[NOT MEASUREMENT SENSITIVE]

MIL-DTL-197J
9 July 2000
SUPERSEDING
MIL-P-197H
29 July 1994

DETAIL SPECIFICATION

PACKAGING OF BEARINGS, ANTIFRICTION ASSOCIATED PARTS AND SUBASSEMBLIES

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Purpose. This specification covers the cleaning, drying, preservation, packing and marking of stock and production antifriction bearings, associated parts and subassemblies.

1.1.1 The requirements of MIL-STD-2073 are not applicable for this specification.

1.1.2 Military and Federal Specifications and Standards have been replaced with non-government standards whenever possible.

1.2 Applicability. The applicability for this document has changed to include all types and classes of bearings, associated parts, and subassemblies that require packaging by MIL-DTL-197.

1.2.1 The specification assigns default preservation and packing methods. The specification allows flexibility for contracting officers, providing additional requirements that may be selected from APPENDICES when a greater degree of protection is required or other requirements are needed.

1.3 Exceptions. The requirements of this specification may not apply for the items intended for delivery-at-sea, items delivered during wartime, or items delivered requiring reusable containers.

1.4 Commercial. Commercial packaging requirements have been deleted from this specification. ASTM D3951 is the guide for commercial packaging. Note that the Clean room requirements and other requirements found in MIL-DTL-197 are not required when using Commercial Processes.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center - Richmond, DSCR-VBD, 8000 Jefferson Davis Highway, Richmond, VA 23297-5821, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A AREA PACK

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

2. APPLICABLE DOCUMENTS.

2.1 General. The documents listed in this section are specified in this specification. While every effort has been made to ensure, completeness of this list, specification users are cautioned that they must meet all the specified requirements of this standard, whether or not they are listed.

2.2 Government Documents.

2.2.1 Specification, 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 acquisition document (see 6.2). Many specifications have been converted to MIL-PRF and MIL-DTL Specifications. Others have been replaced by a commercial specification. This document may identify some specifications that have since been changed to a new format.

SPECIFICATIONS

FEDERAL

A-A-1894	Paper Kraft, Treated (Fire Resistant)
L-P-378	Plastic Sheet and Strip, Polyolefin
PPP-B-566	Boxes, Folding, Paperboard
PPP-B-576	Boxes, Wood Cleated Panelboard
PPP-B-585	Boxes, Wood, Wirebound
PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-665	Boxes, Paperboard, Metal Edged and Components
PPP-B-676	Boxes, Setup
PPP-C-795	Cushioning Material, Packaging (Flexible Closed Cell Plastic Film for long Shipping Cycle Applications)
PPP-B-1055	Barrier Material, Waterproofed, Flexible
PPP-C-1120	Cushioning Material, Uncompressed Bound Fiber For Packaging
QQ-A-1876	Aluminum Foil
PPP-T-60	Tape, packaging Waterproof
PPP-T-76	Tape, Packaging, Paper
TT-T-292	Thinner, Paint, Mineral Spirits Regular
UU-P-268	Paper, Kraft, Wrapping
VV-L-800	Lubricating Oil, General Purpose, Preservative (Water Displacing)

DEPARTMENT OF DEFENSE

MIL-C-104	Crates, Wood, Lumber and Plywood Sheathed, Nailed and Bolted
MIL-B-117	Bags, Sleeves and Tubing
MIL-B-121	Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-P-130	Creped Paper
MIL-PRF-131	Paper, Wrapping, Laminated and Creped
MIL-P-149	Plastic Coating Compound, Strippable (Hot Dipping)
MIL-D-3464	Desiccants, Activated, Bagged, Packaging Use and Static Dehumidification
MIL-PRF-6085	Lubricating Oil, Instrument, Aircraft, Low Volatility
MIL-R-6130	Rubber, Cellular, Chemically Blown
MIL-PRF-10924	Grease, Automotive and Artillery
MIL-C-11796	Corrosion Preventive Compound, Petrolatum, Hot Application
MIL-P-17667	Paper Wrapping, Chemically Neutral (Non Corrosive)
MIL-B-17931	Bearings Ball, Annular, For Quiet Operation
MIL-PRF-20092	Rubber or Plastic Sheets and Assembled and Molded Shapes, Synthetic, Foam or Sponge, Open Cell
MIL-PRF-22191	Barrier Materials, Transparent, Flexible, Heat Sealable
DOD-G-24508	Grease High Performance, Multi-Purpose (Metric)
MIL-B-26195	Boxes, Wood Cleated, Skidded, Load Bearing Base
MIL-PRF-26514	Polyurethane Foam, Rigid or Flexible, For Packaging
MIL-I-26860	Indicator, Humidity, Plug, Color Change
MIL-L-10547	Liners, Case and Sheet, Overwrap, Waterproof
MIL-L-19140	Lumber and Plywood, Fire Retardant
Ml-PRF-23827	Grease, Aircraft and Instrument, Gear
MIL-C-3955	Cans, Composite
MIL-G-27617	Grease, Aircraft and Instrument, Fuel and Oxidized Resistant
MIL-I-52211	Components and Assemblies for Industrial Gas Production, Storage and Transport Equipment, Packaging of
MIL-L-53131	Lubricating Oil, Precision Rolling Element Bearing, Polyolefin Based
MIL-PRF-81322	Grease, Aircraft, General Purpose, Wide Temperature Range
DOD-L-81846	Lubricating Oil, Instrument, Ball Bearing, High Flash Point
MIL-G-81937	Grease, Instrument, Ultra Clean, Metric
MIL-F-83671	Foam, Combustion Retardant for Cushioning Navy Ships
MIL-PRF-83671	Foam in Place Packaging Materials, General Specification For
MIL-PRF-8188	Corrosion Preventive Oil, Gas Turbine Engine

STANDARDS

FEDERAL

FED-STD-209	Airborne Particulate Cleanliness and Clean Zones
FED-STD-791	Lubricants, Liquid Fuels, and Related Products; Methods of Testing
FED-STD-101	Test Procedures for Packaging Materials

DEPARTMENT OF DEFENSE

MIL-STD-130	Identification Marking of US Military Property

MIL-STD-147	Palletized Unit Loads
MIL-STD-1246	Product Cleanliness Levels of Contamination
MIL-STD-129	Standard Practice for Military Marking
MIL-STD-1334	Process for Barrier Coating of Anti-Friction Bearings
MIL-STD-1647	Identification Marking for Domestically Manufactured Bearings

HANDBOOKS

MIL-HDBK-200	Quality Surveillance Handbook for Fuels, Lubricants (see App W)
MIL-HDBK-129	Military Marking (used in conjunction with MIL-STD-129)
MIL-HDBK-774	Palletized Unit Loads

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Defense Printing Service Detachment Office, Building 4 Section D, NPM-DODSSP, 700 Robbins Avenue, Philadelphia, PA 19111-5096).

2.2.2 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.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

JSCM 5322	Precision Packaging Materials Cleanliness. Specification For
PUB 8060.1	Flammability, Odor and Off-gassing Requirements and Test Procedures for Materials in Environments that Support Combustion

(Application for copies should be addressed to the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, TX 77085)

NAVAIR 01-1A-503/TM55-1500-322-24 TO-44B-1-122	Maintenance of Bearings (tri-service bearing manual)

(Application for copies should be addressed to Naval Air Rework Facility Code 341 Building 469, Naval Air Station, North Island, San Diego, Ca 92135)

LAWS AND REGULATIONS

Code for Federal Regulations, Title 49 (CFR49)
Code for Federal Regulations, Title 40 (CFR40)
Code for Federal Regulations, Title 21 (CFR 21)

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

2.3 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 be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) cited in the solicitation. Unless otherwise specified, the issues of the documents not listed in the DODISS are the issues of the documents cited in the acquisition document (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE/AMERICAN BEARING MANUFACTURERS ASSOCIATION (ANSI/ABMA)

Standard 16.2	Airframe, Ball, Roller, Needle Bearings Inch Design
Standard 16.1	Airframe Ball, Roller ,Needle Bearings Metric Design
Standard 10	Metal Balls
Standard 12.1	Instrument Ball Bearings, Metric Design
Standard 12.2	Instrument Ball Bearings, Inch Design
Standard 20	Radial Bearings of Ball, Cylindrical Roller and Spherical Roller Type, Metric Design

(Application for copies should be addressed to the American Bearing Manufacturers Association, INC., 1200 19th Street NW, Suite 300, Washington DC, 20036-2401)

ODS FREE CLEANING (developed by the Rolling Element Bearing Group cleaning sub-committee)

(Application for copies: Mr. Fran Marchand E Mail “frachand@draper.com)
Draper Laboratory 160 Broadway, Cambridge Ma. 02139 and REBG web page DSCR Richmond.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D996	Standard Terminology of Packaging
D1974	Methods of Closing, Sealing and Reinforcing Fiberboard Shipping Containers
D3951	Standard Practice for Commercial Packaging. (DOD adopted)
D4727	Fiberboard, Corrugated and Solid, Sheet Stock (Container Grade) and Cur Shapes
D5118	Practice for Fabrication of Fiberboard Shipping Boxes
D5330	Tape, Pressure Sensitive, Packaging Filiment Reinforced
D5168	Practice for Fabrication and Closure of Triple Wall Corrugated Containers
D5486	Standard Specification for Pressure-Sensitive Tape for Packaging, Box Closure, and Sealing
F311	Practice for Processing Aerospace Liquid Samples for Particulate Contamination Analysis Using Membrane Filters
D4169	Standard Practice for Performance Testing of Shipping Container
F312	Methods for Microscopical Sizing and Counting Particles from Aerospace Fluids on Membrane Filters

(All the above have been DOD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959)

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

3. REQUIREMENTS

3.1 General. When this specification is cited in the procurement document/contract, the contracting officer shall elect to use the default packaging details shown in APPENDIX A or shall use APPENDIX B through APPENDIX V of this standard to develop other detailed packaging data.

3.1.1 Hazardous Material. Packaging of hazardous material shall comply with the applicable requirements contained in Code of Federal Regulations (CFR) Title 29, Title 40 and Title 49. Hazardous material shipment documentation shall be provided with the shipment as required. This requirement normally will only be applicable when a supplier is shipping quantities of lubrication to the Government for further distribution in the supply system.

3.1.2 Packaging of Classified Items. Packaging of classified items shall meet the requirements of DOD 5220.22m Industrial Security Manual for Safeguarding Classified Information. This requirement will normally be applicable to items such as gyroscopes, however, some bearings are classified.

3.1.3 Loose Fill Materials. Loose fill materials are prohibited in all military packages.

3.1.4 Facilities. Packaging facilities shall meet the requirements specified herein. Where the bearing manufacturer does not operate captive facilities in accordance with this specification, contract packaging facilities may be utilized. The bearing manufacturer shall retain ultimate responsibility for acceptability of the bearings.

3.1.5 Method of transfer. One of the methods specified in (3.1.5.1 or 3.1.5.2) shall be used when transferring bearings from the manufacturing facility to the contract packaging facility.

3.1.5.1 Prior to cleaning. Bearings shall be protected against damage and shipped to the packager with a minimum of transport and storage time. The packager shall perform military preservation operations and packaging in accordance with this specification.

3.1.5.2 Prior to packaging. Preserved bearings (3.2.4.4) scheduled for transfer to a commercial packager shall be placed individually or in bulk in a clean dust-excluding container. Containers and lining shall protect the bearings against damage, corrosion and deterioration when shipped in the protective container. Storage and transport time shall be held to a minimum and intimate wrapping shall be applied in the required packaging environment.

3.1.6 Classification. The protection (preservation and packing) of bearings and bearing components shall be classified by the Level of Pack and the Method of Preservation which work in tandem to determine the protection provided to the item(s).

3.1.7 Levels of Packing. Unit, intermediate and exterior containers.

3.1.7.1 Level A . Packing required shall be capable of meeting the most severe worldwide shipment, handling and storage conditions. Level A packing, in tandem with applied preservation, shall be capable of protecting material from the effects of direct exposure to extremes of climate, terrain, and operational and transportation environments.

3.1.7.2 Level B. Packing required shall be capable of meeting moderate worldwide shipment, handling, and storage conditions. Level B packing, in tandem with the applied preservation, shall be capable of protecting material not directly exposed to extremes of climate, terrain, and operational and transportation environments.

3.1.7.2 Level C. Provides minimum protection under favorable conditions for material used at the first destination or stored under favorable warehouse environment.

3.2 PRESERVATION

3.2.1 The following level of Preservation, including preservatives and packaging, apply as listed in TABLE I. The details of these methods are described in this standard. These requirements are the minimum acceptable. Methods used by the contractor/distributor exceeding these requirements are acceptable when approved by the U.S. Government Quality Assurance Representative (QAR).

3.2.2 Preservation. Military preservation shall be used in conjunction with the specified levels of packing.

3.2.2.1 Military preservation methods. TABLE I provide the Method codes used for the various military preservation methods. Method used shall meet military requirements, however, in some cases the method may be modified to meet specific bearing requirements. The TABLE I shows the old Method code in " _" along with the new method code (in this revision only). The preservation method code shall be marked on the marking label in accordance with MIL-STD-129.

3.2.2.2 Additional Methods Added TABLE I. TABLE I provides Method codes for various specific techniques that have been developed to meet preservation requirements for several types of bearings. In the absence of such requirements detailed in Section 3, any appropriate Method shall be selected from TABLE I.

TABLE I
MILITARY PRESERVATION TABLE

Description of Method	Method Code	MIL-DTL-197 Method	Method MIL-P-116 Superseded	Method MIL-STD-2073 Superceded
Bearing dipcoated with preservative, or operating lubricant followed by intimate aluminum wrap then greaseproof wrapped (see 3.6.4)	M20	"A"	IB2	FA,FP,FM
Metal drums, bearings wrapped desiccated (bulk). (see 3.6.5)	M55	"B"	IId	FB
Vials (transparent plastic), bearings, balls or rollers immersed in preservative oil, vial sealed. (see 3.6.6)	M44	"F"	IA6	FF
Bearing preserved or lubricated; wrapped; placed in greaseproof, water-vaporproof bag; sealed. (see 3.6.7)	M41	"G"	IA8	FG,FM
Vials (transparent plastic), bearings, balls, or rollers dipcoat preserved or lubricated; wrapped, cushioned, vial sealed. (see 3.6.8)	M46	"H"	IA13	FH
Bearing preserved with operating fluid; wrapped in greaseproof spiral inner wrap, overwrapped with self adhering greaseproof spiral wrap; external surface coated with hot wax, cushioned, and unit packed in a container of fiberboard or wood (see 3.6.10)	M49	"M"	IA20	FM
Vacuum formed plastic skin pack, bearings dipcoat preserved or lubricated. (see 3.6.9)	M40	"L"	IA19	FL,FM,FN,
Container, water-vapor proof bag, sealed container (see 3.6.11)	M52	"B"	IIb	FB

TABLE I (continued)
MILITARY PRESERVATION TABLE

Description of Method	Method Code	MIL-DTL-197 Method	Method MIL-P-116 Superseded	Method MIL-STD-2073 Superceded
Physical protection of bearing (see 3.6.12)	M10	New	III	10
Waterproof or waterproof-greaseproof with preservation (see 3.6.13)	M30	New	IC	2Y
Waterproof bag sealed (see3.6.14)	M31	New	IC3	2D
Container waterproof bag sealed (see 3.6.15)	M32	New	IC2	2M
Greaseproof waterproof bag sealed (see 3.6.16)	M33	New	IC1	2E
Container waterproof vapor-proof bag sealed container (see 3.6.17)	M42	New	IA14	3Q
Floating waterproof vapor-proof bag sealed (see 3.6.18)	M43	New	IA16	3H
Metal rigid container (see 3.6.19)	M45	New	IA5	3V
Waterproof protection with desiccant (see 3.6.20)	M50	New	II	4Y
Water-vapor-proof bag sealed (see 3.6.21)	M51	New	IIC	4G
Floating waterproof-vapor-proof bag sealed (see 3.6.22)	M53	New	IIA	4H
Rigid container other than metal (see 3.6.23)	M54	New	IIF	4T

3.2.2.3 General preservation process. All bearings are subject to a general preservation procedure. The details of that procedure are determined by bearing type. The general procedure consists of the following steps: Demagnetization, Cleaning, Drying, Preservation, Lubrication, Intimate Bagging or Wrapping, and Unit Packaging. In all cases, the preservation process has started.

3.2.3 Demagnetization, Cleaning and Drying. Prior to cleaning, the magnetization of instrument precision ball bearings shall not exceed a pole strength of 2 gauss and a magnetization of all other bearings shall not exceed a pole strength of 5 gauss. Bearings in excess of the applicable value shall be demagnetized and retested.. Bearings shall be cleaned and dried according to type. Processed bearings shall be free of any chemical or particulate residue that will have detrimental effect on the life of the bearing.

3.2.4 Lubricants and preservative compound. The lubricant or preservative compound used shall conform to the bearing purchase item description (PID) or technical data applicable to the assigned National Stock Number (NSN) or other identification number when an NSN has been assigned as specified. When the bearing NSN does not specify a lubricant or preservative compound, that material shall be specified in TABLE II.

