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# MILITARY STANDARD

ORGANIC CHEMICAL COMPOUNDS, SOLID,

TECHNICAL GRADE



AMSC N/A

FSC 6810

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## MIL-STD-1437A

### FOREWORD

#### Organic Chemical Compounds, Solid, Technical Grade

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.
2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to : Commander, U.S. Army Edgewood Research, Development and Engineering Center, Attn: SCBRD-ENE (STD/SPECS/PKG), Aberdeen Proving Ground, MD 21010-5423, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.
3. This standard is approved 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 document is not intended to restrict any service in selecting new items resulting from state-of-the-art changes.

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### 1. SCOPE

1.1 Coverage. This standard is a presentation of nomenclature, Chemical Abstracts Service Registry Numbers, symbols, physical and chemical properties and requirements, military and typical commercial uses, directions for use, packaging data, labeling, general safety precautions, storage information, and shelf life of all military standard technical grade, solid, organic chemical compounds. This standard does not necessarily include all classifications of the items represented by the title or those which are commercially available. Many are not included because they are either reagent grade or are included under other military standards covering technical grade chemicals; aldehydes, ketones, and peroxides; esters and metal organics; organic acids; miscellaneous alcohols and amines; or liquid organic compounds. It does contain items preferred for use in the selection of technical grade, solid organic chemical compounds for application by the Department of Defense.

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

1.3 Classification. The items in this standard are classified on the basis of chemical composition as organic compounds, solid, technical grade.

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**2. APPLICABLE DOCUMENTS****2.1 Government documents.**

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

**SPECIFICATIONS****FEDERAL**

R-N-91	Naphthalene, Technical
JJJ-A-20	Acacia, Technical (Gum Arabic)
LLL-R-626	Rosin, Gum; Rosin, Wood; and Rosin Tall Oil
PPP-C-2020	Chemicals, Liquid, Dry and Paste; Packaging of

**MILITARY**

DOD-U-10866	Urea, Technical
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**STANDARDS****FEDERAL**

FED-STD-313	Material Safety Data Sheets, Preparation And The Submission Of
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**MILITARY**

MIL-STD-12	Abbreviations For Use On Drawings, And In Specifications, Standards And Technical Documents
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(Unless otherwise indicated, copies of federal and military specifications, standards and handbooks are available from the DODSSP-Customer Service, Standardization Documents Order Desk, 700 Robbins Avenue, Bldg 4D, Philadelphia, PA 19111-5094.)

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2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

### CODE OF FEDERAL REGULATIONS (CFR)

- Title 29 - Department of Labor, Occupational Safety and Health Agency (OSHA); General Industry Standards And Interpretations
- Title 40 - Environmental Protection Agency (EPA); Hazardous Waste And Consolidated Permit Regulations
- Title 49 - Department Of Transportation (DOT); Hazardous Materials Regulations
  
- DOD 4145.19-R-1 - Storage And Materials Handling
- DOD 4160.21-M - Defense Utilization And Disposal Manual
- DOD 6050.5 - DOD Hazardous Materials Information System, Hazardous Item Listing.
- TB MED 502 - Occupational And Environmental Health Respiratory  
(DLAM 1000.2) Protection Program.
- TB MED 506 - Occupational And Environmental Health Occupational Vision
- TM 38-250 - Packaging, Materials Handling-Preparation Of Hazardous Materials For Military Air Shipment.

### NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

Registry of Toxic Effects of Chemical Substances  
Recommendation for Environmental Exposure Limits

(Copies of specifications, standards, handbooks, drawings, and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation.

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### AMERICAN CONFERENCE OF GOVERNMENT INDUSTRIAL HYGIENISTS (ACGIH)

Threshold Limit Values (TLVs) for Chemical Substances in the Work Environment Adopted by American Conference of Governmental Industrial Hygienists (ACGIH) with Intended Changes.

(Application for copies should be addressed to American Conference of Governmental Industrial Hygienists, 6500 Glenway Avenue, Bldg D-7, Cincinnati, OH 45211-4438.)

### AMERICAN NATIONAL STANDARD

ANSI Z358.1-1990 for Emergency Eyewash and Shower Equipment.

(Application for copies should be addressed to American National Standards Institute, 1430 Broadway, New York, NY 10018.)

### ASTM

- ASTM E 11 - Standard Specification for Wire-Cloth Sieves For Testing Purposes
- ASTM E 323 - Standard Specification For Perforated - Plate Sieves For Testing Purposes
- ASTM E 380 - Standard For Metric Practice

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

### CHEMICAL ABSTRACTS SERVICE REGISTRY

The Chemical Abstracts Service (CAS) Registry number provides a key to access the wealth of information available through CAS.

(For details on how to search the CAS files and database using the registry number, contact Chemical Abstracts Services, Customer Service, P.O. Box 3012, Columbus, OH 43210.)

### INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

Dangerous Goods Regulations

(Application for copies should be addressed to the Publications Assistant, International Air Transport Association, 2000 Peel Street, Montreal, Quebec, Canada H3A 2R4.)



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### INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO)

Technical Instructions for the Safe Transport of Dangerous Goods by Air, DOC 9284-AN/905.

(Application for copies should be addressed to the Document Sales Unit, International Civil Aviation Organization, 1000 Sherbrooke Street West, Suite 400, Montreal, Quebec, Canada H3A 2R2.)

### INTERNATIONAL MARITIME ORGANIZATION (IMO)

International Maritime Dangerous Goods Code (IMDG), Publication 200 89.10.E, Vols. I-IV.

(Application for copies should be addressed to the International Maritime Organization, 4 Albert Embankment, London SE1 7SR.)

### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

#### National Fire Codes

(Application for copies should be addressed to National Fire Protection Association, Battery March Park, Quincy, MA 02269.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

**2.3 Order of precedence.** In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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## 3. DEFINITIONS

3.1 Definitions of Technical Terms.

3.1.1 Amorphous - An amorphous substance is one that has no definite form or is not crystallized.

3.1.2 Baume - The Baume scale is an arbitrary hydrometer scale of specific gravities. For liquids lighter than water:

$$^{\circ}\text{Baume} = \left[ \frac{140}{\text{Specific gravity } 60^{\circ}\text{F}/60^{\circ}\text{F}} \right] - 130$$

For liquids heavier than water:

$$^{\circ}\text{Baume} = 145 - \left[ \frac{145}{\text{Specific gravity } 60^{\circ}\text{F}/60^{\circ}\text{F}} \right]$$

3.1.3 Colloid - The stage between solution and suspension of a solid in a liquid with no apparent settling. In general, particle diameters range from about 0.005 microns to about 0.2 microns in such colloidal solutions (suspensions).

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

3.1.5 Explosive limits - When combustible vapor is mixed with air in the proper proportions, ignition will produce an explosion. This proper proportion is called the explosive range. The explosive range includes all concentrations of a mixture of flammable vapor or gas in air, in which a flash will occur or a flame will travel if the mixture is ignited. The lowest percentage at which this occurs is the lower explosive limit; and the highest percentage, the upper explosive limit. Explosive limits are expressed in percent by volume of vapor in air and, unless otherwise specified, under normal conditions of temperature and pressure.

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3.1.6 Flash point - The temperature to which a substance must be heated under specific conditions to give off sufficient vapor to form a mixture with air that can be ignited momentarily by a specified flame.

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

3.1.8 Hazardous substance - Any substance or mixture of substances which is (1) toxic; (2) corrosive; (3) an irritant; (4) a strong sensitizer; (5) flammable, or which (6) generates pressure through decomposition, heat or other means, if such substance or mixture of substances may cause substantial personal injury or substantial illness during or as a direct result of any customary or reasonably anticipated handling or use.

3.1.9 Melting point - The temperature at which the liquid and solid phases of a substance exist together in equilibrium, and transition from the solid to the liquid occurs.

3.1.10 Oxidizing agent - A substance that gains electrons as a result of an oxidation-reduction reaction. It causes an increase in the oxidation state of another substance.

3.1.11 pH - A numerical measure of the hydrogen ion concentration, indicating degree of acidity or alkalinity of a solution. It is expressed as  $\text{pH} = -\log_{10}[\text{H}^+]$ . At the neutral point,  $\text{pH} = 7$ . At a pH lower than 7, a solution is acidic. At a pH higher than 7, a solution is basic.

3.1.12 Reducing agent - A substance that loses electrons during an oxidation-reduction reaction. It causes a decrease in the oxidation state of another substance.

3.1.13 Saponification - The conversion of an ester heated with an alkali into the corresponding alcohol and acid salt.

3.1.14 Saponification number - The number of milligrams of potassium hydroxide required to hydrolyze one gram of a sample of an ester or mixture.

3.1.15 Solubility - The weight of a substance which will dissolve in a specific volume of solvent at a specified temperature to produce a saturated solution. In this standard, the solubility will be expressed as the weight of solute in grams dissolved in 100 ml of the specific solvent.

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3.1.16 Specific gravity - The ratio of the mass of a body to the mass of an equal volume of water at 4°C or other specified temperature. In this standard, the first temperature indicates the temperature of the substance, and the second indicates the temperature of water it is referred to. If there is no mention of the temperatures, (20°/4°C) is understood.

3.1.17 Technical grade - Denotes a quality of chemicals which are generally used for industrial, solvent, and manufacturing applications. Generally, specific processes are not employed by the manufacturer to limit all the impurities, aside from the normal precautions which are taken in the manufacturing process. A technical chemical may be specially processed to reduce specific impurities so as to suit the chemical to a given industrial application. In such cases, the identification of the items must be further expanded to indicate the specific impurities limitation.

3.1.18 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.

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

3.2 Definitions of abbreviations. The use of abbreviations shall be in accordance with MIL-STD-12 where applicable. Metric system abbreviations and symbols shall be in accordance with ASTM E 380.

Additional abbreviations are as follows:

Be	- Baume
CAS	- Chemical Abstracts Service Registry Number
DRMO	- Defense Reutilization and Marketing Office
FW	- Formula Weight
HMIS	- Hazardous Materials Information System
MSDS	- Material Safety Data Sheet

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**4. GENERAL REQUIREMENTS**

4.1 Packaging data and labeling. All chemicals included in this standard shall be packaged in accordance with Federal Specification PPP-C-2020 and all applicable documents referenced therein. When the commodity is a hazardous material, the shipping containers for domestic shipments using commercial carriers shall be labeled in accordance with current Department of Transportation (DOT) Hazardous Materials Regulations applicable to each chemical. Likewise, shipping containers for international shipments using commercial carriers shall be labeled in accordance with the International Hazardous Materials Regulations appropriate for the mode of shipment used (see Para. 2.2 herein). When shipping hazardous material by military aircraft, the requirements of TM 38-250 shall apply. Additionally, each item shall be packaged and labeled as specified in the applicable contract or order. All labels shall comply with Hazard Communication Standard, 29 CFR 1910.1200 (f) and the appropriate domestic or international Hazardous Materials Regulations.

4.2 Hazardous materials information. DOD 6050.5, DOD Hazardous Materials Information System (HMIS) acquires, reviews, stores, and disseminates Material Safety Data Sheet (MSDS) information for all hazardous materials used by DOD. The contractual acquisition of an MSDS is accomplished through use of Federal Acquisition Regulation, paragraph 52.223-3, Hazardous Material Identification and Material Safety Data. The MSDS is prepared in accordance with the instructions in FED-STD-313 and shall comply with the requirements of Hazard Communication Standard, 29 CFR 1910.1200 (g).

**4.3 Safety.**

4.3.1 Personal protective measures. The necessary respiratory, eye and skin protection to be used when handling chemicals shall be prescribed by the responsible installation industrial hygiene, medical and safety authorities.

4.3.1.1 Respiratory protection. Respirators, approved by the National Institute for Occupational Safety and Health (NIOSH) or the Mine Safety and Health Administration (MSHA) or by particular respiratory schedules of the Bureau of Mines (BM) for the compounds being used, may be employed for intermittent, non-routine exposure (i.e., not exceeding 1 hour/day for 1 day/week), when the installation medical authority determines that there are no feasible engineering or work practice controls, during interim periods when engineering controls are being designed and/or installed, during emergencies, or for supplementing other control measures (refer to TB MED 502 or DLAM 1000.2). Ventilation containment, process controls, or other feasible engineering controls shall be adequate to remove hazardous concentrations.

