.

- (1) For use on nonporous surfaces.
- (2) For marking ammunition with a rubber stamp.
- (3) For marking uncoated fabrics.

## 218. Ink, Stencil, Opaque (for Nonporous Surfaces)

a. CHARACTERISTICS. A quick-drying, light-resistant, weather-resistant, flat-finish stencil ink used for marking nonabsorbent surfaces. Stencil inks are usually composed of the same pigments and vehicles used to produce flat paints in which case the vehicle usually contains a minimum of 20 percent nonvolatile material. Stencil inks for nonporous surfaces have a maximum drying time of 15 minutes.

b. UNITS OF ISSUE.

- (1) ea : 1-gal. can, black.
- (2) ea : 1-gal. can, yellow.

c. **USE.** For marking or stenciling nonporous surfaces such as ammunition, glass surfaces, stone, etc.

d. **APPLICATION.** By stencil brush (not fountain brush) in conjunction with a perforated and/or machine cut metal, plastic, or oiled-paper stencil board.

**Caution:** Flammable.

## 219. Ink, Stencil, Opaque (for Porous Surfaces)

a. **CHARACTERISTICS.** A quick-drying, light-resistant, weather-resistant, flat-finish stencil ink used for marking porous surfaces such as wooden boxes, fiberboard cartons, bales, sacks, burlap, etc. It is available in black, white, red, yellow, green, light and dark blue, gray, maroon, and orange colors. Stencil inks usually contain the same pigments and vehicles used to produce flat paints in which case the vehicle contains a minimum of 20 percent non-volatile material. Stencil inks for porous surfaces have a maximum drying time of 5 minutes.

b. **UNITS OF ISSUE.**

(1) ea: 1-gal. can, black.

(2) ea: 1-gal. can, white.

c. **USE.** For marking or stenciling of porous surfaces.

d. **APPLICATION.** By use of a stencil brush of either the fountain or ordinary wood-handle type in conjunction with a perforated and/or machine cut metal, plastic, or oil-paper stencil board.

**Caution:** Flammable.

## 220. Lubricant, Tire Mold, Glycerin Base

a. **CHARACTERISTICS.** A fine, white powder. Chemically, it is composed of the sodium salts of sulfate mono-esters of a mixture of higher, fatty alcohols.

b. **UNIT OF ISSUE.** ea: 1-lb. sack.

c. **USE.** For coating the inner surfaces of tire molds to prevent sticking and to leave the mold tread-cut designs clean.

d. **APPLICATION.**

(1) The tire mold is sprayed with a 0.5-percent solution of the lubricant.

(2) Use 2 ounces of lubricant to 1 gallon of water.

## 221. Magnesium Fluoride, Chemically Pure

a. **CHARACTERISTICS.** A white, crystalline substance.

b. **UNIT OF ISSUE.** ea: ¼-lb. jar.

*Note.* For issue only to shops using SET, optical coating, cleaning and preserving materials, listed in ORD 6 SNL F-272.

c. **USE.** For coating optics to reduce the reflection of light.

## 222. Manganese Carbonate, Technical Grade

- a. CHARACTERISTICS. A light, white, water-soluble powder.
- b. UNIT OF ISSUE. ea: 10-lb. bottle.
- c. USE. For use in preparing phosphatizing solutions (TM 9-1861).

## 223. Methyl Orange and Xylene Cyanole, Solution (Indicator)

a. CHARACTERISTICS. An orange-red liquid composed of approximately 0.1 gram of methyl orange and 0.14 gram of xylene cyanole in 1,000 milliliters of distilled water. This indicator, when shipped from the manufacturer, is approximately 20 times stronger than required. Therefore, to prepare a ready-for-use liquid, it is necessary to prepare a 5-percent solution in distilled water. The property of this solution depends upon the tinctorial power of the dye "xylene cyanole." This is carefully determined by the manufacturer each time a fresh batch is prepared. The final indicator solution is correct for a pH range of 3.2 to 4.4.

b. UNIT OF ISSUE. ea: 16-oz. bottle in ready-to-use form.

*Note.* QMC issue when present stocks are exhausted.

c. USE. For use in testing manganese-base phosphate solutions for free acid (TM 9-1861).

## 224. Naphthalene, Ball

a. CHARACTERISTICS. White, crystalline balls derived from coal tar. Naphthalene vaporizes and forms a gas.

b. UNITS OF ISSUE.

(1) ea: 1-lb. bx.

(2) ea: 10-lb. bx.

*Note.* QMC issue.

c. USE. For prevention of damage to helmet liners, felt material, carpets, and paint brushes by moths. It must be used within wrapped packages of the material or in a confined place to retard loss of the naphthalene.

## 225. Oil, Castor, Technical Grade

a. CHARACTERISTICS. A transparent yellowish to yellowish-brown, odorless, vegetable oil obtained from the seeds of the castor plant. It is free of suspended matter, sediment, and admixture with other oils. Castor oil usually contains a small amount of oxidation inhibitors, such as hydroquinone not in excess of 0.2 percent by weight. This acts as a stabilizer against rancidity.

**b. UNITS OF ISSUE.**

- (1) ea : 1-qt. mtl. oblong can.
- (2) ea : 7-gal. mtl. oblong can.

**c. USES.**

- (1) Used on rubber or synthetic rubber packings of some hydropneumatic recoil mechanisms.
- (2) Preparation of hydraulic brake systems on vehicles for storage and shipment.
- (3) Preparation of hydraulic brake cylinders in packages.
- (4) Preparation of target marking ink.
- (5) Used to separate compound lenses bonded with thermo-setting cement (TM 9-1501).
- (6) Suitable for the treatment of leather.

## **226. Oil, Cutting, Soluble (OS)**

**a. CHARACTERISTICS.** A clean homogeneous oil free from disagreeable odor, mineral acids, sediment, or ingredients injurious to personnel as issued or in emulsion with water.

**b. UNITS OF ISSUE.**

- (1) ea : 1-gal. can.
- (2) ea : 5-gal. can.
- (3) ea : 55-gal. drum.

**c. USES.**

- (1) Primarily used as a coolant-lubricant-flushant for machine cutting and threading operations.
- (2) Added to water, 1 pint to 4 gallons, for flushing cooling systems.
- (3) Added to ethylene glycol/water antifreeze solution as a corrosion inhibitor when no regular inhibitor is available.

## **227. Oil, Low Vapor Pressure**

**a. CHARACTERISTICS.** A specially refined, colorless oil with high absorption capacity.

**b. UNIT OF ISSUE.** ea : 1,000-g can.

*Note.* Issued only to shops using optical-coating equipment listed in ORD 6 SNL F-272.

**c. USE.** Used in the diffusion pump on the optical-coating equipment (TM 9-1501).

## **228. Oil, Lubricating, Engine, SAE-10 (OE-10)**

**a. CHARACTERISTICS.** A noncorrosive lubricant with additives.

**b. UNIT OF ISSUE.** ea : 1-qt. screw-top can.

*Note.* QMC issue.

*c.* USE. For quenching and light tempering, and low-temperature-drawing heat treatment.

*d.* APPLICATION. By dipping items in a bath of oil, properly heated (TM 9-2835).

## **229. Oil, Lubricating, Engine, SAE-30 (OE-30)**

*a.* CHARACTERISTICS. A noncorrosive lubricant with additives.

*b.* UNIT OF ISSUE. ea: 1-qt. screw-top can.

*Note.* QMC issue.

*c.* USE. For quenching and light tempering, and low-temperature-drawing heat treatment.

*d.* APPLICATION. By dipping item in a bath of oil, properly heated (TM 9-2835).

## **230. Oil, Lubricating, Engine, SAE-50 (OE-50)**

*a.* CHARACTERISTICS. A noncorrosive lubricant with or without additives.

*b.* UNIT OF ISSUE. ea: 1-qt. screw-top can.

*Note.* QMC issue.

*c.* USE. For quenching and light tempering, and low-temperature-drawing heat treatment.

*d.* APPLICATION. By dipping item in a bath of oil, properly heated.

## **231. Oil, Lubricating, Steam Cylinder, Mineral**

*a.* CHARACTERISTICS. A refined petroleum oil containing no fatty oils, fatty acids, resins, soaps, or nonhydrocarbon materials. It is suitable for use at high temperatures and has a high viscosity.

*b.* UNIT OF ISSUE. ea: 1-gal. can.

*Note.* For issue only until stocks are exhausted.

*c.* USE. For quenching and tempering where a heavier oil than tempering oil is required. It is a substitute in the field for tempering oil. It is also used for the lubrication of noncondensing steam-engine cylinders.

*d.* APPLICATION. By dipping item in a bath of oil, properly heated.

## **232. Oil, Tempering, Light and Medium**

*a.* CHARACTERISTICS. A black, heavy petroleum oil with an admixture of animal oil, having a flash point of 350° F. (light) and 400° F. (medium). The pour point is 20° F. It is supplied in light and medium viscosities.

**b. UNIT OF ISSUE.** ea: 1-gal. can.

*Note.* To be issued only until stocks are exhausted. Service troops substitute lubricating engine oil SAE-10 or hydraulic oil for light class, and engine lubricating oil SAE-30 or recoil oil (special) for medium class.