3.2.4.1 Contamination levels for oils. When measured in accordance with FED-STD-791, method 3009.3 (optical) or FED-STD-791, method 3011.1 (particle counter) the number of solid contaminant particles in the lubricating oil shall not exceed the following limits:

a. Oil for general purpose, precision and large bearings

Particle size range (micrometers)	Count per 100 ml
5 to 15	1785
> 15 to 25	265
> 25 to 50	78
> 50 to 100	11
> 100	0

b. Oil for Instrument and Instrument Precision Bearings

Particle size range (micrometers)	Count per 100 ml
5 to 15	150
> 15 to 25	45
> 25 to 50	23
> 50 to 100	10
> 100	0

3.2.4.2 Contamination Levels for Grease. Grease for general purpose, precision and large bearings shall be tested in accordance with FED-STD-791, method 3005.4; no more than 1000 particles per cubic centimeter (cm^3) of 25 micrometers or larger in size and no particles larger than 75 micrometers shall be allowed. For instrument and instrument precision bearing greases, the contamination requirements of MIL-G-81937 shall apply.

TABLE II Lubricants and Preservative Compounds

Bearing Class (see 6.4.3)	Bearing Closure (see 6.4.4)	Lubricant or Preservative Compound
General Purpose and Precision	Open Closed	MIL-C-11796, Class 3 1/ or VV-L-800, MIL-PRF-6085 MIL-PRF-81322, DOD-G-24508 or MIL-PRF-10924
Instrument and Instrument Precision	Open Closed	MIL-PRF-6085, DOD-L-81846 MIL-L-53131 MIL-PRF-81322, DOD-G-24508 MIL-G-81937, MIL-PRF-10924
Oxygen Equipment (free of hydrocarbons)	Open Closed	Fluorocarbon Grease MIL-PRF-27617
Large (Over 16 inches OD or 40 pounds)	Open Closed	MIL-PRF-6085 , VV-L-800 MIL-PRF-8188 , MIL-PRF-10924
Airframe bearings	Closed	MIL-PRF-81322
Rod End Bearings	Closed	MIL-PRF-81322

1/ VV-L-800 is recommended in accomplishing method M20 “A”, and method M41 “G” preservation for open bearings. Bearings shall cool to ambient temperature before packaging.

3.2.4.3 Certification and Re-certification. Lubricants shall be certified, when procured, to meet all requirements of the appropriate specification. Re-certification of all lubricants shall occur at 2 years for organic based oils, 3 years for organic based greases, and 5 years for silicone and perfluorinated oils and greases. A visual check shall be made on all closed containers for damage and leakage every 12 months. The lubrication will be given a visual check when the containers are first opened. A visual inspection check (see APPENDIX W par W4) for separation, contamination, and color shall be made on all containers that have been opened every 12 months. The use of nonconforming lubricants is prohibited. APPENDIX W provides the Test requirement for selected lubricants. For lubricants not listed , refer to MIL-HDBK 200, or perform all of the listed tests for the oil or grease as shown.

3.2.4.4 Preservative application Unless otherwise specified, bearing and bearing parts shall be coated with the lubricant or preservative compound specified in 3.2.4. Bearings shall be completely preserved so as to obtain a continuous coating on all surfaces. During or after preservation with the compound, all internal surfaces shall receive complete coverage. When an operational lubricant (grease or oil) is specified, the quantity applied shall conform to the item description or technical data applicable to the assigned National Stock Number (NSN) (or other identification number when an NSN has not been assigned) (see 6.2). When no quantity is specified, it shall be in accordance with the manufacturer’s standard practice. Non-stainless steel closed bearings shall have a thin coating of compatible lubricant on outer surfaces and shall be internally greased.

3.2.4.5 Method of Preservation. Method of Preservation shall be Military. Commercial preservation is not authorized in this specification.

3.3 Oxygen equipment bearings.

3.3.1 Separate clean work area for oxygen equipment bearings. A minute deposit of hydrocarbon oil film on an oxygen equipment bearing presents an explosion hazard when installed in the system; for this reason a separate clean work area shall be designated for the processing of oxygen equipment bearings. This area shall be isolated from all manufacturing processes and shall contain only equipment necessary to process the oxygen equipment bearings. Workbenches, tools, and processing equipment shall be maintained free of grease, oil, or other combustible materials and shall only be used on or for oxygen equipment. Personnel present in this area shall maintain themselves and their clothing in a condition which will prevent transferring contaminants to bearing surfaces.

3.3.2 Cleaning, drying and unit preservation of oxygen equipment bearings. The method of cleaning and drying as well as the cleanliness classification that determines the type of inspection shall be as specified in MIL-I-52211. Cleaning and drying of oxygen equipment bearings shall be as specified in MIL-I-52211 and the appendix thereto. Preservation shall be Military, Method 41 "G" and shall include the special marking requirements of MIL-I-52211. The environment and processing cleanliness for oxygen equipment bearings shall be the same as that described in 3.4.3.

3.3.3 Lubricants and preservative compounds for oxygen equipment bearings. The preservative for oxygen equipment bearings shall be the operating grease. Oils and greases shall be fluorocarbon. Hydrocarbon oils or greases are prohibited.

3.3.4 Intimate bags for oxygen equipment bearings. Intimate bag material shall be fluorocarbon or chlorofluorocarbon film (at least 2 mils nominal thickness) which meets the liquid oxygen (LOX) impact compatibility requirements of NASA per tests specified in NASA Publication 8060.1. Closure shall be by heat sealing. Bags shall allow for reclosure and shall be leak-proof when resealed.

3.3.5 Outer bags for oxygen equipment bearings. Unit bags shall be in accordance with 3.6.7.2.

3.4 Instrument and instrument precision ball bearings.

3.4.1 Environment and process cleanliness of cleaning and drying areas for instrument and instrument precision ball bearings. Cleaning and drying areas are defined as those areas in which bearings are subjected to the cleaning and drying processes. Requirements of class 10,000 of FED-STD-209 for particle count shall be met (see 4.5.3). Relative humidity (R.H.) shall not exceed 45 percent at 75 $\pm$ 5 degrees Fahrenheit (F^{o}).

3.4.2 Cleaning and drying of instrument and instrument precision ball bearings. Bearings shall be cleaned and dried by any suitable process or processes that are not injurious to the item. The cleaning process shall include sprays, ultrasonic, and vapor rinsing. The use of chlorinated and fluorinated solvents and acetone and aqueous washes and other suitable non-ODS's are permitted. Solutions used to clean barrier film coated bearings shall be stored separate from solutions used to clean non-barrier film coated bearings. A barrier film coated bearing shall not be processed through the regular bearing cleaning area. Procedures for packaging barrier coated bearings are specified in MIL-STD-1334 and these procedures shall be followed. Bearings shall be thoroughly dried prior to lubrication and wrapping.

3.4.3 Preservation area environment and process control for instrument and instrument precision ball bearings. Working area shall be well illuminated and air-conditioned. Requirements of class 10,000 of FED-STD-209 shall be met (see 4.5.3). When bearings are dry, they shall be preserved, lubricated and intimate packaged in a continuous process under a Class 100 environment. Any transfer out of the class 100 environment after the preservation process has begun will require that the bearings be placed in clean dust excluding containers.

3.5 General purpose and precision bearings.

3.5.1 Environment and process cleanliness of cleaning and drying areas for general purpose and precision bearings. Care in dust control shall be maintained. The presence of dust and dirt producing sources, such as cartons, trash barrels, and so forth, shall be kept at a minimum. Smoking, eating and drinking shall not be permitted in the cleaning and drying areas. Cleaning and drying areas are defined as those areas within a 10-foot radius of the cleaning and drying equipment, including aisles.

3.5.2 Preservation area environment and process control for general purpose and precision bearings. Working area shall be well illuminated. Requirements of class 100,000 of FED-STD-209 shall be met (see 4.5.3). The relative humidity shall not exceed 45 percent at 75 $\pm$ 5°F. Area control shall be in accordance with 3.5.1. Bearings shall be preserved and transferred to the packaging area in a continuous process. Delays shall be minimized. Bearings waiting to be preserved or lubricated shall be kept in covered containers, or suitable rust preservative oils, to avoid contamination. Bearings shall be re-cleaned if they become contaminated. Preserved bearings shall immediately be transferred (after insertion of seals or shields) to the packaging area in a clean dust excluding compatible containers.

3.5.3 Cleaning of general purpose and precision bearings. The bearings shall be cleaned by any process or combination of processes that will accomplish thorough cleaning without damage to the item. Agitation tanks and commercial filtration systems shall be used. Spray washes and ultrasonic are permitted. Bearings shall be thoroughly dried prior to lubrication and wrapping. The cleaning system shall be capable of cleaning bearings to the requirements of paragraph 4.5.4. Written procedures shall be established for planned maintenance and checks of the cleaning and drying systems. At a minimum, the procedures shall include machinery cleanliness, filter maintenance, cleaning fluid quality and cleanness, replacement or replenishment of fluids and the frequency of such maintenance and checks.

3.5.4 Method 40 "L" preservation area environment, cleaning and drying areas, and process controls. Working area environment and process control for Method 40 "L" bearings shall conform to paragraphs 3.4.1, 3.4.2 and 3.4.3.

3.6 METHODS OF UNIT PRESERVATION

3.6.1 General Military Package. Military packaging of bearings and bearing components shall be consistent with the required performance while retaining the protection required and enhancing standardization.

3.6.2 Military Preservation. The military preservation procedure should be accomplished without interruption. When interruptions are unavoidable, temporary covers or enclosures shall be provided to insure against contamination or deterioration of items.

3.6.2.1 Cleaning and drying. Items shall be cleaned and dried by any suitable process or procedure that are not injurious to the item. The cleaning handbook developed by the REBG Committee may be used as a guide for selection of cleaning processes. (see par 2.3)

3.6.2.2 Preservative Applicability. When contact preservatives are required to protect an item, the preservatives shall conform to the drawing requirements or TABLE II of this document. The required preservative shall be uniformly applied by any applicable procedure that permits the preservative to coat all the necessary surfaces. Methods of application are: dipping, flow coating, sloshing, brushing, filling, flushing, fogging, spraying, centrifuge, etc.

3.6.2.3 Application of volatile corrosion inhibitors (VCI). Volatile corrosion inhibitor preservative treatment shall only be applied when called for by drawing requirements.

3.6.3 Unit preservation Unit preservation methods shall be in accordance with 3.6.4 through 3.6.23. Method 40 "L" unit preservation is required for MIL-B-17931 bearings. Unless otherwise specified (see 6.2), unit preservation for instrument precision ball bearings shall be Method M41 (see APPENDIX B) The appropriate Military Method defined in this specification shall be used for the type of bearings being packaged. See Table III and Table I for requirements. When the Method is not defined by the Contract or this specification one of the Military Methods shown in Table I shall be selected by the manufacturer/packager with concurrence by the Government QAR. Other bearings shall be preserved in accordance with one of the methods listed in TABLE III for the applicable bearing size. Bearings shall be packaged individually, in pairs, or as sets. The quantity of bearing components and bulk packaging of bearings shall be as specified (see 6.2). Unit preservation for balls and rollers shall be Method 41 "G", or Method 46"H".

TABLE III. Methods of unit preservation by sizes.

Size	Open Bearings	Closed Bearings
	Method	Method
Up to and including 1.1811 inches or 30 mm (metric) OD 1/	41 "G" 44 "F" 46 "H" 52,55 "B"	41 44 46 55, 52
Over 1.1811 inches or 30 mm (metric) but not exceeding 16 inches OD 1/ 2/	40 "L" 41 "G" 3/ 20 "A"	40 41 3/ 20
Greater than 16 inches OD or 40 pounds	49 "M"	49
	10 New	10 New
	30 New	30 New
	31 New	31 New
	32 New	32 New
	33 New	33 New
	42 New	42 New
	43 New	43 New
	45 New	45 New
	50 New	50 New
	51New	51 New
	53 New	53 New
	54 New	54 New

1/ Method 40 "L" is required for bearings to MIL-B-17931.
2/ Method 20 "A" may be used for bearings with OD over 4.86 inches.

3/ Method 41 "G" bag weight limit is 10 pounds.

3.6.4 Method 20 "A" . After cleaning and drying, the bearings shall be coated as specified in 3.2.4.4 with the materials listed in 3.2.4. Bearings shall be securely wrapped in aluminum foil. The aluminum foil shall be in accordance with QQ-A-1876 and be 0.0015 inches thick for bearings weighing up to 5 pounds, and 0.0020 inches thick for bearings weighing more than 5 pounds. Bearings having a bore diameter of 3-1/2 inches or greater, or weighing over 20 pounds, shall be doughnut wrapped. Separable bearing assemblies, or cup and cone combinations that measure over 2-1/2 inches outside diameter shall have aluminum foil in accordance with QQ-A-1876 placed between each part to prevent brinelling. Bearings thus treated shall be cooled to room temperature and coated with strippable compound conforming to type II of MIL-P-149 to a minimum thickness of 0.05 inch, and over wrapped in a grease-proof barrier material conforming to MIL-B-121, grade A, type optional.

3.6.5 Method 55 "B". (Bulk Quantities Only). Bearings shall be packaged utilizing the container specified in 3.7.5. Bearings shall be coated as specified (see 3.2.4.4) prior to intimately wrapping each bearing with nylon 6. Prior to wrapping, the bearings shall be drained of all excess preservative. Bearings shall be secured in place in a manner devised by the contractor. Activated desiccant shall be used as required and shall be evenly distributed among the bearings. Desiccant and shall not come in direct contact with the bearing surfaces. Size of the container shall be minimum, consistent with the quantity and weight of the bearings packed therein. Quantity of bearings shall be such that the gross weight shall not exceed 70 pounds. Additional overpacking is not required. Unless otherwise specified in the contract or purchase order, all unit packs shall include humidity indicator.

3.6.5.1 Desiccant (activated). The bagged activated desiccant shall conform to MIL-D-3464. Type I shall be used unless Type II or Type III is specified or required because of special characteristics of the item. The desiccant shall be located in the pack in a place most accessible to voids in the item or pack interior. Desiccant bags shall be secured within the unit pack by tying, taping, etc., or in a specially designated desiccant baskets affixed to the container interior. Desiccant shall be adequately secured so as to prevent its shifting or movement and under no circumstances be permitted to come in direct contact with critical surfaces of the enclosed item. When direct contact is absolutely unavoidable, the desiccant shall be isolated from the item with MIL-B-121, Grade A barrier material. The desiccant shall not be unnecessarily exposed to the ambient environment when removed from the vaporproof desiccant storage container. Removal of the desiccant and its insertion into the unit pack shall be the last action prior to effecting the final seal of the bag or container.

3.6.5.2 Quantity of desiccant. The minimum quantity of desiccant to be used per a unit pack shall be computed in accordance with either Formula I or II as applicable. The various values of "X" take into consideration the quality and type of dunnage, if more than one. The inner container of the method (when applicable) must be considered in the dunnage calculations.

Formula I - to find units of desiccant for use within a sealed container other than rigid all metal:

$$U = CA + X_1D + X_2D + X_3D + X_4D$$

Formula II - to find units of desiccant for use within a sealed rigid metal container:

$$U = KV = X_1D + X_2D + X_3D = X_4D$$

Symbols used above are defined as follows:

U = The number of units of desiccant to be used.
C = 0.011 when the area of the barrier material is stated in square inches; or,
1.6 when the area of the barrier material is stated in square feet.
A = Area of container (barrier) stated in square inches or square feet.

K = 0.0007 when volume is stated in cubic inches; or,
1.2 when volume is stated in cubic feet.
V = Volume within container in cubic inches or cubic feet.
X_1 = 8.0 for cellulosic material, including wood and any other material, including wood not noted below.
X_2 = 3.6 for bound fibers (synthetic or vegetable fibers bound with rubber).
X_3 = 2.0 for glass fibers (fiberglass).
X_4 = 0.5 for synthetic foams and rubber.

D = Pounds of dunnage within the barrier and other than rigid all metal containers.

Note: Formula II may also be used to determine the units of desiccant required for sealed rigid containers other than all metal, when the sealed enclosure provides a WVTR not exceeding 0.001 grams for 24 hours per 100 square inches.

3.6.5.3 Humidity Indicators: Humidity indicators shall conform to MIL-I-26860, unless otherwise specified in the contract or purchase order. The humidity indicator shall be firmly secured directly behind the inspection window or immediately within the closure seal of the container. When specified, externally mounted humidity indicating elements or devices shall be installed in barrier or rigid container used to effect the unit pack.

3.6.6 Method 44 "F" - vials (plastic). Items shall be fully immersed in preservative compound, (oil type) within a sealed rigid container of extruded plastic (use of polyvinyl chloride (PVC) is prohibited) resistant to the particular lubricant or preservative being utilized. The vial wall thickness shall be 0.030 inches minimum and vial length shall not exceed 10 inches. The size of the vial shall be such as to provide minimum weight and cube, permitting not less than 0.010 inch play between bearings or bearing parts and inside diameter of the vial. In filling the container, a five-percent minimum void shall be provided to permit thermal expansion. Vials shall be initially closed by a secure leak proof closure. Vials shall allow for re-closure and need to be leak proof when re-closed.

