

MIL-STD-1426

9 APRIL 1971

MILITARY STANDARD

MISCELLANEOUS COMPOUNDS



FSC 6850

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DEPARTMENT OF DEFENSE
Washington, D. C. 20301

Miscellaneous Compounds

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1. This Military Standard is mandatory for use by all Departments and Agencies of the Department of Defense, to assure that selection of new items is limited to essential items, for which no comparable standard item exists.
2. Recommended corrections, additions, or deletions should be addressed to Commanding Officer, Edgewood Arsenal, ATTN: SMUEA-TSE-LS, Edgewood Arsenal, Maryland 21010.

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FOREWORD

This is the first book format standard generated on miscellaneous compounds. This document is mandatory for use by all departments and agencies of the Department of Defense in the selection of items for application. It is intended to prevent the entry of unnecessary items (sizes, types, varieties) into the Department of Defense logistics system. This is not a procurement document. This document is not intended to restrict any service in selecting new items required to support state-of-the-art changes.

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1. SCOPE

1.1 Coverage. This standard is a presentation of nomenclature, symbols chemical and physical properties and requirements, military and typical commercial uses, directions for use, packaging data, labeling, storage, and shelf life of military standard miscellaneous compounds. This standard does not necessarily include all classifications of the items represented by the title or those which are commercially available; it does contain items preferred for use in the selection of miscellaneous compounds for application by the Department of Defense. The standard covers thirty-six items.

1.2 Application. Items listed herein accommodate essential requirements of the military and defense agencies and will effect continued economies in all logistics functions when properly used in new applications.

2. REFERENCED DOCUMENTS

The issues of the following documents in effect on the date of invitations for bid form a part of this standard to the extent specified herein.

Federal Specifications

O-F-1044	Fuel, Engine Primer: Cold Starting, in Pressurized and Nonpressurized Containers
P-D-800	Dust Mop Treating Compound
PPP-C-300	Chemicals, Liquids, Packaging and Packing of
PPP-C-301	Chemicals, Dry and Paste, Packaging and Packing of

Military Specifications

MIL-C-20217	Compounds, Carbonizing
MIL-C-21665	Catalyst, Carbon Monoxide and Hydrocarbon Oxidizing (For Use in an Air Purifying Device Aboard Submarines)
MIL-E-14114	Etching Compound, For Glass or Quartz
MIL-C-7024	Calibrating Fluid, Aircraft Fuel System Components
MIL-F-27351	Fluid, Calibrating, High Flash Point, Aircraft Fuel System Components
MIL-F-38299	Fluid, Purging, For Preserving Fuel Tanks of Jet Aircraft
MIL-R-6882	Rain Repellent Kit, Glass Window and Windshield
MIL-R-81261	Rain Repellent, Glass Window and Windshield, For In-Flight Application
MIL-S-10699	Salts, Heat-Treating (For Metals)

Regulations

Title 21 - Code of Federal Regulations, Food and Drug Administration, Department of Health, Education, and Welfare, Chapter I.

Title 49 - Code of Federal Regulations, Department of Transportation, Chapter I.

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3. GLOSSARY

3.1 Definitions.

Accelerator - A substance which accelerates the vulcanization of rubber or permits vulcanization at lower temperature.

Aniline point - The minimum equilibrium solution temperature for equal volumes of aniline and solvent.

Auto-Ignition temperature - The temperature at which the combustion of a substance will occur spontaneously. This action is independent of the presence of an igniter such as an electrical spark or flame.

Boiling point - The temperature at which the vapor pressure of a liquid is equal to the external pressure. In this standard, the external pressure is approximately one atmosphere (760 mm Hg).

British Thermal Unit - The quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit.

Calibrate - To determine, rectify, or mark the graduations of an instrument.

Carbonaceous - Pertaining to, consisting of, or containing carbon.

Carbonizing - Converting into carbon by combustion, the action of fire, or an acid.

Carburizing - A process to impregnate, cover, or combine with carbon.

Catalyst - A substance which when present increases the rate of a chemical reaction.

Centipoise - One hundredth of a poise.

Centistoke - One hundredth of a stoke.

Coefficient of expansion - The ratio of the change in size per degree C to the size at)°C.

Combustible - Flammable, capable of being easily ignited.

Coolant - Any fluid that is circulated to remove heat.

Corrosive - A caustic material which causes a burning sensation and the destruction of living tissue or which causes a destructive effect on metal.

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Critical pressure - The pressure under which a substance may exist as a gas in equilibrium with the liquid at the critical temperature.

Critical temperature - The temperature above which a gas cannot be liquified by an increase in pressure.

Decomposition - The chemical separation of a substance into two or more simpler substances, which differ from each other and from the original substance.

Deliquescent - Able to take up water vapor until dissolved.

Density - The concentration of matter, measured by mass per unit volume. It is usually expressed as grams per cubic centimeter or pounds per cubic foot.

Dielectric constant - The ratio of the electrical capacity of a condenser, containing the specified material, to the capacity of the same condenser with material replaced by a vacuum. Generally speaking, it is a measure of the ability of a material to maintain a difference in electrical charge over any specified distance.

Dielectric strength - The maximum electric field that an insulator or dielectric can withstand without breakdown, usually measured in kilovolts per centimeter.

Dispersion - A system of minute particles (solid, liquid, or gaseous) distinct and separate from one another and suspended in a liquid, gaseous, or solid medium.

Distillation - The process of separation consisting of vaporizing a liquid and collecting the vapor, which is usually condensed to a liquid.

Dyns - The force which generates an acceleration of one centimeter per second per second when acting on one gram.

Eutectic - A mixture of two or more substances which has the lowest melting point.

Flash point - The lowest temperature at which a combustible liquid will give off a flammable vapor which will burn momentarily.

Formula weight - The sum of the atomic weights of all the atoms appearing in a chemical formula. In this standard, the formula weight is computed according to the international atomic weight values of 1961.

Freezing point - The temperature at which the liquid and solid of a single substance exist together in equilibrium and the transition from liquid to solid occurs.