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4.3.1.2 Skin protection. Personnel using these compounds shall be provided with and required to use impervious gloves, sleeves, aprons, and boots whenever indicated. Protective creams and ointments commonly known as "barrier creams" may be of value in certain cases. However, barrier creams shall not be used to replace protective clothing. During use, avoid contact with eyes, skin and clothing. Wash with soap and water after handling. When not in use, keep in a tightly closed container. In case of contact with the eyes, remove any contact lenses and irrigate with copious amounts of water for at least 20-30 minutes, and obtain medical attention. Eye lavages and emergency showers shall be located where there is a potential for direct contact with harmful chemicals. All emergency eyewashes and emergency showers shall be activated weekly to flush the line and to verify proper operation in accordance with ANSI standard Z-358-1-1990.

4.3.1.3 Face and eye protection. Personnel using these compounds shall be provided with and required to wear chemical splash-proof safety goggles. In addition, face shields shall be provided and worn over the goggles if splashing could occur. In case of contact with the eyes, immediately irrigate with copious amounts of water for at least 20-30 minutes, and obtain medical attention. (Refer to TB MED 506.)

4.3.1.4 Training. Employers shall provide employees with training and information, including MSDSs, on all chemical items in their work area, in accordance with 29 CFR 1910.1200 (h) and, 49 CFR 172 Subpart H, as may be applicable, to ensure that employees know potential hazards of the chemicals with which they come in contact and the symptoms of exposure, as well as how these chemicals affect the body and bodily functions. Employees shall be adequately trained to render first aid. Additionally, any employee involved with the packaging, preparation, handling or causing a hazardous material to be shipped or transported, shall be provided with all of the training specified in 49 CFR 172 Subpart H.

4.3.1.5 Exercises. Participation in training exercises shall be stressed to demonstrate skills in the use of personal protective equipment and emergency response equipment.

4.3.2 Storage conditions. DOD 4145.19-R-1 describes general storage practices and requirements for hazardous materials in the DOD supply system. Specific requirements provided in the following paragraphs are supplementary in nature and shall be observed in consonance with the DOD storage regulations.

\*Refers only to materials that have become waste.

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**4.3.2.1 Flammable, combustible, pyrophoric and ignitable materials. A**

flammable material is generally any solid, liquid, vapor or gas that ignites easily and burns rapidly. Combustible materials are generally those that are difficult to ignite and burn slowly. The DOT, in Part 173, Subpart D, Section 173.115 of 49 CFR, defines a flammable liquid as one having a closed cup flash point below 37.8°C (100°F). In the DOT's Final Rule to Docket HM-181, the flash point for a flammable liquid was raised from below 37.8°C (100°F) to not more than 60.5°C (141°F). A combustible liquid is defined, by DOT in the above reference, as one having a closed cup flash point at or above 60.5°C (141°F) and below 93.3°C (200°F). A pyrophoric liquid is defined, by DOT in the above reference, as one that ignites spontaneously in dry or moist air at or below 54.5°C (130°F). Materials with flash points of 93.3°C (200°F) or higher are to be considered as burnable. The DOT has permitted, for domestic shipments only and except for shipments by air or water, that "...a flammable liquid with a flash point at or above 38°C (100°F)..." and which does not meet the definition of any other hazard class as defined in 49 CFR, may be re-classed as a combustible liquid. The Environmental Protection Agency (EPA), in Part 261, Subpart C, Section 261.21 of 40 CFR\*, designates the criteria for flammable and combustible materials and oxidizers that exhibit the characteristic of ignitability (I). Liquids with closed cup flash points of less than 60°C (140°F) are defined by EPA as ignitable. The autoignition point (temperature) of a substance is generally defined as the minimum temperature required to initiate or cause self-sustained combustion in the absence of a spark or flame. Materials that ignite easily under normal industrial conditions are considered to be dangerous fire hazards. Such materials shall be stored in a manner to prevent ignition and combustion. Easily ignitable substances, such as reducing agents, shall be kept away from strong oxidizing agents. All containers shall be tightly sealed. It is important to provide adequate ventilation in storage areas, and to locate the storage areas of these items away from fire hazards. Ample fire-control equipment shall be easily accessible. Storage buildings, rooms and cabinets shall comply with provisions of the National Fire Codes. The building shall be electrically grounded and signs posted to prevent the lighting of matches or smoking in the area. Flammable storage areas shall be equipped with smoke or fire detection equipment.

**4.3.2.2 Water-sensitive fire and explosive hazardous materials.** These are materials that react on contact with water or steam to ignite or evolve heat or explosive gases. Such materials exhibit the characteristic of reactivity (R) as designated by the EPA in Section 261.23 of the above reference.\* These materials shall be stored in well-ventilated, cool, dry areas. All containers shall be tightly sealed. These materials are a fire hazard in contact with water or moisture; therefore, it is

\*Refers only to materials that have become waste.

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essential that no sprinkler be used. Otherwise, the building shall conform to that required for storage of flammable materials. The building shall be waterproof, located on high ground, separated from other storage areas and meet National Fire Codes.

4.3.2.3 Incompatible materials. Materials that are chemically incompatible shall be segregated in the storage of both serviceable and unserviceable items. The degree of segregation will depend upon DOD 4145.19-R-1 and local supplementary requirements that insure safe storage conditions. Hazardous storage compatibility codes are provided in the HMIS referred to in 4.2. Hazardous material storage compatibility may also be determined through use of the EPA Hazardous Materials Compatibility Chart. This chart determines reactions of most binary combinations of hazardous wastes by assigning Reactivity Group Numbers (RGNs) based on chemical classes and general chemical reactivities.