3.6.7 Method 41 "G". After cleaning and drying, the bearings shall be coated as specified in 3.2.4.4. Items shall then be wrapped or bagged with the material specified in 3.4.4 or 3.5.6 as appropriate, closure being effected by means of heat sealing. The bearings shall then be placed individually into a water-vapor proof bag in accordance with MIL-B-117, Type I, Class E. Entrapped air shall be exhausted from the bag by any suitable means but not to the point where undo stress is placed upon the barrier and then the bag shall be heat-sealed. Strength of the heat seals shall be as specified in 4.4.1, based upon samples made on production packaging equipment.

3.6.7.1 Intimate bags for instrument and instrument precision ball bearings for Method 41"G". All intimate bags for instrument and instrument precision ball bearings shall be nylon 6 at least 2 mils nominal thickness, certified as meeting Food and Drug Administration (FDA) requirements for direct contact with food, in accordance with 21 CFR paragraph 177.1500, transparent, and cleaned to NASA JSCM 5322 level 50. Intimate bags shall be heat sealed so as to prevent free movement of the bearing inside the bag. Sealing shall take place in an environment meeting the requirements of FED-STD-209 class 100. Bags shall allow for re-closure and shall be leak-proof when resealed.

3.6.7.2 Outer bags for Method 41 "G". Outer bag for instrument and instrument precision ball bearings shall be MIL-PRF-22191 type I material heat- sealed. Bags shall allow for re-closure and shall be leak-proof when resealed.

3.6.8 Method 46 "H" - vials (plastic). After cleaning and drying, the bearings, balls, or rollers shall be coated as specified in 3.2.4.4 and wrapped with nylon 6. Wraps shall be made secure either by heat sealing or folding followed by insertion into vials specified in 3.6.6. Each vial shall have been cleaned with a blast of dry nitrogen, by vacuum, or solvent washed before inserting the contents. Additional dunnage of nylon 6 shall be used when necessary to prevent movement of the bearings, balls, or rollers within the vial. The vial closure seal shall provide a water vapor transmission rate (WVTR) equal to the vial material. Vials shall allow for re-closure and shall be leak proof when re-closed.

3.6.9 Method 40 "L" vacuum formed plastic skin package. After cleaning and drying, the bearings shall be thoroughly coated as specified in 3.2.4.4 and enclosed in a vacuum-formed package. Plastic sheet shall be cleaned prior to draping over the bearing. Packaged bearing shall show no evidence of corrosion (see 4.4.3). Material used in forming the package shall be either cellulose acetate, cellulose acetate butyrate, or cellulose propionate (use of PVC is prohibited). Material shall be sufficiently transparent to permit ease of reading and identification of bearing marking and visual examination of the exterior bearing surfaces. In packaging bearings up to 6 inches outside diameter the plastic sheet shall have a minimum thickness of 15 mils prior to forming. The minimum thickness after forming shall be 8 mils single thickness at the outside diameter and 4 mils in the bearing bore. In packaging bearings with outside diameter over 6 inches, the sheet shall have a minimum thickness of 30 mils prior to forming. Doughnut packages shall be limited to bearings with bore diameter 1 inch or larger. Dimpling at bore will be acceptable for all bearings and may be used as an alternate to the doughnut type pack, except that dimpling hole shall not be permitted between the inner and outer rings of any bearing.

3.6.9.1 Vacuum forming. Transparent plastic sheet shall be vacuum formed over the bearing. Single seal and single shield bearings shall be oriented with the bearing seal or shield up under the first drape. Bearings with snap rings on the outside diameter shall be oriented so that the snap ring is on the side opposite to the final seal.

3.6.9.2 Sealing. Plastic shall be sealed at the base edge with a cellulose acetate base of acetone. Flange type seals are not permitted. Seal shall be positive and shall not impair the transparency of the package. Small air bubbles formed in the closing shall not be cause for rejection.

3.6.10 Method 49 "M". After cleaning and drying, bearings shall be dip preserved or lubricated with the bearing operating fluid. The bearings shall be wrapped in a greaseproof spiral inner wrap and over wrapped with self-adhering greaseproof spiral wrap. The external surface of the over wrap shall be coated with hot wax. The unit shall be cushioned and unit packaged in a container of fiberboard or wood (see 3.7.5)

3.6.10.1 Intimate bags for general purpose and precision bearings. The intimate bag material shall be 2 mils nominal thickness nylon 6 or 4 mils nominal thickness polyethylene in accordance with L-P-378, type I. All materials shall be transparent. Intimate bags for general purpose and precision bearings shall be cleaned to the requirements of NASA JSCM 5322 Level 100. Bags shall allow for re-closure and shall be leak-proof when resealed.

3.6.10.2 Intimate wrapping of large bearings exceeding 16 inches outside diameter and 40 pounds (Method 49 "M"). Bearing shall be wrapped with an intimate wrap of material in accordance with MIL-B-121, grade A (greaseproof) and shall be wound in a spiral fashion from inside diameter to outside diameter to inside diameter. An over-wrap of material in accordance with MIL-B-121, grade C shall be applied in a spiral fashion and in the opposite direction of the intimate wrap. Hot wax shall be applied to the entire surface of the wrapped bearing. The hot wax shall be applied with a brush in order to form a seal as water vapor-proof and waterproof as possible. Method 41 "G" is an acceptable alternative to Method 49 "M", however, the intimate

wrap bag must be 4 mils nominal thickness; and the outer bag MIL-B-117 will be Type I heavy duty. (see TABLE G1 and G2)

3.6.11.1 Method 52 "B" . Preserved/lubricated bearing shall be wrapped and enclosed in a close fitting box conforming to PPP-B-566, PPP-B-676 or PPP-B-665. The box will be desiccated with activated desiccant conforming to MIL-D-3464. The quantity will be determined in accordance with 3.6.5.2. The desiccant will not be permitted to come in direct contact with critical surfaces of the bearings. The desiccant will be located as to not be load-carrying. The box shall be enclosed in a heat sealed bag conforming to MIL-B-117 Type I, Class E, Style 1 or Type II, Class E, Style 1 or Type III, Class E, Style 1. The sealed bags will be enclosed in a outer container conforming to ASTM-D5118 or ASTM-D5168 as applicable. Closure of the container will be in accordance with ASTM-D1974.

3.6.12 Method 10 (formerly Method III) – Physical protection. The preserved items shall be protected from physical damage and mechanical malfunction. Cushioning materials, dunnage, blocking and bracing shall be applied as required to protect the items(s) and the enclosing media and restrict the movement of the item within the container. Materials shall be clean and as dry as practicable. Blocking, bracing, etc. shall be accomplished in accordance with MIL-STD-1186 as necessary.

3.6.13 Method 30 (formerly Method IC)- Waterproof or waterproof-greaseproof protection with preservative as required. Items protected in accordance with Method 30 shall be sealed within a waterproof or waterproof-greaseproof enclosure. Projections, sharp edges or other physical characteristics of the item which may damage the waterproof or waterproof-greaseproof barrier or container shall be cushioned as required to mitigate shock thereby preventing physical and functional damage to the item. Unless otherwise specified, preservative coating requirements shall be determined in accordance with 3.2.4.4.

3.6.14 Method 31 (formerly submethod IC-3) – Waterproof bag, sealed. The item preserved, wrapped and cushioned as required in 3.16.13 shall be enclosed in a sealed bag conforming to MIL-B-117,Type I, Class B, Style 2 or MIL-B-22020 as limited by MIL-I-8574. A carton or box may be used to effect the unit container and the primary cushioning shall be placed between the outside of the bag and the inside of the carton or box.

3.6.15 Method 32 (formerly Submethod IC-2) – Container, waterproof bag, sealed. The item, preserved, wrapped and cushioned as required in 3.6.13 shall be enclosed in a close fitting container (box) selected From Table GI which in turn shall be enclosed in a sealed waterproof bag conforming to MIL-B-117. Type I, Class B Style 2. When specified a protective wrap of heavy duty kraft paper or equivalent material (tape sealed) shall be provided to protect the barrier material during handling and storage.

3.6.16 Method 33 (formerly Submethod IC-1) – Greaseproof-waterproof bag sealed. The item, preserved wrapped and cushioned as required in 3.6.13. shall be enclosed in a close fitting sealed bag conforming to MIL-B-117, Type I. Class C, Style 1,2 or 3; or type II, Class C, Style ! or bags conforming to MIL-B-22020 as limited by MIL-I-8574. A carton or box may be used to effect the unit container and the primary cushioning shall be placed between the outside of the bag and the inside of the carton or box.

3.6.17 Method 42 (formerly Submethod IA 14) – Container, watervaporproof bag, sealed container. The item, wrapped and cushioned as required in 3.6.10 shall be enclosed in a closed fitting inner container (box). Selected from appendix G and enclosed in a sealed bag conforming to MIL-B-117, Type I, Class E, Style 1; or Type II, Class E, Style 1; or Type III, Class E, Style 1. Bags in accordance with MIL-E-5060 shall be used when the construction limitations of MIL-B-117 are exceeded. The sealed bag shall then be enclosed within an appropriate outer container (box),

selected from appendix F. When fiberboard containers are selected or specified for the outer container of this method they shall conform to the weather resistant class and grade of ASTM-D5118 or ASTM -D5168 as applicable. When wood, wood cleated plywood, wood cleated fiberboard, paper overlaid veneer etc. are specified as the outer container of this method 6 mil polyethylene conforming to L-P-378 or equivalent material shall be used as an overwrap (tape sealed) around the sealed bag to prevent chafing or rupture by the outer container. When the primary cushioning is located between the sealed bag and the outer container, the barrier protective wrap specified herein is not required. Closure, banding, or sealing of the outer container shall be performed in accordance with the applicable container specification procedures or ASTM-D1974 making certain that no damage is inflicted on the bag. (NOTE: When the outer container becomes the shipping container, it shall be marked as a shipping container in accordance with MIL-STD-129: the bag shall be marked as a unit pack in accordance with MIL-STD-129.)

3.6.18 Method 43 (formerly Submethod IA-16) – Floating watervaporproof bag, sealed. The item, wrapped and cushioned as required in 3.6.10 and anchored or shock mounted as required in MIL-STD-1186, shall be enclosed in a sealed bag conforming to MIL-E-6060. (NOTE: When the outer container becomes the shipping container, it shall be marked as a shipping container in accordance with MIL-STD-129: the bag shall be marked as a unit pack in accordance with MIL-STD-129.)

3.6.19 Method 45 (formerly Submethod IA-5) – Rigid metal container, sealed. The item, preserved, wrapped and cushioned as required in 3.6.10 shall be snugly enclosed in a sealed rigid metal container. Any selected type of rigid metal container with machine seamed or reusable gasketed closure may be used if the container provides a WVTR not exceeding 0.075 grams per 100 square inches per 24 hours when tested in accordance with ASTM-D1008 unless a specific type of container and closure is specified in the contract or purchase order. When specified in the contract or purchase order or when dictated by the requirements of the item, the metal container may be vacuum sealed.

3.6.20 Method 50 (formerly Method II) – Watervaporproof protection with desiccant. Items protected in accordance with Method 50 shall be sealed in a watervaporproof enclosure with activated desiccant as required. Unless otherwise stated in the contract or purchase orders, unit packs of all of these methods shall include a humidity indicator. Projections, sharp edges or other physical characteristics of the item which may damage the watervaporproof bag or container shall be cushioned as necessary. The item shall also be cushioned as required to mitigate shock, thereby preventing physical and functional damage to the item. Unless otherwise specified preservative coating requirements shall be determined in accordance with 3.2.4.4. When bags are used the bags size shall be of sufficient surface area to permit subsequent resealing after item inspection. Requirements for desiccant and humidity indicators are as follows:

3.6.20.1 Desiccant (activated) The bagged activated desiccant shall conform to MIL-D-3464. Type I shall be used unless Type II or III is specified or required because of special characteristics of the item. Desiccant shall be in standard unit sized bags. The desiccant shall be strategically located in the pack so as not to be load bearing. Optimally it should be placed in voids of the item or pack interior. Desiccant should be adequately secured to prevent its shifting or movement or placed in specially designed desiccant baskets affixed to the container interior. Under no circumstances shall desiccant be permitted to come in direct contact with critical surfaces of the enclosed item. The desiccant shall not be unnecessarily exposed to the ambient environment when removed from the sealed desiccant storage container. Removal of the desiccant and its insertion into unit pack shall be the last action prior to effecting the final seal of the bag or container.

3.6.20.2 Quantity of desiccant The minimum quantity of desiccant to be used per unit pack shall be computed in accordance with either Formula I or II as applicable. The various values of "X" take into consideration the quantity and types of dunnage. The inner container (when applicable) must be considered in the dunnage calculations.

3.6.20.3 See paragraph 3.6.5.2 for formula.

3.6.21 Method 51 (formerly Submethod IIC) – Watervaporproof bag. The item, preserved, wrapped, cushioned and desiccated as required in 3.6.20 shall be enclosed within a sealed bag conforming to MIL-B-117. Type 1, Class E, Style 1, 2 or 3; or Type II, Class E, Style 1 or 3, or Type III Class E, Style 1. A carton or box may be used to effect the unit container, and the primary cushioning shall be placed between the outside of the bag and the inside of the carton or box.

3.6.21.3 Method 53 (formerly Submethod IIA) – Floating watervaporproof bag, sealed. The item, preserved, wrapped, cushioned and desiccated as required in 3.6.20 and anchored or shock mounted as required in MIL-STD-1186 shall be enclosed in a sealed bag conforming to MIL-E-6060. When specified in the contract or purchase order, a window of material conforming to MIL-B-22191. Type I shall be provided in the bag in accordance with MIL-E-6060 procedures for packs 15 cubic feet or larger. When specified, externally mounted plug type humidity indicators conforming to MIL-I-26860 shall be used. When an exterior container is to be placed over the floating bag, a removable inspection port shall be provided in the exterior container body, so situated as to coincide with the location of the inspection window of the bag or the mounted humidity plug.

3.6.22 Method 54 (formerly Submethod IIF) – Rigid container (other than metal), sealed. The item, preserved, wrapped, cushioned and desiccated as required in 3.6.20 shall be enclosed in a sealed close fitting, rigid container other than all metal. For items not exceeding 20 pounds, fiber containers conforming to MIL-C-3955 Type I, Grade B (style and class as applicable) may be used. When a greaseproof liner is required, material shall conform to MIL-L-45973. For heavier items, fiber containers conforming to PPP-D-723, Type III, Grade A, Class 2 may be used. Other sealed rigid containers other than all metal may be used as long as the sealed container provides a WVTR not exceeding 0.075 grams per hundred square inches per 24 hours when tested in accordance with ASTM-D1008.

3.7 Packing Level. All bearings shall be packed Level C unless otherwise specified (see 6.2). The requirements for Level A ,B, and C Packing are detailed below.

3.7.1 Level A packing. When specified in paragraph 6.2, packaged bearings shall be packed in containers conforming to the following : (see APPENDIX F)

Specification	Type or Class
PPP-B-576	Class 2, overseas type
PPP-B-585	Class 3
PPP-B-601	Overseas type
PPP-B-621	Class 2, overseas type
ASTM-D5118	Weather resistant (with vials)
ASTM-D5168	Class 2, weather resistant (with vials)

Exterior shipping containers shall be multiapplication type containers designed to protect bearings and bearing components within a given fragility and size range. Intermediate containers shall provide weather resistant case liners, closed and sealed in accordance with military practices. Alternately, wrapping of unit or intermediate packages with PPP-B-1055 barrier material with all seams sealed with a minimum 2 inch-wide tape conforming to ASTM-D5486 is acceptable in lieu of case liners. Boxes shall be closed, strapped, or banded in accordance with the applicable box specification or appendix thereto, except that ASTM-D5118 boxes shall be closed and reinforced per ASTM-D1974 method V and

ASTM-D5168 boxes, style E or F closed and reinforced with nonmetallic strapping or tape in lieu of steel strapping. Unless otherwise specified (see 6.2), the gross weight of wood or wood-cleated boxes shall not exceed 200 pounds; fiberboard boxes shall not exceed the weight limitation of the applicable box specification.

3.7.1.1 Exterior Shipping Container. Unless otherwise specified (see 6.2), containers conforming to ASTM-D5118 , ASTM-D5168, PPP-B-566, and PPP-B-665 are prohibited as exterior shipping containers under level A.

3.7.1.2 Exception. Exceptions shall be as follows:

a) Bearing unit protected Method 44 "F" (where shipments do not exceed 20 pounds gross weight) the shipping container shall be in accordance with ASTM-D5118 class weather resistant. Fiberboard separators, or other devices, of material in accordance with ASTM-D4727 shall be provided to separate unit packages both horizontally and vertically.

b) Bearing unit protected Method 20 "A", shipping containers not exceeding 1000 pounds gross weight shall be in accordance with PPP-B-601 or PPP-B-621. Container shall have skids applied in accordance with applicable container specification. Shipping containers exceeding 1000 pounds gross weight shall be in accordance with MIL-B-26195 or MIL-C-104. Dunnage shall be used to prevent movement of the bearing relative to the crate. Nylon sling straps shall be used in lifting bearings from the crate.

3.7.2 Level B packing. Except as specified in paragraph 6..2 , bearings shall be packed in containers conforming to one of the following specifications and subsidiary types or classes: APPENDIX F

Specification	Type or Class
PPP-B-576	Class 2
PPP-B-585	Class 2 or 3
PPP-B-601	Domestic Type
PPP-B-621	Class 1
ASTM-D5118	Class weather resistant
ASTM-D5168	Class 2, weather resistant

Box closures shall be as specified in the applicable box specification or appendix thereto or as specified in ASTM-D1974.