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Hazardous substance - A substance or mixture of substances that is toxic, highly toxic, an irritant, a corrosive, a strong oxidizer a strong sensitizer, a combustible liquid, flammable, an extremely flammable liquid, dangerously reactive or pressure generating, provided such substances or mixture of substances may cause substantial personal injury or substantial illness during, or as a direct result of, any customary or reasonable foreseeable handling or use.

Heat of combustion - The quantity of heat required to ignite a substance.

Heat of fusion - The quantity of heat necessary to change one gram of solid to a liquid with no temperature change.

Heat of vaporization - The quantity of heat necessary to change one gram of liquid to vapor without a change of temperature, measured in calories per gram.

Melting point - The temperature at which a liquid and a solid exist together in equilibrium and transition from the solid to the liquid state occurs.

Mole - The weight of a substance equal numerically to its formula weight. For example a gram-mole is the weight in grams equal to the formula weight.

Oxidizing agent - An agent which produces a chemical change in which the oxidation state (positive valence) of a substance increases.

pH - A means of expressing the degree of acidity or basicity of a solution. It is defined as the logarithm of the reciprocal of the hydrogen ion concentration in gram equivalents per liter of solution ($\text{pH} = \log 1/(\text{H}^+)$)

Poise - The unit of viscosity expressed as one dyne per second per square centimeter.

Pour point - The lowest temperature at which a liquid will flow when a container is inverted.

Reducing agent - A substance which removes electrons from another substance (the oxidizing agent) or which causes a substance to decrease its oxidation state.

Refractive index - A constant, characteristic of each substance, which represents the ratio of the velocity of light in a vacuum to that in the substance.

Specific gravity - The ratio of the mass of a body to the mass of an equal volume of gas-free distilled water at a stated temperature. In this standard the first temperature indicates the temperature of the material and the second indicates the temperature of the water to which it is referred.

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Specific heat - The ratio of the heat capacity of a substance to the heat capacity of water at 15°C; or the quantity of heat required for a mole degree temperature change in a weight of material.

Stoke - The unit of viscosity equal to the viscosity in poises divided by the density of the fluid in grams per cubic centimeter, both measured at the same temperature.

Surface tension - A property of liquid or solid matter due to unbalanced molecular forces near a surface.

Tensile strength - The load necessary to rupture a given material when pulled in the direction of length.

Thermal conductivity - The capacity for conducting heat, usually expressed as the number of calories which pass per second through a plate one square centimeter in area and one centimeter thick having its opposite faces differing in temperature by 10°C.

Thixotropic - A jelly-like substance which liquifies when agitated and returns to jelly-like form when at rest.

Vapor pressure - The pressure exerted when a solid or liquid is in equilibrium with its own vapor. The vapor pressure is a function of the substance and of the temperature.

Viscosity - The internal resistance offered by a fluid (liquid or gas) to flow. Viscosity is a characteristic property and is a measure of the combined effects of adhesion and cohesion.

Volatile - A substance which evaporates rapidly due to its high vapor pressure.

3.2 Abbreviations. The same abbreviation is used for all tenses, the possessive case, and the singular and plural forms of a given word.

ASTM - American Society for Testing and Materials

atm - atmosphere

btu - British thermal unit

C - Celsius (Centigrade)

cm - centimeter

cu - cubic

DOT - Department of Transportation

F - Fahrenheit

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ft - foot, feet

FW - Formula weight

HEW - Department of Health, Education, and Welfare

Hg - mercury

in. - inch

lb - pound

kc - kilocycle

max - maximum

mg - milligram

min - minimum

ml - milliliter

mm - millimeter

No. - Number

pph - parts per hundred

ppm - parts per million

psi - pound per square inch

RH - relative humidity

wt - weight

3.3 Symbols

% - percent

± - plus or minus

° - degrees

- number

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4. GENERAL REQUIREMENTS

4.1 Chemical and physical requirements. All values given in tables of chemical and physical requirements are in percent by weight unless otherwise indicated.

4.2 Nomenclature. Department of Defense item names, as used throughout this standard, are in capital letters. Other names that are sometimes used commercially are in small letters immediately beneath.

4.3 Safety. All hazardous chemicals in this standard are indicated as such immediately beneath each item name. General safety and hygienic measures should be exercised in the handling and use of all chemicals. For more specific information on hazardous chemicals the appropriate safety and medical authorities must be consulted in order to determine personal protective measures and environmental controls.

4.4 Shelf life. Factors such as moisture, temperature, type and condition of containers, and exposure to sunlight and the atmosphere cause variations in shelf life. Ideal storage conditions are outlined for each item. An approximate period of time after which this material will no longer be suitable for its intended use is also presented. The term "cool" denotes temperatures from above freezing up to 70°F but not consistently over 80°F when stored out of direct sunlight. The term "dry" is usually used to denote an area where condensation does not come in contact with the packages or contents (for example, storing on pallets away from walls in an enclosure or building). Periodic examinations of the containers or material should be made more frequently when storage conditions vary from the ideal. For applications where quality may be critical, each compound should be analyzed prior to use. Shelf life is dated from the date of manufacture. All chemicals in this standard shall not be older than one year from the date of manufacture when purchased except where specified otherwise under storage data. Upon reaching the annotated shelf-life period, items should be examined and tested to determine quality. If still acceptable, examination should be conducted periodically thereafter.

4.5 Packaging data and labeling. All liquid chemicals included in this standard shall be packaged in accordance with Federal Specification PPP-C-300 and all applicable documents mentioned therein. All dry and paste chemicals included in this standard shall be packaged in accordance with Federal Specification PPP-C-301 and all applicable documents mentioned therein. Packaging shall be as specified by specification preparing or engineering support activity.

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5. DETAIL REQUIREMENTS

5.1 Name. ACCELERATOR, RUBBER VULCANIZATION PROCESS
(HAZARDOUS)

5.1.1 Specifications. None.

5.1.2 Technical description. Accelerators for rubber vulcanization processes are normally organic compounds of nitrogen and sulfur although a few inorganic compounds are still used. Those accelerators which are identified by generic nomenclature are found in FSC 6810; hence they will not be further discussed here. Accelerators which are compounded for specific applications according to a manufacturer's secret formulation are of necessity identified by the functional nomenclature and may be supplied in solid or liquid form. One such typical compound is a dark reddish-brown liquid which is quite hygroscopic and has a tendency to settle on standing.