4.3.3 Chemical hazardous exposure limits. Chemical hazardous exposure limits for airborne concentrations of substances are obtained from the current TLVs in Threshold Limit Values for Chemical Substances in the Work Environment adopted by the American Conference of Governmental Industrial Hygienists (ACGIH); current Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL), 29 CFR, Part 1910, Section 1910.1000; and NIOSH Recommendation for Environmental Exposure Limits. Such information is also shown in MSDSs and the HMIS referred to in 4.2.

Carcinogenic substances are listed by OSHA in Category I for confirmed carcinogens, and in Category II for suspected carcinogens. Category I substances have standard exposure limits set at the lowest possible levels. Category II substances have standard exposure limits set to prevent acute or chronic effects.

4.3.4 Toxicity. Toxicity information for chemical compounds is available from various publications and from MSDSs, which are collected in DOD 6050.5-LR Hazardous Materials Information System.

4.3.4.1 EPA Toxic (T). Some chemical compounds have been designated by the EPA as toxic (T) in accordance with the criteria shown in Part 261, Subpart B, Section 261.11(a)(3) of 40 CFR.\* Some commercial chemical products are listed as toxic under Subpart D, Section 261.33 (f).

\*Refers only to materials that have become waste.



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4.3.4.2 EPA Acute Hazardous Toxicity (H). Some chemical compounds have been designated by the EPA as acutely hazardous (H) in toxicity in accordance with the criteria shown in Subpart B, Section 261.11(a)(2) of the above reference.\* Some commercial chemical products are listed as acutely hazardous in toxicity under Subpart D, Section 261.33(e).

4.3.4.3 EPA Toxicity Characteristic Leaching Procedure (TCLP). This is a procedure used to determine the properties of a waste that are directly related to the potential of the waste to pose a hazard to groundwater when disposed of in a landfill environment. It replaces the EPA EP toxicity test. The TCLP procedure is contained in EPA Method No. 1311, SW-846. Some 40 chemical contaminants have been designated by EPA as being a hazard to groundwater in a landfill environment. (See Section 261.24 of 40 CFR.)\*

#### 4.4 Pollution and disposal.

4.4.1 Pollution potential. All items described in this standard shall be assumed to have a pollution potential. However, to minimize this potential, the proper use, storage and disposal methods shall be strictly followed.

4.4.2 Disposal of excess or unserviceable material. To minimize disposal problems, it is recommended that no more than a one year's supply of each item listed in this standard be stocked. When stocks have been declared excess or unserviceable, they will be disposed of in accordance with the Defense Utilization and Disposal Manual, DOD 4160.21-M, and applicable DOD Policy Memoranda. Guidance can be obtained from your servicing Defense Reutilization and Marketing Office (DRMO) on procedures required for proper reporting and turn-in.

4.4.3 Disposal and storage of hazardous wastes. Items are classified and managed as hazardous wastes as defined by the Resource Conservation and Recovery Act (RCRA) (Public Law 94-580). Items have been identified as meeting the characteristics (i.e., ignitable, corrosive, reactive or are subject to Toxicity Characteristic Leaching Procedure (TCLP)) or are listed (i.e., toxic or acutely hazardous) according to Identification and Listing of Hazardous Waste, Part 261, 40 CFR; or have been determined to be hazardous wastes by declaration of the Defense Reutilization and Marketing Service (DRMS) in accordance with procedures set forth in DOD 4160.21-M. Disposal of such items shall be managed in accordance with the Installation Environmental Office, the DRMO, or the Safety and Health Office to insure proper reporting of disposal and treatment actions to the US EPA and State, and shall

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be managed in accordance with Federal, State and local laws. The three main disposal methods are turn-in to the DRMO, on-post disposal by installation personnel, or disposal by commercial contract. Hazardous wastes that cannot be used or disposed of as stated in 4.4.3.2 shall be stored under environmentally safe conditions until suitable methods of disposal are determined. Short-term storage (less than 90 days) requires proper containment (i.e., packaging and facilities) in accordance with 40 CFR Section 262.34 of the above reference. Long-term storage (greater than 90 days) requires permitting by the EPA or by the state under Public Law 94-580 (RCRA), in compliance with the requirements of 40 CFR, Parts 264 and 265. Physical custody will be accomplished by the activity with conforming storage or most nearly conforming storage. When physical custody is in question, the Post Commander will make the final decision. In all cases where the wastes are to be collected, stored, transported and disposed of at a state or local permitted disposal facility, the identity and description of the waste shall be maintained and recorded in accordance with Part 262 of the above reference. Transportation of the waste must be in accordance with Part 263 of the above reference, Standards Applicable to Transporters of Hazardous Waste. State and/or local regulations may be more stringent than Federal requirements. It is essential that the installation Environmental Office review all disposal actions for compliance with all applicable regulations.

4.4.3.1 Cleanup of liquid spills. To control the migration of spilled or leaking liquids, dike around the item with an inert, dry absorbent (e.g., clay sawdust or vermiculite) or follow installation spill plans (Spill Prevention Control and Countermeasure Plan and Installations Spill Contingency Plan). Control entry to the spill site and segregate salvageable materials away from the spill area. Initiate waste cleanup operations immediately in accordance with local procedures. The residue shall be safely handled and transported to an approved or permitted disposal or storage facility. Packaging, labeling, transportation and record-keeping requirements for this waste material are determined by the appropriate Federal and State agencies and local procedures. It is recommended that all activities involving disposal preparation and transportation to commercial facilities be properly coordinated with the appropriate Federal and State agencies responsible for health and environmental aspects of hazardous materials. It is imperative that the proper description of waste accompany the packaged item at all times. Final disposal of the waste item shall be accomplished by reutilization, transfer, donation or sales by DRMS in accordance with DOD 4160.21-M or by ultimate disposal as described in 4.4.3.2. Spill residue, including contaminants, to be turned into the DRMO shall first be properly identified, containerized, and labeled. For large scale spills that grossly contaminate the environment, the Chemical Transportation Emergency Center (CHEMTREC) can be called for assistance (1-800-424-9300). Applicable procedures of the local spill control plan shall be followed. Necessary respiratory, eye, and skin protection measures are to be used while performing cleanup operations.

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4.4.3.2 Ultimate disposal. Ultimate disposal shall be accomplished at a permitted or approved hazardous waste treatment or disposal facility designated by the Installation Environmental Office, DRMO, or Safety and Health Offices.

