

MIL-STD-1599  
 NOTICE 4  
 4 JAN 93

MILITARY STANDARD

BEARINGS, CONTROL SYSTEM COMPONENTS, AND ASSOCIATED  
 HARDWARE USED IN THE DESIGN AND CONSTRUCTION OF  
 AEROSPACE MECHANICAL, SYSTEMS AND SUBSYSTEMS

TO ALL HOLDERS OF MIL-STD-1599

1. Add the following pages to MIL-STD-1599

NEW PAGES	DATE
203.1 thru 203.4	4 Jan 93
309.1 thru 309.4	4 Jan 93
310.1 thru 310.4	4 Jan 93
402.1 thru 402.3	4 Jan 93
501.1 thru 501.5	4 Jan 93

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-1599 will verify that page additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the military standard is completely revised or canceled.

Custodians:

Army - AV  
 Navy - As  
 Air Force - 99

Preparing Activity:

Air Force - 84

Project 31GP-0023

Review Activities:

Air Force - 99  
 DLA - IS

AMSC N/A

FSC 31GP

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MIL-STD-1599  
 Requirement 203  
 4 Jan 93

## COMPONENT LUBRICATION

### 1. SCOPE

1.1 Scope. This requirement establishes standard design practices for the lubrication of the bearings and bearing surfaces used in flight control systems and all other mechanical subsystems installed in airframes except engines and their accessory drive gear boxes and helicopter transmission drive systems.

### 2. APPLICABLE DOCUMENTS

#### 2.1 Government documents

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those listed in the issue of the Department of Defense Index of Specifications and standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2)

#### SPECIFICATION

##### MILITARY

MIL-G-21164	Grease; Molybdenum Disulfide (for low and high temperatures)
MIL-G-23827	Grease; Aircraft and Instrument Gear and Actuator Screw
MIL-G-81322	Grease; Aircraft, General Purpose, Wide Temperature Range

#### STANDARDS

##### MILITARY

MIL-STD-838	Lubrication of Military Equipment
MS 15720	Fittings, Lubrication (Hydraulic) Throat or Surface Check, 1/4 - 28 Taper Threads, Corrosion-Resistant Steel, Type VII

MIL-STD-1599, Req. 203 cont'd

HANDBOOK

MILITARY

MIL-HDBY-275            Guide for Selection of Lubricant Fluids and  
Compounds for Use in Flight Vehicles and Components

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

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

DODISS                    - Department of Defense Index of Specifications  
and Standards.

(Copies of the DODISS are available on a yearly subscription basis either from the Government Printing Office hard copy, or microfiche copies are available from the director, Navy publications and Printing Service Office, 700 Robbins Avenue, Philadelphia, PA 19111-5093.)

2.2 Non-Government publications. This paragraph is not applicable to this requirement .

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets, or MS standards), 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. DEFINITIONS

3.1 Lubricant. The term lubricant as stated herein is defined as any solid, fluid or semi-fluid material that performs a lubricating or related specialty function.

3.1.1 Standard lubricant. A standard lubricant as stated herein is defined as any solid, as a lubricant qualified or procured in accordance with Federal or Military specifications or official purchase descriptions as listed in MIL-HDBK-275; C-6800-IL, Chemical and Chemical Products, Identification List; and C-9100-IL, Fuels, Lubricants, Oil and Waxes, Identification List.

3.1.2 Non-standard lubricant. A non-standard lubricant as stated herein is defined as a lubricant procured on a brand or trade name basis, without reference to a federal or military specification, or to a purchase description.

MIL-STD-1599 Req. 203 cont'd

#### 4. GENERAL REQUIREMENTS

4.1 Lubrication applications. All bearings and bearing surfaces which require lubrication during the design life of its installation, will have provisions made so that lubrication can be performed with the minimum of aircraft disassembly and the minimum of support equipment consistent with mission requirements and the resulting limitations of space and weight.

#### 5. DETAIL REQUIREMENTS

5.1 Lubricant selection. Whenever possible, standard lubricants shall be used in accordance with MIL-STD-838 and MIL-HDBK-275. In those instances where non-standard lubricants are required, their usage shall be in accordance with MIL-STD-838.

##### 5.1.1 Lubricant recommendation.

5.1.1.1 Rolling element anti-friction bearings. Rolling element anti-friction bearings shall be lubricated with either the preferred MIL-G-81322 or MIL-G-23827 grease depending upon the environmental operating temperature of the installation.