5.1.3 Use data. Accelerators are intended for military use in reducing the time required for vulcanization of natural or synthetic rubber or to permit vulcanization at lower temperatures. The typical compound described here is used for repair of collapsible fabric tank, 3000 gallon capacity.

5.1.4 Packaging data and labeling. The accelerator is packaged for military use in one ounce unit quantity dark glass bottles containing 10 cubic centimeters of the liquid. There are no applicable DOT packaging or shipping regulations for this compound. Each bottle must bear the following precautionary label:

ACCELERATOR, RUBBER VULCANIZATION PROCESS

CAUTION! MAY CAUSE SKIN IRRITATION AVOID contact with the skin.

In case of contact, wash thoroughly with water.

Precautionary labeling for all accelerators is required according to the degree of hazard involved.

5.1.5 Storage data. The accelerator should be stored in a cool, dark area and should always be kept below 80°F. The shelf life in unopened containers is six months.

5.2 Name. CALIBRATING FLUID, AIRCRAFT FUEL SYSTEM COMPONENTS

Normal Heptane $\text{CH}_3(\text{CH}_2)_5\text{CH}_3$
 Special Run Stoddard Solvent
 Hydrocarbon Compounds
 (HAZARDOUS).

FW 100.21

5.2.1 Specifications. MIL-C-7024, Calibrating Fluid, Aircraft Fuel Systems Components; and MIL-F-27351, Fluid, Calibrating, High Flash Point, Aircraft Fuel Systems Components.

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5.2.2 Technical description. Calibrating fluid has three separate compositions: normal heptane, Stoddard Solvent, and hydrocarbon compounds. All three are clear and free from undissolved water, sediment, and suspended matter. Chemical and physical requirements are shown in Table I.

Table I. - Chemical and physical requirements of calibrating fluids

Properties	Requirements of MIL-F-27351		Requirements of MIL-C-7024	
	Min	Max	Normal Heptane	Special Run Stoddard Solvent
Aniline point, °F	190	---		150
Color, Saybolt	+25	---	+25	---
Copper strip corrosion No.	---	1	1	1
Flash point, °F	175	---		100
Specific gravity at 60°F/60°F	0.775	0.785	0.699 ±0.002	0.770 ±0.005
Vapor pressure, psi, max	---	---	2.0	---
Viscosity, centistokes 32°F	^a 2.37	^a 2.57	0.785 ±0.01	^b 1.17 ±0.05
Reaction to methyl orange	---	---		None
Mercaptan sulfur, max	---	---		0.005
Gum, Max mg per 100 ml fluid				
Accelerated	---	---	5.0	---
Existent	---	---	2.0	10
Freezing point, °F	---	-65		
Distillation range				
Initial boiling point, °F	420	---		300
Fluid 50% evaporated, °F	430	450	---	---
Final boiling point, °F	450	475	^c 208	410
Recovery, %	---	---	---	98.5
Distillation loss volume, %	---	1-1/2	---	---
Residue, volume %	---	1-1/2	---	---

^aat 100°F

^bat 77°F

^crange between 5% and 95% shall not exceed 3°F and shall include 208°F

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5.2.3 Use data. Calibrating fluid under Specification MIL-C-7024 is intended for military use in the calibration of fuel system components for aircraft reciprocating engines and aircraft gas turbines. Fluid under Specification MIL-F-27351 is intended for same uses in addition for use in calibration of fuel system components for ram-jet engines when high flash point test fluid is required. Typical commercial applications include uses as: an anesthetic, a solvent in organic synthesis, and in the preparation of laboratory engines.

5.2.4 Packaging data and labeling. Calibrating fluid is packaged for military use in 55 gallon drums, Specification MIL-C-7024, Type I and MIL-F-27351; Type II calibrating fluid, MIL-C-7024, is packaged in 55 gallon drums and in bulk. Packaging, packing and marking of calibrating fluid in 55 gallon drums shall be in accordance with MIL-STD-290. Shipping containers for calibrating fluid composed of normal heptanes must bear the DOT red label for flammable liquids.

5.2.4.1 Calibrating fluid (hydrocarbon mixture). Individual containers must bear the following precautionary label:

**CALIBRATING FLUID, AIRCRAFT FUEL SYSTEM COMPONENTS
(HYDROCARBON MIXTURE)**

CAUTION! MAY CAUSE SKIN IRRITATION

Keep away from heat, sparks, or open flame.

Use with adequate ventilation.

Do not breathe spray mists.

Avoid prolonged or repeated contact with skin.

5.2.4.2 Calibrating fluid (n-heptane). Individual containers must bear the following precautionary label:

**CALIBRATING FLUID, AIRCRAFT FUEL SYSTEM
COMPONENTS (n-HEPTANE)**

WARNING! FLAMMABLE LIQUID

VAPOR HARMFUL

Keep away from heat, sparks, or open flame.

Use with adequate ventilation.

Avoid prolonged breathing of vapor.

Avoid prolonged or repeated contact with skin.

5.2.4.3 Calibrating fluid (special run Stoddard Solvent). Individual containers must bear the following precautionary label:

**CALIBRATING FLUID, AIRCRAFT FUEL SYSTEM
COMPONENTS (SPECIAL RUN STODDARD SOLVENT)**

CAUTION! COMBUSTIBLE LIQUID

HARMFUL IF SWALLOWED

Keep away from heat, sparks, and open flame.

Use with adequate ventilation.

Avoid prolonged breathing of vapor.

Avoid prolonged or repeated contact with skin.

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5.2.5 Storage data. Calibrating fluid should be stored in a tightly-closed, plainly labeled container and placed in a cool, ventilated area away from fire hazards, open flames, and spark sources. It has an indefinite shelf life.

5.3 Name. CARBONIZING COMPOUND, GRANULAR
(HAZARDOUS)

5.3.1 Specifications. MIL-C-20217; Compounds, Carbonizing

5.3.2 Technical description. Granular carbonizing compound is a mixture of charcoal, coke, and carbonate energizer, with a binder. The formulation covered herein provides a depth of 0.080 inches or less. Chemical and physical properties are shown in Table II.