3.7.2 Level C packing. Containers shall be Class Domestic in accordance with ASTM- D5118 and ASTM-D5168.

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3.7.3.1 Level C Sealing, Closure, Reinforcing Methods . Cartons shall be closed, sealed and reinforced in accordance with the appropriate TABLE in ASTM-D1974.

3.7.3.2 Level C Size and Weight Limitations. Cartons shall conform to the appropriate size and weight limitations specified in the TABLE in ASTM-D5118.

3.7.4 Palletization. When specified (see 6.2), shipping containers shall be palletized as shown in MIL-HDBK-774 .

3.7.5 Containers for bearings. Container selection shall be determined by the size and weight of the bearing (for example, fiberboard box, cleated plywood, nailed box, metal drum or wood crate. Containers for large bearings shall have sufficient strength to withstand the forces exerted on the container during handling. Dunnage shall be used to prevent movement of the bearing within the container.

3.7.5.1 Unit containers. (see APPENDIX G) Bearings and components larger than 1.625 inches or 40 millimeter outside diameter , unit protected in accordance with Methods 41 “G” ,40 “L”, and 20 “A” shall be individually packaged in a unit container. Bearings 1.625 inches outside diameter and smaller may be packaged up to 25 per unit container. Unit containers shall conform to PPP-B-665, PPP-B-566, or PPP-B-676 for containers not exceeding 5 pounds and ASTM-D5118 or PPP-B-665 for containers in excess of 5 pounds.

3.7.5.2 Closure of unit container. Unit packs shall be closed as specified in the appendices or notes of the applicable container specifications. When level A packaging is specified and ASTM-D5118 class weather resistant or class domestic boxes are intermediate packed, weather resistant boxes shall be closed method 5 and domestic boxes closed method 1 in accordance with ASTM-D1974. Vial closures shall be in accordance with 3.6.6 and 3.6.8.

3.7.5.3 Intermediate container (see APPENDIX R) Unless excepted by 3.7.5. 4, or unless otherwise specified (see 6.2), unit packs may be intermediate packed. Intermediate containers shall provide a snug fit for contents and shall contain identical items only. The applicable container specification or a limit of 20 pounds shall govern gross weight of intermediate packs, whichever is smaller. Unit packs shall be placed in the intermediate containers in an upright position, or a position that will preclude possible brinelling of the packed bearings. For Method 44 “F” and Method 46 “ H”, fiberboard separators of material conforming to ASTM-D4727 shall be provided to separate unit packs both horizontally and vertically. Intermediate packs shall be marked to indicate the top of the container.

3.7.5.4 Exceptions. Intermediate containers shall not be required when any of the following apply:

a) Level C packing is required.
b) Shipments do not exceed 20 pounds gross weight.
c) Packs include a carton conforming to ASTM-D5118 as the unit package.

3.7.5.5 Intermediate container when Level A packing is specified. Intermediate container shall be accomplished as specified in 3.7.5.3. Containers shall conform to ASTM-D5118 (class weather resistant). Containers shall be closed as specified in method 5, ASTM-D1974.

3.7.5.6 Intermediate container when Level B packing is specified. Intermediate container shall be accomplished as specified in 3.7.5.3. Containers shall conform to PPP-B-566, ASTM-D5118 (class domestic), PPP-B-665 or PPP-B-676. Container closure shall be in accordance with the applicable specification and ASTM-D1974.

3.7.6 Cushioning materials. The use of excelsior, newspaper, shredded paper (all types) and similar hygroscopic or non-neutral materials and all types of loose fill materials for applications such as cushioning, fill, stuffing, and dunnage is prohibited. APPENDIX N and P provide a list of approved materials and thickness.

3.7.7 Level C Processing. Procedures, facilities, and materials for cleaning, drying, and application of preservative or lubricant shall conform to the requirements of Section 3 as applicable and the best manufacturer practices. Containers shall afford adequate protection against corrosion, deterioration, and physical damage during shipment from the source to the first domestic receiving activity. Unit quantities shall be as specified in APPENDIX C.

3.8 Marking. The priority for marking bearings shall be performed in the following sequence: Contract/PO, Drawing, Specification, MIL-DTL-197, and Manufacturer’s Process requirements.(see APPENDIX H for additional information)

3.8.1 Levels A, B, and C. In addition to the marking required in 3.8.1. through 3.8.12 interior (unit and intermediate) packages, exterior shipping containers, and palletized unit loads shall be marked in accordance with MIL-STD-129 and as shown in MIL-HDBK-129.

3.8.2 Method 41 "G" marking. Bearings unit protected in accordance with Method 41 "G" shall have the barrier bag and unit container marked in accordance with MIL-STD-129 and as shown in MIL-HDBK-129.

3.8.3 Level C. Unless otherwise specified (see 6.2), bearings packaged Level C shall be marked in accordance with MIL-STD-129 and as shown in MIL-HDBK-129.

3.8.4 Bar coding. Unless otherwise specified (see 6.2), bar code markings shall be applied on interior (unit and intermediate) packs, exterior shipping containers, and palletized unit loads, in accordance with MIL-STD-129 and as shown in MIL-HDBK-129and ASTM/AIM BC1

3.8.5 Precautionary marking. One of the following markings shall appear on one side of each unit, intermediate, and exterior packing as applicable:

a) For level A, B, and C packing other than barrier film coated and oxygen equipment or bearings lubricated for operational use:

PACKAGED MIL-DTL-197
LUBRICATED WITH (SPECIFICATION NUMBER)"
(Note: Use above marking only if operational lubricant is specified)

b) For level A, B, and C packing with preservative (not operational lubricant) of other than barrier film coated and oxygen equipment bearings requiring lubrication prior to use:

"PACKAGED.....MIL-DTL-197
PRESERVED WITH (SPECIFICATION NUMBER)
CLEAN AND LUBRICATE PRIOR TO USE AS REQUIRED"

c) For barrier film coated bearings:

"PACKAGED.....MIL-DTL-197
LUBRICATED WITH (SPECIFICATION NUMBER) BARRIER FILM COATED"

d) For oxygen equipment bearings:

"PACKAGED.....MIL-DTL-197
LIQUID OXYGEN/GASEOUS OXYGEN SYSTEM"
(Special marking and labeling in accordance with MIL-I-52211 also required)

3.8.6 Special requirement bearings. There should be no deviation from MIL-STD-129. Special circumstances however, may require special marking. For example, bearings may be acquired for a special project. Such bearings would require marking that shows the project designation (see APPENDIX Z).

3.8.7 Method 20 "A". In addition to the required markings on containers, bearings unit protected to Method 20 "A" shall be labeled as follows:

a) A label shall be affixed to the outermost circumference (tapered rollers may be packed separately) of the bearing after the bearing has been foil wrapped.

b) Printing on the label shall be readable through the strippable compound applied at the hot dip operation.

3.8.8 Method 40 "L" labeling. In addition to required markings on containers, bearings unit protected to method L shall be permanently marked with the NSN and date packaged. The marking may be printed directly onto the plastic or may be applied as a label. The label, if used, shall be compatible with the plastic and shall not be affected by the lubricant or preservative compound. Labels shall be sealed between layers of the transparent material around the outer circumference of the bearing. If the label obscures more than 50 percent of the outer circumference of the bearing, it shall be of a transparent material.

3.8.9 Workmanship. Workmanship shall be such that when the proper process and procedure are followed, materials and items shall be protected against corrosion, deterioration, and damage during handling, shipment, storage, and require minimum processing for service.

3.8.10 Lot Numbers. Bearing manufacturers lot number(s) shall be shown on the unit and exterior container labels for every lot of packaged bearings. Lot numbers are not required when bearings are serialized. (see 3.8.12)

3.8.11 Other Marking. Bearings manufactured to Specifications shall require the unique marking requirements of the Specification and the requirements of MIL-STD-129. (see APPENDIX H)

3.8.12 Serial Numbers. Bearing serial numbers shall be shown on the unit marking label.

3.8.13 Matched sets. Individually packaged bearings constituting a set shall be taped together with transparent pressure-sensitive tape before the insertion into the unit package or heat sealed together as a set, or individual unit package of a set shall be taped together so markings are not obscured. In all cases, the unit package shall have the following warning: "Matched Set, Do Not Separate".

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

a) Conformance inspections.
b) Quality System
c) Tests

4.1.1 Conformance inspections. The conformance inspection shall consist of the inspections and examinations as applicable for the methods used for the characteristics shown in TABLE VI. Quality conformance inspection shall be performed on every lot of packaged bearings acquired under this specification. As a minimum the contractor shall randomly select a sample quantity from each lot of completed packages in accordance with TABLES V Code letter A. If one or more defects are found in any sample, the entire lot shall be rejected. The contractor has the option of screening 100 percent of the lot for the defective characteristics or providing a new lot, which shall be inspected in accordance with the sampling plan, contained herein. The contractor shall maintain for a period of 3 years after contract completion, records of inspections, tests, and any resulting rejections.

4.1.2 Materials. All materials to be used in the packaging or lubricants shall be inspected in accordance with the applicable material specification and the cleanliness levels of this specification, or certified inspection and laboratory test reports shall be provided which show that materials as furnished conforms to the detailed specification.

4.1.3 Visual Examination. Each of the sample packages selected in accordance with 4.1.1 shall be visually examined to verify compliance with the requirements of this specification.

4.1.4 Visual examination under magnification. Instrument and instrument precision ball bearings packaged in transparent materials shall be visually examined under a 10X scope through the package for contamination within the bearing or the package prior to shipment. Other bearings as applicable shall be examined visually through the transparent package for contamination. The use of a 2X scope may be used in the event the transparent material is cloudy.

4.1.5 Marking examination. Unit, intermediate, and exterior packages shall be examined to determine compliance with the marking requirements specified in 3.8.1 through 3.812 and APPENDIX H.

4.1.6 Method of Preservation. Military method used is in accordance with contract requirements and the requirements of this specification.

4.1.7 Level of Packing. Level C packing shall be used unless the contract identifies a different requirement.

4.1.8 Magnetism. Magnetism of bearing does not exceed the specified level for the preservation method used.

4.1.9 Requirements for Method. Verify the requirements of Section 3 have been accomplished for the preservation method utilized.

4.2 Quality system. The contractor shall implement and maintain a quality system that satisfies program objectives and meets the test, examination and inspection requirements.

4.3 Test methods. Table IV shows the tests required for each applicable method. The sampling requirements are also identified.

4.3.1 Daily Sample for Corrosion Test and Fingerprint Corrosion Test. A daily sample shall consist of one day's production or processing of bearings, regardless of bearing dimensions and subject to the same packaging method and cleanliness level. See footnotes 1/ and 2/ TABLE V.

4.3.2 Sample for Heat Seal Test. Samples from each heat sealer shall be tested daily with each type of materials used. If the heat sealer is dedicated to a specific material and the temperature setting is not changed the sealer may be tested monthly. The monthly testing shall not be started until (30) thirty days of continuous testing results in no failures. A log will be maintained for recording the results of this test by heat sealer. Sealers tested shall be selected from intimate pack, primary and secondary pack areas.

4.3.3 Leakage and heat-sealed seam tests. The leakage and heat sealed seam test shall be in accordance with Method FED-STD-101.

a. The leakage tests will be performed in accordance with Method 5009 Of FED-STD-101. The requirement for the technique used for this test will depend on the method of preservation utilized in the packaging process. The QAR will review the test method used to insure that the containers are being tested by selection of a proper technique that will detect leaks. It is possible that the contractor will use one or more technique in performing the leakage test.

b. The heat seal seam test will be conducted in accordance with Method 2024 of FED-STD 101. In addition the test will be performed at room temperature using a static load weight as specified herein. When the barrier materials conform to MIL-B-121, the static load weight shall be 36 ounces plus or minus 2 ounces. When the barrier

materials conform to L-P-378 or MIL-B-131 or MIL-B-22191, the static load weight shall be 50 ounces plus or minus 2 ounces. Heat seals shall not separate during the final 3 minutes of the test. Partial separation in the area of partial fusion adjacent to the actual seam is acceptable within the first two minutes of the test.

4.3.4 Fingerprint corrosion and cleanliness test. Sample specimens shall be selected in accordance with 4.3.1 and footnote 1/. Samples shall be cleaned and dried in accordance with 3.2.3 and 3.3.2 or 3.5.5 along with the production lot. The test shall be performed by suspending the unpacked samples in the air over the water in a static humidity chamber at 75 $^{+}_{-}5^{o}$ F for 24 hours. If no corrosion is seen without visual aid at the conclusion of the test, satisfactory cleanliness has been achieved.

4.3.5 Corrosion test. Packaged bearings, selected in accordance with 4.3.1 and footnote 2/ shall be exposed for 1 week (168 hours) at 90 $^{+}$ 5% RH at 120 °F ± 5° . If no corrosion is seen without visual aid at the conclusion of the test, satisfactory cleanliness has been achieved.

TABLE IV. Tests applicable to each method of unit preservation.

Inspection/ test	Method 49 “M”	Method 44 “F”	Method 20 “A”	Method 52, 55 “B”	Method 40 “L”	Method 41 “G”	Method 46 “H”	SAMPLE PLAN
Leakage test (see 4.3.3)	-	X	-	X 1/	-	X	X	A
Fingerprint corrosion and cleanliness test (see 4.3.4)	X	X	X	X	X	X	X	B
Heat sealed seam test (see 4.3.3)	-	-	-	-	-	X	-	A
Corrosion (see 4.3.5)	-	-	-	-	X	-	-	C
.Inspection/ test	Method 10	Method 30	Method 31”	Method 32	Method 42	Method 43	Method 45	Sample plan
Leakage test (see 4.3.3)	-		X	X 1/	X 1/	X	X 1/	A
Fingerprint corrosion and cleanliness test (see 4.3.4)	X	X	X	X	X	X	X	B
Heat sealed seam test (see 4.3.3)	-	-	X	X	X	X	-	A
Corrosion (see 4.3.5)	-	-	-	-	X	-	-	C
Inspection/ test	Method 50	Method 51	Method 53	Method 54	Sample plan			
Leakage test (see 4.3.3)	X	X	X	X 1/	A			
Fingerprint corrosion and cleanliness test (see 4.3.4)	X	X	X	X	B			
Heat sealed seam test (see 4.3.3)	X	X	X	-	A			
Corrosion (see 4.3.5)	-	-	-	-	C			

1/ Leakage test required for bulk quantities

TABLE V. Sample size for conformance inspection and tests.

	Sample Size		
Lot Size	Sampling plan code letter A	code letter B	code letter C
2 to 8	2	1/	2/
9 to 15	2	1/	2/
14 to 25	3	1/	2/
26 to 50	5	1/	2/
51 to 90	5	1/	2/
91 to 150	6	1/	2/
151 to 280	7	1/	2/
281 to 500	9	1/	2/
501 to 1200	11	1/	2/
1201 to 3200	13	1/	2/
3201 to 10,000	15	1/	2/

1/ Sampling for fingerprint corrosion and cleanliness test. A daily sample shall be tested for fingerprint corrosion and cleanliness in accordance with 4.3.1 (not applicable to ceramic materials). Samples shall be one of the following:

a) Five panels fabricated of the same material as the bearing outer ring and having the same surface finish as the bearing outer ring.

b) Five bearings or bearing outer rings selected at random which are classified as “scrap” or “reject”, but whose surfaces are adequate for the purpose of this test.

2/ Sampling for corrosion test (Method 40 “L”). Two packages prepared by the same production procedures as the packages being offered for acceptance shall be selected at random as often as necessary for the test of 4.3.5. Material contained in the packages may be as specified in 1/. This shall be a continuous test and packages shall be examined daily. A new set of test packages shall be placed under test every week (168 hours) unless a failure is noted prior to the end of the 168-hour period. If a failure (any corrosion) is noted prior to the end of the 168-hour period, a new package, or packages, as applicable, shall be placed under test immediately and packaging by the method represented by the failure shall be stopped. All items packaged by the method represented, which have not already been shipped, shall be rejected. After the correction of procedural deficiencies, the rejected material shall be reprocessed, repackaged, re-sampled, and re-tested. This test is for process control only and shall not affect material already shipped.

TABLE VI. Examination

Examination	Requirement
Visual Examination	4.1.4
Marking Examination	4.1.5
Method Preservation	4.1.6
Level of Packing	4.1.7
Magnetism	4.1.8
Requirements of Method	4.1.9

4.4 Atmosphere in work rooms.

4.4.1 Temperature, humidity, and airborne particle count. Relative humidity, and temperature, for workrooms shall be tested daily for conformance to 3.4.1, 3.4.3, and 3.5.4. Recorders shall be installed to record the temperature and humidity on a 24 hour 7 day week basis. Testing for airborne particle count shall be performed on a quarterly basis in accordance with class 100, class

10,000 and class 100,000 of FED-STD-209. Applicable work rooms shall be tested in accordance with 4.4.3.1 quarterly to determine conformance to these requirements.

4.4.2 Equipment calibration. Equipment used to control and monitor clean room and work station condition shall be calibrated annually.