**c. USE.** Used as a quenching oil and tempering oil for low-temperature-drawing heat treatment.

**d. APPLICATION.** By dipping item in a bath of oil, properly heated.

### **233. Paper, Black Velour**

**a. CHARACTERISTICS.** A lightweight paper of even texture and uncalendered or unpolished finish containing 70 percent rag stock. The color is fast black and will not run under wet conditions. It is stable in quality.

**b. UNIT OF ISSUE.** roll: 36-in. width, 11-yd. roll.

*Note.* QMC issue when present stocks are exhausted.

**c. USE.** For lining interiors of certain optical instruments.

### **234. Paper, Stencil Board (Oiled)**

**a. CHARACTERISTICS.** A firm, noncurling, oiled paperboard, having a smooth, ink-repellent surface. The sheets are 0.015 inch thick. The weight of 1,000 sheets, 20 x 24 inches, is 285 pounds.

**b. UNITS OF ISSUE.**

(1) ea: sheet, 12 x 36 in. (Issue only until stocks are exhausted).

(2) ea: sheet, 20 x 24 in.

(3) ea: sheet, 24 x 36 in. (Issue only until stocks are exhausted.)

*Note.* QMC issue when present stocks are exhausted.

**c. USE.** For making stencils having a high degree of resistance to wear.

### **235. Paste, Masking**

**a. CHARACTERISTICS.** A white or nearly white, noncorrosive, homogeneous paste which is free from grit and rough particles. It has no objectionable odor and is nontoxic.

**b. UNIT OF ISSUE.** ea: 1-gal. can.

**c. USE.** To prevent the adhesion of paints, enamels, and lacquers to glass, plastic, chromium, and other surfaces adjacent to areas which are being coated.

## 236. Phenolphthalein Test Solution, USP

a. **CHARACTERISTICS.** A water-white solution of phenolphthalein in an alcohol-water solution (50 percent pure ethyl alcohol and 50 percent distilled water).

b. **UNIT OF ISSUE.** ea: 16-oz. cntr.

*Note.* QMC issue when present stocks are exhausted.

c. **USE.** An indicator for testing phosphatizing solutions for percentage of acid phosphates (TM 9-1861).

## 237. Pigment, Paste-in-oil, Iron Blue

a. **CHARACTERISTICS.** A dry, iron-blue pigment ground in linseed oil (with a small amount of volatile thinner), to a semifluid or fluid consistency. It mixes readily with a thinning liquid to form a smooth product of brushing consistency. It has a relatively low specific gravity and high bulking value. This material is susceptible to the action of alkali.

b. **UNIT OF ISSUE.** ea: 1-oz. tube.

*Note.* ENG issue when present stocks are exhausted.

c. **USE.** As a marking material to show high-spots to be removed in fitting bearings to journals. Also used as a substitute for prussian blue.

## 238. Pigment, White Lead, Basic-carbonate

a. **CHARACTERISTICS.** A semipaste containing approximately the following materials: 87.5 percent white lead pigment, 10.5 percent linseed oil, and 2.0 percent volatile matter. Semipaste white lead is also known as soft-paste white lead, and can be poured.

b. **UNITS OF ISSUE.**

(1) ea: 1-lb. can.

(2) ea: 5-lb. can.

*Note.* ENG issue when present stocks are exhausted.

c. **USES.**

(1) A sealing and antiseize compound for threaded fittings, such as piping and the base plugs of empty projectiles.

(2) As prescribed for preparation of amphibious vehicles.

(3) A mixture of one-third pigment and two-thirds water pump grease or asbestos grease for application on brake mechanisms (cylinder covers, etc.), except the rubber cups of amphibious material.

(4) An extra-heavy rust preventive coating for exposed metallic surfaces.

(5) May be thinned by mixing with rust-preventive compound or mutton tallow for use as a preservative.

### 239. Potassium Permanganate Solution, Titrating

a. CHARACTERISTICS. A pink, aqueous solution composed of approximately 6.0 grams of chemically pure potassium permanganate dissolved in 1,000 milliliters of distilled water. When properly standardized, 1 milliliter of this solution is equivalent to 0.0100 gram of iron.

b. UNIT OF ISSUE. ea: ½-gal. dark-brown bottle.

Note. QMC issue when present stocks are exhausted.

c. USE. A titrating solution to determine the percentage of iron in phosphatizing process (TM 9-1861).

### 240. Sodium Hydroxide, ACS, Pellets

a. CHARACTERISTICS. A highly caustic chemical sometimes referred to as lye, caustic soda, sodium hydrate, or white caustic. It is white, deliquescent, and crystalline in structure. When dissolved in water, it generates a large amount of heat.

b. UNIT OF ISSUE. ea: 1-lb. can.

c. USE. For decoating of lenses and prisms of optical instruments (TM 9-1501).

**Caution:** It is very destructive to body and clothing. Burns must be treated immediately. Due to its hygroscopic nature, sodium hydroxide should be kept in tightly sealed containers. This will prevent the absorption of water and carbon dioxide from the atmosphere.

### 241. Sodium Hydroxide Solution, USP, Volumetric, One-tenth Normal

a. CHARACTERISTICS. A standardized solution of chemically pure sodium hydroxide in distilled water suitable for chemical analyses. Freezing point is approximately 31° F.

b. UNIT OF ISSUE. ea: 1-gal. bottle.

c. USE. For use in testing phosphate solutions to determine the percentage of acid phosphates (TM 9-1861).

### 242. Sodium Silicate (Solution), Liquid

a. CHARACTERISTICS. A syrupy and cloudy solution of sodium silicate in water.

b. UNIT OF ISSUE. ea: 1-gal. can.

c. USE. Used in connection with reababbiting of bearings, etc. (See ORD 5 SNL J-20.) Also used for coating asbestos pipe insulation.

## 243. Padding, Crepe, Impregnated with Vinylite

a. CHARACTERISTICS. A cushioning material composed of a crepe which has been impregnated with a vinyl resin.

b. UNIT OF ISSUE. roll: 24-in. width, 75-yd. roll.

c. USE. As a cushioning material in strippable film process preservation operations for storage of anti-aircraft matériel.

## 244. Stencil, Paper, Gummed Back

a. CHARACTERISTICS. Most stencils are made from a Kraft type treated paper with an adhesive backing. Star stencils are made from cardboard and are ungummed (*b*(1) below).

b. DESIGNS, SIZES, AND UNITS OF ISSUE OF STENCILS.

Design	Unit of issue	Stencil size
Star insignia -----	ea	4-, 6-, 10-, 12-, 15-, 16-, 20-, 25-, 32-, and 36-in. ungummed backs.
Cross -----	ea	40-in. gummed back.
"U.S.A." and "W" -----	set	{ 1-in. high, gummed back, set of 5 in a pkg. 2-in. high, gummed back, set of 5 in a pkg. 3-in. high, gummed back, set of 5 in a pkg. 4-in. high, gummed back, set of 5 in a pkg.
Numerals "0" through 9.	set	{ 1-in. high, gummed back, set of 5 in a pkg. 2-in. high, gummed back, set of 5 in a pkg. 3-in. high, gummed back, set of 5 in a pkg. 4-in. high, gummed back, set of 5 in a pkg.
"S" -----	set	{ 2-in. high, gummed back, set of 5 in a pkg. 3-in. high, gummed back, set of 5 in a pkg.
"AMBULANCE" -----	set	Gummed back, 1 ea.
Caduceus -----		Gummed back, 2 ea.
Cross -----		Gummed back, 2 ea., 4 in.
Cross -----		Gummed back, 2 ea., 8 in.
Cross -----		Gummed back, 2 ea., 20 in.

Note. QMC issue when present stocks are exhausted.

c. USE. For marking matériel in accordance with AR 850-5.

## 245. Stopper, Cork, Straight, Extra-Long

a. CHARACTERISTICS. An uncemented, Standard XXXX, extra-long cork stopper made of natural corkwood.

b. UNIT OF ISSUE. M: diam  $\frac{3}{8}$  in., lgh.  $\frac{7}{8}$  in. (May be ordered in multiples of 100.)

c. USE. As an alternate for tapered cork stoppers for plugging the muzzle of the cal. .30 machine gun; the muzzles and gas ports

of the cal. .30 US rifle, cal. .30 US carbine, and cal. .30 automatic rifle during phosphatizing process.

*d. APPLICATION.* New corks must be soaked for 15 minutes at 200° F. in 10-percent solution of trisodium phosphate and water to remove tannic acid which may cause discoloration of the barrel. After above treatment, wash corks with clean water and dry. Then dip stopper in light oil before reuse.

## 246. Stopper, Cork, Tapered, Uncemented

*a. CHARACTERISTICS.* An uncemented cork made of natural cork-wood, in the grades, classes, and identifying numbers as given below.