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Table II. - Chemical and physical properties of granular carbonizing compound

<u>Properties</u>		
	<u>Min</u>	<u>Max</u>
Material, %		
Coke*	20	26
Barium carbonate	5	7
Calcium carbonate	5	7
Sodium carbonate	3	5
Charcoal, hardwood	---	55
Total sulphur	---	.5
Moisture	---	2
Total inorganic matter	---	5
Exclusive of carbonate		
Weight, lb per cu. ft.	---	26
Material, passed through in the clear, %		
3/8-in. screen	---	95
1/8-in. screen	---	10

*Solvay special carburizing coke or petroleum

5.3.3 Use data. This carbonizing compound is intended for military use in carbonizing case depth, for 0.080 inch or less.

5.3.4 Packaging data and labeling. Granular carbonizing compound is packaged for military use in 100 pound unit quantity boxes, waterproofed and paper lined, or in 100 pound unit quantity fiber drums. Unless

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exempted under section 173.162 of Title 49, code of Federal Regulations, shipping containers must bear the DOT yellow label for flammable solids. Each unit container must bear the following precautionary label:

CARBONIZING COMPOUND, GRANULAR

WARNING! FLAMMABLE

Keep away from heat, sparks and open flame.

5.3.5 Storage data. Store in a cool, dry, ventilated area away from heat, open flames, fire hazard area, and oxidizing materials. Containers should be kept tightly closed and plainly labeled. If stored as directed, the shelf life is approximately two years, after which time the material should be checked for decomposition.

5.4 Name. CARBONIZING COMPOUND, PASTE

5.4.1 Specifications. None

5.4.2 Technical description. Carbonizing compound paste is a heavy black paste, which will harden heat-softened metal. The formulation includes an ammonium compound as an activator which imparts a distinct odor of ammonia.

5.4.3 Use data. This compound is intended for military use in welding shop sets and equipment, blacksmith shop sets, and combat vehicle rebuild shop sets. It is applied to heated metal to speed up hardening of certain portions. Typical commercial applications are the same.

5.4.4 Packaging data and labeling. Carbonizing compound paste is packaged for military use in 5 gallon unit quantity drums, lined with a high temperature baked phenolic lining. The drum has a ringlock, with bolt and nut closure which allows tight reclosing. It is an olive drab color with instructions lithographed on the outside. There are no available DOT shipping regulations.

5.4.4.1 Degree of hazard. Insufficient information is available regarding ingredients of Carbonizing Compound, Paste to determine its hazardous or non-hazardous nature.

5.4.5 Storage data. The compound should be stored, closed tight, at room temperature to avoid deactivation. If properly stored, it has a shelf life of three years.

5.5 Name CATALYST, CARBON MONOXIDE AND HYDROCARBON OXIDIZING
(HAZARDOUS)

5.5.1 Specifications. MIL-C-21665; Catalyst, Carbon Monoxide and Hydrocarbon Oxidizing (For Use in An Air Purifying Device Aboard Submarines).

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5.5.2 Technical description. Carbon monoxide and hydrocarbon oxidizing catalyst is granular in form with a maximum moisture content of 0.5 percent. It is a mixture of copper oxide and manganese oxide with an apparent density of 1 to 1.10 grams per cubic centimeter. It does not permit passage of more than 50 parts per million of carbon monoxide at $100^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 0.5 part per million of ethylene at $205^{\circ}\text{C} \pm 5^{\circ}\text{C}$ during or at end of a thirty minute period. Particle size conforms to Table III. Prior to packaging it is mixed with lithium hydroxide to provide a mixture of 90% catalyst and 10% lithium hydroxide by volume.

Table III. - Particle size requirements of carbon monoxide and hydrocarbon oxidizing catalyst

<u>SIEVES</u>	<u>MAX</u>	<u>MIN</u>
Retained on No. 4	2	---
Passing No. 4, retained on No. 6	70	50
Passing No. 6, retained on No. 8	50	30
Passing No. 8	5	---

5.5.3 Use data. Catalyst is intended for military use in atmospheric air purification aboard submarines. There is no known commercial application.

5.5.4 Packaging data and labeling. Catalyst is packaged for military use in 5 gallon unit quantity pails. Each pail shall be fitted with screw cap closures and inner seals. Exterior coating shall be olive drab. Wire handles or bails shall be either galvanized or protectively coated to resist corrosion. Unless exempted under section 173.153 of Title 49, Code of Federal Regulations, shipping containers must bear the DOT yellow label for oxidizing materials. Each unit container must bear the following precautionary label:

CATALYST, CARBON MONOXIDE AND HYDROCARBON OXIDIZING
 WARNING! FLAMMABLE
 CAUSES IRRITATION

Keep away from heat, sparks, and open flame.

Avoid contact with eyes, skin, and clothing.

Wash thoroughly after handling.

In case of contact with skin, wash with plenty of soap and water;
 for eyes, flush with plenty of water and get medical attention.

5.5.5 Storage data. Catalyst should be stored in a cool, dry place away from flames or easily oxidized materials. It has an indefinite shelf life.

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5.6 Name CATALYST, CURING

Benzoyl peroxide, Dibenzoyl peroxide and Tricresyl Phosphate
(HAZARDOUS)

5.6.1 Specifications. None.

5.6.2 Technical description. Curing catalyst is a white paste which is insoluble in water and soluble in common organic solvents. It is a benzoyl peroxide paste compounded with tricresyl phosphate, containing a minimum of 50% benzoyl peroxide and 3.3% active oxygen. It is free from any thixotropic or suspending agents that might create a cloudiness or a haziness in cured clear laminations or castings.

5.6.3 Use data. Catalyst is intended for military use in the curing of clear laminates or castings by the addition of this compound to the base compound. Typical commercial applications are the same.