4.4.4 DISCLAIMER. RECOMMENDED DISPOSAL INSTRUCTIONS ARE FORMULATED FOR USE BY ELEMENTS OF THE DEPARTMENT OF DEFENSE. THE UNITED STATES OF AMERICA IN NO MANNER WHATSOEVER, EITHER EXPLICITLY OR IMPLICITLY, WARRANTS, STATES, OR INTENDS SAID INSTRUCTION TO HAVE ANY APPLICATION, USE OR VIABILITY BY OR TO ANY PERSON OR PERSONS CONTRACTING OUTSIDE THE DEPARTMENT OF DEFENSE OR ANY PERSON OR PERSONS CONTRACTING WITH ANY INSTRUMENTALITY OF THE UNITED STATES OF AMERICA, AND DISCLAIMS ALL LIABILITY FOR SUCH USE. ANY PERSON USING THESE INSTRUCTIONS WHO IS NOT A MILITARY OR CIVILIAN EMPLOYEE OF THE UNITED STATES OF AMERICA SHOULD SEEK COMPETENT PROFESSIONAL ADVICE TO VERIFY AND ASSUME RESPONSIBILITY FOR THE SUITABILITY OF THESE INSTRUCTIONS TO HIS PARTICULAR SITUATION, REGARDLESS OF SIMILARITY TO A CORRESPONDING DEPARTMENT OF DEFENSE OR OTHER GOVERNMENT SITUATION.

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## 5. DETAILED REQUIREMENTS

5.1 Name. ACACIA, TECHNICAL FW from about 240,000  
 Gum Arabic; Senegal; Kordofan; Morocco;  
 Cape; Aden; Suakin; White Senaar; Wattle Gum CAS 9000-01-5

5.1.1 Specification. JJJ-A-20; Acacia, Technical (Gum Arabic)

5.1.2 Technical description. Acacia is the dried exudate from the stems and branches of Acacia senegal (Linne) Willdenow or of other related African species of Acacia (Family Leguminosae). A carbohydrate polymer, complex and highly branched, it is composed essentially of the calcium salt of arabic acid, and on hydrolysis, it yields arabinose, galactose, aldobionic and galacturonic acids. It varies in form from lumps to thin flakes, powder, granules or angular fragments of white to yellowish white color, and it is almost odorless. Acacia is completely soluble in hot or cold water, yielding a uniform viscous solution of mucilage which is acid to litmus. It is insoluble in alcohol. The specific gravity is 1.35 to 1.49, but samples dried at 100°C are heavier. Moisture content usually varies from 13 to 15%.

In addition to the requirements listed in Table I, the acacia shall be free from tannin-bearing gums, starch and dextrin, and inorganic acidity. It shall not reduce Fehlings solution and shall pass the test for identification as outlined in Federal Specification JJJ-A-20.

TABLE I. Chemical and physical requirements of acacia, technical.

Property	Requirement (max) % by wt
Acid-insoluble salt	0.5
Ash, total	4.0
Insoluble residue	1.0
Moisture	15.0
Organic acidity, as acetic acid	0.4

5.1.3 Use. Acacia, technical, is intended for military use as a colloidal stabilizer in photographic emulsions and for lithographic work. Typical commercial applications include use in adhesives, inks, textile printing, in general, as a thickening agent and colloidal stabilizer. It is also used in the preparation of tools and pharmaceuticals.

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5.1.4 Packaging. Refer to 4.1.

5.1.5 Safety. Material which contains less than 12 percent moisture tends to chip and to produce dust when roughly handled. It can be precipitated when solutions of borax, ferric salts, or basic lead acetate are added to it. Alcohol, gelatin and sodium silicate do the same thing. Acacia can be an irritant and should be handled as such.

5.1.6 Storage. Acacia, technical, should be stored in closed containers in a cool, dry place. When stored under these conditions, the shelf life is indefinite.

5.1.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4. EPA Hazardous Waste Classification - None.

5.2 Name. ALBUMEN, EGG, TECHNICAL FW about 45000  
 Ovalbumin  
 Albumen CAS 9006-50-2

5.2.1 Specification. Manufacturers requirement. (No Government Specification.)

5.2.2 Technical description. Egg albumen is the dried white of egg separated from the egg yolk. It is pale yellow, transparent, in amorphous lumps or scales, free from egg yolk, dyes or other denaturants and foreign matter; it is a simple, naturally occurring protein soluble in water and coagulated by heat. Egg albumen will decompose in moist air with the formation of ammonia. Technical grade egg albumen intended for military use shall be free from starch, dextrin, glucose and reducing sugars. It shall have the appearance of shiny, pale yellow scales and have a characteristic egg odor, free from objectionable odor.

TABLE II. Chemical and physical requirements of albumen, egg, technical.

Property	Requirement
Non-volatile matter (% by wt, min)	85
pH of aqueous solution (20%)	5.0 to 6.5
Specific gravity of 20% aqueous solution (25°C)	1.037 (5.2°Be)
Water-insoluble matter (% by wt, max)	3

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5.2.3 Use. Albumen, egg, technical, is intended for military use in the preparation of sensitizing solutions for photolithographic zinc, aluminum, plastic, glass or composition plates. Typical commercial applications include use as a clarifying agent. It has the property of coagulating when heated and carrying down coloring matter and other impurities in the process. It is also used in the manufacture of cements, adhesives, varnishes, and ivory substitutes; in photography for manufacture of albumen paper and coating plates; in sizing paper and printing fabrics; for rendering certain dyes fast; and for stamping with gold and bronze powder and leather manufacture.

5.2.4 Packaging. Refer to 4.1.

5.2.5 Safety. Albumen decomposes in moist air. It swells in water and then it gradually dissolves. The solution coagulates at 61°C because the proteins are denatured. The salts of copper, iron, mercury, silver, hydrogen peroxide, phenol, picric acid, alum, tannic acid, formaldehyde, ether and alcohol also denatures albumen solutions. Decomposition fumes or albumen particles can be irritating to eyes, skin and the respiratory tract.