5.1.1.2 Gear boxes. Gear boxes shall be lubricated in accordance with the requirements of the performance acquisition document.

5.1.1.3 Sliding element bearing. Sliding element bearings shall be permanently lubricated or shall be capable of being relubricated with a grease. For grease lubrication, either MIL-G-21164, MIL-G-23827, or MIL-G-81322 is recommended. Permanently lubricated bearings shall be lubricated with a solid lubricant containing polytetrafluoroethylene (PTFE) in some form of liner system.

5.2 Periodic lubrication. For those installations requiring periodic lubrication, the requirements of MIL-STD-838 shall apply.

#### 6. NOTES

6.1 Intended use. This requirement is intended to establish standard design practices for the lubrication of the bearings and bearing surfaces used in flight control systems and all other mechanical subsystems installed in airframes except engines and their accessory drive gear boxes and helicopter transmission drive systems.

MIL-STD-1599 Req. 203 Cont'd

6.1.1 Provisions for lubrication.

6.1.1.1 Unsealed rolling element bearings. Unsealed rolling element bearings shall be protected by an enclosure and periodically serviced with a proper lubricant unless they receive adequate lubrication from the lubricant of the unit in which they are installed.

6.1.1.2 Sealed rolling element bearings. Rolling element bearings which are permanently sealed are considered to be lubricated for the life of the bearing, unless a means of relubrication is provided. Rolling element bearings with replaceable seals shall be considered to be permanently lubricated for the life of the installation, unless service experience demonstrates the need for periodic lubrication.

6.1.1.3 Lubrication fittings. Insofar as possible, provisions for lubrication and access to lubrication fittings shall not require the removal of adjacent fittings, structure, or the use of specialized equipment.

6.1.1.4 Recommended lubrication fittings. The recommended lubrication fittings to be used for grease lubrication are described in requirement 501.

6.2 Issue of DODISS. When this requirement is used in acquisition, the issue of the DODISS to be applicable to this solicitation must be cited in this solicitation (see 2.1.1 and 2.2).

## BUSHINGS

## 1. SCOPE

1.1 Scope. This requirement establishes engineering criteria and requirements for the selection and application of bushings for aerospace systems. These design requirements are peculiar to these bushings and are to be used as a supplement to requirements specified in Requirement 201. This requirement also identifies the presently approved bushings for aerospace applications.

1.2 Classification. Bushings covered by this requirement are of the following classes:

- Class A - Plain, ream type
- Class B - Flanged, ream type
- Class C - Plain, non-ream type
- Class D - Flanged, non-ream type

## 2. APPLICABLE DOCUMENTS

2.1 Government documents

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those listed in the issue of the Department of Defense Index of Specifications and standards (DODISS) and supplement thereto, cited in the solicitation (see 3.2)

STANDARDSMILITARY

- MS 14237 Bushing, Sleeve, Plain, Press Fit, Ream Type
- MS 14238 Bushing, Sleeve, Flanged, Press Fit, Ream Type

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications Form a part of this

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document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DODISS - Department of Defense Index of Specifications and Standards.

(Copies of the DODISS are available on a yearly subscription basis either from the Government Printing office hard copy, or microfiche copies are available from the director, Navy publications and Printing Service Office, 700 Robbins Avenue, Philadelphia, PA 19111-5093.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B46.1 Surface Texture (surface Roughness, Waviness and lay.)

(copies of the above publication may be obtained from the American National Standards Institute, ATTN: Sales Dept., 1430 Broadway, New York, NY 10018-3363.)

#### STANDARDS

##### INDUSTRY

NAS 75	Bushing-Plain, Press Fit, Steel
NAS 76	Bushing-Plain, Press Fit, Copper & Bronze
NAS 77	Bushing-Flanged, Press Fit, Steel, Bronze & Copper

(Copies of the above publication may be obtained from the American National Standards Institute, ATTN: Sales Dept., 1430 Broadway, New York, NY 10018-3363.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets, or MS standards), 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, DEFINITIONS

3.1 Bushings (general). Bushings have a simple cylindrical construction that may or may not be flanged. They may be used without lubrication provisions in

MIL-STD-1599 Req. 309 cont'd

static joints or low speed dynamic joints to protect structure and provide an economical, easily replaced element. Similar to plain spherical bearings, bushings allow a load to be transmitted from one structural member into another and permit rotational movement along the axis of the bushing between the two parts. They also provide bolt clamp-up shoulders, reduce wear, and make friction and wear more predictable. Bushings, however, do not have misalignment capability.