4.4.3 Environment and process cleanliness tests.

4.4.3.1 Clean Room environment test (airborne particle counting methods). This test shall be conducted in accordance with FED-STD-209.

4.4.4 Cleanliness of general purpose and precision bearings manufactured to ABEC or RBEC 3 or better, excluding 5T for torque and extra thin bearings. Contamination on cleaned or preserved bearings visible to the unaided eye is unacceptable. Verification of abrasive or metal (except silver) particles may be accomplished by the following or equivalent method. Flush the bearing with solvent capable of dissolving the preservative or lubricant. The solvent used to flush the bearing shall be filtered through a one-inch diameter 0.5 micron absolute filter, or finer, marked in 1/8 inch by 1/8 inch grids, in accordance with ASTM F311. The filter shall be inspected in accordance with ASTM F312 method B, for particle abrasive or metal (except silver) contamination to the acceptability limits below. Cause and corrective action is required for any failure of this test.

Particle size range (inches)	Maximum allowable number of particles
.002 - .005	15 max allowable per 4 random grid squares
> .005 - .010	10 entire filter
> .010	0 entire filter

5. PACKAGING

5.1 This section is not applicable to this specification.

6. NOTES

6.1 Intended use. This specification is intended for use as a reference in section 5 of the bearing commodity specifications and for direct reference in acquisition documents. It is intended to furnish direction in the packaging of bearings at Military and other Government activities and at plants of commercial subcontractors. The packaging requirements specified herein are intended to ensure proper and safe transportation, storage and stowage of bearings for shipment to Government activities.

6.2 Acquisition requirements. (see APPENDIX A and page 39)

a) Title, number , and date of this specification.
b) Quantity Unit Pack (if other than (1) one see Appendix C)
c) Method of Preservation (see APPENDIX B) if other than default requirement
d) Method of cleaning, drying, (see APPENDIX K) if other than default requirement.
e) Preservation Material (see APPENDIX L) if other than specified in default requirement.
f) Wrapping Material see method of preservation. If other than specified (see APPENDIX M)
g) Cushioning/dunnage and cushioning thickness (see APPENDIX N and P) if other than default.
h) Bulk pack quantity required (see APPENDIX C)
i) Unit Containers (see APPENDIX G) when other than default requirement
j) Preservation (see APPENDIX D) if other than Military default requirement

k) Level of Packing - Level C. For other Levels A or B (see APPENDIX E).
l) Palletization, when required (see 6.2).
m) Marking when other than MIL-STD-129 (see APPENDIX H)
n) When bar coding is not required. (see 6.2)
o) If an operational lubricant is other than specified by drawing. (see 6.2)
p) Intermediate Quantity (see APPENDIX Q) if other than default requirement
q) Intermediate Container (see APPENDIX R) if other than default requirement
r) Weight and Cube (see APPENDIX S) if other than default requirement
s) Special requirement (see APPENDIX V) if other than default requirement
t) Exterior Containers (see APPENDIX F) if other than default requirement .

6.3 Cleanliness.

6.3.1 Cleaning the exterior of the bearing package before opening. This note is directed particularly toward instrument precision ball bearings, although it can apply generally to all types. After the bearing has left the manufacturers plant and have been properly packaged under clean room conditions, the exterior of the package may become dirty. Containers and packages frequently generate small amounts of static electricity that attracts dirt and dust particles, and contamination adheres to the package. Particularly for instrument precision ball bearings, control should be established to clean the exterior parts of the package before entry into the processing area. A recommended method is to have the package blasted with absolutely clean dry air or remove static electricity charge with an appropriate solvent. Once entering the processing area and placed in a laminar flow hood, the package should be washed again with the appropriate solvent for approximately 5 to 10 seconds to remove exterior contaminants before being placed in a clean container ready to be cut open. The package should be opened carefully so that there will be no chips of the packaging material generated and the bearing should be removed with tweezers, or suitable handling tools. Bearings should never be handled with bare hands or fingers.

6.3.2 Visual inspection of bearings before installation. The bearings should be inspected under suitable lighting conditions to assure that bearings are free from contamination, corrosion, and rust prior to installation. Bearings should be handled in a manner that must not result in contamination.

6.3.3 Bearing cleanliness. Cleaning is a most important part of bearing preservation. It is essential that the cleaning method not leave residues that either may react unfavorably with the preservative, lubricant, or packing material, or may be unstable and decompose to form corrosive residues.

6.3.4 Bearing (support item). When bearings are acquired by equipment contractors for subsequent delivery to the Government as spares, proof of conformance to the provisions of this document by the bearing manufacturer, including the environment and process cleanliness provisions of 4.5, may serve as the basis for Government acceptance.

6.3.5 Air cleanliness classes. The information contained in the appendix of FED-STD-209 should be utilized to the fullest in achieving and maintaining the air cleanliness classes required herein for clean rooms and work stations.

6.3.6 Oxygen use bearings. Must be free of any contamination by hydrocarbons. Hydrocarbons in the form of oil, grease, lint, debris or combustible foreign matter create explosion hazards in the presence of oxygen.

6.4 Definitions.

6.4.1 ABEC. Annular Bearing Engineers Committee. The class or degree of precision of radial ball bearings.

6.4.2 ANSI / ABMA. American National Standards Institute / American Bearing Manufacturers Association.

6.4.3 Bearing Classes. For the classification purposes of this specification, bearing classes are defined in ANSI/ABMA Standards 12.1, 12.2, 16.1, 16.2 and 20.

6.4.4 Bearing closure. Bearing closure is defined in accordance with 6.4.20 and 6.4.21.

6.4.5 Categorization. The processes of evaluating an item by chemical and physical characteristics that are significant in determining the preservation requirements.

6.4.6 Consumable. An item of supply that is normally expended or used up beyond recovery in the use for which it was designed or intended.

6.4.7 Critical Item. Items meeting one or more of the following criteria are considered critical.

6.4.7.1. Critical chemically. Items which are of such a nature that any degree of deterioration (in the form of corrosion, mold, bacteria, fungi, etc.) caused by oxygen, moisture, living organisms, and other contaminants which are time or temperature dependent, will result in premature failure or malfunction of the item or equipment in which installed or to which the item is interfaced.

6.4.7.2. Critical Physically. Items that would become unfit for use as a result of physical action on the item or any integral surfaces. This includes items having a surface finish of 32 microinches root mean square or less. Items having a high degree of cleanliness and freedom from contamination and items requiring special protection from shock, vibration, or abrasion.

6.4.8 Drug store fold. Drug store fold (confectioners wrap) refers to a method of closing the long fold of an over-wrapped package by multiple folding.

6.4.9 General purpose bearings. General purpose bearings are bearings which fall into the following tolerance classification: Tolerances coinciding with those of unground bearings up to and including the ANSI/ABMA tolerances of ABEC 1 or RBEC 1.

6.4.10 Exterior pack. An exterior pack is a container, bundle, or assembly that is sufficient by reason of material, design and construction to protect material during shipment and storage. This can be the unit packs or a container with any combination of unit or intermediate packs.

6.4.11 Intermediate pack. An intermediate pack is a wrap, box, or bundle that contains two or more unit packs of identical items.

6.4.12 Intimate bag / wrap. The inner bag, or wrap used directly against the bearing / bearing component.

6.4.13 Instrument bearings. Instrument bearings are ball bearings with outside diameter (OD) not over 30 mm or 1.1811 inches and ABEC 3 tolerance or better.

6.4.14 Instrument precision bearings. Instrument precision ball bearings are ball bearings with outside diameters not over 30 mm or 1.1811 inches and ABEC tolerances of ABEC 5P, 5T, or better.

6.4.15 Large bearings. Large bearings are those bearings exceeding 16 inches outside diameter or 40 pounds in weight.

6.4.16 Small bearings. Small bearings are those bearings that do not exceed 16 inches outside diameter or 40 pounds in weight.

6.4.17 Oxygen equipment bearings. Oxygen equipment bearings are those bearings used in gaseous or liquid oxygen systems and high-pressure submersible, life support systems. They must be free from combustible materials, lubricants, or debris.

6.4.18 Precision bearings. Precision bearings are bearings manufactured to, or better than, the following ABEC tolerances:

6.4.18.1 ABEC 3 and RBEC 3 for metric ball and roller bearings
6.4.18.2 ABEC 5T for torque tube and extra thin type bearings
6.4.18.3 Class 3 for inch tapered roller bearings.

6.4.19 Open bearings. Open bearings are those having a single seal, or shield, or those having no seals or shields, or those that are separable.

6.4.20 Closed bearings. Closed bearings are those having either seals, shields, bands, or retainment plates, or other devices completely closing both sides of bearings, or a single contact seal on one side only, rendering cleaning and re-lubrication difficult.

6.4.21 Packing. The following levels of protection apply equally to packing.

6.4.21.1 Level A. Protection required to meet most severe worldwide shipment, handling, and storage conditions. A Level A pack must, in tandem with the applied preservation, be capable of protecting material from the direct effects of direct exposure to extremes of climate, terrain and operational and transportation environments. Examples of this situation which indicate a need for Level A pack: War Reserve Material, mobilization, strategic and theater deployment/ employment, open storage and deck loading. Examples of Level A pack includes but are not limited to overseas type wood boxes. For exterior containers the Joint DOD Packaging Administration has determined that domestic type fiberboard and paperboard containers are unacceptable material for use. The conditions to be considered are:

(a) Multiple handling during transportation and in transit storage from point of origin to final user
(b) Shock, vibration and static loading during shipment.
(c) Loading on shipdeck, transfer at sea, helicopter delivery, and offshore or over the beach discharge to final user.
(d) Environmental exposure during shipment or during in transit operations where port and warehouse facilities are limited or nonexistent.
(e) Outside storage in all climatic conditions.
(f) Static loads imposed by stacking.

6.4.21.2 Level B. Protection required to meet moderate worldwide shipment, handling, and storage conditions. A Level B pack must, in tandem with the applied preservation, be capable of protecting material not directly exposed to extremes of climate, terrain, and operational transportation environments. Examples of situations that indicate a need for use of Level B pack : Security Items, Foreign Military Sales (FMS) and containerized overseas shipments. Examples of exterior containers used for Level B pack requirements include but are not limited to domestic wood crates, weather resistant fiberboard containers, fast pack containers, and weather resistant

drums. Domestic type and grade non-weather resistant fiberboard and paperboard are unacceptable.

The conditions to be considered include, but are not limited to:

(a) Multiple handling during transportation and in-transit storage.
(b) Shock, vibration, and static loading of shipments worldwide by truck, rail, aircraft, or ocean transport.
(c) Favorable warehouse environment necessary for storage.
(d) Environmental exposure during shipment and in-transit transfers, excluding deck loading and offshore cargo discharge.
(e) Stacking and supporting superimposed loads during shipment and extended storage.

6.4.21.3 Level C. This packing provides minimum protection. It is needed to protect material under known favorable conditions. Level C packaging will normally be used for domestic shipments when such packing will satisfy the DOD needs. Normally Level C packing must not be specified when the items will be directly introduced into the military distribution system. The following criteria determine the requirements for this degree of protection:

(a) Use of the item at the first destination. (further breakout at Defense Depot)
(b) Limited Shock, vibration, and static loading during the limited transportation cycle.
(c) Favorable warehouse environment.
(d) Minimal effects of environmental exposure during shipment and in-transit delays.
(e) Minimal stacking and supporting superimposed loads during shipment and temporary storage.

6.4.22 Marking. Marking is the application of numbers, letters, labels, tags, symbols, or colors for handling or identification during shipment and storage.

6.4.23 Military Distribution System. The process by which material, not intended for immediate use, is stored and moved within or between DOD facilities.

6.4.24 Military packing. Military packing refers to the materials and methods or procedures prescribed in Federal and Military specifications, standards, drawings, or other authorized documents that are designed to provide the degree of packing protection determined necessary to prevent damage and deterioration during world wide distribution of material.

6.4.25 Outer bag. The bag that the intimate bag/wrap is placed into, providing water-vaporproof protection.

6.4.26 Packing. Packing refers to the assembling of items into a unit, intermediate, or exterior pack with necessary blocking, bracing, cushioning, weatherproofing, reinforcement, and marking.

6.4.27 Preservation (unit protection). Preservation (unit protection) is the application of protective measures, barrier materials, cushioning, and containers when necessary. Preservation is the process and procedures used to protect material from deterioration and damage. It includes cleaning, drying, preserving, packing, marking, and unitization.

6.4.28 RBEC. Roller Bearing Engineers Committee. The class or degree of precision of radial roller bearings.

6.4.29 Repairable Item. An item which, by application of engineering, economy or other factors, could be reasonably restored to a serviceable condition through regular repair procedures.

6.4.30 Special Group Item. Items with peculiar characteristics such as weight, configuration, complexity, fragility and other considerations that cannot be classified as common or selective. An item is considered special if drawings, sketches, illustrations, or narrative type instructions are required to specify packaging details.

6.4.31 Unit pack. A unit pack is the first tie, wrap, or container applied to a single item or a quantity thereof, or to a group of items of a single stock number, preserved or unpreserved, that constitutes a complete or identifiable package.

6.4.32 Nominal The middle value between the maximum and minimum value prescribed for a specific dimension.

6.4.33 Critical Surface/ Critical Application Criteria. Items will be classified as having critical surfaces or application if they meet one or more of the following conditions:

6.4.33.1 The metallic surfaces of the item are machined to close tolerances or high finish. The surfaces are prepared for close fit and intimate contact when assembled with the surfaces of the mating part. Operationally these surfaces:

(1) Are mating parts of driven gears, bushings, shafts, bearings etc.
(2) Are secured to the surface of the mating part to obtain a seal. (metal to metal)
(3) Are threaded with closely controlled dimensions and geometry and are utilized in the control varied movement of assemblies or components for adjustment.

6.4.33.2 Surfaces of the item have been worked by grinding or polishing surfaces to attain a highly polished surface of 16 Microinches or better.

6.4.33.3 Items whose application, either in assembly or operation, provides an essential attribute to attaining critical military objectives

6.5 Subject term (key word) listing.

Drying
Intimate Wrap
Lubricant Compounds
Marking
Preservation
Preservative Compounds

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

Custodians:
Army - AR
Navy - SH
Air Force - 99

Preparing Activity:
DLA - GS

(Project PACK-1088)

Reviewers:
Army - AT, SM
Navy - AS, MC, OS, SA
Air Force - 11

APPENDIX A

A1 The code system established in the APPENDICES of this specification is a position and sequence code. By use of codes, descriptive data is reduced to a convenient length.

A2 Digit positions 1 through 11 are **mandatory** in the acquisition document/contract. See TABLE A2 for the FORMAT for the PREPERATION FOR DELIVERY DESCRIPTION that shall be inserted into the contract/PO acquisition document.

A3 Digit positions 12 through 28 are optional for use in the acquisition document/contract.

A4 For the purpose of uniformity the following are established as the minimum essential elements that will be used for acquisition purposes.

TABLE A
MANDATORY

DIGIT	CODE FIELD	APPENDIX	DEFAULT
1-2-3	Method of Preservation (PRES MTHD)	B	MXX
4	Quantity Unit Pack (QUP)	C	1
5	Level of Preservation (LEVEL PRES)	D	M
6	Level of Packing (PACKING LEVEL)	E	C
7-8	Exterior Container (EXTER CONT)	F	AN
9-10	Unit Container (UNIT CONT)	G	XX
11	Marking (MARKING)	H	K

TABLE A1
OPTIONAL

DIGIT	CODE FIELD	APPENDIX	DEFAULT
12-13	Cleaning & Drying (CLNG/DRY)	K	YY
14-15	Preservative Materials (PRESV MAT)	L	AA
16-17	Wraps Material (WRAP MAT)	M	YY
18-19	Cushioning & Dunnage (CUSH/DUNN MAT)	N	YY
20	Cushioning Thickness (CUSH THK)	P	Y

APPENDIX A (Cont.)

DIGIT	CODE FIELD	APPENDIX	DEFAULT
21	Intermediate Container Quantity(INTERMDTE CONT QTY)	Q	Y
22-23	Intermediate Container (INTERMDTE CONT)	R	YY
24-25	Weight and Cube (WEIGHT/CUBE)	S	YY
26-27	Reserved for future use (RESERVED)	T	00
28	Special Requirement (SPECIAL RQMT)	V	0

A5 The use of the code zero 0 or 00 or the alphabetical code O or OO shall indicate that the field does not apply.

A6 The use of the code X or XX shall indicate that the requirement is included as a part of the requirements defined for the Method of Preservation.

A7 The use of the code Y or YY shall indicate that the packager (contractor) is responsible for selecting the appropriate requirement. The contractor will limit the selection to requirements listed in this specification.

A8 The use of the code Z or ZZ shall indicate a special requirement not represented by any code. When this is the case the details of the requirement shall be provided with the acquisition contract/order.

A9 The Acquisition Officer may change any of the coded data. When this is done the coded data must identify the new code and the sequence number(s) of the field(s) involved in the change. Appendices are provided for the contractors and Government Agencies preparing or interpreting coded data shown in this specification. The changes should only use codes established by this specification.

A10 Deviations from this specifications are not authorized except upon approval by Defense Supply Center Richmond DSCR-VBD 8000 Jefferson Davis Highway, Richmond VA. 23297-5821.

A11 In the event of conflicts between the default codes of these Appendices and the text of this document, the text of this document will take precedence.