5.2.6 Storage. Technical grade egg albumen should be stored in tightly closed containers in a cool, dry place. When stored under these conditions, the shelf life is indefinite.

5.2.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4. EPA Hazardous Waste Classification - None.

5.3	<u>Name</u> . CORNSTARCH, TECHNICAL (C <sub>6</sub> H <sub>10</sub> O <sub>5</sub> ) <sub>n</sub>	FW (162.07) <sub>n</sub> .
	Amylum	CAS 9005-25-8

5.3.1 Specification. Manufacturer's requirements. (No Government specification.)

5.3.2 Technical description. Cornstarch, technical, is a white, amorphous, tasteless, fine powder prepared from clean, sound corn (maize) that is essentially free from other grains, weed seeds and other foreign material. It has a specific gravity range of 1.499 to 1.513; it does not melt but decomposes (burns) when heated. It is insoluble in cold water, alcohol or ether; however, it is soluble in hot water, forming a jelly on cooling. Cornstarch, technical, shall be made of such purity to meet the

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requirements of Table III and shall be finely pulverized, white to cream in color, be free of lumps, caking, dirt and any foreign matter.

TABLE III. Chemical requirements of cornstarch, technical.

Property	Requirement, % max
Ash*	0.15
Moisture	12.0
Nitrogen*	0.08

\*Determined on a moisture-free basis

5.3.3 Use. Cornstarch, technical, is intended for military use in the treatment of sea water feed to marine distillers aboard ship. Typical commercial applications include use in manufacture of adhesives, sizing and finishing textiles, sizing paper, book binding, and in colloidal preparations.

5.3.4 Packaging. Refer to 4.1

5.4.5 Storage. Cornstarch, technical, should be stored in a cool, dry place, away from definite fire hazards or oxidizing materials. When stored under these conditions, the shelf life is indefinite.

5.3.6 Safety. When exposed to flame, starch dust may ignite or explode and can react with oxidizing materials. Care in storage and handling must be exercised.

5.3.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4. EPA Hazardous Waste Classification - None.

5.4 Name. p-DICHLOROBENZENE, TECHNICAL  $C_6H_4Cl_2$  FW 147.00  
 Paradichlorobenzene  
 1,4-Dichlorobenzene CAS 106-46-7  
 PDB

5.4.1 Specification. Manufacturer's requirement. (No Government specification.)

5.4.2 Technical description. The compound p-dichlorobenzene, technical, is a white crystalline, volatile material of characteristic penetrating odor, and freely soluble

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in alcohol, benzene, chloroform, ether, and carbon disulfide, but insoluble in water. It has a specific gravity of 1.458, a boiling point of 173.7°C, a melting point of 53°C and a flash point of 65.5°C. It is derived by the further chlorination of monochlorobenzene under proper conditions.

TABLE IV. Chemical and physical requirements of p-Dichlorobenzene, technical

Property	Requirement
Crystallizing point (°C)	52.5 to 53.5
Particle size: <u>1/</u>	Percent by Weight
Retained on 850 micrometer sieve	5
Retained on 9.5 micrometer sieve	100

1/Standard sieve designation in accordance with ASTM E 11 or ASTM E 323 as applicable.

In addition to requirements listed in Table IV, the crystals, when melted, shall be essentially free from turbidity and suspended matter.

TABLE V. Physical constants of p-Dichlorobenzene

Property	Constant
Boiling point (°C)	174
Flash point (closed cup, °C)	65.5
Melting point (°C)	53
Specific gravity (21/4°C)	1.458
Vapor density (air = 1.00)	5.07

5.4.3 Use. The compound p-dichlorobenzene, technical, is intended for military use as an insecticide, primarily as a moth preventative. Typical commercial applications include use in insecticides, germicides, deodorants, dyes, and in agricultural soil and crop fumigating products.

5.4.4 Packaging. Refer to 4.1

5.4.5 Safety. The compound p-dichlorobenzene, technical, is not compatible with naphthalene. Care should be taken not to use these two items interchangeably.



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The compound p-dichlorobenzene can react vigorously with oxidizing materials, and when heated to decomposition, releases vapors which are very painful to the eyes and nose. Do not get p-dichlorobenzene in the eyes. In case of contact, immediately flush with plenty of water for at least 15 minutes and get medical attention. Avoid prolonged breathing of dust or vapor. Use with adequate ventilation.

5.4.6 Storage. The compound p-dichlorobenzene, technical, should be plainly labeled and stored in tightly closed containers in a cool, well-ventilated area, away from oxidizing materials, open flames and areas of acute fire hazard. When stored under proper conditions, the shelf life is indefinite.

5.4.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4.

1,4-dichlorobenzene is listed in 40 CFR Section 261.24 Table 1 for toxicity characteristics. 1,4-dichlorobenzene will exhibit the characteristic of toxicity (hazardous waste number D027). The compound 1,4-dichlorobenzene is also a U listed waste in 40 CFR Section 261.33 (hazardous waste number U072). Designations of toxic hazardous waste apply only to material declared as waste.

5.5 Name. GELATIN, TECHNICAL

FW high average

CAS 9000-70-8

5.5.1 Specification. Manufacturer's requirements. (No Government specification.)

5.5.2 Technical description. Gelatin, technical, is a protein obtained from collagen by boiling skin, ligaments, tendons, and bones, principally from beef and calves, with water. It is a colorless or slightly yellow, practically odorless and tasteless powder that swells up and absorbs five to ten times its weight of cold water. It is soluble in hot water, glycerol and acetic acid, but insoluble in alcohol, chloroform and other organic solvents.

5.5.3 Use. Gelatin, technical, is intended for military use in photography, lithography and adhesives. Typical commercial applications include use in photography and photolithography and as a protective colloid in electrometallurgical and other processes.

5.5.4 Packaging. Refer to 4.1

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5.5.5 Safety. Gelatin is incompatible with tannin and formaldehyde. It is an incomplete protein with small amounts of some important amino acids, but it lacks tryptophan, and therefore it is nutritionally deficient.

5.5.6 Storage. Gelatin, technical, should be stored in tightly closed containers in a cool, dry place. When stored under these conditions, the shelf life is indefinite.