5.6.4 Packaging data and labeling. Catalyst is packaged for military use in 1 pound unit quantity glass or polyethylene jars. Shipping containers must bear the DOT yellow label for oxidizing materials. Shipment by parcel post is prohibited. Individual containers must bear the following precautionary label:

CATALYST, CURING (50% min Benzoyl peroxide with tricresyl
Phosphate)

DANGER! FLAMMABLE PASTE

OXIDIZING MATERIAL

HEAT OR CONTACT WITH OTHER
MATERIALS MAY CAUSE FIRE OR
EXPLOSIVE DECOMPOSITION

Store in a cool place in original container and protect
from direct sunlight.

Keep away from heat, sparks, and open flame.

Do not add to hot materials; do not grind or subject to
frictional heat or shock - explosive decomposition may result.

Prevent contamination with readily oxidizable materials and
polymerization accelerators.

Avoid contact with skin, eyes, and clothing.

Avoid breathing vapor.

In case of contact with skin, wash with plenty of soap and
water; for eyes, flush with plenty of water and get medical
attention.

5.6.5 Storage data. Catalyst should be stored in a cool, dark, dry place isolated from the direct rays of the sun, acids, and any materials which may cause a rise in temperature. Temperatures of below 100°F are necessary to prevent activity loss. Temperatures above 130°F cause rapid decomposition and possible explosion. Freezing of the catalyst is undamaging; however, thawing must take place at room temperature, without exposure to external heat sources. When stored under above conditions, at room temperature, it has a shelf life of approximately two years.

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5.7 Name. DUST MOP TREATING COMPOUND

5.7.1 Specifications. P-D-800; Dust Mop Treating Compound.

5.7.2 Technical description. Dust mop treating compound is a stable, free-flowing liquid, compounded of mineral oils and emulsifying agents and which has no objectionable odor. It is in a concentrated form which must be diluted 6 to 1, water to concentrate. Repeated applications cause no deleterious effects to or discoloration of dust mops or cloths. The minimum Flash point is +350°F and the tendency to heat or ignite spontaneously is negative. Impregnation is between 16 and 35 percent of the dry weight of the mop.

5.7.3 Use data. Dust mop treating compound is intended for military use in treating mops and cloths by soaking them in the diluted mixture, and after drying it will increase dirt pick-up-and-hold ability. Typical commercial applications are the same.

5.7.4 Packaging data and labeling. Dust mop treating compound is packaged for military use in 5 gallon unit quantity drums. There are no applicable DOT shipping regulations.

5.7.5 Storage data. Dust mop treating compound should be stored in a closed container between +20°F and +100°F. If properly stored, it has an indefinite shelf life.

5.8 Name. ETCHING SOLUTION (HAZARDOUS)

5.8.1 Specifications. None.

5.8.2 Technical description. This etching solution, an activated form of sodium in solution, reacts with a fluorocarbon polymer, extracts fluorine atoms at the surface, and forms a carbonaceous film which is compatible with most adhesives. Etching of the polymer surface is accomplished in approximately 15 seconds after contact with fresh etching solution. After minute penetration of the polymer surface by the solution and subsequent formation of the carbonaceous film, the reaction ceases thereby precluding the possibility of overexposure. The etching solution, when active, is blue-black in color. It reacts very rapidly with moisture in the air and will lose its activity in a very short time on exposure to air of even average humidity. The blue-black color changes to brown when this occurs. For this reason, dipping is the most practical method of application with the parts to be protected from the etchant masked with standard materials. A deep, narrow container should be used, partially filled to maintain a solvent vapor cover over the solution or provided with a dry inert gas cover. When masking procedures are impractical, brushing, spraying, or spotting methods may be used; but these methods require an inert gas cover or chamber.

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5.8.3 Use data. Teflon etching solution is intended for military use to make fluorocarbon polymers easily bondable to other materials by conventional methods. Typical commercial applications are the same.

5.8.4 Packaging data and labeling. This compound is packaged for military use in 1 pint unit quantity glass or polyethylene bottles. Unless exempted under section 173.244 of Title 49, Code of Federal Regulations, shipping containers must bear the DOT white label for corrosive liquids. Each bottle must bear the following precautionary label:

ETCHING SOLUTION

WARNING! CAUSES BURNS

Do not get in eyes, on skin, on clothing.
In case of contact, immediately flush skin
or eyes with plenty of water for at least
15 minutes; for eyes get medical attention.

5.8.5 Storage data. This compound should be stored in tightly closed containers away from moisture. It has a shelf life of six months.

5.9 Name. FLUID, PURGING, PRESERVING, FUEL SYSTEM COMPONENTS

5.9.1 Specifications. MIL-F-38299; Fluid, Purging, for Preserving Fuel Tanks of Jet Aircraft.

5.9.2 Technical description. Fuel system components preserving purging fluid consists completely of hydrocarbon compounds. It is free from undissolved water, sediment, and suspended matter. Chemical and physical requirements are listed in Table IV.

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Table IV. - Chemical and physical requirements of fuel system components preserving purging fluid

<u>Properties</u>	<u>Requirements</u>	
	<u>Min</u>	<u>Max</u>
Specific gravity at 60°F	0.780	0.800
Flash point, °F	215	---
Viscosity, at 100°F, centistokes	3.3	3.6
Copper strip corrosion, ASTM Class, at 212°F	---	1
Freezing point, °F	---	-72
Acidity, distillation residue	---	neutral
Heat of combustion (net btu/lb)	18,000	---
Color, Saybolt	+25	---
Existent gum, mg/100ml	---	7
Sulfur, total, percent wt	---	0.4
Miscibility with fuels	Completely	Miscible
Distillation:		
Initial boiling point, °F	50	---
Fluid evaporated, 10% at °F	*---	---
Fluid evaporated, 50% at °F	465	475
Fluid evaporated, 90% at °F	*---	---
End point, °F	490	500
Residue, volume percent	---	1-1/2
Distillation loss, volume percent	---	1-1/2

*To be reported - not limited

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5.9.3 Use data. This compound is intended for military use in purging and preserving fuel tanks of jet aircraft before hangaring and conducting maintenance operations. Typical commercial applications are the same.

5.9.4 Packaging data and labeling. This compound is packaged for military use in bulk unit quantities. There are no applicable DOT shipping regulations.