### *b. UNITS OF ISSUE.*

- (1) M: No. 000, lgh  $\frac{1}{2}$  in., end diam.  $\frac{1}{4}$  and  $\frac{5}{32}$  in., class 2, grade A.
- (2) M: No. 00, lgh  $\frac{5}{8}$  in., end diam.  $\frac{5}{16}$  and  $\frac{3}{16}$  in., class 3, grade A (extra long).
- (3) M: No. 1, lgh  $\frac{5}{8}$  in., end diam.  $\frac{7}{16}$  and  $\frac{21}{64}$  in., class 2, grade A.
- (4) ea: No. 2, lgh  $\frac{11}{16}$  in., end diam.  $\frac{1}{2}$  and  $\frac{3}{8}$  in., class 2, grade A.
- (5) M: No. 4, lgh  $\frac{15}{16}$  in., end diam.  $\frac{5}{8}$  and  $\frac{29}{64}$  in., class 3, grade A (extra long).
- (6) M: No. 9, lgh  $1\frac{1}{4}$  in., end diam.  $\frac{15}{16}$  and  $\frac{45}{64}$  in., class 3, grade A (extra long).
- (7) ea: No. 11, lgh  $1\frac{1}{4}$  in., end diam.  $1\frac{1}{16}$  and  $\frac{53}{64}$  in., class 2, grade B.
- (8) ea: No. 24, lgh  $1\frac{1}{2}$  in., end diam.  $\frac{17}{8}$  and  $1\frac{19}{32}$  in., class 2, grade B.

*Note.* Items (1), (2), (3), (5), and (6) may be ordered in multiples of 100.

### *c. USES.*

- (1) For plugging the bores of small arms during phosphatizing operations.
  - (a) *No. 000.* Used in muzzle of cal. .22 US rifle.
  - (b) *No. 00.* Used in breech of cal. .22 US rifle.
  - (c) *No. 1.* Used in muzzle of cal. .30 machine gun; the muzzle and gas port of cal. .30 rifle M1 and cal. .30 automatic Browning rifle, and the muzzle and breech of cal. .30 US carbine.
  - (d) *No. 2.* For issue to shops using coated-optics equipment listed in ORD 6 SNL F-272 and for use on small arms matériel where required.

- (e) *No. 4.* Used in cal. .45 pistol and submachine gun M3; in the muzzle of the cal. .50 machine gun; and in the breech of cal. .30 US rifle and cal. .30 machine gun.
  - (f) *No. 9.* Used in the breech of the cal. .50 machine gun and in gas cylinder of cal. .30 carbine.
  - (g) *No. 11.* For issue to shops using coated-optics equipment listed in ORD 6 SNL F-272 and for use on small arms matériel where required.
  - (h) *No. 24.* For issue to shops using coated-optics equipment listed in ORD 6 SNL F-272 and for use on small arms matériel where required.
- (2) When issuing pure distilled water to troops in glass bottles.

*d.* APPLICATION. New corks must be soaked for 15 minutes at 200° F. in 10-percent solution of trisodium phosphate and water to remove tannic acid which may cause discoloration of the barrel. After above treatment, wash corks with clean water and dry. Dip stopper in light oil before reuse (except when used in bottling distilled water).

## **247. Strainer, Paint, Cloth, Conical**

*a.* CHARACTERISTICS. A conical-shaped strainer containing stiffened cheesecloth as the straining material.

*b.* UNIT OF ISSUE. ea: 1-qt. size.

*Nota.* QMC issue when present stocks are exhausted.

*c.* USE. For straining sludge and other foreign matter from liquid preservatives and cleaners.

## **248. Strainer, Paint, Metal-screen Type**

*a.* CHARACTERISTICS. A sheet metal, tapered strainer with a top diameter of 12 to 13 inches, a bottom diameter of 7½ to 8½ inches, and a height of 5 to 6 inches. It has two handles, one on each end.

*b.* UNIT OF ISSUE. ea: one strainer.

*c.* USE. For straining sludge, skins, and other foreign matter from liquid preservatives and cleaners.

## **249. Talcum, Technical Grade (Soapstone), Powdered**

*a.* CHARACTERISTICS. A fine, greasylike, soft, white powder, also known as powdered soapstone. It is sometimes used as a substitute for French chalk and tire talc.

*b.* UNITS OF ISSUE.

(1) ea: 1-lb. can, sifter type, w/cap.

(2) ea: 5-lb. bag.

**c. USES.**

- (1) For dusting the interior surfaces of tires when assembling tubes.
- (2) Used in the preservation of rubber eyepieces, face pieces, etc.
- (3) For making sectional curing bag paint for tire repair.
- (4) For dusting synthetic rubber gas check pads after washing with soap and water.

## **250. Ventilator, Metal, 3-inch Orifice**

**a. CHARACTERISTICS.** An exhaust type ventilator.

**b. UNIT OF ISSUE.** ea: one ventilator.

**c. USE.** For use in ventilation of tactical and special purpose vehicles in storage.

**d. APPLICATION.** Installed with ADAPTER, ventilator metal, as prescribed.

## **251. Waste, Wool, Colored**

**a. CHARACTERISTICS.** A homogeneous mass of a high-grade, extra-long fiber, woolen carpet and merino yarn waste.

**b. UNITS OF ISSUE.**

(1) ea: 5-lb. pkg.

(2) ea: 100-lb. bale.

*Note.* QMC issue when present stocks are exhausted.

**c. USE.** For oil-packing of railroad car journal bearing boxes, artillery trail hinges, and similar waste-packed bearing surfaces.

## **252. Wax, Insulating, Moisture- and Fungus-resistant**

**a. CHARACTERISTICS.** A blend of microcrystalline, petroleum wax containing a chemical fungicide. The melting point is approximately 185° F.

**b. UNIT OF ISSUE.** ea: 10-lb. block.

**c. USE.** To protect electrical components of fire control equipment against moisture, mildew, low leakage resistance, and dielectric breakdown between terminals.

## **253. Wax, Stitching, Summer, Brown**

**a. CHARACTERISTICS.** A hard, brown, rosin or pitchlike substance with a melting point of 122° to 126° F. It contains no ingredients that would be injurious in any way to thread or leather.

*b.* UNIT OF ISSUE. ea : ½-lb. ball.

*Note.* QMC issue when present stocks are exhausted.

*c.* USE. For waxing thread for sewing leather goods in summer temperatures.

## **254. Wood Substitute, Plastic, Natural**

*a.* CHARACTERISTICS. A light-colored, nontoxic, water-resistant material containing wood fibers and other materials to form a mixture that will be plastic, easily formed, quick-setting, and hardening. This material hardens to unusable form if not kept in well-sealed containers. When dry (within 4 hours), it can be readily cut, sawed, bored, reamed, and filed. It withstands driving of nails into it without cracking, and adheres strongly to wood and/or metal surfaces. Acetone is the proper material to use for thinning purposes.

*b.* UNIT OF ISSUE. ea : 1-lb. can.

*c.* USE. For filling in undesirable holes and cracks or building up parts of wood patterns or joiner work. It is also used for plugging over countersunk screw heads, etc.

# APPENDIX I

## REFERENCES

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### 1. Publication Indexes

The following publication indexes and lists of current issue should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to matériel covered in this manual:

- Index of Administrative Publications (Army Regulations, Special Regulations, Joint Army-Air Force Adjustment Regulations, General Orders, Bulletins, Commercial Traffic Bulletins, Joint Procurement Circulars, Department of the Army Pamphlets, and ASF Manuals). SR 310-20-5
- Index of Army Motion Pictures and Film Strips SR 110-1-1
- Index of Blank Forms and Army Personnel Classification Tests. SR 310-20-6
- Index of Training Publications (Field Manuals, Training Circulars, Firing Tables and Charts, Army Training Programs, Mobilization Training Programs, Graphic Training Aids, Joint Army-Navy Air Force Publications, and Combined Communications Board Publications). SR 310-20-3
- Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, Tables of Equipment. SR 310-20-4
- Introduction and Index (Supply Catalogs) ORD 1
- Military Training Aids FM 21-8

### 2. Supply Catalogs

The following catalogs of the Department of the Army Supply Catalog pertain to this matériel:

- Cleaners, Preservatives, Lubricants, Recoil Fluids, Special Oils, and Related Maintenance Materials. ORD 3 SNL K-1

Items of Soldering, Metallizing, Brazing, and Welding Materials; Gases and Related Items. ORD 3 SNL K-2  
 Miscellaneous Kits and Tool Sets\_\_\_\_\_ ORD 5 SNL J-20  
 Tool Sets for Maintenance of Sighting and Fire Control Equipment. ORD 6 SNL F-272

### 3. Other Publications

The following explanatory publications contain information pertinent to this matériel and associated equipment:

#### a. GENERAL.

Black-Finishing Equipment for Ferrous Metals\_\_\_\_\_ TM 9-1861  
 Marking of Clothing, Equipment, Vehicles, and Property. AR 850-5  
 Star-Gaging Equipment, Impression Outfits, and Pressure Gages. TM 9-1860  
 Storage Batteries, Lead-Acid Type\_\_\_\_\_ TM 9-2857

#### b. MAINTENANCE AND REPAIR.

Cable System, M1 (for 90-mm Antiaircraft Gun Mounts M1A1 and M2). TM 9-1649  
 Chassis-Coating Compound (Underbody-Coating Compound)—Description, Method of Application, and Equipment Use. TB ORD 401  
 Cooling Systems: Vehicles and Powered Ground Equipment. TM 9-2858  
 Fungus-Proofing Optical Instruments\_\_\_\_\_ TB ORD 331  
 Instruction Guide, Instrument Repairman\_\_\_\_\_ TM 9-2602  
 Lubrication \_\_\_\_\_ TM 9-2835  
 Operation and Maintenance of Optical Coating Equipment. TM 9-1501  
 Ordnance Vehicles Reverse Flushing of Cooling System. TB ORD 361  
 Painting Instructions for Field Use\_\_\_\_\_ TM 9-2851  
 Preparation of Ordnance Matériel for Deep Water Forging. TM 9-2853