5.5.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4. EPA Hazardous Waste Classification - None.

5.6	<u>Name</u> . GUM GHATTI, TECHNICAL	FW high average
	Complex Structure	
	Ghatti Gum	CAS 9000-28-6
	Indian Gum	
	British Indian Gum	

5.6.1 Specifications. Manufacturer's requirements. (No Government specification.)

5.6.2 Technical description. Gum Ghatti, technical, is somewhat similar to gum arabic (Acacia). It is the gummy exudate from the stem of the Anogeissus latifolia, Dhaua, and related trees of India and Ceylon. It is in the form of colorless to pale yellow tears, rounded or vermiform. It is a tasteless and odorless substance that is partially soluble in water. It can be solubilized by autoclaving. Solubilized gum ghatti in solution forms a very viscous mucilage, more viscous but less adhesive than acacia.

5.6.3 Use. Gum ghatti is intended for military use as a colloidal stabilizer in photographic emulsions and lithographic work. Typical commercial applications include use in adhesives, inks, and textile printing, and in general, as a thickening agent and colloidal stabilizer. Gum ghatti can replace acacia in many cases.

5.6.4 Packaging. Refer to 4.1

5.6.5 Safety. Ghatti Gum does not form a true gel. It is insoluble in 90% alcohol and dilute sulfuric acid. Ghatti gum occurs as a calcium magnesium salt of a complex water-soluble polysaccharide and requires normal precautions when handled.

5.6.6 Storage. Gum Ghatti, technical, should be stored in closed containers in a cool, dry place. When stored under these conditions, the shelf life is indefinite.

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5.6.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4. EPA Hazardous Waste Classification - None.

5.7	<u>Name</u> . METHYL CELLULOSE, TECHNICAL (C <sub>7</sub> H <sub>13</sub> O <sub>5</sub> ) <sub>n</sub> Cellulose Methyl Ether	FW 40000 to 180000  CAS 9004-67-5
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5.7.1 Specification. Manufacturer's requirements. (No Government specification.)

5.7.2 Technical description. Methyl cellulose, technical, is a methyl ether of cellulose. It is a grayish-white fibrous powder formed by the reaction of methanol with cellulose in the presence of dehydrating agents. The proportions of the reacting materials are varied to control the properties of the product, such as water solubility and viscosity of the water solutions. This compound swells in water and produces a clear to opalescent, viscous, colloidal solution which is neutral to litmus. It is insoluble in hot water, alcohol, ether and chloroform, but soluble in glacial acetic acid, ethyl acetate, ethylene dichloride, benzene and carbon tetrachloride. It is not affected by oils and greases, is stable to light and to temperatures up to 300°C. It is flammable when ignited.

5.7.3 Use. Methyl cellulose, technical, is intended for military use as a dispersing agent, emulsifier and thickener. Typical commercial applications include use in fabric finishing "crease proofing", as an adhesive and as a sizing agent.

5.7.4 Packaging. Refer to 4.1.

5.7.5 Safety. Methyl Cellulose, technical, is flammable and due care should be exercised to keep it away from open flames.

5.7.6 Storage. Methyl Cellulose, technical, should be stored in closed containers in a cool, dry area away from acute fire hazards and open flames. When stored under proper conditions, the shelf life is indefinite.

5.7.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4. EPA Hazardous Waste Classification - None.

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5.8 Name. NAPHTHALENE, TECHNICAL  $C_{10}H_8$  FW 128.18  
 Tar camphor  
 Naphthalin CAS 91-20-3

5.8.1 Specification. R-N-91; Naphthalene, Technical

5.8.2 Technical description. Naphthalene, technical, is a white, crystalline, volatile solid, derived from the coal-tar oils boiling between 170° and 230°C by crystallization and distillation or from petroleum fractions after various catalytic processing operations. It has the characteristic odor of moth balls and is insoluble in water, moderately soluble in absolute alcohol and very soluble in benzene. For military use, naphthalene shall solidify at a minimum temperature of 79°C; shall have no residue on ignition; and shall be insoluble in water and soluble in boiling ethanol. It shall be supplied in ball or flake form.

TABLE VI. Physical constants of naphthalene.

Property	Constant
Boiling point (760 mm pressure, °C)	217.9
Explosive limits (% by volume in air)	0.88 to 5.9
Flash point (closed cup, °C)	78
Melting point (°C)	80.2
Specific gravity (20°/4°C)	1.145
Vapor density (air = 1.00)	4.42

5.8.3 Use. Naphthalene, technical, is intended for military use as an insecticide, primarily as a moth preventative. Typical commercial applications include use in the manufacture of dyes, moth repellents, fungicides, explosives, cutting fluids, lubricants, synthetic resins, synthetic tannings, preservatives and emulsion breakers.

5.8.4 Packaging. Refer to 4.1.

5.8.5 Safety. Naphthalene, technical, forms explosive mixtures in air and reacts with oxidizing materials. It is irritating to the skin and is readily absorbed when inhaled. Naphthalene is not compatible with p-dichlorobenzene, also used as a moth repellent. Care should be taken not to use these two items interchangeably.

5.8.6 Storage. Naphthalene, technical, should be plainly labeled and stored in closed containers in a cool, dry place away from all fire hazards and oxidizing materials. When stored under proper conditions, the shelf life is indefinite.

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5.8.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4. Naphthalene is listed in 40 CFR Section 261.33 as a "U" listed hazardous waste for toxicity (EPA hazardous waste number U165). Designations of toxic hazardous waste apply only to material declared as waste.

5.9 Name. POLYETHYLENE GLYCOL, TECHNICAL                      FW 200-6000  
H(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>OH  
CAS 25322-68-3

5.9.1 Specifications. Manufacturer's requirement. (No Government specification.)

5.9.2 Technical description. Polyethylene glycol, technical, required for military use is a white, odorless, wax-like solid. It has an average molecular weight of 7500 and is soluble in water, alcohol and other organic solvents. It is inert to many chemical agents and has a low vapor pressure. Material of this molecular weight would have a specific gravity of approximately 1.212 (25°/25°C) and a flash point at approximately 268°C.