TABLE A2

PREPARATION FOR DELIVERY DESCRIPTION

PKGING DATA - MIL-DTL-197J, XX JUN 2000 PRES MTHD = MXX QUP = 1 LEVEL PRES = M PACKING LEVEL = C EXTER CONT = AN UNIT CONT = XX MARKING = K CLNG/DRY = YY PRESV MAT = AA WRAP MAT = YY CUSH/DUNN MAT = YY CUSH THK = Y INTERMDTE CONT QTY = Y INTERMDTE CONT = YY WEIGHT/CUBE = YY RESERVED = 00 SPECIAL RQMT = 0
PACKAGING MARKING SHALL BE IN ACCORDANCE WITH MIL-STD-129 AND THE REQUIREMENTS OF THIS SPECIFICATION.
BAR CODE MARKING REQUIRED IAW MIL-STD-129 AND ANSI/AIM BC1 LATEST REVISIONS.
SUPPLEMENTAL INSTRUCTIONS: ADD AS REQUIRED

TABLE A3

MANDATORY FIELDS

DIGIT POSITION	1	2	3	4	5	6	7	8	9	10	11
	METHOD OF PRESERVATION			QUANTITY UNIT PACK	LEVEL PRESER	LEVEL PACK	EXTERIOR CONT	UNIT CONTAINER		MARKING	
	APPENDIX										
METHOD PRES	B	MXX		1	M	C	AN	XX		K	
UNIT PACK QTY	C										
MILITARY	D										
LEVEL C	E										
ASTM-D5118/ ASTM-D5168	F										
METHOD PRES	G										
MIL-STD-129	H										

NONMANDATORY FIELDS

DIGIT POSITION	12	13	14	15	16	17	18	19	20	21	22	23	24
	CLEAN/DRYING		PRES MATERIALS		WRAP MATERIALS		CUSH&DUNNAGE	CUS THK	INT CONT QTY	INTER CONTAINER		WEIGHT/CUB	
	APPENDIX												
ANY SUITABLE PROCESS	K	YY	AA		AA		YY	Y	YY	YY		YY	
OPER LUBE	L												
PACKERS OPTION	M												
PACKERS OPTION	N												
PACKERS OPTION	P												
PACKERS OPTION	Q												
PACKERS OPTION	R												
PACKERS OPTION	S												
RESERVED SPECIAL RQMT NONE	T V												

APPENDIX B

PRESERVATION METHOD (1ST , 2ND and 3rd DIGIT)

B1 This Appendix provides options for the Method of Preservation

B2 **The DEFAULT code assigned to this field is CODE MXX. This shall be the appropriate Military Method described in MIL-DTL-197 for the type of bearing being preserved.**

B3 The preservation Method is a required entry on the bar code label IAW with MIL-STD-129.

B4 The QAR or the contractor has the authority to change this code to another Method in this specification when it is more suitable for the type of bearings being shipped. The Method will not be changed when this specification text defines the Method to be used. (see TABLE II)

B5 The Methods of Military Preservation are listed below. The superseded codes are also listed in this revision to clarify the new method used. The "M" in the METHOD is for MILITARY.

TABLE B

CODE	METHOD	SUPERSEDED		
		MIL-P-116	MIL-STD-2073	MIL-P-197
M20	M20	IB2	FA,FP,FM	A
M44	M44	IA6	FF	F
M40	M40	IA19	FL,FM,FN,FP	L
M49	M49	IA20		M
M41	M41	1A8	FG,FM	G
M46	M46	IA13	FH	H
M52	M52	IIb	FB	B
M55	M55	IId	FB	B
MXX	**SELECT THE APPROPRIATE METHOD FROM MIL-DTL-197. WHEN NO METHOD IS DETERMINED USE MANUFACTURERS STANDARD**			
M45	M45	IA5	3V	N/A
M33	M33	IC1	2E	N/A
M50	M50	II	4Y	N/A
M42	M42	IA14	3Q	N/A
M32	M32	IC2	2M	N/A
M43	M43	1A16	3H	N/A
M30	M30	IC	2Y	N/A
M51	M51	IIC	4G	N/A
M31	M31	IC3	2D	N/A
M54	M54	IIF	4T	N/A
M10	M10	III	10	N/A
YYY	MILITARY	(any of the listed method codes)		
ZZZ	Special Requirement.	Detailed instructions attached in order.		

Bold Highlighting is Default Requirement. This method includes all of the Military Methods listed above. One of the Military Methods shall be selected for the appropriate marking on the labels in accordance with MIL-STD-129. See TABLE I and TABLE II.

APPENDIX C

QUANTITY PER UNIT PACK (4th) DIGIT

C1 This Appendix provides options for the Quantity Per Unit Pack.

C2 T**he DEFAULT QUANTITY per unit pack shall be CODE 1,one each, one pair, one set.**

C3 Items packed in accordance with some preservation methods , for example vials Method M46 or Method M44 will have more than one item in a vial.

C4 Items in kits will indicate one each, regardless of the quantity of items contained in the kit.

C5 The quantity unit pack for large bearings will be one each due to their fragile nature. (brinnelling)

C6 The contracting officer may have a different acquisition requirement for the quantity per unit pack. The TABLE listed below allows the Acquisition Officer to select a different code for the 4th digit.

TABLE C
QUANTITY PER UNIT PACK

CODE	QUANTITY	CODE	QUANTITY	CODE	QUANTITY
0	NA	C	15	Q	100
1	**1**	D	16	R	150
2	2	E	18	S	200
3	3	F	20	T	250
4	4	G	24	V	500
5	5	H	25	W	Quantity in the clear as specified
6	6	J	32	X	BULK
7	7	K	36	Y	PACKAGERS' OPTION
8	8	L	48	Z	SPECIAL REQUIREMENT
9	9	M	50		
A	10	N	72		
B	12	P	75		

BOLD HIGHLIGHT IS DEFAULT QUANTITY

APPENDIX D

PRESERVATION (5th) DIGIT

D1 This Appendix provides options for the Preservation requirements.

D2 **The DEFAULT preservation is CODE M, MILITARY**.

TABLE D
PRESERVATION

CODE	METHOD
M	**MILITARY**
Z	SPECIAL REQUIREMENT. See attached instructions or drawing.

APPENDIX E

LEVEL OF PACKING (6th) DIGIT

E1 This Appendix provides options for the Level of Packing.

E2 **The DEFAULT LEVEL OF PACKING IS LEVEL C, CODE C.**

E3 The contracting acquisition officer may have a different requirement for the level of packing. The TABLE listed below allows the acquisition officer to select a different code for the 6th digit.

LEVELS OF PACKING

TABLE E

CODE	LEVEL	
A	LEVEL A	See par 6.4.22.1.1 for definition
B	LEVEL B	See par 6.4.22.1.2 for definition
C	**LEVEL C**	**See par 6.4.22.1.3 for definition**
D	PACKING IS NOT REQUIRED	
E	SHIPMENTS BY PARCEL POST SHALL COMPLY WITH POSTAL REGULATIONS	
F	PACKING SHALL BE PERFORMED BY A PACKAGING CONTRACTOR	
X	SEE METHOD OF PRESERVATION	
Y	PACKAGERS OPTION PROVIDED CONTRACTUAL REQUIREMENTS ARE MET.	
Z	SPECIAL REQUIREMENT.	See attached instructions or drawing.

E4 ASTM-D4169, Standard Practice For Performance Testing Of Shipping Containers, does comply with all DOD Military packaging, design and validation procedures peculiar to the military.

E5 Level A packing must meet the requirements of Distribution Cycle 18 of ASTM-D4169. The Quality Assurance Level shall be Assurance Level 1.

E6 Level B packing must meet the requirements of Distribution Cycle 18 of ASTM-D4169. The Quality Assurance Level shall be Assurance Level 2.

E7 Level C packing shall meet the requirements of Distribution Cycle 1 of ASTM-D-4169 for Domestic shipments and also pass test level of Distribution Cycle 15,16 or 17 as appropriate. Assurance Level II shall be used and the acceptance criteria shall be criteria I, no product damage.

APPENDIX F

EXTERIOR CONTAINER (7th and 8th) DIGIT

F1 This Appendix provides options for the exterior container.

F2 **The DEFAULT exterior container shall be CODE AN, a commercial fiberboard box, in accordance with ASTM-D5118 or ASTM-D5168. For additional information see paragraph 3.7.3.**

F3 The contracting officer may have a different acquisition requirement for the exterior container. The TABLE listed below provided options for other selections.

F4 Closure, sealing, and reinforcement shall be in accordance with the specification for the shipping container and ASTM-D1974 as applicable.

TABLE F

CODE	SPECIFICATION	DESCRIPTION	PROTECTION
AA	ASTM-D5118	Fiberboard box	Level C
AB	ASTM-D5118	Type CF Class Domestic Corrugated fiberboard	Level C
AC	ASTM-D5118	Type CF Class Domestic Single wall corrugated	Level C
AD	ASTM-D5118	Type CF Class Domestic Double wall corrugated	Level C
AE	ASTM-D5118	Type CF Class Weather Resistant corrugated	Level C & Level B
AF	ASTM-D5118	Type CF Class Weather Resistant Single Wall Corrugated	Level C & Level B
AG	ASTM-D5118	Type CF Class Weather Resistant Double Wall Corrugated	Level C & Level B
AH	ASTM-D5118	Type SF Class Domestic Solid Fiberboard	Level C
AJ	ASTM-D5118	Type SF Class Weather Resistant Solid Fiberboard	Level C & Level B
AK	ASTM-D5168	Triple Wall Fiberboard	Level C

APPENFIX F (cont.)

CODE	SPECIFICATION	DESCRIPTION	PROTECTION
AL	ASTM-D5168	Class 1 Non Weather Resistant Triple wall fiberboard	Level C
AM	ASTM-D5168	Class 2 Weather Resistant Triple Wall Fiberboard	Level C & Level B
AN	**ASTM-D5118 ASTM-D5168**	**Fiberboard Container Domestic**	**Level C**
BA	MIL-C-104	Type I Class 1 Nailed Wood Crate Lumber Sheathed	Level A & Level B
BB	MIL-C-104	Type I Class 2 Nailed Wood Crate Plywood Sheathed	Level A & Level B
BC	MIL-C-104	Type II Class 1 Bolted Wood Crate Lumber Sheathed	Level A & Level B
BD	MIL-C-104	Type II Class 2 Bolted Wood Crate Plywood Sheathed	Level A & Level B
BE	PPP-B-576	Class 1 Wood Cleated Panelboard Box Domestic	Level B
BF	PPP-B-576	Class 2 Wood Cleated Panelboard Box Weather Resistant	Level A
BG	PPP-B-585	Class 2 Wirebound Wood Box	Level B
BH	PPP-B-585	Class 2 Wirebound Wood Box	Level A
BJ	PPP-B-601	Cleated Plywood Box Domestic	Level B
BK	PPP-B-601	Cleated Plywood Box Overseas	Level A
BL	PPP-B-621	Class 1 Nailed Box Domestic	Level B
BM	PPP-B-621	Class 2 Nailed Box Overseas	Level A
BN	PPP-B-566	Folding Paperboard Box	
CA	PPP-B-96	Metal Can	

APPENFIX F (cont.)

CODE	SPECIFICATION	DESCRIPTION	PROTECTION
CB	MIL-C-3955	Composite Can	
CC	MIL-D-6054	Reusable Metal Drum	
XX	See Method of Preservation.		
YY	Packager's options as long as all contractual requirements are met.		
ZZ	Special Requirement. See specific instructions or drawings attached.		

APPENDIX G

UNIT CONTAINER (9th and 10th) DIGIT

G1 This Appendix provides options for the unit container.

G2 **The DEFAULT CODE shall be CODE XX . Container is specified in the Method of Preservation. See paragraph 3 for requirements.**

G3 The contracting officer may have a different acquisition requirement for the unit container. The TABLE G listed below provides options for other selections.

TABLE G

CODE	SPECIFICATION	DESCRIPTION	PROTECTION
AA	ASTM-D5118	Fiberboard box	Level C
AB	ASTM-D5118	Type CF Class Domestic Corrugated fiberboard	Level C
AC	ASTM-D5118	Type CF Class Domestic Single wall corrugated	Level C
AD	ASTM-D5118	Type CF Class Domestic Double wall corrugated	Level C
AE	ASTM-D5118	Type CF Class Weather Resistant corrugated	Level C & Level B
AF	ASTM-D5118	Type CF Class Weather Resistant Single Wall Corrugated	Level C & Level B
AG	ASTM-D5118	Type CF Class Weather Resistant Double Wall Corrugated	Level C & Level B
AH	ASTM-D5118	Type SF Class Domestic Solid Fiberboard	Level C
AJ	ASTM-D5118	Type SF Class Weather Resistant Solid Fiberboard	Level C & Level B
AK	ASTM-D5168	Triple Wall Fiberboard	Level C
AL	ASTM-D5168	Class 1 Non Weather Resistant Triple wall fiberboard	Level C
AM	ASTM-D5168	Class 2 Weather Resistant Triple Wall Fiberboard	Level C & Level B

APPENDIX G (cont.)

CODE	SPECIFICATION	DESCRIPTION	PROTECTION
BA	MIL-C-104	Type I Class 1 Nailed Wood Crate Lumber Sheathed	Level A & Level B
BB	MIL-C-104	Type I Class 2 Nailed Wood Crate Plywood Sheathed	Level A & Level B
BC	MIL-C-104	Type II Class 1 Bolted Wood Crate Lumber Sheathed	Level A & Level B
BD	MIL-C-104	Type II Class 2 Bolted Wood Crate Plywood Sheathed	Level A & Level B
BE	PPP-B-576	Class 1 Wood Cleated Panelboard Box Domestic	Level B
BF	PPP-B-576	Class 2 Wood Cleated Panelboard Box Weather Resistant	Level A
BG	PPP-B-585	Class 2 Wirebound Wood Box	Level B
BH	PPP-B-585	Class 2 Wirebound Wood Box	Level A
BJ	PPP-B-601	Cleated Plywood Box Domestic	Level B
BK	PPP-B-601	Cleated Plywood Box Overseas	Level A
BL	PPP-B-621	Class 1 Nailed Box Domestic	Level B
BM	PPP-B-621	Class 2 Nailed Box Overseas	Level A
BN	PPP-B-566	Folding Paperboard Box	Level C
CA	PPP-B-96	Metal Can	Level A
CB	MIL-C-3955	Composite Can	
CC	MIL-D-6054	Reusable Metal Drum	Level A
CD	Cellulose Acetate	Vial with Cap	Level C
CE	Cellulose Acetate Beterate	Vial with Cap	Level C

APPENDIX G (cont.)

CODE	SPECIFICATION	DESCRIPTION	PROTECTION
CF	Cellulose Propionate	Vial with Cap	Level A,B,C
CG	Laminated Polymylar	Roll Stock (bags) 4 Mils (JSCM 5322)	Level A,B,C
CH	Polyethylene	Roll Stock (bags) 6 Mils (JSCM 5322)	Level A,B,C
CJ	L-P-378 Polyethylene	Bags Type II Class 1 Grade A	Level A,B,C
CK	Polyethylene	Preformed Pill Pack 4 Mils (JSCM 5322)	Level A,B,C
CL	Nylon 6	Bags/Pill Pack 2 Mils (JSCM 5322)	Level A,B,C
CM	Teflon	Bags (JSCM 5322)	Level A,B,C
CN	Laminated Polymylar	Transpar Roll Stock 4 Mils (JSCM 5322)	Level A,B,C
CP	Hi Density Polyethylene	Bottles Screw Cap Closure	Level A,B,C
GA	Unit container is not an acceptable shipping container		
GB	Unit Container provides Level A pack		
GC	Unit Container provided Level B pack		
GD	Unit Container provides Commercial pack		
GE	No container is required		
XX	See Method of Preservation. See Section 3 for requirements.		
YY	Packager’s option as long as all contractual requirements are met.		
ZZ	Special Requirement. See specific instructions or drawings attached.		

APPENDIX G (cont.)

TABLE G1

CODE	MIL-B-117 TYPE	CLASS	BAG STYLE	CHARACTERISTICS
DA	I	B	1	HEAVY DUTY WATERPROOF OPAQUE
DB	I	B	2	HEAVY DUTY WATERPROOF TRANSPARENT
DC	I	B	3	HEAVY DUTY WATRERPROOF ONE SIDE OPAQUE OTHER SIDE TRANSPARENT
DD	I	C	1	HEAVY DUTY WATERPROOF GREASEPROOF OPAQUE
DE	I	C	2	HEAVY DUTY WATERPROOF GREASEPROOF TRANSPARENT
DF	I	C	3	HEAVY DUTY WATERPROOF GREASEPROOF ONE SIDE OPAQUE OTHER SIDE TRANSPARENT
DG	I	E	1	HEAVY DUTY WATERPROOF GREASEPROOF OPAQUE
DH	I	E	2	HEAVY DUTY WATERPROOF GREASEPROOF TRANSPARENT
DJ	I	E	3	HEAVY DUTY WATERPROOF GREASEPROOF ONE SIDE OPAQUE OTHER SIDE TRANSPARENT
DK	I	G	1	HEAVY DUTY WATERPROOF GREASEPROOF FLAME RESISTANT OPAQUE
DL	II	B	1	MEDIUM DUTY WATERPROOF OPAQUE
DM	II	C	1	MEDIUM DUTY WATERPROOF GREASEPROOF OPAQUE
DN	II	E	1	MEDIUM DUTY WATERPROOF GREASEPROOF OPAQUE
DP	II	E	3	MEDIUM DUTY WATERPROOF GREASEPROOF ONE SIDE OPAQUE OTHER SIDE TRANSPARENT
DQ	III	B	1	LIGHT DUTY WATERPROOF OPAQUE
DR	III	E	1	LIGHT DUTY WATERPROOF GREASEPROOF OPAQUE

APPENDIX G (cont.)