#### c. SHIPMENT AND LIMITED STORAGE.

Inspection, Preservation and Maintenance in Storage of Small Arms Matériel. SB 9-65  
 Instruction Guide, Ordnance Packaging and Shipping (Posts, Camps, and Stations). TM 9-2854  
 Instructions for Preservation of Mobile Artillery Matériel for Stand-By Storage. SB 9-61  
 Ordnance Storage and Shipment Chart—Group A. TB 9-OSSC-A

Ordnance Storage and Shipment Chart—Group B. SB 9-OSSC-B  
 Ordnance Storage and Shipment Chart—Group C. TB 9-OSSC-C  
 Ordnance Storage and Shipment Chart—Group D. SB 9-OSSC-D  
 Ordnance Storage and Shipment Chart—Group F. SB 9-OSSC-F  
 Ordnance Storage and Shipment Chart—Group G. TB 9-OSSC-G  
 Ordnance Storage and Shipment Chart—Group J. SB 9-OSSC-J  
 Ordnance Storage and Shipment Chart—Group K. SB 9-OSSC-K  
 Ordnance Storage and Shipment Chart—Group L. SB 9-OSSC-L  
 Packaging and Packing for Overseas Shipment— Methods of Preservation. JAN-P-116  
 Packaging and Packing of Engines, Spare or Installed (Other Than Aircraft). MIL-P-10062 (ORD)  
 Preparation of Unboxed Ordnance Matériel for Shipment. SB 9-4  
 Preservation of Excess and/or Surplus Unboxed Motor Vehicles. SB 9-67  
 Preservation, Packaging and Packing Materials, Supplies, and Equipment Used in the Army. SB 38-100  
 Protection of Ordnance General Supplies in Open Storage. TB ORD 379  
 Storage, Inspection, and Issue of Unboxed Serviceable Motor Vehicles; Preparation of Unserviceable Vehicles for Storage; and Deprocessing of Matériel Prior to Operation. SB 9-63

## APPENDIX II

### LIST OF ABBREVIATIONS

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The following is a list of abbreviations appearing in this manual:

AA	antiaircraft
ACS	American Chemical Society
aprx.	approximately
bbl	barrel
bndl	bundle
bx	box
cal.	caliber
CmlC	Chemical Corps
cntr	container
CO	Chief of Ordnance
ctn	carton
°C.	degree Centigrade
°F.	degree Fahrenheit
diam.	diameter
ea	each
ENG	Corps of Engineers
etc.	and so forth (et cetera)
fbr	fiber
g	gram (s)
gal.	gallon (s)
gr	grain
ICC	Interstate Commerce Commission
i.e.	that is, namely
in.	inch (es)
kg	kilogram (s)
lb.	pound (s)
lgh	length
M	model, one thousand
med	medium
ml	milliliter (s)
mm	millimeter (s)
mtl	metal
NG	National Guard
No.	No.
OD	outside diameter
ORC	Organized Reserve Corps

oz.	ounce (s)
par.	paragraph
pc	piece
pH	the reciprocal of the logarithm of the hydrogen ion concentration
pkg	package
pt	pint (s)
QMC	Quartermaster Corps
qt.	quart (s)
rd	round (s)
rect	rectangular
ROTC	Reserve Officers Training Corps
sp gr	specific gravity
US	United States
USA	United States Army
USP	United States Pharmacopoeia
wtrprf	waterproof
wxd	waxed
x	by, in dimensions only as 2 x 4
yd	yard (s)
ZI	Zone of Interior

## APPENDIX III

### HYDROMETER CONVERSION DATA

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In handling liquids, such as acids, alkalis, and other solutions, either heavier or lighter than water, it is customary to use the Baumé scale of degrees instead of specific gravity readings to express the density of the liquid. The Baumé scale is easier to use because it does not have small decimals as is shown by the following values for nitric acid:

Baumé (Bé) deg	Sp gr
10.00	1.0741
20.00	1.1600
30.00	1.2609
40.00	1.3810

For liquids heavier than water, the conversion equation is:

$$\text{Bé deg} = 145 - \frac{145}{\text{sp gr}^*}$$

For liquids lighter than water, the conversion equation is:

$$\text{Bé deg} = \frac{140}{\text{sp gr}^*} - 130$$

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\*All densities taken at 60° F. and referred to water at 60° F. as standard.

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TECHNICAL MANUAL

**ABRASIVE, CLEANING, PRESERVING, SEALING,  
ADHESIVE, AND RELATED MATERIALS ISSUED  
FOR ORDNANCE MATERIEL**

CHANGES }  
No. 1 }

DEPARTMENT OF THE ARMY  
WASHINGTON 25, D. C., 28 July 1954

TM 9-850, 10 October 1951, is changed as follows:

**14.1. Aluminum Oxide**  
(Added)

*a. Characteristics.* A hard, reddish-brown abrasive. It is produced in an electric furnace from bauxite, to which is added a small amount of coke and iron filings. Because of its grain structure, it does not fracture easily and will stand up under the most severe working conditions.

*b. Units of Issue.*

- (1) Grit No. 20: Each 1-lb air-tight container.
- (2) Grit No. 24: Each 1-lb air-tight container.
- (3) Grit No. 30: Each 1-lb air-tight container.
- (4) Grit No. 46: Each 1-lb air-tight container.
- (5) Grit No. 800: Each 5-lb container and 25-lb container.

*c. Use.* For grinding and polishing metals.

**14.2. Band, Abrasive, Aluminum Oxide, Spiral Wound, Cloth Backing, Resin Bond**  
(Added)

*a. Characteristics.* An aluminum oxide abrasive with cloth backings of jeans or drills cloth. The bands are sleeves with a diameter less than 4 inches. Because they are spirally wound, the abrasive surface is endless and jointless.

*b. Units of Issue.*

Width	Diameter	Grit No.
1 1/2 in	1 in	36 (2)
3 in	3 in	24 (3)
3 in	3 in	50 (1)
3 in	3 in	80 (1/0)
6 in	2 in	80 (1/0)
6 in	3 in	80 (1/0)
7 5/8 in	3 in	40 (1 1/2)

*c. Uses.* With a portable hand grinder and rubber-cushioned polishing wheel for deburring and polishing irregular areas, depres-

sions, contoured and curved surfaces, and other hard-to-finish surfaces.

### 14.3. Belt, Abrasive, Aluminum Oxide, Cloth-Backing (Added)

*a. Characteristics.* An aluminum oxide abrasive with cloth backing. The cloth backing is good quality jeans cloth for grits number 80 and smaller and drills cloth for coarser grits. The cloth is "closed coat". The abrasive grit is applied to only one side of the cloth and covers the surface completely.

#### *b. Units of Issue.*

<i>Grit. No.</i>	<i>Width</i>	<i>Length</i>
120 (3/0)	3 in	23¾ in
100 (2/0)	3 in	23¾ in
80 (1/0)	3 in	23¾ in
60 (½)	3 in	23¾ in
50 (1)	3 in	23¾ in
100 (2/0)	3 in	24 in
80 (1/0)	3 in	24 in
60 (½)	3 in	24 in
30 (2½)	3 in	23¾ in
30 (2½)	3 in	24 in
50 (1)	3 in	24 in
40 (1½)	3 in	24 in
60 (½)	4 in	36¼ in
120 (3/0)	4 in	36¼ in
100 (2/0)	4½ in	26 in
50 (1)	4½ in	26 in
36 (2)	4½ in	26 in
24 (3)	4½ in	26 in
50 (1)	6 in	48 <sup>5</sup> / <sub>16</sub> in
200 (2/0)	6 in	48 <sup>5</sup> / <sub>16</sub> in
120 (3/0)	8 in	21 <sup>5</sup> / <sub>8</sub> in

*c. Uses.* When mounted on a portable or stationary-type sanding machine, these belts provide a rapid and economical method for eliminating die and tool marks, nicks and scratches, and other defects from metal surfaces. Belts are utilized for sanding operations on flat, curved, or irregular surfaces.

### 14.4. Belt, Abrasive, Garnet, Cloth-Backing (Added)

*a. Characteristics.* A cloth-backed abrasive not quite as hard as aluminum oxide. The belts are composed of diagonal-weave cloth which is drills or jeans cloth, depending on the grit size.

### *b. Units of Issue.*

<i>Grit. No.</i>	<i>Width</i>	<i>Length</i>
120 (3/0)	3 in	27 in
80 (1/0)	3 in	27 in
60 (½)	3 in	27 in
50 (1)	3 in	27 in
40 (1½)	3 in	27 in
36 (2)	3 in	27 in
24 (3)	3 in	27 in
36 (2)	4 in	53 in
36 (2)	4 in	64 in
60 (½)	4 in	64½ in
24 (3)	4½ in	26 in
50 (1)	6 in	171 in
120 (3/0)	4½ in	26 in
40 (1½)	4½ in	26 in
80 (1/0)	6 in	48⅞ in
40 (1½)	6 in	48⅞ in

### *c. Uses.*

- (1) For the sanding of wood and certain wood finishes to condition for subsequent coats.
- (2) For the sanding of curved or irregular wood surfaces.
- (3) The operating speed for garnet belts is usually slower than that required for harder abrasives such as aluminum oxide.