5.9.3 Use. Polyethylene glycol, technical, is intended for military use as a lubricant, a mold release agent and an anti-sticking compound. Typical commercial applications include use as a coupling agent in cutting oils; as a lubricant in metal rolling, forming and drawing; as an antifoam agent in ceramic glaze solutions, latex paints, methanol antifreezes, rubber lubricants and mold release agents; as a lubricant in brake fluid formulations and as a floatation froth control agent.

5.9.4 Packaging. Refer to 4.1.

5.9.5 Safety. Polyethylene glycols are compounds of low toxicity. They are present in many foods and pharmaceutical products. However, they have a solvent action on some plastics.

5.9.6 Storage. Polyethylene glycol, technical, should be stored in a cool, dry place. When stored under proper conditions, the shelf life is indefinite.

5.9.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4. EPA Hazardous Waste Classification - None.

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5.10 Name. ROSIN, GUM FW above 302.46  
 (mixture) 90%  $C_{20}H_{30}O_2$ , 10%  $C_{20}H_{32}O_2$ ,  $C_{20}H_{28}O_2$   
 Rosin CAS 8050-09-7  
 Colophony

5.10.1 Specification. LLL-R-626; Rosin, Gum; Rosin, Wood; and Rosin, Tall Oil.

5.10.2 Technical Description. Gum rosin is the residue obtained after the distillation of turpentine oil from the exuded oleoresin collected from living pine trees, chiefly Pinus palustris and Pinus caribaea. It is translucent; yellow, amber or red colored; and in large lumps or solid masses. It is insoluble in water, but it is freely soluble in alcohol, benzene, ether, glacial acetic acid, oils, carbon disulfide and dilute solutions of fixed alkali hydroxides. Gum rosin has a specific gravity of 1.08 at 25°C and a melting point of 100° to 150°C. Rosin acids of the abietic and pimaric types have the general formula  $C_{19}H_{29}COOH$ , and have a phenanthrene nucleus. They are unsaturated and hence reactive. An unsaponifiable portion of rosin (3-10%) contains hydrocarbons and high molecular weight alcohols. These constituents vary greatly according to the source of the rosin.

TABLE VII. Chemical and physical requirements of type I rosin.

Characteristic	All grades except grade FF	Grade FF
Insoluble matter in toluene, max, % by wt	0.05	0.05
Softening point, °C, min	70	67
Acid number, min	160	150
Saponification number, min	166	162

Gum rosin for military use shall be in the form of a solid mass of the darker colored rosins (grades D and E of the Federal Naval Stores Act). It shall be clear and transparent, free from more than traces of visible particles of dirt or foreign matter suspended in the solid mass. The softening point by Ring and Ball method shall not be lower than 70°C.

5.10.3 Use. Gum rosin is intended for military use as a matrix in shrapnel and in paints, varnishes and driers. Typical commercial applications include use in the manufacture of linoleum, soldering compounds, core oils, insulating compounds, molding compounds and sealing waxes.

5.10.4 Packaging. Refer to 4.1

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5.10.5 Safety. Gum rosin is flammable and gives off acrid fumes. It has a tendency to heat spontaneously and can react with oxidizing materials. It may irritate eyes.

5.10.6 Storage. Gum rosin should be stored in a cool, well-ventilated area away from all fire hazards, open flames and oxidizing agents. When stored under these conditions, the shelf life is indefinite.

5.10.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4. EPA Hazardous Waste Classification - None.

5.11 Name. UREA, TECHNICAL  $\text{CO}(\text{NH}_2)_2$  FW 60.06  
Carbamide  
Carbonyldiamide CAS 57-13-6

5.11.1 Specification. MIL-U-10866; Urea, Technical.

5.11.2 Technical description. Urea, technical, is supplied in the form of small, free flowing pellets or beads. It is almost odorless, has a specific gravity of 1.335 and decomposes before boiling. Urea is soluble in water, alcohol and benzene, slightly soluble in ether and almost insoluble in chloroform. Urea occurs in urine and other body fluids.

TABLE VIII. Chemical and physical requirements of urea, technical.

Characteristic	Class 1		Class 2	
	Minimum	Maximum	Minimum	Maximum
Nitrogen, % by wt	46.0	46.7	46.0	46.7
Water, % by wt	---	---	---	0.50
Biuret content, % by wt	---	---	---	2.5
Ash, % by wt	---	0.003	---	0.1
Initial melting point, °C	132.0	133.0	129.0	133.0

5.11.3 Use. Urea, technical, is intended for military use to melt thin ice at temperatures above 15°F as well as prevention of ice accumulation during freezing rain upon aircraft runways and ramp areas. Typical commercial applications include use in the manufacture of fertilizers, animal feed, and resins; as a stabilizer for explosives, and in adhesives.

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5.11.4 Packaging. Refer to 4.1

5.11.5 Safety. Urea can react with oxidizing materials and, when heated, emits fumes of cyanide. Proper storage and handling will minimize this potential hazard.

5.11.6 Storage. Urea, technical, should be stored in a cool, dry place away from all fire hazards, open flames and oxidizing agents. When stored under proper conditions, the shelf life is indefinite.

5.11.7 Disposal. In case of spills, gather up the dry compound and place in containers for use or disposal. For appropriate procedures, contact the Installation Environmental Office, the DRMO, or Safety and Health Offices. Refer to 4.4.4. EPA Hazardous Waste Classification - None.



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### 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. This standard is intended to cite nomenclature, Chemical Abstracts Service Registry Numbers, formulas, physical and chemical properties, specification requirements, military and typical commercial uses, safety information, storage information and disposal information for Organic Chemical Compounds, Solid, Technical Grade, preferred for application by the Department of Defense.

6.2 Subject term (key word) listing.

Acacia, technical  
Albumen, egg, technical  
Cornstarch, technical  
p-Dichlorobenzene, technical  
Gelatin, technical  
Gum ghatti, technical  
Methyl cellulose, technical  
Naphthalene, technical  
Polyethylene glycol, technical  
Rosin, gum  
Urea, technical

6.3 Changes from previous issue. Asterisks or vertical lines are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

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