Below is a conversion chart to identify the **BAG MATERIAL** used for the type class and style bags listed above.

TABLE G2

	MIL-B-117 BAG						
CODE	TYPE	CLASS	STYLE	SPECIFICATION	TYPE	GRADE	CLASS
DA	I	B	1	MIL-B-121	I	A	1
DB	I	B	2	MIL-PRF-22191 L-P-378	III I or II	- A	- A
DC	I	B	3	MIL-B-121 MIL-PRF-22191	I III	A -	1 -
DD	I	C	1	MIL-B-121	I	A	1
DE	I	C	2	MIL-PRF-22191	II	-	-
DF	I	C	3	MIL-B-121 MIL-PRF-22191	I II	A -	1 -
DG	I	E	1	MIL-PRF-131	I	-	1
DH	I	E	2	MIL-PRF-22191	I	-	-
DJ	I	E	3	MIL-PRF-131 MIL-PRF-22191	I I	- -	1 -
DK	I	G	1	MIL-PRF-131	II	-	-
DL	II	B	1	MIL-B-121	II	A	1
DM	II	C	1	MIL-B-121	II	A	1
DN	II	E	1	MIL-PRF-131	I	-	3
DP	II	E	3	MIL-PRF-131 MIL-PRF-22191	I I	- -	3 -
DQ	III	B	1	MIL-B-121	II	A	1
DR	III	E	1	MIL-PRF-131	I	-	2

APPENDIX H

MARKING (11th DIGIT)

H1 This APPENDIX provided options for the method of marking the packing and the bearings and bearing components.

H2 **The DEFAULT CODE K is assigned to this field.**

H3 Marking is a mandatory field on the acquisition document/contract.

H4 Laser engraving of bearings is authorized unless prohibited by drawing.

H5 Marking shall be readable with ease and accuracy by the unaided eye.

H6 The marking of the bearings shall be performed using a combination of specification and drawing and contract/PO requirements. Bearings shall be marked with drawing requirements in addition to the military marking requirement. For example: high points, duplex alignment marks, coding (bore and od), thrust marking, BC (barrier coat), serial numbers, material used (M50), NDT marking etc.

H7 All unit, intermediate, and exterior packing shall be marked in accordance with MIL-STD-129 and the additional marking requirements of this specification.

H8 Physical identification of product shall not use metal stamping unless authorized.

H9 TABLE H I below provides a combination of requirements that shall be considered for marking the bearings and the packaging for bearings.

APPENDIX H (cont.)

TABLE H

MARKING

CODE	**DESCRIPTION**
0	No requirement

CODE	**DESCRIPTION**
A	Packing marking in accordance with MIL-STD-129. Physical identification of product in accordance with MIL-STD-130.
B	Packing marking in accordance with MIL-STD-129. Physical identification of product in accordance with QPL specification.
C	Packing marking in accordance with MIL-STD-129. Physical identification of product in accordance with commercial practice.
D	Packing marking in accordance with MIL-STD-129. Physical identification of product in accordance with MIL-STD-1647.
E	Packing marking in accordance with MIL-STD-129. Physical identification of product in accordance with OEM drawing.
F	Packing marking in accordance with MIL-STD-129. Physical identification of product in accordance with MS or other drawing requirement.
G	Packing marking in accordance with Commercial practice. Physical identification of product in accordance with commercial practice.
H	Packing marking in accordance with MIL-STD-129. Physical marking of product in accordance with MIL-STD-129.
J	Packing marking accordance with MIL-STD-129. Physical marking of product in accordance with Specification requirements.
K	**Packing marking in accordance with MIL-STD-129 , and as shown in MIL-HDBK-129, with ANSI/AIM BC1 and MIL MIL-DTL-197. Physical identification of product in accordance with MIL-STD-1647 for symbolic marking, MIL-STD-130 for in the clear marking, OEM unique drawing marking, QPL and other specification marking and Oxygen equipment bearing marking. (seeTABLE H1)**
X	Packing marking in accordance with method of preservation.
Y	Packagers option for marking packing and marking product.
Z	Special marking requirement. Details are provided with the order.

APPENDIX H (cont.)

TABLE HI

The requirements for the physical marking of bearings and bearing components and packaging for DOD contracts/PO shall review this TABLE for applicable requirements.

SPECIFICATION	DESCRIPTION	MIL-STD-1647	MIL-STD-130	MIL-DTL-197	SPECIFICATION	OEM/ OTHER DRAWING	MIL-STD-129
NAS-M-81793	BEARING BALL ANNULAR INSTRUMENT AND PRECISION (INCH) 30mm OR LESS OR ABEC THIN SERIES	X		X	X	X	X
NAS-M-81793	BEARING BALL ANNULAR INSTRUMENT AND PRECISION (INCH) OVER 30mm		X	X	X	X	X
NAS-M-973	BEARING BALL ANNULAR INSTRUMENT AND PRECISION (METRIC) 30mm OR LESS OR ABEC THIN SECTION	X		X	X	X	X
NAS-M-973	BEARING BALL ANNULAR INSTRUMENT AND PRECISION (METRIC)		X	X	X	X	X
SAE-AS7949	BEARING BALL AIRFRAME		X	X	X	X	X
SAE-AS6039	BEARING BALL ROD END DOUBLE ROW		X	X	X	X	X
SAE-AS81934	BEARING SLEEVE FLANGED		X	X	X	X	X
SAE-AS81935	BEARINGS PLAIN ROD END		X	X	X	X	X
SAE-AS5380	BEARING TRACK ROLLER NEEDLE AIRFRAME		X	X	X	X	X
MIL-I-5221	BEARING OXYGEN SYSTEMS EQUIPMEN		X	X	X	X	X
FF-B-187	BEARING ROLLER TAPERED		X	X	X	X	X
MIL-B-17931	BEARING BALL ANNULAR QUIET OPERATION		X	X	X	X	X
FF-B-171	BEARING BALL ANNULAR (METRIC)		X	X	X	X	X

APPENDIX H (cont.)

TABLE HI

The requirements for the physical marking of bearings and bearing components for DOD requirements shall be as follows:

SPECIFICATION	DESCRIPTION	MIL-STD-1647	MIL-STD-130	MIL-DTL-197	SPECIFICATION	OEM/ OTHER DRAWING	MIL-STD-129
MIL-B-81819	BEARING PLAIN SLIDING SPHERICAL		X	X	X	X	X
MIL-B-81820	BEARINGS PLAIN SELF ALLIGNING		X	X	X	X	X
OEM DRAWING	BEARING BALL OR ROLLER		X	X		X	X
FF-B-171	BEARING BALL INSTRUMENT OR PRECISION (METRIC) 30mm OR LESS OR ABEC THIN SECTION	X		X	X	X	X
FF-B-2844	BEARING BALL INSTRUMENT OR PRECISION(INCH) 30mm OR LESS OR ABEC THIN SECTION	X		X	X	X	X
ABEC 1,3,5,7,9 “P” OR “T” SERIES 30 mm OR LESS	BEARING INSTRUMENT OR INSTRUMENT PRECISION	X	X	X	X	X	X
ABEC 1,3,5,7,9 OVER 30 mm	BEARING INSTRUMENT OR INSTRUMENT PRECISION		X	X	X	X	X
MIL-B-17931			X	X	X	X	X
RBEC 1, 3, and 5	ROLLER BEARING		X	X	X	X	X

Note. The TABLES and illustrations as shown in MIL-HDBK-129 shall be used in conjunction with MIL-STD-129.

APPENDIX K

CLEANING AND DRYING (12th and 13th DIGIT) non mandatory field

K1 This APPENDIX provides options for the method of cleaning.

K2 The DEFAULT CODE YY is assigned to this field.

K3 The REBG cleaning subcommittee has developed a document, " ODS FREE CLEANING", which is available through Draper Laboratory which may be used as a guide.

K4 The cleaning and drying codes are listed below.

TABLE K

CODE	DESCRIPTION
00	No Requirement
01	Any suitable process that is not injurious to the item.
02	Any suitable process followed by fingerprint removal test as required by the method of preservation. (see TABLE IV)
03	Clean for oxygen service in accordance with industry practice. Petroleum and other inflammable solvents shall not be used.
04	The contractor shall use code 02 for all bearings except Oxygen bearings when code 03 shall be used.
XX	All of the requirements are defined in the preservation method.
YY	**Packagers option as long as all contractual requirements are met.**
ZZ	Special requirement. See attached instructions.

APPENDIX L

PRESERVATION MATERIALS (14th and 15th DIGIT)

L1 This APPENDIX provides options for the selection of preservation materials.

L2 **The DEFAULT CODE AA is assigned to this field.**

L3 The preservation materials code is not a mandatory on the acquisition document/contract.

TABLE L

PRESERVATION MATERIALS

CODE	MATERIAL	
00	No Requirement	
01	MIL-C-11796	Class 3 light preservative compound soft film hot application
02	MIL-C-8188	Corrosion preventive oil synthetic base for aircraft turbine engines
03	MIL-L-53131	Lubricating oil precision rolling element polyolefin based
04	MIL-L-81846	Lubricating oil instrument ball bearing high flash point
05	MIL-PRF-6085	Lubricating oil instrument aircraft low volatility
06	VV-L-800	Very light preservative oil water displacing cold application
07	DOD-G-24508	Grease high performance multi-purpose
08	MIL-G-10924	Grease automotive and artillery
09	MIL-G-27617	Grease aircraft and instrument fuel and oxidized resistant
10	MIL-G-81937	Grease instrument ultra clean metric
11	MIL-PRF-23827	Grease aircraft and instrument gear
12	MIL-PRF-81322	Grease aircraft general purpose wide temperature range
13	Preserve by commercial process	
AA	**Preserve with normal operating lubricant or compatible lubricant**	
BB	Bearing shall be dry	
XX	See method of preservation	
YY	Packagers option as long as all other contractual requirements are met	
ZZ	Special requirement. See specific instructions provided	

APPENDIX M

WRAPPING MATERIALS (16th and 17th DIGIT) non mandatory field

M1 This APPENDIX provides options for the selection of wrapping materials.

M2 **The DEFAULT CODE YY is assigned to this field .**

M3 The wrapping materials approved for selection are listed below.

TABLE M

CODE	SPECIFICATION	
00	No Requirement	
01	QQ-A-1876	Aluminum foil
02	MIL-P-17667	Neutral wrapping paper
03	MIL-P-17667	Type I Neutral wrapping paper
04	MIL-P-17667	Type II Neutral wrapping paper
05	MIL-P-130	Laminated and creped wrapping paper
06	MIL-B-121	Grade A greaseproof, waterproof barrier
07	MIL-B-121	Grade A Type I heavy duty greaseproof waterproof barrier
08	MIL-B-121	Grade A Type II medium duty greaseproof waterproof barrier
09	L-P-378	Plastic sheet strip polyolefin 2 mil
10	L-P-378	Plastic sheet polyolefin
11	Nylon 6	Nylon 6 FDA approved 2 mil
12	Nylon 6	Nylon 6 FDA approved 4 mil
13	Nylon 6	Nylon 6 FDA approved 6 mil
14	MIL-PRF-22191	Type III transparent waterproof barrier
15	MIL-PRF-131	Barrier Materials Waterproof Greaseproof Type I
16	MIL-PRF-131	Barrier Materials Waterproof, Greaseproof Type II
17	MIL-PRF-22191	Barrier Materials Transparent Type I
18	MIL-PRF-22191	Barrier Materials Transparent Type II
XX	See method of preservation	
YY	**Packagers option as long as the requirements of this specification are met**	
ZZ	Special requirement. See specific instructions attached	

APPENDIX N

CUSHIONING AND DUNNAGE (18th and 19th DIGIT) non mandatory field

N1 This APPENDIX provides options for selection of cushioning and dunnage.

N2 **THE DEFAULT CODE YY is assigned for this field.**
N3 The cushioning and dunnage codes are listed below.

TABLE N
Cushioning materials

Code	Specification	Material	Type, Class or Grade
01	A-A-1894	Paper Kraft, treated (fire resistant)	Type I or Type II
02	PPP-C-795	Plastic film, flexible, cellular bound fiber	Class 3
03	PPP-C-1120	Bound fiber	Type II or III, class A, grade 1
04	MIL-P-130	Material - Laminated and crepe wrapping paper	
05	MIL-R-6130	Rubber cellular	Grade A
06	MIL-P-17667	Material - Paper, wrapping, chemically neutral (non corrosive)	
07	MIL-PRF-20092	Rubber sheets and molded shapes, cellular, synthetic exploded shell	Class 5
08	MIL-PRF-26514	Polyurethane foam	
09	MIL-PRF-83671	Foam - in - place	
10	PPP-C-1120	Water resistant bound fiber	Class A
11	PPP-C-1120	Medium soft density water resistant bound fiber	Class A Type II
12	PPP-C-1120	Medium firm density water resistant bound fiber	Class A Type III
13	PPP-C-1120	Firm density water resistant bound fiber	Class A Type IV
14	PPP-C-795	Cellular plastic film cushioning	Class 1
15	MIL-PRF-26514	Flexible Polyurethane foam	Type I Class 2
16	MIL-R-20092	Latex foam rubber	
17	MIL-PRF-26514	Rigid polyurethane foam	Type I Class 1
18	MIL-PRF-26514	Flexible polyurethane foam light load	Type I Class 2 Grade A
19	MIL-PRF-26514	Flexible polyurethane foam medium load	Type I Class 2 Grade B
20	MIL-PRF-26514	Flexible polyurethane foam heavy load	Type I Class 2 Grade C
22	MIL-PRF-26514	Flexible polyurethane foam for corner pads	Type I Class 2
XX	Method Preservation	As described by the Method of preservation	
YY	**Packagers option**	**Packers option as long as requirements of specification and contract are met**	
ZZ	Special requirement	Special requirement instructions attached with the order	
AA	ASTM-D4727	Fiberboard separators	

APPENDIX P

THICKNESS OF CUSHIONING OR DUNNAGE (20th DIGIT)

P1 This APPENDIX provides options for the thickness of cushioning or dunnage used. This is not a mandatory field for the contract.

P2 **The DEFAULT CODE Y is assigned for this field.**

TABLE P

CODE	MINIMUM THICKNESS	CODE	MINIMUM THICKNESS
0	Not applicable	R	4 inches thick
A	¼ inch thick	S	4-1/4 inches thick
B	½ inch thick	T	4-1/2 inches thick
C	¾ inch thick	U	4-3/4 inches thick
D	1 inch thick	V	5 inches thick
E	1-1/4 inches thick	W	5-1/4 inches thick
F	1-1/2 inches thick	X	As required to protect the item or elements of the package.
G	1-3/4 inches thick		
H	2 inches thick	**Y**	**Packagers option as long as all other contractual requirements** are met.
J	2-1/4 inches thick		
K	2-1/2 inches thick		
L	2-3/4 inches thick	Z	Special requirements. See specific instructions or attached drawings.
M	3 inches thick		
N	3-1/4 inches thick		
P	3-1/2 inches thick		
Q	3-3/4 inches thick		

APPENDIX Q

QUANTITY PER INTERMEDIATE PACK (21st) DIGIT

Q1 This Appendix provides options for the Quantity Per Intermediate Pack.

Q2 **The DEFAULT QUANTITY per intermediate pack shall be the contractors option, Code Y.**

Q3 The quantity intermediate pack for large bearings will be limited by weight and consideration given due to their fragile nature. (brinnelling)

Q4 The contracting officer may have a specific acquisition requirement for the quantity per intermediate pack. The TABLE listed below allows the Acquisition Officer to select a different code for the 20th digit.

QUANTITY PER INTERMEDIATE PACK

TABLE Q

CODE	QUANTITY	CODE	QUANTITY	CODE	QUANTITY
0	NA	C	15	Q	100
1	1	D	16	R	125
2	2	E	18	S	150
3	3	F	20	T	250
4	4	G	24	V	500
5	5	H	25	W	1000
6	6	J	32	X	BULK
7	7	K	36	**Y**	**PACKAGERS OPTION**
8	8	L	48	Z	SPECIAL REQUIREMENT
9	9	M	50		
A	10	N	72		
B	12	P	75		

BOLD HIGHLIGHT IS DEFAULT QUANTITY

APPENDIX R

INTERMEDIATE CONTAINER (22nd and 23rd) DIGIT

R1 This Appendix provides options for the exterior container.

R2 **The DEFAULT intermediate container shall be CODE YY, a commercial fiberboard box in accordance with ASTM-D5118 or ASTM-D5168 or other container as long as the contract requirements are met.**

R3 The contracting officer may have a different acquisition requirement for the exterior container. The TABLE listed below provided options for other selections.