5.9.5 Storage data. This compound shall be stored at room temperature. It has an indefinite shelf life.

5.10 Name. FUEL, ENGINE PRIMER
(HAZARDOUS)

5.10.1 Specifications. O-F-1044; Fuel, Engine Primer: Cold Starting, In Pressurized and Nonpressurized Containers.

5.10.2 Technical description. Fuel, engine primer, is an aerosol can containing a minimum of 85% diethyl ether. The remaining components, optional with the manufacturer, are totally soluble and stable in the ether and will not react chemically with the other fuel components or the propellant. The resultant compound is a clear, colorless, flammable liquid which is functional at a minimum temperature of -50°F. The propellant may be carbon dioxide, nitrogen, argon, nitrous oxide, or a combustible hydrocarbon gas.

5.10.3 Use data. This compound is intended for military use in low atmospheric temperatures as an aid for starting internal combustion engines. It is sprayed into the carburetor to start gasoline engines and can be sprayed into the air intake or intake manifold (where a plug is removed) when starting diesel engines.

5.10.4 Packaging and labeling. This compound is packaged for military use in 12 fluid ounce unit quantity aerosol cans containing a minimum of eight ounces avoirdupois of primer fuel. Shipping containers must bear the DOT red gas label for flammable compressed gas. Each can must bear the following precautionary label:

FUEL, ENGINE PRIMER (Contains Diethyl Ether)
DANGER! EXTREMELY FLAMMABLE
HARMFUL IF SWALLOWED OR INHALED
Highly Volatile
Contents under Pressure
Keep away from excessive heat, sparks, or
open flame.
Use in a well-ventilated area.
Avoid breathing mist.
Wash thoroughly after handling.

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5.10.5 Storage data. This compound should be stored at room temperature in a well-ventilated area. It has a shelf life of 24 months.

5.11 Name. GLASS-QUARTZ ETCHING COMPOUND, AMMONIUM BIFLUORIDE
Ammonium Bifluoride (NH_4HF_2) and Molasses
(HAZARDOUS)

5.11.1 Specifications. MIL-E-14114; Etching Compound, for Glass or Quartz.

5.11.2 Technical description. Glass-quartz etching compound ammonium bifluoride, is a homogeneous mixture of ammonium bifluoride and molasses. It is seventy-three to seventy-seven percent ammonium bifluoride and twenty-three to twenty-seven percent molasses.

5.11.3 Use data. This compound is intended for military use in the etching of glass or quartz. Typical commercial applications are the same.

5.11.4 Packaging data and labeling. This compound is packaged for military use in 10 pound unit quantity pails which shall have crimped-on lids. Each pail shall be fitted with a heat sealed polyethylene liner of three mil thickness. There are no applicable DOT shipping regulations. Each container must bear the following precautionary label:

GLASS-QUARTZ ETCHING COMPOUND, AMMONIUM BIFLUORIDE
DANGER! MAY BE FATAL IF SWALLOWED OR INHALED

Causes skin irritation

Keep away from heat and open flame.

Do not take internally.

Do not breathe vapor.

Avoid contact with eyes, skin and clothing.

Wash thoroughly after handling.

5.11.5 Storage data. Etching compound should be stored in a cool, well ventilated area. It has an indefinite shelf life.

5.12 Name. HEAT TRANSFER FLUID
(HAZARDOUS)

5.12.1 Specifications. None.

5.12.2 Technical description. Heat transfer fluid is a colorless liquid that contains 61.45% \pm 0.6% ethylene glycol, 36.92% \pm 0.37% battery water, 1.48% \pm 0.015% sodium benzoate, and 0.15% \pm 0.0015% sodium nitrite. It has a boiling point of 232°F, and a temperature range of -70°F to +20°F.

5.12.3 Use data. Heat transfer fluid is intended for military use in test equipment for basic Hawk missile.

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5.12.4 Packaging data and labeling. Heat transfer fluid is packaged for military use in 1 gallon unit quantity bottles with screw caps. There are no applicable DOT shipping regulations. Each bottle must bear the following precautionary label:

HEAT TRANSFER FLUID (ETHYLENE GLYCOL BASE)
WARNING! MAY BE FATAL IF SWALLOWED
Do not take internally.
Wash thoroughly after handling.

5.12.5 Storage data. Heat transfer fluid should be stored in a cool, dry place. It has an indefinite shelf life.

5.13 Name. HEAT TRANSFER FLUID, HIGH TEMPERATURE
(HAZARDOUS)

5.13.1 Specifications. None.

5.13.2 Technical description. This heat transfer fluid is available in three compositions. The first composition is an aromatic petroleum oil which is resistant to deterioration by thermal cracking. The second composition is a clear, straw-colored, eutectic mixture containing 26.5% diphenyl and 73.5 % diphenyl oxide which darkens rapidly on use. The third composition is a paraffinic heat transfer oil. Chemical and physical properties are contained in Table V.

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Table V. - Chemical and physical properties of high temperature heat transfer fluid

<u>Properties</u>	<u>Petroleum Oil</u>	<u>Diphenyl and Diphenyl Oxide</u>	<u>Paraffinic Oil</u>
Boiling point, °F	---	495.8	---
Color, ASTM, max	7.5	---	2
Critical pressure, atm	---	31.62	---
Critical temperature, °F	---	927	---
Critical volume, lb/ft ³	---	0.049	---
Density at 76°F, lb/ft ³	---	66.3	---
Fire point, °F	---	275	---
Flash point, °F	350	255	380
Freezing point, °F	---	53.6	---
Heat of combustion, btu/lb	---	14000	---
Heat of fusion, btu/lb	---	42.2	---
Ignition temperature, °F	---	1150	---
Specific gravity at 60°F/60°F	0.95	---	---
Pour point, °F	20	---	25
Surface tension at 68°F, dyne/cm	---	40.1	---
Temperature range, °F	+10 to +600	0 to +750	+200 to + 500
Viscosity at 100°F, centistokes	60, approximate	---	---

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5.13.3 Use data. High temperature heat transfer fluid is intended for military use as a coolant in heat transfer systems. Typical commercial applications are the same.