## **14.5. Belt, Abrasive, Silicon Carbide, Cloth-Backing, Wet or Dry (Added)**

*a. Characteristics.* These belts consist of a lap-jointed drills cloth to which the silicon-carbide is bonded with an adhesive that is not softened or otherwise impaired by water.

### *b. Units of Issue, Each Belt.*

- (1) Grit No. 220 (6/0), width 4 in, 106 in long.
- (2) Grit No. 120 (3/0), width 4 in, 106 in long.
- (3) Grit No. 80 (1/0), width 4 in, 106 in long.

*c. Use.* On horizontal and vertical belt-type sanding equipment for grinding and finishing metal parts.

## **15. Cloth, Abrasive, Aluminum Oxide, Closed Coat**

\* \* \* \* \*

### *b. (Superseded) Units of Issue.*

- (1) Each: roll, 50 yd.
  - (a) Width 1 in, grit No. 240 (7/0), 150 (4/0), 100 (2/0), and 50 (1).
  - (b) Width 1½ in, grit No. 150 (4/0), 100 (2/0), 80 (1/0), 60 (½), 50 (1) and 36 (2).

- (c) Width  $1\frac{3}{8}$  in, grit No. 100 (2/0) and 50 (1).
- (d) Width 2 in, grit No. 320 (9/0), 240 (7/0), 220 (6/0), 180 (5/0), 150 (4/0), 120 (3/0), 100 (2/0), 80 (1/0), 60 ( $\frac{1}{2}$ ), 50 (1), 40 ( $1\frac{1}{2}$ ), and 36 (2).
- (e) Width 4 in, grit No. 80 (1/0) and 60 ( $\frac{1}{2}$ ).
- (f) Width 8 in, grit No. 12 ( $4\frac{1}{2}$ ).
- (g) Width 24 in, grit No. 100 (2/0).
- (2) Each: sheets, 9 x 11 in, sleeve of 50 sheets.  
Grit No. 320 (9/0), 240 (7/0), 220 (6/0), 180 (5/0), 150 (4/0), 120 (3/0), 100 (2/0), 80 (1/0), 60 ( $\frac{1}{2}$ ), 50 (1), 40 ( $1\frac{1}{2}$ ), 36 (2), and 30 ( $2\frac{1}{2}$ ).
- (3) Each: package, sheets  $4\frac{1}{2}$  x  $5\frac{1}{2}$ , 12 sheets in package (used in Army-Navy Radio Set AH-CPS-1).  
Grit No. 120 (3/0), 100 (2/0), 80 (1), 60 ( $\frac{1}{2}$ ), 40 ( $1\frac{1}{2}$ ), and 30 ( $2\frac{1}{2}$ ).

\* \* \* \* \*

### 15.1. Cloth, Abrasive, Silicon-Carbide

(Added)

a. *Characteristics.* Silicon-carbide grit cemented on a cloth backing. Drills cloth is used for No. 60 grit and jeans cloth for No. 80 grit and finer.

b. *Units of Issue.*

- (1) Each: package, sheets 9 x 11, 50 sheet sleeve, grit numbers as shown below.

Grit No. 320 (9/0)	Grit No. 120 (3/0)
Grit No. 240 (7/0)	Grit No. 100 (2/0)
Grit No. 180 (5/0)	Grit No. 80 (1/0)
Grit No. 150 (4/0)	Grit No. 60 ( $\frac{1}{2}$ )

- (2) Each: roll, 6 in x 96 ft, grit No. 60 ( $\frac{1}{2}$ ).

c. *Uses.*

- (1) The abrasive-coated sheets are used to abrade metals of low tensile strength, such as aluminum and bronze.
- (2) The roll material is cut into pieces of suitable lengths and used for nonslip treads on floors, stairways, decks, etc.

### 15.2. Cloth and Paper Combination, Abrasive, Silicon-Carbide

(Added)

a. *Characteristics.* This abrasive consists of a 60 x 60 weave cotton cloth cemented to a heavy Kraft paper with an open coat application of silicon carbide grit on the cotton side.

b. *Units of Issue.*

- (1) Grit No. 50 (1), package, 9 x 11 sheet, 50 sheet sleeve.

- (2) Grit No. 50 (1), package, heel breaster piece (style 303), 100 piece package.
- (3) Grit No. 16 (4), package, 9 x 11 sheet, 25 sheet sleeve.

*c. Uses.*

- (1) The 9 x 11 sheets are used for buffing leather in shoe repairing.
- (2) The heel breaster is the inner face at the heel of a shoe.
- (3) The grit No. 16 abrasive is used to roughen soles to obtain good adhesion in shoe repairing.

### 17.1. Disk, Abrasive, Aluminum Oxide, Closed-Coat (Types I and II) (Added)

*a. Characteristics.* The aluminum oxide disks are composed of a combination cotton drill and vulcanized fiber backing, with the abrasive bonded to the backing either with glue or synthetic-resin adhesive. For closed-coat disks, the abrasive grit is applied over the entire surface of the backing. For open-coat disks, 50 percent of the surface of the backing is covered, leaving open spaces between the abrasive grits. The disks are provided with arbor holes so that the disks can be clamped to the rotating element of the motor-driven sanding machine.

*b. Units of Issue. Each.*

- (1) *Type I, class I, closed-coat, glue bond.*

<i>Diameter</i>	<i>Arbor Hole</i>	<i>Grit No.</i>
7 in	$\frac{1}{2}$ in	150 (4/0)
7 in	$\frac{7}{8}$ in	150 (4/0)
7 in	$\frac{1}{2}$ in	100 (2/0)
7 in	$\frac{7}{8}$ in	100 (2/0)
7 in	$\frac{1}{2}$ in	60 ( $\frac{1}{2}$ )
7 in	$\frac{7}{8}$ in	60 ( $\frac{1}{2}$ )
7 in	$\frac{7}{8}$ in	50 (1)
7 in	$\frac{7}{8}$ in	36 (2)
7 in	$\frac{7}{8}$ in	16 (4)

- (2) *Type II, class 1, closed-coat, synthetic-resin bond.*

<i>Diameter</i>	<i>Arbor Hole</i>	<i>Grit No.</i>
7 in	$\frac{7}{8}$ in	100 (2/0)
7 in	$\frac{1}{2}$ in	80 (1/0)
7 in	$\frac{7}{8}$ in	80 (1/0)
$9\frac{1}{8}$ in	$\frac{1}{2}$ in	80 (1/0)
$9\frac{1}{8}$ in	$\frac{7}{8}$ in	80 (1/0)
7 in	$\frac{1}{2}$ in	36 (2)
7 in	$\frac{7}{8}$ in	36 (2)
$9\frac{1}{8}$ in	$\frac{1}{2}$ in	36 (2)
$9\frac{1}{8}$ in	$\frac{7}{8}$ in	36 (2)

<i>Diameter</i>	<i>Arbor Hole</i>	<i>Grit No.</i>
7 in	$\frac{1}{2}$ in	24 (3)
7 in	$\frac{7}{8}$ in	24 (3)
$9\frac{1}{8}$ in	$\frac{1}{2}$ in	24 (3)
$9\frac{1}{8}$ in	$\frac{7}{8}$ in	24 (3)

*c. Uses.* The disks are used to remove rust, scale, weld flashers, old finishes, etc, from metal surfaces. The best results with abrasive disks are obtained when the angle between the disk and the work being ground does not exceed 9°. A firm steady pressure of 5 to 10 pounds is desirable.

## 17.2. Disk, Abrasive, Aluminium Oxide, Open-Coat, Glue Bond (Type I, Class 2) (Added)

*a. Characteristics.* Disks of the open-coat type have the abrasive grit so distributed that only 50 percent of the surface is covered, leaving relatively wide spaces between the individual grains. In other respects these disks are identical with those described in paragraph 17.1a.

*b. Units of Issue.* Each.

<i>Diameter</i>	<i>Arbor Hole</i>	<i>Grit No.</i>
$9\frac{1}{8}$ in	$\frac{1}{2}$ in	120 (3/0)
$9\frac{1}{8}$ in	$\frac{7}{8}$ in	120 (3/0)
7 in	$\frac{1}{2}$ in	100 (2/0)
7 in	$\frac{7}{8}$ in	100 (2/0)
$9\frac{1}{8}$ in	$\frac{1}{2}$ in	100 (2/0)
7 in	$\frac{7}{8}$ in	80 (1/0)
$9\frac{1}{8}$ in	$\frac{7}{8}$ in	80 (1/0)
7 in	$\frac{1}{2}$ in	60 ( $\frac{1}{2}$ )
7 in	1 in	60 ( $\frac{1}{2}$ )
$9\frac{1}{8}$ in	$\frac{1}{2}$ in	60 ( $\frac{1}{2}$ )
7 in	$\frac{1}{2}$ in	50 (1)
7 in	$\frac{7}{8}$ in	50 (1)
$9\frac{1}{8}$ in	$\frac{1}{2}$ in	50 (1)
$9\frac{1}{8}$ in	$\frac{7}{8}$ in	50 (1)
7 in	$\frac{1}{2}$ in	36 (2)
7 in	$\frac{7}{8}$ in	36 (2)
7 in	1 in	36 (2)
$9\frac{1}{8}$ in	$\frac{1}{2}$ in	36 (2)
$9\frac{1}{8}$ in	$\frac{7}{8}$ in	36 (2)
7 in	$\frac{1}{2}$ in	24 (3)
7 in	$\frac{7}{8}$ in	24 (3)
$9\frac{1}{8}$ in	$\frac{1}{2}$ in	24 (3)
$9\frac{1}{8}$ in	$\frac{7}{8}$ in	24 (3)
7 in	$\frac{1}{2}$ in	16 (4)
7 in	$\frac{7}{8}$ in	16 (4)
$9\frac{1}{8}$ in	$\frac{1}{2}$ in	16 (4)
$9\frac{1}{8}$ in	$\frac{7}{8}$ in	16 (4)

*c. Uses.* For removing old finishes and for grinding and polishing the softer metals since the open-coat disks do not clog up as quickly as the closed-coat disks.