TABLE R

CODE	SPECIFICATION	DESCRIPTION	PROTECTION
AA	ASTM-D5118	Fiberboard box	Level C
AB	ASTM-D5118	Type CF Class Domestic Corrugated fiberboard	Level C
AC	ASTM-D5118	Type CF Class Domestic Single wall corrugated	Level C
AD	ASTM-D5118	Type CF Class Domestic Double wall corrugated	Level C
AE	ASTM-D5118	Type CF Class Weather Resistant corrugated	Level B & Level C
AF	ASTM-D5118	Type CF Class Weather Resistant Single Wall Corrugated	Level B & Level C
AG	ASTM-D5118	Type CF Class Weather Resistant Double Wall Corrugated	Level B & Level B
AH	ASTM-D5118	Type SF Class Domestic Solid Fiberboard	Level C
AJ	ASTM-D5118	Type SF Class Weather Resistant Solid Fiberboard	Level C & Level C
AK	ASTM-D5168	Triple Wall Fiberboard	Level C
AL	ASTM-D5168	Class 1 Non Weather Resistant Triple wall fiberboard	Level C
AM	ASTM-D5168	Class 2 Weather Resistant Triple Wall Fiberboard	Level B & Level C

APPENDIX R (cont.)

CODE	SPECIFICATION	DESCRIPTION	PROTECTION
BA	MIL-C-104	Type I Class 1 Nailed Wood Crate Lumber Sheathed	Level A & Level B
BB	MIL-C-104	Type I Class 2 Nailed Wood Crate Plywood Sheathed	Level A & Level B
BC	MIL-C-104	Type II Class 1 Bolted Wood Crate Lumber Sheathed	Level A & Level B
BD	MIL-C-104	Type II Class 2 Bolted Wood Crate Plywood Sheathed	Level A & Level B
BE	PPP-B-576	Class 1 Wood Cleated Panelboard Box Domestic	Level B
BF	PPP-B-576	Class 2 Wood Cleated Panelboard Box Weather Resistant	Level A
BG	PPP-B-585	Class 2 Wirebound Wood Box	Level B
BH	PPP-B-585	Class 2 Wirebound Wood Box	Level A
BJ	PPP-B-601	Cleated Plywood Box Domestic	Level B
BK	PPP-B-601	Cleated Plywood Box Overseas	Level A
BL	PPP-B-621	Class 1 Nailed Box Domestic	Level B
BM	PPP-B-621	Class 2 Nailed Box Overseas	Level A
CA	PPP-B-96	Metal Can	
CB	MIL-C-3955	Composite Can	
CC	MIL-D-6054	Reusable Metal Drum	
XX	See Method of Preservation.		
YY	**Packager's option as long as all contractual requirements are met**.		
ZZ	Special Requirement. See specific instructions or drawings attached.		

APPENDIX S

WEIGHT AND CUBE (24th and 25TH DIGIT) not a mandatory field

S1 This APPENDIX provides options for the selection of containers of different weight and cube.

S2 **The DEFAULT code for this field is CODE YY. (TABLE S5)**

S3 The TABLES listed below provide options for use by the packagers and contracting officers.

TABLE S

SIZE and WEIGHT LIMITATION CLASS DOMESTIC CF and SF FIBERBOARD ASTM-D5118

CODE	GRADE SW (1)	GRADE DW (1)	GRADE SF	MAX FULL BOXWEIGHT IN LBS	MAX INSIDE DIMENSION INCHES
AA	125		125	20	40
AB	150			30	50
AC	175		175	40	60
AD	200	200	200	65	75
AE	275	275	275	90	90
AF	350	350	350	120	100
AG		500	500	140	110
AH		600	600	160	120

(1)Type CF Variety

Explanation of abbreviations in above TABLE
CF corrugated fiberboard
SF solid fiberboard
SW singlewall fiberboard
DW doublewall fiberboard
Max inside dimension= lengh+width+depth
Max weight = box and contents

TABLE S1

SIZE and WEIGHT LIMITATION CLASS WEATHER RESISTANT FIBERBOARD and WATER and WATER RESISTANT FIBERBOARD BOXES USED AS EXTERIOR CONTAINER ASTM-D5118

CODE	GRADE	MAX FULL BOXWEIGHT IN LBS	MAX INSIDE DIMENSION INCHES
AJ	V2s	120	100
AK	V3s,V4s,V3c	90	90
AL	W5s,W5c	65	75
AM	W6s,W6c	30	30
AN	V11c	160 (1)	120
AP	V13c	120	100
AQ	V15c	90	90

(1) Max weight increased to 225 lbs. when metal fasteners used

APPENDIX S (cont.**)**

TRIPLE WALL CORRUGATED FIBERBOARD CONTAINERS ASTM-D5168

TABLE S2

CODE	CLASS NON-WEATHER RESISTANT	CLASS WEATHER RESISTANT	WEIGHT OF CONTENTS LBS MAXIMUM	PACKING LEVEL
BA	STYLE A		See ASTM	Level C
BB		STYLE A	See ASTM	Level B
BC	STYLE B			Level C
BD		STYLE B		Level B
BE	STYLE C		See ASTM	Level C
BF		STYLE C	See ASTM	Level B
BG	STYLE D		See ASTM	Level C
BH		STYLE D	See ASTM	Level B
BJ	STYLE E		See ASTM	Level C
BK		STYLE E	See ASTM	Level B
BL	STYLE F		See ASTM	Level C
BM		STYLE F	See ASTM	Level B
BN	STYLE G		See ASTM	Level C
BP		STYLE G	See ASTM	Level B

See ASTM-D5168 APPENDIX for sealing and closure requirements for each STYLE.

MAXIMUM WEIGHT OF CONTENTS FOR MILITARY SPECIFCATION CONTAINERS

TABLE S3

CODE	SPECIFICATION	DESCRIPTION	MAXIMUM WEIGHT OF CONTENTS	MILITARY LEVEL PACK
CA	PPP-B-576	BOX WOOD CLEATED PANELBOARD CLASS 1 DOMESTIC	350 LBS	LEVEL B
CB	PPP-B-576	BOW WOOD CLEATED PANELBOARD CLASS 2 WEATHER RESISTANT	350 LBS	LEVEL A
CC	PPP-B-585	BOXES WOOD WIRE BOUND CLASS 2	400 LBS	LEVEL B
CD	PPP-B-585	BOXES WOOD WIRE BOUND CLASS 1	300 LBS	LEVEL A

APPENDIX S (cont.)
MAXIMUM WEIGHT OF CONTENTS FOR MILITARY SPECIFCATION CONTAINERS

TABLE S3 (cont.)

CODE	SPECIFICATION	DESCRIPTION	MAXIMUM WEIGHT OF CONTENTS	MILITARY LEVEL PACK
CE	PPP-B-601	BOXES WOOD CLEATED PLYWOOD DOMESTIC	1,000 LBS	LEVEL B
CF	PPP-B-601	BOXES WOOD CLEATED PLYWOOD OVERSEAS	1,000 LBS	LEVEL A
CG	PPP-B-621	BOXES WOOD NAILED LOCK-CORNER CLASS 2 OVERSEAS	1,000 LBS	LEVEL A
CH	PPP-B-621	BOXES WOOD NAILED LOCK-CORNER CLASS 1 DOMESTIC	600 LBS	LEVEL B
CJ	MIL-C-104	CRATES WOOD LUMBER AND PLYWOOD SHEATHED NAILED SCREWED	30,000	LEVEL A

TABLE S4
INTERIOR CONTAINERS (INTERIOR PACKING)

CODE	SPECIFICATION	DESCRIPTION
DA	PPP-B-566	BOX FOLDING PAPERBOARD VARIETY 1 PROCESS I
DB	PPP-B-566	BOX FOLDING PAPERBOARD VARIETY 1 PROCESS II
DC	PPP-B-566	BOX FOLDING PAPERBOARD VARIETY 2 PROCESS I
DD	PPP-B-566	BOX FOLDING PAPERBOARD VARIETY 2 PROCESS II
DE	PPP-B-676	BOXES SETUP
DF	MIL-B-117	BAGS, SLEEVES, TUBING
DG	ASTM-D5118	FIBERBOARD SHIPPING BOX CLASS DOMESTIC
DH	ASTM-D5118	FIBERBOARD SHIPPING BOX CLASS WEATHER RESISTANT

TABLE S5
OPTIONS

CODE	DESCRIPTION
XX	THE REQUIREMENTS ARE DEFINED IN THE METHOD OF PRESERVATION
YY	**THE PACKAGER WILL USE INTERIOR CONTAINERS FROM TABLE S 4 AND OTHER CONTAINERS AS DEFINED IN THE SPECIFICATION FROM TABLES S, S1, S2, S3, S4**
ZZ	SPECIAL REQUIREMENT . SPECIFIC INSTRUCTIONS ATTACHED TO THE ORDER

APPENDIX T

THIS APPENDIX IS RESERVED FOR FUTURE USE (DIGIT 26 and 27)

T1 This APPENDIX provides an option for selection of a new requirement.

T2 **The DEFAULT code for this field is 00**.

TABLE T

CODE	EXPLANATION
00	**NONE**

APPENDIX V

SPECIAL REQUIREMENTS

SPECIAL REQUIREMENT (28th DIGIT) not a mandatory field

V1 This APPENDIX provides option for the selection of Special Requirements. The code assigned indicates the nature of the special requirement, however additional instructions shall be attached by the acquisition officer to clarify the exact requirements.

V2 **The DEFAULT CODE assigned to this field is 0**

TABLE V

CODE	EXPLANATION
0	**NONE**
0	FRAGILE
1	SHELF LIFE
2	KEEP DRY
3	DO NOT DROP
4	REUSABLE CONTAINER
5	OPEN THIS SIDE
6	DO NOT BEND
7	DO NOT SLING
8	USE NO HOOKS
A	HARDNESS CRITICAL
B	OMISSION OF MARKING FOR PILFERABLE ITEM
C	OMISSION OF MARKING FOR CLASSIFIED ITEM
D	DO NOT THROW
E	OPEN FOR INSPECTION OR USE ONLY
F	SLING POINT
G	THIS SIDE UP
H	DO NOT PACK WITH ESD SENSITIVE DEVICES
J	MANUFACTURERS MARKING APPLICABLE
K	OTHER SPECIAL REQUIREMENT
L	NO SPECIAL MARKING REQUIRED
M	FMS MARKING REQUIREMENTS APPLY
N	SPECIAL PROJECT CODE REQUIREMENT
P	SPECIAL REQUIREMENT ATTACHED WITH STATEMENT OF WORK
Q	SPECIAL REQUIREMENT ATTACHED IN PROCEDURAL SPECIFICATION
R	PROJECT CODE ASSIGNED

APPENDIX W

CERTIFICATION AND RECERTIFICATION OF LUBRICANTS

W1 This APPENDIX defines the minimum sampling and testing requirements for lubricant products. The requirements of this APPENDIX are mandatory.

W2 No receiving inspection tests are necessary on packaged lubricants provided the containers are intact and markings adequately identify the lubricant(s).

W3 Lubricants containers will have a shelf life added to the container markings in accordance with the requirements of this specification.

W4 A visual check of all lubricants will be made annually. Closed containers will be checked for damage or leak out but will not be opened unless there is evidence of damage. The visual inspection will be conducted prior to use. The containers that have been opened will be checked for: proper color , all forms of visual contamination, evidence of water and evidence of separation. Experience will dictate what can be considered nonconforming products. Any lubricants that show evidence of deterioration because of age or contamination will be sent out for laboratory testing.

W5 A laboratory inspection will be conducted on all lubricants that have gone beyond the established shelf life established by this specification. A partial analysis will be performed by checking the principal characteristics most likely to affect deterioration of the lubrication. The tests listed below are considered the minimum requirements. The contractor is not restricted from conducting additional tests as they feel are required.

W6 Listed below are the characteristics that shall be checked in the laboratory analysis.

W7 The laboratory will provide a re-certification document to the contractors as evidence of the quality of the lubricants.

W8 The contractor will maintain a log of the results of the annual visual inspection of lubricants on hand.

W9 This data has been extracted from MIL-HDBK-200. Other lubricants will be added to this list as required.

W10 See the appropriate Specification for the lubrication to be tested to establish a test method as required.

TYPE OF TEST REQUIRED AND REQUIRED CHARACTERISTICS FOR RECERTIFICATION

TABLE W

VISUAL INSPECTION

GREASE	**OIL**
APPEARANCE	APPEARANCE
COLOR/ ODOR	COLOR
CONTAMINATION	CONTAMINATION
SEPARATION	SEPARATION
WATER	SEDIMENT
DAMAGED CONTAINER	DAMAGED CONTAINER

RECERTIFICATION OF LUBRICANTS

TABLE W1

LABORATORY TEST

GREASE	**MIL-G-81322**	**MIL-G-23827**	**MIL-G-81937**	**DOD-G-24508**
APPEARANCE	X	X	X	X
ODOR	X	X	X	X
PENETRATION				
WORKED	X	X	X	X
UNWORKED		X	X	
STABILITY	X	X	X	X
MELTING POINT	X	X	X	X
OIL SEPARATION	X	X	X	X
EVAPORATION LOSS	X	X	X	X
COPPER CORROSION	X	X	X	X
RUST PREVENT PROP	X	X	X	X
LOAD CAPACITY (1)	X	X		X
WATER RESISTANCE	X	X	X	X
DIRT (PARTICULATE)	X	X	X	X
OXIDATION STABILTY (100 HOUR)			X	

APPENDIX W (continued)

TABLE W1

	MIL-G-10924	**MIL-G-27617**
APPEARANCE	X	X
ODOR	X	
PENETRATION		
WORKED	X	X
UNWORKED		X
STABILITY WORKED	X	
MELTING POINT	X	
OIL SEPARATION	X	X
EVAPORATION LOSS	X	X
COPPER CORROSION	X	X
RUST PREVENT PROPERTY	X	
LOAD CAPACITY (1)	X	
WATER RESISTANCE		X
DIRT (PARTICULATE)		
FUEL RESISTANCE		X
OXIDATION STABLTY		X

(1) WHEN CAPABILITY EXISTS

APPENDIX W (cont.)

CERTIFICATION AND RECERTIFICATION OF LUBRICANTS

TABLE W2

LABORATORY TEST

OIL	**VV-L-800**	**MIL-L-6085**	**MIL-L-81846**	**MIL-PRF-8188**
APPEARANCE	X	X	X	X
COLOR	X	X	X	
VISC AT 210°F			X	X
VISC AT 130°F		X		
VISC AT 100°F	X		X	
VISC AT -40°F	X			
VISC AT -65°F	X	X	X	
SPECIFIC GRAVITY				
FLASH POINT	X	X	X	X
POUR POINT	X	X	X	
ACID NUMBER		X		
COPPER CORROSION	X			
LEAD CORROSION				X
OXIDATION STABILITY		X	X	
EVAPORATION LOSS	X		X	
PRECIPITATION #	X	X		
PERCENT ASH				
HYDROLYTIC STABILITY				
EMULSION				
FOAM TEST				
WATER CONTENT				
PARTICULATE			X	
TRACE METALS				
CARBON RESIDUE				
SULFUR				
SAPONIFICATION #				
LOAD CAPACITY				
PROTECTION				X
PH				

(1) IF CAPABILITY EXISTS

APPENDIX W (cont)

CERTIFICATION AND RECERTIFICATION OF LUBRICANTS

LABORATORY TEST

OIL	**MIL-C-11796**	**MIL-L-53131**
APPEARANCE	X	X
COLOR		
VISC AT 210°F		
VISC AT 130°F		
VISC AT 100°F		
VISC AT -40°F		
VISC AT -65°F		
SPECIFIC GRAVITY		
FLASH POINT		
POUR POINT		
ACID NUMBER		
COPPER CORROSION		
LEAD CORROSION		
OXIDATION STABILITY		
EVAPORATION LOSS		
PRECIPITATION #		
PERCENT ASH		
HYDROLYTIC STABILITY		
EMULSION		
FOAM TEST		
WATER CONTENT		
PARTICULATE		
TRACE METALS		
CARBON RESIDUE		
SULFUR		
SAPONIFICATION #		
LOAD CAPACITY		
PROTECTION		
PH		
WORKED PENETRATION	X	
MELTING POINT	X	
CORROSION	X	
STABILITY	X	

(1) IF CAPABILITY EXISTS

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	**1. DOCUMENT NUMBER** MIL-DTL-197J	**2. DOCUMENT DATE (YYYYMMDD)** 20000709

3. DOCUMENT TITLE **PACKAGING OF BEARINGS, ANTIFRICTION ASSOCIATED PARTS AND SUBASSEMBLIES**

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

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON *(if applicable)*	**7.DATE SUBMITTED** (YYYYMMDD)

8. PREPARING ACTIVITY

a. NAME DEFENSE SUPPLY CENTER RICHMOND	b. TELEPHONE *Include Area Code)* (1) Commercial (804) 279-5019 (2) AUTOVON 695-5019
c. ADDRESS *(Include Zip Code)* DSCR-VBD (GS) 8000 JEFFERSON DAVIS HIGHWAY RICHMOND, VA 23297-5610	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman road, Suite 2533, Ft. Belvoir, VA 22060-2533 Telephone (703) 767-6888 AUTOVON 427-6888