3.1.1 Ream type bushings. MS 14237 and MS 14238 bushings have a reduced inside diameter that requires reaming after assembly. This is necessary because of reduction and possible distortion of the inside diameter when the bushing is installed with an interference fit to the housing or to accommodate line reaming of multiple bushings. Depending on the application, reaming may be accomplished after installation to obtain close tolerance of bushing I.D.

3.1.2 Non-ream type bushings. NAS 75, NAS 76, and NAS 77 are intended for installation with a lighter press fit (push fit). They have an inside diameter that is satisfactory for use with standard close tolerance bolts where ream tolerances are desired but without subsequent machining. Non-ferrous NAS 76 and NAS 77 bushings may be reamed if required, however, to accommodate line reaming of multiple bushings.

#### 4. GENERAL REQUIREMENTS

4.1 Approved parts. Bushings specified in section 2 shall be used in design and shall be procured from qualified manufacturers as required by procurement specifications. Bushings other than those listed above must be approved by the acquisition activity for each application.

4.2 Materials and finish. The materials and finish of the bushings shall be in accordance with the applicable military standard or drawing.

4.3 Design. Pushing design conforms to that specified on the applicable military standard or drawing.

4.4 Dimensions and tolerances. Dimensions and tolerances are as specified on the applicable military standard or drawing and shall apply to the after plating condition. Other dimensions not shown shall be at the option of the manufacturer.

4.5 Surface texture. Surface texture shall be in accordance with the applicable military standard or drawing and shall be measured according to ANSI B46.1 requirements.

4.6 Lubrication. The bushings covered by this requirement are intended to be used without lubrication provisions. Other special metallic bushings, however, may be solid film lubricated or grease lubricated (when lube grooves and holes are provided in the design).

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5. DETAIL REQUIREMENTS

5.1 Installation and retention. Bushings are designed to be installed and retained using a press/interference fit. Adhesive can be used to aid in the retention, but care shall be taken to avoid installations which rely on adhesive as the sole means of retaining the bearing in an oversized hole. Adhesive brittle failure may occur in such cases. Housing fits and resulting clearance shall be in accordance with the installation drawing.

6. NOTES

6.1 Intended use. This requirement is intended to establish engineering criteria and requirements for the selection and application of bushings for aerospace systems. These design requirements are peculiar to these bushings and are to be used as a supplement to requirements specified in Requirement 201. This requirement also identifies the presently approved bushings for aerospace applications .

6.2 Issue of DODISS. When this requirement is used in acquisition, the issue of the DODISS to be applicable to this solicitation must be cited in this solicitation (see 2.1.1 and 2.2) .

MIL-STD-1599  
 Requirement 310  
 4 Jan 93

## BEARINGS, SLEEVE, METALLIC, SELF-LUBRICATING

### 1. SCOPE

1.1 Scope. This requirement establishes engineering criteria and requirements for the selection of self-lubricating metallic sleeve bearings for aerospace systems. These design requirements are peculiar to these types of bearings and are to be used as a supplement to design requirements specified in Requirement 201. This requirement also identifies the presently approved lined sleeve bearings for aerospace applications.

### 2. APPLICABLE DOCUMENTS

#### 2.1 Government documents

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those listed in the issue of the Department of Defense Index of Specifications and standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2)

### SPECIFICATIONS

#### MILITARY

MIL-B-81934	Bearings, Sleeve, Plain and Flanged, Self-Lubricating
MIL-B-81934/1	Bearing, Sleeve, Plain, Self-Lubricating, -65° to +325°F
MIL-B-81934/2	Bearing, Sleeve, Flanged, Self-Lubricating, -65° to +325°F

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

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

MIL-STD-1599 Req. 310 cont'd

DODISS - Department of Defense Index of Specifications and Standards.

(Copies of the DODISS are available on a yearly subscription basis either from the Government Printing Office hard copy, or microfiche copies are available from the director, Navy publications and Printing Service Office, 700 Robbins Avenue, Philadelphia, PA 19111-5093.