### **17.3. Disk, Abrasive, Garnet, Cloth** (Added)

*a. Characteristics.* This is a garnet cloth disk, 10 inches in diameter, with a 1/2-inch arbor hole. Grit sizes are 100 (2/0) and 80 (1/0).

*b. Units of Issue.* Each.

*c. Use.* For wood finishing with portable or other sanding machine.

### **17.4. Disk, Abrasive, Silicon-Carbide, Cloth-Backing, Open-Coat** (Added)

*a. Characteristics.* A 4 1/2 inch disk, coated with No. 36 silicon-carbide grit and having a 7/8-inch arbor hole.

*b. Units of Issue.* Each.

*c. Use.* Component of portable automotive tool kit that contains portable grinder 40-G-99-990.

### **17.5. Disk, Abrasive, Silicon-Carbide, Cloth, Open-Coat** (Added)

*a. Characteristics.* The silicon-carbide grit used on this disk is harder and sharper than aluminum oxide, but more brittle.

*b. Units of Issue.* Each, 4 1/2 inch diameter, 7/8-inch arbor hole, grit No. 36 (2).

*c. Uses.* Especially suitable for use on a motor-driven sanding machine for grinding softer metals such as bronze and aluminum. It is not as suitable for heavy-duty service as the tougher aluminum oxide.

### **19. Paper, Abrasive, Aluminum Oxide, Closed-Coat, Waterproof** (Superseded)

*a. Characteristics.* This paper differs from that described in paragraph 20 in that the entire surface of the paper is coated with abrasive grit. The adhesive used to bind the abrasive grit to the back is not softened or damaged by water.

*b. Units of Issue.* Package, sheets, 2 x 2, 100 sheet sleeve.

*c. Uses.* For wet or dry sanding of undercoats, such as fillers and primers, to prepare the surface for subsequent coats.

## 20.1. Paper, Abrasive, Flint (Sandpaper) (Closed- and Open-Coat) (Added)

*a. Characteristics.* The abrasive used for this paper is a good quality quartzite or flint. The backing is a good quality paper. The adhesive has an animal-hide glue base. The abrasive paper comes in three classes described in (1) through (3) below.

- (1) *Class 1.* Flint finishing paper, 5/0, 4/0, 3/0, and 2/0.
- (2) *Class 2.* Flint paper: Extra fine, fine, medium, coarse, and extra coarse. The grit sizes of the class 2 flint paper compared to corresponding aluminum oxide grit numbers are as follows:

<i>Class 2 Flint paper</i>	<i>Aluminum Oxide Grit number</i>
Extra fine .....	220 to 180
Fine .....	120 to 100
Medium .....	100 to 60
Coarse .....	50 to 40
Extra coarse .....	36 to 30

- (3) *Class 3.* Rolls, flint paper.

### *b. Units of Issue.*

- (1) *Extra fine (4/0 to 3/0) closed-coat.* Package, 1 x 12 sheet, 100 sheet sleeve.
- (2) *Fine (2/0 to 1/0) and medium (1½ to 1), closed-coat.* Set, consisting of 30 sheets, 4¾ x 5¼, of fine and medium.
- (3) *Assortment, closed-coat.* Set, consisting of a 20-sheet assortment including extra fine (4/0 or 3/0), fine (2/0 or 1/0), medium (1½ or 1), coarse (1½ or 2), and extra coarse (2½ or 3).
- (4) *Class 2, closed-coat, 9 x 10 sheet.*
  - (a) *Extra fine (4/0 or 3/0):* 100 sheet sleeve
  - (b) *Fine (2/0 or 1/0):* 100 sheet sleeve
  - (c) *Medium (1½ or 1):* 100 sheet sleeve
  - (d) *Coarse (1½ or 2):* 50 sheet sleeve
  - (e) *Extra coarse (2½ or 3):* 50 sheet sleeve
- (5) *Class 3, closed-coat, 50 yard roll.*
  - (a) *Fine (1/0 or 2/0):* Each: roll, 1 in wide
  - (b) *Coarse (1½ or 2):* Each: roll, 24 in wide
- (6) *Class 1, open-coat, ½ x 6 sheet.* Each: 5/0, 4/0, 3/0, and 2/0 inch 100 sheet sleeves.

### *c. Uses.*

- (1) For smoothing wood surfaces before the application

of the first paint coat and for smoothing painted wood preparatory to the application of a subsequent coat.

- (2) Fine-grade paper is used for sanding wood surfaces, such as rammer staves and plotting boards, in preparation for varnishing. Also for smoothing generator and armature commutators.
- (3) Medium-grade paper is used for rubbing down paint and varnish undercoats in preparation for the final coat. This is the coarsest grade permitted for rubbing down stocks of small arms.
- (4) Coarse and extra coarse grades are used for rubbing down old coats of paint preparatory to repainting. The coarse grade is used where the existing coat is in fair condition; the extra coarse, where the existing coat is in bad condition and must be removed before repainting.

## **20.2. Paper, Abrasive, Garnet (Closed- and Open-Coat)** (Added)

*a. Characteristics.* This paper is composed of a rope or wood-fiber paper, on one side of which a clear, hard, garnet grit is cemented with an animal-hide, glue-base adhesive. The surface of the closed-coat paper is entirely covered with abrasive grit. The grit is more sparsely applied on the open-coat paper, covering approximately 50 percent of the surface.

*b. Units of Issue.* 9 x 11 sheets, packaged as shown in (1) and (2) below.

(1) *Closed-coat.*

(a) Grit No. 150 (4/0), 120 (3/0), and 100 (2/0); 100 sheet sleeves.

(b) Grit No. 80 (1/0), 60 (1/2), 50 (1), 40 (1 1/2), and 36 (2); 50 sheet sleeves.

(2) *Open-coat.* Grit No. 280 (8/0), 220 (6/0), 180 (5/0), 150 (4/0), and 120 (3/0); 100 sheet sleeves.

*c. Uses.*

(1) Garnet paper designated as "A weight" (40-lb paper) or "finishing paper" and so marked, is a lightweight, flexible paper used chiefly for hand sanding on finishing materials.

(2) Garnet paper designated as "C weight" (70-lb paper) or "D weight" (90-lb paper) cabinet paper or "E weight" (130-lb paper) is less flexible and is used chiefly for hand sanding on wood metal, or other surfaces where greater pressure is required for stock removal.

## **22. Paper, Flint (Sandpaper)**

Rescinded

## **30.1. Stick, Abrasive, Jewelers**

(Added)

*a. Characteristics.* This is a rigid wooden stick  $\frac{3}{8}$  inch square and  $4\frac{1}{2}$  inch long.

*b. Units of Issue.* Each.

*c. Use.* Component of Army-Navy tool equipment TK-21G. Used for polishing pivots, by friction.

## **45.1. Cleaner, Antistatic**

(Added)

*a. Characteristics.* This is a clear, light-body petroleum distillate, with a minimum flash point of 100° F. It is free of offensive odors and contains no ingredients that are injurious to using personnel if reasonable safety precautions are employed.

*b. Units of Issue.* Each, 1 pint can.

*c. Use.* Used to remove electrostatic charges from methacrylate plastics.

## **45.2. Cleaner, Painted Surface, Powdered**

(Added)

*a. Characteristics.* This cleaning powder is soluble in soft, hard, or sea water in the ratio specified by the manufacturer. It is free of objectionable odors and is not irritating to the skin. It contains a synthetic detergent.

*b. Units of Issue.* Each, 5-gal container.

*c. Uses.*

- (1) For cleaning operations that require a nonabrasive cleaner which will have no harmful effect on using personnel or on the surface to which it is applied.
- (2) For cleaning automotive equipment.
- (3) For removing oil, grease, and occupational soil from painted surfaces, and for general soil removal.
- (4) Application is by cloth, sponge, or brush.

*Note.* This material is not intended for use on aircraft surfaces.

## **54.1. Compound, Corrosion-Preventive, Fingerprint-Remover**

(Added)

*a. Characteristics.* This is a liquid compound with a minimum flashpoint of 100° F. It contains no ingredients that will be injurious to using personnel if reasonable safety precautions are employed. It is free of disagreeable odors.

*b. Units of Issue.*

- (1) Each, 5-gal can.
- (2) Each, 55-gal drum.