5.13.4 Packaging data and labeling. This heat transfer fluid is packaged for military use in 5 gallon unit quantity cans (paraffinic oil) and 55 gallon unit quantity drums (petroleum oil and diphenyl). The cans must be epoxy lined and tightly capped, while the drums must be made of 18 gaged steel. The must bear a red DOT shipping label for flammable liquids. Each unit container must bear the following precautionary label:

HEAT TRANSFER FLUID, HIGH TEMPERATURE
WARNING! HARMFUL IF SWALLOWED OR INHALED
FLAMMABLE

Keep away from heat, sparks, and open flame.
Use with adequate ventilation.
Avoid breathing vapor.
Wash thoroughly after handling.

5.13.5 Storage data. High temperature heat transfer fluid should be stored in a tightly closed container, at temperatures between 60°F and 100°F. If unopened they have an indefinite shelf life; if opened they have a shelf life of 2 years.

5.14 Name. HEAT TRANSFER FLUID, LOW TEMPERATURE $(C_4F_9)_3N$ FW 671.10
Perfluorotributylamine

5.14.1 Specifications. None.

5.14.2 Technical description. This class of heat transfer fluids is a colorless, odorless, tasteless, inert fluorochemical compound, perfluorotributylamine. Chemical and physical properties for two types are contained in Table VI.

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Table VI. - Chemical and physical properties of low temperature heat transfer fluid

<u>Properties</u>	<u>Type 1</u>	<u>Type 2</u>
Boiling point, °F	207	345
Coefficient of expansion	0.0008	0.0009
Critical temperature, °F	484	578
Critical pressure, atm	207	218
Density at 76°F, lb/ft ³	111	117
Dielectric Strength at 77°F, volts/mil	450	560
Dielectric Constant at 77°F and 1 kc	1.86	1.90
Dissipation factor at 77°F and 1 kc	0.0005	0.0005
Heat of vaporization, btu/lb	30	36
Pour point, °F	-150	-58
Refractive index at 77°F	1.276	1.291
Specific heat at 77°F, btu/lb	0.25	0.27
Surface tension at 77°F, dynes/cm	15	16
Temperature range, °F	-100	+35
Vapor pressure at 77°F, mm Hg	0.3	42
Viscosity at 77°F, centistokes	0.80	2.6

5.14.3 Use data. Low temperature heat transfer fluid is intended for military use as a coolant in heat transfer systems. Typical commercial applications are as a dielectric coolant, controlled environment fluid, test bath fluid, and calibrating fluid.

5.14.4 Packaging data-and labeling. This heat transfer fluid is packaged for military use in 5 gallon unit quantity cans. There are no applicable shipping regulations.

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5.14.5 Storage data. Low temperature heat transfer fluid requires no special storage. It has an indefinite shelf life.

5.15 Name. ISOLATING COMPOUND

5.15.1 Specifications. None.

5.15.2 Technical description. Isolating compound is a greyish, opaque water base paint. It will settle out of solution, but all that is required is stirring before use. It is nontoxic, has no effect on iron, and is not hygroscopic. It is applied to metal surfaces by painting or spraying, and dries in thirty minutes. It may contain copper but it is not required. It may also be applied with fingers or spread with putty knife.

5.15.3 Use data. Isolating compound is intended for military use in the protection of steel surfaces from carburization or decarburization during heating for hardening, carburizing, annealing, normalizing, forging or rolling. It is not suitable for use with salt bath. Typical commercial applications are the same.

5.15.4 Packaging data and labeling. Isolating compound is packaged for military use in 1 gallon unit quantity cans. There are no applicable shipping regulations.

5.15.5 Storage data. Isolating compound requires no special storage. It has a shelf life of several years.

5.16 Name. ISOLATING PASTE

5.16.1 Specification. None.

5.16.2 Technical description. Isolating paste is an off-white, heavy paste the consistency of putty.

5.16.3 Use data. Isolating paste is intended for military use to keep sections of metals soft during hardening by covering the desired section. Typical commercial applications are the same.

5.16.4 Packaging data and labeling. Isolating paste is packaged for military use in 1 gallon unit quantity round tin cans with a double friction cover. There are no applicable DOT shipping regulations.

5.16.4.1 Degree of hazard. Insufficient information is available regarding ingredients of Isolating Paste to determine its hazardous or non-hazardous nature.

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5.16.5 Storage data. Isolating paste should be stored in a tightly closed container, which contains a moistened felt disc over the compound, to prevent the compound from drying out. If properly stored, it has a shelf life of approximately one year.

5.17 Name. LAYOUT DYE
(HAZARDOUS)

5.17.1 Specifications. None.

5.17.2 Technical description. Layout dye consists of organic dyes, resins and solvents, and is available in red, blue, green, and yellow. It is quick-drying and has a thickness of less than 0.002 inch when dry. It does not flake or scale, and is water and oil resistant.

5.17.3 Use data. Layout dye is intended for military use in laying out dies and templates, and for color coding and identification by painting this compound on the metal surface. Typical commercial applications are the same.

5.17.4 Packaging data and labeling. Layout dye is packaged for military use in 1 pint unit quantity cans. It must bear a DOT red shipping label for flammable liquids. Each unit container must bear the following precautionary label:

LAYOUT DYE
WARNING! FLAMMABLE
Keep away from heat, sparks, and open flame.
Use with adequate ventilation.

5.17.5 Storage data. Layout dye should be stored at room temperature, away from heat or open flames. When stored under these conditions, it has a shelf life of one year.

5.18 Name RAIN REPELLENT

5.18.1 Specifications. MIL-R-81261; Rain Repellent, Glass window and Windshield, For In-Flight Application.

5.18.2 Technical description. Rain repellent is a non-toxic polymeric material that reacts, when water is present, to form a water repellent film on glass windshields. The film is clear and transparent, and is nonflammable. It is applied during flight.

5.18.3 Use data. Rain repellent is intended for military use to give good visibility in rainy conditions especially during low level flying and landing operations. Typical commercial applications are the same.

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5.18.4 Packaging data and labeling. Rain repellent is packaged for military use in 1 quart unit quantity containers. There are no applicable DOT shipping regulations.