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B46.1 Surface Texture (surface Roughness, Waviness and lay.)

(Copies of the above publication may be obtained from the American National Standards Institute, ATTN: Sales Dept., 1430 Broadway, New York, NY 10018-3363.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets, or MS standards), 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, DEFINITIONS

3.1 Sleeve bearings (general). Sleeve bearings have a simple cylindrical construction that may or may not be flanged. The self-lubricating lining is bonded to the inside diameter of the bearing and the external surface of the flange (when used). Similar to plain spherical bearings, sleeve bearings allow a load to be transmitted from one structural member into another and permit rotational movement along the axis of the bearing between the two parts. These bearings, however, do not have misalignment capability.

### 4. GENERAL REQUIREMENTS

4.1 Approved parts. MIL-B-81934/1 and MIL-B-81934/2 bearings shall be used in design and procured from qualified manufacturers as listed on the applicable qualified products list for MIL-B-81934. These bearings are approved for use in new design, modification, or repair of aerospace vehicles or ground support equipment. Sleeve bearings other than those listed above must be approved by the acquisition activity for each application.

4.2 Materials and finish. The materials and finish of the bearings shall be in accordance with the applicable military standard or drawing.

MIL-STD-1599 Req. 310 cont'd

4.3 Design. Bearing design conforms to that specified on the applicable military standard or drawing. Special design applications shall not exceed a length to bore ratio of 5:1.

4.4 Dimensions and tolerances. Dimensions and tolerances are as specified on the applicable military standard or drawing. Dimensions not shown shall be at the option of the manufacturer.

4.5 Surface texture. Surface texture shall be in accordance with the applicable military standard or drawing and shall be measured according to ANSI B46.1 requirements.

4.6 Lubrication. Lined sleeve bearings are not permitted to be initial grease or oil lubricated by the manufacturer since the liner is self-lubricating. They should also be kept free of any relubrication. The liners are sacrificial and the normal wear ratio can be accelerated by liquid contaminants such as oils and greases.

4.7 Temperature range. These sleeve bearings shall not be used in applications which exceed the temperature limits of  $-65^{\circ}\text{F}$  and  $+325^{\circ}\text{F}$  as listed in the military standard or drawing.

## 5. DETAIL REQUIREMENTS

### 5.1 Performance

5.1.1 Static radial limit load. The static radial limit load is the maximum radial load applied to the bearing and housing which may result in a maximum permanent set as defined in the applicable military standard or drawing. For static limit load capacity calculations, see the calculations for lined sleeve bearings in Requirement 201.

5.1.2 Dynamic (oscillating) radial load rating. The dynamic radial load is the load which is applied to the bearing while there is oscillatory motion occurring between the bearing and mating pin. The oscillation angle, number of cycles and corresponding maximum wear allowed is defined in the applicable military specification. For dynamic load capacity calculations, see the lined sleeve bearing calculations in Requirement 201.

## 6. NOTES

6.1 Intended use. This requirement is intended to establish engineering criteria and requirements for the selection of self-lubricating metallic sleeve bearings for aerospace systems. These design requirements are peculiar to these types of bearings and are to be used as a supplement to design requirements specified in Requirement 201. This requirement also identifies the presently approved lined sleeve bearings for aerospace applications.

MIL-STD-1599 Req. 310 cont'd

6.1.1 Installation and retention. Sleeve bearings are designed to be installed and retained using a press/interference fit. Recommended housing and shaft fits for installation of the bearings shall be as specified in Requirement 202. Adhesive can be used to aid in the retention, but care shall be taken to avoid installations which rely on adhesive as the sole means of retaining the bearing in an oversized hole. Adhesive brittle failure may occur in such cases.

6.2 Issue of DODISS. When this requirement is used in acquisition, the issue of the DODISS to be applicable to this solicitation must be cited in this solicitation (see 2.1.1 and 2.2).

MIL-STD-1599  
Requirement 402  
4 Jan 93

## NUTS AND LOCKING DEVICES

### 1. SCOPE

1.1 Scope. This requirement establishes the nuts and locking devices for use in assembly of rod end bearings, control rods, and associated hardware.