*c. Uses.*

- (1) For the removal of fresh, fingerprint residues.
- (2) For the suppression of corrosion that has developed as a result of fingerprint residues.
- (3) As a temporary corrosion preventive, which is to be removed with volatile mineral spirits or dry-cleaning solvent, before other corrosion preventives or finishes are applied.

### **57.1. Compound, Steam-Cleaning**

(Added)

*a. Characteristics.* This is a granular, alkaline compound that is soluble in water. It is noncorrosive and will not affect using personnel, such as by causing skin burning or sneezing. It is free of fatty acids, resin, starch, gritty materials, inert fillers, and free sodium hydroxide.

*b. Units of Issue.*

- (1) Each, 125-lb drum.
- (2) Each, 425-lb drum.

*c. Uses.* In high-pressure, steam cleaning of ferrous and nonferrous surfaces of equipment, such as motor vehicle chassis and engines. The cleaning solution contains 2 ounces of compound per gallon of water. The compound must be added to the water and thoroughly dissolved.

### **66.1. Remover, Paint (Alkali-Type)**

(Added)

*a. Characteristics.* This is a granular alkaline material which, when dissolved in water to the specified concentration will remove paint, lacquer, and varnish from metal surfaces. The material comes in two classes.

*b. Units of Issue.* Each, 400-lb drum with full, removable head.

*Note.* For issue only to depot shops and arsenals.

*c. Uses.*

- (1) Class 1: For heavy duty stripping of alkyd resin, modified ureaformaldehyde alkyd resin, oleoresinous, and nitrocellulose finishes from ferrous metals.
- (2) Class 2: For stripping alkyd resin, modified ureaformaldehyde alkyd resin, oleoresinous, and nitrocellulose finishes from aluminum and other nonferrous metals.
- (3) The cleaning solution contains 12 ounces of paint remover per gallon of water.

- (4) Items to be stripped are usually limited to those shapes that can be conveniently immersed in the boiling solution; however, large items may be cleaned by repeated flushing with the hot solution, if the necessary equipment is available. The solution must be maintained at a constant level and parts completely submerged.
- (5) A soft bristle-brush may be used to facilitate removal of the loosened finish.
- (6) Surfaces stripped with this remover must be thoroughly neutralized by flushing with large quantities of hot water, preferably by spraying, prior to repainting.

**Caution:** If the paint remover is accidentally splashed onto the skin, wash immediately with plenty of fresh water.

## **66.2. Remover, Paint and Varnish (Alkali-Organic-Solvent-Type) (Added)**

*a. Characteristics.* This remover is a homogenous liquid which, when applied on a paint or varnish finish, will provide a noninflammable, nonhardening, water-rinsable film that will lift and cause the underlying paint or varnish to disintegrate.

*b. Units of Issue.*

- (1) Each, 5-gal can.
- (2) Each, 55-gal drum.

*c. Uses.*

- (1) Primarily for removing multiple coats of paint from motor vehicles.
- (2) For removing paint from silica-base materials such as glass, concrete, and brick.

*d. Precautions.*

- (1) Use with extreme caution on aluminum, aluminum alloys, or galvanized surfaces. Permit only short time of contact, neutralize with acid, and rinse.
- (2) Do not allow the compound to come in contact with wood or plastics. Acetate-fiber masking tape provides an effective shield on wood and plastic surfaces.

**Caution:** This compound contains a toxic solvent and should be used only with adequate ventilation. Avoid inhalation of fumes. Avoid contact with skin, eyes, and clothing. Use goggles or face mask and protective rubber clothing (rubber gloves, boots, and apron). In case of accidental contact, flush affected parts with water and

wash with vinegar or boric acid solution. Eyes must be flushed with water at least 15 minutes.

*e. Application.*

- (1) Apply a saturation coat with a nylon brush or by non-atomized spraying.
- (2) Allow to act on the surface for 1 hour.
- (3) Dry-brush with a nylon brush.
- (4) Apply a second coat by brushing or spraying.
- (5) Allow to act on the surface for an additional 1 hour.
- (6) Dry-brush with a nylon brush.
- (7) Allow to act on the surface for not less than 12 hours.
- (8) Wet with cold or warm water.
- (9) Allow to stand for 15 minutes.
- (10) Scrub with a tampico-fiber brush and simultaneously flush with cold or warm water, applied with a high-pressure hose. Remove all compound from cracks, crevices, and depressions. An air and water nozzle, using compressed air and tap water, should be used in this operation.
- (11) After the paint coatings are stripped from metal surfaces, remove all rust and apply, as soon as possible, a coat of COATING, PRETREATMENT as a preparatory coat for subsequent finishes.

**75.1. Sponge, Synthetic, Vinyl Type, Coarse Pore Compressed (Added)**

*a. Characteristics.* This sponge consists of a polyvinyl-formal-base resin and coloring matter, without filler. As issued, it is compressed to one-fifth the thickness specified in *b* below, which is the thickness obtained after the sponge is saturated with water. The sponge shows no deterioration when immersed in a 7-percent solution of hydrochloric acid, a 20-percent solution of sulfuric acid, a 10-percent solution of caustic soda, or a 5-percent solution of trisodium phosphate. It is also highly resistant to gasoline, acetone, and volatile mineral spirits or dry-cleaning solvent.

*b. Units of Issue.*

- (1) Each, size A,  $6\frac{3}{4} \times 3\frac{3}{4} \times 2\frac{3}{4}$  minimum.
- (2) Each, size C,  $4\frac{3}{4} \times 3\frac{1}{2} \times 1\frac{7}{8}$  minimum.

*c. Use.* For cleaning surfaces.

**89. Compound, Antifreeze, Ethylene Glycol Type**

\* \* \* \* \*

*e. Reclamation of Used Ethylene Glycol Antifreeze Solutions.*

- (1) (Superseded) Reclaimed antifreeze solutions are author-

ized for use in all administrative, tactical, and combat vehicles operated in the continental United States.

\* \* \* \* \*

### **90.1. Compound, Corrosion-Preventive, Food-Handling Machinery and Equipment** (Added)

*a. Characteristics.* This compound is composed of petrolatum, lanolin, and microcrystalline wax in solution with dry-cleaning solvent. It is nontoxic, and harmless if taken into the stomach.

*b. Units of Issue.*

- (1) Each, 1-gal can.
- (2) Each, 5-gal can.
- (3) Each, 55-gal drum.

*c. Use.* To provide a thin, easily removable, corrosion-preventive film on food-handling machinery and equipment. The film can be removed with dry-cleaning solvent or volatile mineral spirits.

### **120.1. Grease, Lubricant, Mineral, Ball and Roller Bearing** (Added)

*a. Characteristics.* This lubricant is a smooth, homogenous mixture of a lubricating oil and a gelling agent. Its dropping point is approximately 300° F. and it is free of abrasive or otherwise undesirable impurities. It has a slight odor of mineral oil or soap. It is noncorrosive.

*b. Units of Issue.*

- (1) Each, 1-lb can.
- (2) Each, 25-lb can.

*Note.* QMC issue only.

*c. Use.* This grease is intended for a wide range of lubricating applications. It is suitable for use on rotating, sliding, or roller bearing surfaces at constant or intermittent high temperatures.

### **135.1. Oil, Lubricating, Aircraft Instruments** (Added)

*a. Characteristics.* This lubricant consists of a synthetic-base oil and additive materials to impart oxidation stability and corrosion-preventive properties. It will not gel or separate into solid and liquid phases during storage at temperatures not higher than -54° F. for 72 hours.

*b. Units of Issue.*

- (1) Each, 1-pint can.
- (2) Each, 1-quart can.

*Note.* QMC issue only.

*c. Uses.* For lubricating aircraft instruments, electronic equipment, where a low evaporation rate is required for both high- and low-temperature operation and where oxidation- and corrosion-resistance is desirable. Used in lieu of OIL, LUBRICATING, PRESERVATIVE (PL-Special).

### **135.2. Oil, Lubricating, Car and Locomotive Engine** (Added)

*a. Characteristics.* This is a refined petroleum product. It is issued in one grade which is suitable for all-year use.

*b. Units of Issue.* Each, 1-gal can.

*Note.* QMC issue only.

*c. Uses.* For journal bearings of railway cars and steam or electric locomotives in Army service.

### **135.3. Oil, Lubricating, General Purpose** (Added)

*a. Characteristics.* This oil is issued only to shops using optical coating equipment.

*b. Units of Issue.* Each, 1-gal can.

*Note.* QMC issue only.

*c. Use.* For lubricating the mechanical pump of optical coating equipment. Six to eight drops should be applied each month to the drive shaft of the 1/2-horsepower mechanical pump motor.

### **139.1. Oil, Preservative, Hydraulic Equipment (Type I)** (Added)

*a. Characteristics.* This oil consists of a petroleum base with additives to provide corrosion-resistance, required viscosity-temperature characteristics, and oxidation-resistance. It will not gel, crystallize, or separate, when stored at a temperature of —65° F. for 72-hours.

*b. Units of Issue.*

(1) Each, 1-qt can.

(2) Each, 1-gal can.

(3) Each, 5-gal can.

*c. Uses.*

(1) When specifically prescribed, as a preservative oil in aircraft hydraulic systems and shock struts.

(2) As a testing and flushing oil for hydraulic components.