5.18.5 Storage data. Rain repellent should be stored in a closed container. It has an indefinite shelf life; however, it should be checked once a year for any signs of deterioration of container or contents.

5.19 Name. SALT BATH RECTIFIER

5.19.1 Specifications. None.

5.19.2 Technical description. Salt bath rectifier is a gray powder that is added to a liquid salt bath in order to return the bath to a neutral condition and eliminate the tendency to decarburize the work. It is added to the salt bath in 0.25% amounts, based on the total salt content.

5.19.3 Use data. Salt bath rectifier is intended for military use in the controlling of decarburization in liquid heat salt baths between the temperatures of 1400°F to 2200°F. Typical commercial applications are the same.

5.19.4 Packaging data and labeling. Salt bath rectifier is packaged for military use in 400 pound unit quantity drums. There are no applicable DOT shipping regulations.

5.19.4.1 Degree of hazard. Insufficient information is available regarding ingredients of Salt Bath Rectifier to determine its hazardous or non-hazardous nature.

5.19.5 Storage data. Salt bath rectifier should be stored in a very dry area. If the powder is kept dry it has an indefinite shelf life.

5.20 Name. SALTS, HEAT-TREATING
(HAZARDOUS)

5.20.1 Specifications. MIL-S-10699; Salts, Heat-Treating (For Metals).

5.21.2 Technical description. Heat treating salts are water soluble crystals in a uniform mixture that are free from lumps, dirt, and foreign matter. They are in three different compositions. Chemical and physical requirements are shown in Table VII.

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Table VII. - Chemical and physical requirements of heat treating salts

	Requirements		
	Salt #1	Salt #2	Salt #3
Chemical composition, % by weight			
Sodium nitrate (NaNO_3)	45-47	---	---
Potassium nitrate (KNO_3)	45-47	---	---
Sodium Chloride (NaCl)	---	40-60	---
Potassium chloride (KCl)	---	40-60	5-15
Barium chloride (BaCl_2)	---	---	85-95
Water insoluble	0.10	0.10	0.10
Neutrality			
(pH range 1% aqueous solution)	6-8.5	6.5-8.5	6.5-8.5
Working range, °F	550-1100	1300-1650	1650-2000
Melting range, °F	430-445	1200-1250	1400-1550
Temperature at which becomes a clear liquid, °F	450	1250	1600
Decomposition point, °F	1200	1725	2100
Color	Yellow, Pink, or Red	White	White

5.20.3 Use data. Salt #1 is intended for military use in heat treatment of aluminum alloys, annealing of copper and brass, and tempering of steel. It does not produce a black stain on cartridge brass heat treatment.

Salt #2 is intended for military use in general heat-treating purposes.

It is used in normalizing, annealing, hardening of certain carbon and alloy steels, brazing of all silver solders, preheating of high-speed steels, and preparation for steels for isothermal processes. It does not cause pitting, scaling, or decarburization of the work during treatment. Salt #3 is intended for military use in annealing of stainless steel and hardening of high carbon-high chromium tool steels. It does not cause pitting, scaling, or decarburization of the work during treatment. Typical commercial applications of these heat treating salts are the same.

5.20.4 Packaging data and labeling. Heat treating salts are packaged for military use in 400 pound unit quantity drums (Salt #1) and in bulk unit quantity containers (Salts #2 and #3.) The containers shall be air-tight and water-resistant steel or fiber drums, with open tops, and quick-level-locking, fully removable covers. The must bear a yellow DOT shipping label for oxidizing materials.

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5.20.4.1 Each unit container must bear the following precautionary label:

SALTS, HEAT TREATING

WARNING! FLAMMABLE

Keep away from heat, sparks, and open flame.

and

SALTS, HEAT TREATING (Sodium Nitrate and Potassium Nitrate)

WARNING! HARMFUL IF SWALLOWED

Wash thoroughly after handling.

5.20.5 Storage data. Heat treating salts should be stored in a tightly closed container, which is moisture free, in a dry area away from flammable or organic materials. When stored as indicated, it has an indefinite shelf life.

5.21 Name. SHOE ENAMEL, SOLE AND HEEL EDGE

5.21.1 Specifications. None.

5.21.2 Technical description. Shoe enamel is a black liquid containing emulsions of waxes and pigment dispersions. It is a ready-to use material, with sitrring, that is applied by a small hand brush.

5.21.3 Use data. Shoe enamel is intended for military use in coloring and finishing the edges and heels of shoes and boots. Typical commercial uses are the same.

5.21.4 Packaging data and labeling. Shoe enamel is packaged for military use in 1 gallon unit quantity bottles. There are no applicable DOT shipping regulations.

5.21.4.1 Degree of hazard. Insufficient information is available regarding ingredients of Shoe Enamel, Sole and Heel Edge to determine its hazardous or non-hazardous nature.

5.21.5 Storage data. Shoe enamel should be stored at room temperatures and protected from very high or freezing temperatures. It has in indefinite shelf life.

5.22 Name. WATER REPELLENT KIT

5.22.1 Specifications. MIL-R-6882; Rain Repellent Kit, Glass Window and Windshield.

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5.22.2 Technical description. Water repellent kit consists of a cleaning compound, a rain repellent compound, containers, and tissues. The cleaning compound is a mild, water-suspended abrasives which will remove old rain repellent films. The rain repellent compound is applied in a one-step operation, forming a film on glass surfaces that is water repellent. The film is clear, continuous, free from granular structure, and does not affect visibility.

5.22.3 Use data. Water repellent kit is intended for military use to provide an anti-wetting film on glass windows and windshields so that good visibility will be assured under rain conditions. Typical commercial applications are the same.

5.22.4 Packaging data and labeling. This kit is packaged for military use in single kit combinations containing enough rain repellent to treat a surface of three square feet. There are no applicable shipping regulations.

5.22.4.1 Degree of Hazard. Insufficient information is available regarding ingredients of Water Repellent Kit to determine its hazardous or non-hazardous nature.

5.22.5 Storage data. This kit should be stored at room temperatures. It has an indefinite shelf life.

Notice. - Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.

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	Air Force:	68		
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User activities: Army - AV, AT
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Review activities: Army - MD, ME, MI, MU
Air Force - 68

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