### 2. APPLICABLE DOCUMENTS

#### 2.1 Government documents

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those listed in the issue of the Department of Defense Index of Specifications and standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2)

#### SPECIFICATIONS

##### MILITARY

MIL-B-81935/3 Locking Device, Rod End

#### STANDARDS

##### MILITARY

MS 14198 Lock, Rod End, Extra Strength, High Profile Lug

MS 14227 Lock, Rod End, Improved Strength, NAS Lug

MS 20995 Wire-Safety or Lock

MS 24665 Pin-Cotter (split)

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

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

DODISS - Department of Defense Index of Specifications and Standards.

MIL-STD-1599 Req. 402 cont'd

(Copies of the DODISS are available on a yearly subscription basis either from the Government Printing Office hard copy, or microfiche copies are available from the director, Navy publications and Printing Service Office, 700 Robbins Avenue, Philadelphia, PA 19111-5093.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein, Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2)

### STANDARDS

#### INDUSTRY

NAS 513	Washer - Rod End Locking
NAS 559	Lock - Rod End (Key Type)
NAS 1193	Locking Device, Positive Index

(Copies of the above publication may be obtained from the American National Standards Institute, ATTN: Sales Dept.; 1430 Broadway, New York, NY 10018-3363.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets, or MS standards) , 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. DEFINITIONS - This section is not applicable to this requirement.

#### 4. GENERAL REQUIREMENTS

4.1 Locking devices approved for new and existing design. The following locking devices are approved for use in new and existing design subject to the limitations discussed in 6.1.1.1 and 6.1.1.2. MS14227 is the preferred locking device for existing design.

MIL-B-81935/3	Locking Device, Rod End
MS 14198	Lock, Rod End, Extra Strength, High Profile Lug
MS 14227	Lock, Red End, Improved Strength, NAS Lug
NAS 559	Lock - Rod End (Key Type)
NAS 1193	Locking Device, Positive Index

MIL-STD-1599 Req. 402 cont'd

4.1.1 Locking devices. For new design, MS 14198 or NAS 1193 locks shall be used. MS 14198 locks are specified because of extra strength properties, and because the high profile lug creates an obvious mismatch if improperly installed making inspection for proper engagement easier. If close adjustment of threaded components is needed, NAS 1193 shall be used in lieu of MS 14198.

4.2 Unapproved locking devices. (see 6.1.1.2)

NAS 513 Washer - Rod End

4.3 Safety wire and cotter keys.

MS 20995 Wire - Safety or Lock

MS 24665 Pin - Cotter (split)

5. DETAIL REQUIREMENTS - This section is not applicable to this requirement.

6. NOTES

6.1 Intended use. This requirement is intended to establish the nuts and locking devices for use in assembly of rod end bearings, control rods, and associated hardware.

6.1.1 Locks.

6.1.1.1 Suitable locks. MS 14227 was developed to provide a stronger rod end lock for use in existing design and which would be compatible with NAS 513 and NAS 559 lug slot dimensions in threaded sizes up to 1.125 inch diameter. For larger diameters, the MS 14198 locks are compatible with NAS 513 and NAS 559 lug slot dimensions and offer a retrofittable lock having greater strength.

6.1.1.2 Unsuitable locks. Use of NAS 559 Type A locks in sizes smaller than the -4 (9/16" thread size) should be discontinued because of poor strength. Mechanically formed locks, such as NAS 559 Type B, and stamped-out (not machined) NAS 513 locks should also be discontinued from service because of poor strength and susceptibility to installation damage which may go undetected.

6.2 Issue of DODISS. When this requirement is used in acquisition, the issue of the DODISS to be applicable to this solicitation must be cited in this solicitation (see 2.1.1 and 2.2).



MIL-STD-1599  
Requirement 501  
4 Jan 93

## LUBRICATION FITTINGS

### 1. SCOPE

1.1 Scope. This requirement establishes standard design practices for the use of fittings required to provide grease lubrication of bearings and bearing surfaces as described in Requirement 203.

### 2. APPLICABLE DOCUMENTS

#### 2.1 Government documents

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those listed in the issue of the Department of Defense Index of Specifications and standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2)

#### STANDARDS

##### MILITARY

MS 15001	Fittings, Lubrication (Hydraulic) Surface Check, 1/4-28 Taper Threads, Steel Type I
MS 15002	Fittings, Lubrication (Hydraulic) Surface Check, Straight Threads, Steel Type II
MS 15004	Fittings, Lubrication (Hydraulic) Surface Check, 1/4-28 Taper Threads, Nickel Copper Alloy Type IV
MS 15720	Fittings, Lubrication (Hydraulic) Throat or Surface Check, 1/4-28 Taper Threads, Corrosion-Restraint Steel, Type VII

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

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

DODISS

Department of Defense Index of Specifications and Standards.