### **151.1. Adhesive, Water-Resistant, Fiber-Board Box** (Added)

*a. Characteristics.* A quick-drying adhesive, suitable for brush

application at normal room temperature. The liquid and dried film of adhesive is free from obnoxious and objectionable odors.

*b. Units of Issue.*

(1) Each, 5-gal container.

(2) Each, 55-gal drum.

*c. Uses.* Used for the assembly and sealing of fiber-board boxes.

**151.2. Adhesive, Water-Resistant, Waterproof, Barrier-Material (Type II, Grade B, Class 1)**  
(Added)

*a. Characteristics.* This adhesive is water-resistant and fungi-resistant and contains a solvent. It is designed for application by hand. It is free of objectionable or obnoxious odors.

*b. Units of Issue.* Each, 5-gal container.

*c. Uses.* In the manufacture and closure of waterproof paper bags, wraps, and case liners for other than subsistence items.

**151.3. Adhesive, Water-Resistant, Label (Type I)**  
(Added)

*a. Characteristics.* This is a lacquer-type adhesive that will dry, free of tack, in 5 minutes. It will not blue the printing on the label; it is resistant to both fresh and salt water and remains stable and transparent under all weather conditions.

*b. Units of Issue.* Each, 5-gal container.

*c. Use.* For application of labels to fiber-board surfaces.

*Note.* For issue to depot shops and arsenals only.

**162.1. Cement, Rubber**  
(Added)

*a. Characteristics.* This cement is composed of pure rubber and a small quantity of resin, in solution with benzol or naphtha. It comes in two types.

*b. Units of Issue.*

(1) Type I (artists and photographers), 2-oz bottle w/brush.

(2) Type I (artists and photographers), 1-qt can.

(3) Type I (artists and photographers), 1-gal can.

(4) Type II (cold-patching), 1-gal can.

*c. Uses.*

(1) Type I is used for mounting photographs and masking material used in photographic and art work. The base material is pale crepe rubber.

(2) Type II is used for cold-patching automobile inner tubes. The base material is new crude rubber.

### 164.1. Cement, Rubber, Quick-Drying (Added)

*a. Characteristics.* This cement is composed of crude rubber, rosin, and a sweet-naphtha solvent. It is issued at a consistency suitable for brush application and dries quickly.

*b. Units of Issue.* Each, 5-gal container.

*c. Use.* For attaching soles and taps in shoe repairing.

### 165.1. Cement, Rubber, Synthetic- and Reclaimed-Rubber Base (Added)

*a. Characteristics.* This liquid cement is issued in three types. Type I, general purpose; type II, oil-resistant; and type III, aromatic-fuel-resistant. Type I is composed of reclaimed rubber or equivalent. Synthetic rubbers are used in types II and III.

*b. Units of Issue.*

- (1) Each: Type I (General purpose) 1-oz tube.
- (2) Each: Type I (General purpose) 4-oz tube.
- (3) Each: Type I (General purpose) 1/2-pint can.
- (4) Each: Type I (General purpose) 12-oz container.
- (5) Each: Type III (Aromatic-fuel resistant) 1-pint can.
- (6) Each: Type I (General purpose) 1-pint can.
- (7) Each: Type II (Oil-resistant) 1-pint can.
- (8) Each: Type I (General purpose) 1-quart can.
- (9) Each: Type II (Oil-resistant) 1-quart can.
- (10) Each: Type I (General purpose) 5-gal container.
- (11) Each: Type I (General purpose) 55-gal drum.

*c. Uses.*

- (1) These cements are intended for use where the unit stress on the adhesive is not appreciable. They will adhere to duck, leather, felt, cork, and similar materials, and to each other. In addition, they will cement these materials to aluminum alloy, steel, laminates, wood, and flat sheets of plastic materials.
- (2) Type I is used when conditions requiring the use of types II and III are not present. It is much less moisture-resistant than types II and III.
- (3) Type II is resistant to oil but not to fuel. Its moisture resistance is excellent.
- (4) Type III is resistant to both oil and fuel. Its moisture resistance is excellent.

**Caution:** Under no circumstance will this cement be used for structural purposes, for life rafts, or de-icer manufacture or repair. This cement has a tendency to gel and become unusable when stored at relatively high

temperatures and when held in stock too long. Therefore, the stock should be held to minimum and storage should be in the coolest practicable indoor location.

### **176.1. Compound, Flange-Sealing** (Added)

*a. Characteristics.* This is a synthetic sealing material that will adhere firmly to the surfaces to be joined. After curing, it will not flow at 225° F. nor break when bent around a 1-inch mandrel at -65° F. It will not bleed or discolor finishes over the sealed joints. It is waterproof.

*b. Units of Issue.*

(1) Each, 1-gal can.

(2) Each, 5-gal can.

(3) Each, 55-gal drum (for industrial installations).

*c. Uses.* For sealing and waterproofing bolted and riveted surfaces and under flange joints of tank hulls.

### **176.2. Compound, Insulation, Vermiculite** (Added)

*a. Characteristics.* A mineral substance, derived generally from mica. When mixed with water, it forms a plastic compound which can be molded to provide a heat-resistant seal.

*b. Units of Issue.* Each, 1/2-lb can.

*Note.* Local procurement only.

*c. Use.* For sealing thermostat tube of cleaner 40-C-1008.

### **178.1. Compound, NRC, Red** (Added)

*a. Characteristics.* This is a liquid, nitrocellulose-resin-base, noncorrosive compound that contains a red dye. It provides a hard, tough, elastic film which adheres firmly to a clean, smooth, metal surface.

*b. Units of Issue.* Each, 1-gal can.

*c. Use.* As a sealing compound in the manufacture of ammunition.

### **178.2. Compound, Sealing, Adhesive, W/Accelerator** (Added)

*a. Characteristics.* This compound is issued in a two-compartment container which contains the uncured compound and the accelerator. At the time the compound is to be used, these two materials are mixed thoroughly.

*b. Units of Issue.* Each, two-compartment can containing 1 pint of adhesive and 1/2-pint of accelerator.

*c. Use.* For bonding metal to metal or glass to metal in optical or fire control instruments, by injection.

### **183.1. Compound, Sealing, Noncuring**

(Added)

*a. Characteristics.* This is an inert thermoplastic, nontoxic compound which will not harden or change in composition in normal use. It is issued in two types. Type I is as described in the foregoing. Type II is composed of 5 1/2 parts (by weight) of type I and 1 part (by weight) of Aircraft and Instrument Grease.

*b. Units of Issue.*

(1) *Type I.* Each, 1-pint can.

(2) *Type II.* Each, 1-pint can.

*c. Uses.*

(1) *Type I.* A high-viscosity material used for static sealing metal-to-metal joints or of metal-to-glass joints in optical or fire control instruments.

(2) *Type II.* A low-viscosity material for rotary sealing around shafts or similar movable elements in optical or fire control instruments.

### **225.1. Oil, Cutting, Mineral, Fatty, Sulfurized**

(Added)

*a. Characteristics.* This is a combination of fatty oil containing surfur. It is stable and will not separate into two liquid phases. Its color is brownish.

*b. Units of Issue.*

(1) Each, 1-gal can.

(2) Each, 5-gal can.

(3) Each, 55-gal drum.

*Note.* Type I issued until stock is exhausted.

*c. Use.* As a coolant and lubricant for cutting tools on high-speed lathes, multiple-spindle, automatic screw machines, and on other machines where it may be required.

### **225.2. Oil, Cutting, Mineral-Lard (Grade 3)**

(Added)

*a. Characteristics.* This blend contains not less than 25 percent (by weight) of fatty oil. The blend is free of disagreeable odors, rancidity, dirt, or other foreign matter. It will not deposit gummy materials and the mineral and fatty oils will not separate at working temperatures.

*b. Units of Issue.*

- (1) Each, 1-gal can.
- (2) Each, 5-gal can.
- (3) Each, 55-gal drum.

*c. Use.* As a cutting oil and coolant for machine cutting tools that do not operate at high speed or where a heat-resistant cutting oil is not specifically required.

**225.3. Oil, Cutting, Mineral-Lard, Sulphur-Treated**  
(Added)

*a. Characteristics.* This is a mixture of refined mineral oil and lard oil, in which not less than 1 percent of sulfur is dissolved. It may be used as issued or after diluting with a straight mineral oil.

*b. Units of Issue.* Each, 55-gal drum.

*c. Use.* As a lubricant and coolant for machine-cutting tools where a soluble cutting oil is not suitable.

**225.4. Oil, Lard, Pure**  
(Added)

*a. Characteristics.* An oil expressed from lard and free of rancidity and other oils, greases, or dirt.

*b. Units of Issue.* Each, 1-gal can.

*c. Use.* For the lubrication of tools used for pipe threading and cutting.

[AG 438 (7 Jul 54)]

BY ORDER OF THE SECRETARY OF THE ARMY:

M. B. RIDGWAY,  
*General, United States Army,*  
*Chief of Staff.*

OFFICIAL:

JOHN A. KLEIN,  
*Major General, United States Army,*  
*The Adjutant General.*

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**NG:** Same as Active Army except allowance is one copy for each unit.

**USAR:** None.

Unless otherwise noted, distribution applies to CONUS and overseas.

For explanation of abbreviations used, see SR 320-50-1.