MIL-STD-1599 Req. 501 cont'd

(Copies of the DODISS are available on a yearly subscription basis either from the Government Printing Office hard copy, or microfiche copies are available from the director, Navy publications and Printing Service Office, 700 Robbins Avenue, Philadelphia, PA 19111-5093.

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2)

## STANDARDS

### INDUSTRY

NAS 516 Fittings, Lubrication 1/8" Drive, Flush Type

(Copies of the above Publication may be obtained from the American National Standards Institute, ATTN: Sales Dept., 1430 Broadway, New York, NY 10018-3363.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets, or MS standards), 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. DEFINITIONS - This section is not applicable to this requirement.

4. GENERAL REQUIREMENTS

4.1 Lubrication fitting usage. Lubrication fittings shall be in accordance with MS 15001 (figure 1), MS 15002 (figure 2), MS 15004 (figure 3), MS 15720 (figure 4), or NAS 516 (figure 5), and shall be used in accordance with Requirement 203. Of the two material options available for the NAS 516 fitting, only the NAS 516M1 (Monel) is acceptable for use in Titanium. Straight fittings are the preferred installation as it is extremely difficult to install angled fittings with a particular design orientation. A straight thread fitting, as in MS 15002-1 (figure 2A) shall be used instead of a taper thread fitting, as in MS 15001-1 (figure 1A), in installations where the additional stresses produced by the wedging action of the taper threads affect the performance of the part in which the fitting is installed.

5. DETAIL REQUIREMENTS - This section is not applicable to this requirement.

6. NOTES

6.1 Intended use. This requirement is intended to establish standard design practices for the use of fittings required to provide grease lubrication of

MIL-STD-1599 Req. 501 cont'd

bearings and bearing surfaces as described in Requirement 203.

6.2 Issue of DODISS. When this requirement is used in acquisition, the issue of the DODISS to be applicable to this solicitation must be cited in this solicitation (see 2.1.1 and 2.2).

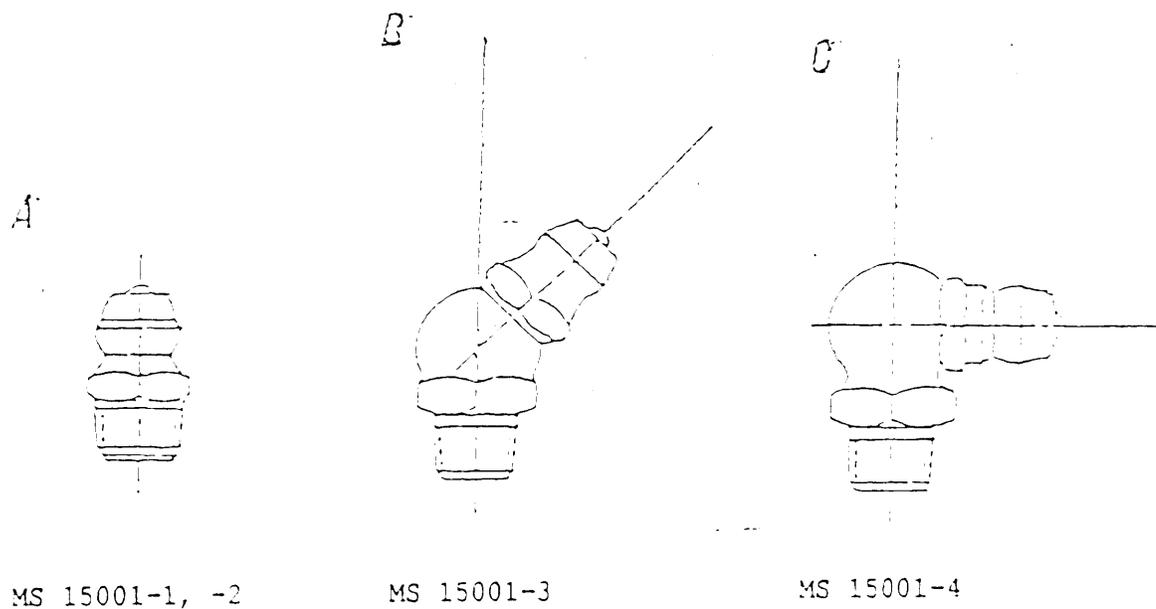


Figure 1. Lubrication Fittings (MS 15001)

MIL-STD-1599 Req. 501 cont'd

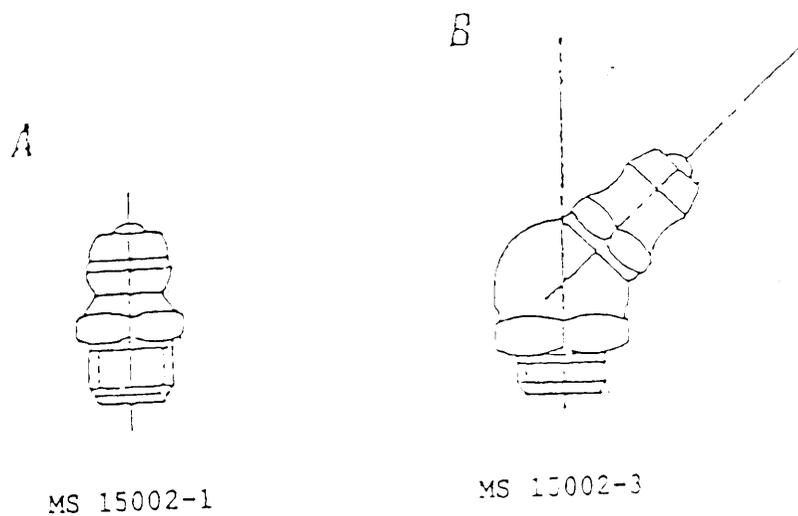


Figure 2. Lubrication Fittings (MS 15002)

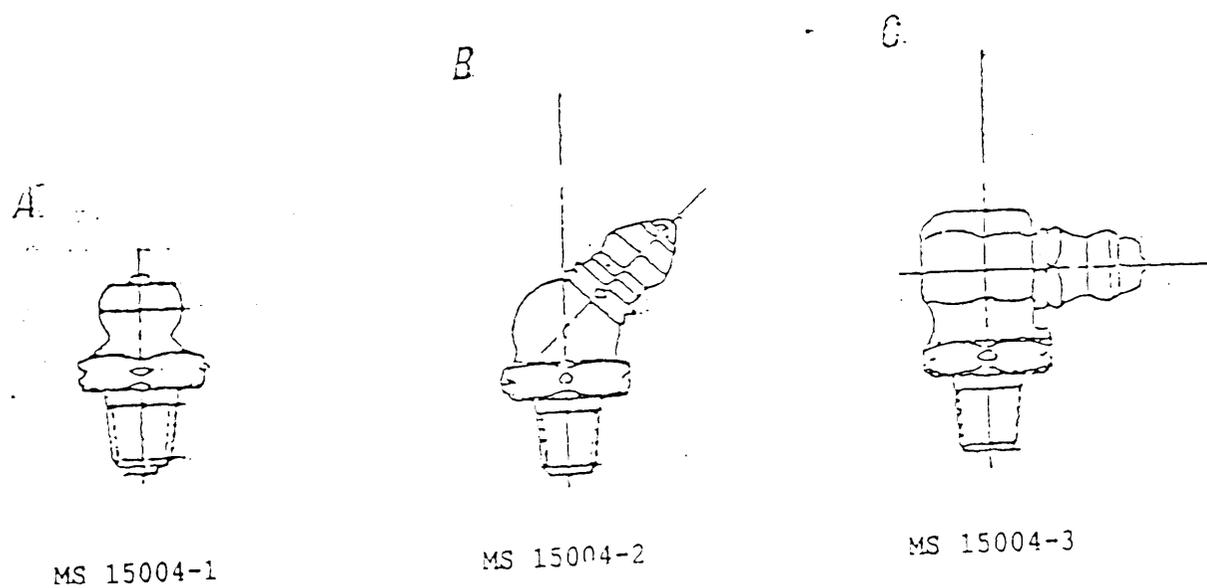


Figure 3. Lubrication Fittings (MS 15004)

MIL-STD-1599 Req. 501 cont'd

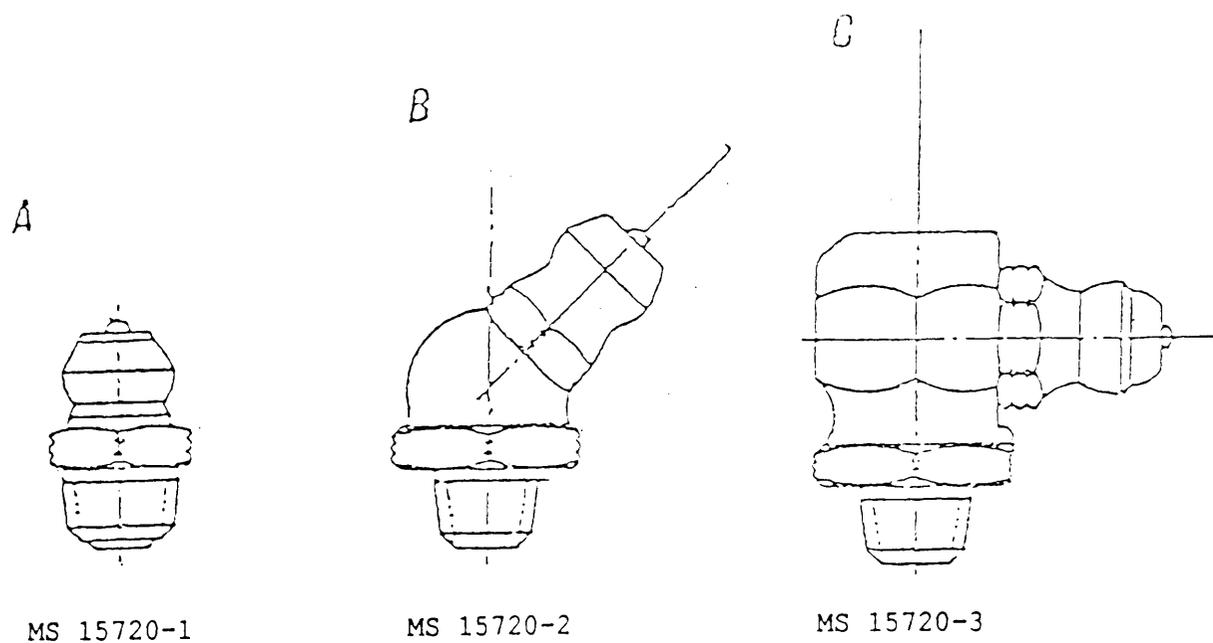


Figure 4. Lubrication Fittings (MS 15720)

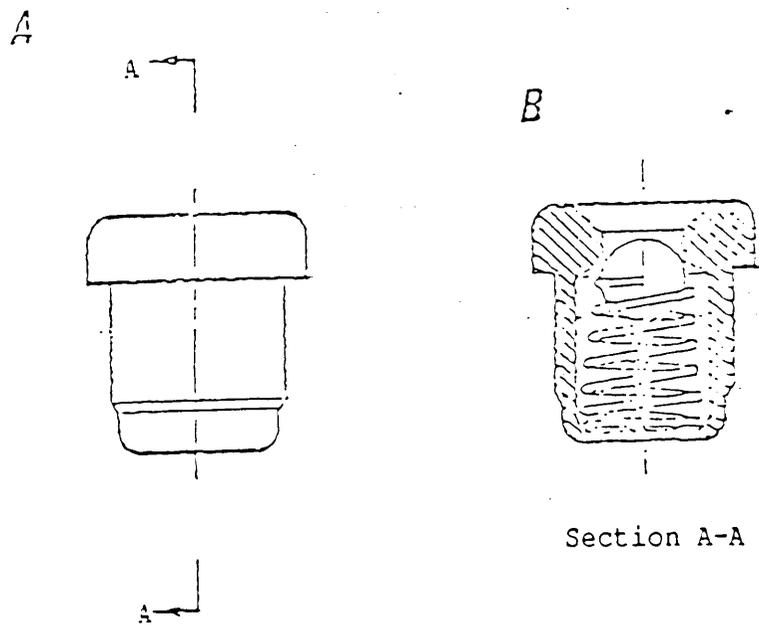


Figure 5. Lubrication Fittings (NAS 516)

