

# **LUBRICATION, THREAD, TUBE FITTING, SPECIFICATION FOR**

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*Reference EDR Log #: 8700, NASA KSC Export Control Office, (321) 867-9209*

**June 30, 2020**

**Engineering Directorate**

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National Aeronautics and  
Space Administration

**John F. Kennedy Space Center**

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**LUBRICATION, THREAD, TUBE FITTING,  
SPECIFICATION FOR**

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**June 30, 2020**

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**RECORD OF REVISIONS/CHANGES**

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This specification revision has been approved by the Engineering Directorate of the John F. Kennedy Space Center (KSC) and is mandatory for use at KSC.

## 1. SCOPE

### 1.1 Purpose

This specification defines the requirements for lubrication of 37-degree flared tube fittings as specified in KSC-GP-425 and applicable SAE Aerospace Standards to prevent galling and to provide consistent preload and seal compression.

### 1.2 Applicability

- a) This specification may be used for the following fluids:
  - i. all hydrocarbons (e.g., Rocket Propellant-1, hydraulic fluid).
  - ii. all gaseous and liquid inert fluids (e.g., argon, helium, nitrogen).
  - iii. gaseous and liquid air, carbon dioxide, hydrogen, and oxygen.
  - iv. hypergolic fuels and oxidizers (e.g., hydrazine, monomethylhydrazine, unsymmetrical dimethylhydrazine, nitrogen tetroxide).
  - v. refrigerants (e.g., ammonia, R-124, R-134a)
  - vi. water.
- b) These requirements apply to new equipment that has not been verified to meet requirements of a previous revision of this standard. Equipment designed or fabricated prior to the effective date of this standard may be verified as acceptable for use against the requirements of a previous revision of this standard. Any design changes to such equipment shall meet the requirements of this revision of this standard.

## 2. APPLICABLE DOCUMENTS

The following documents of the issue in effect on date of invitation for bids or requests for proposal form a part of the specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

*Copies of the documents are available from the NASA Technical Standards website (<http://standards.nasa.gov>), any NASA installation library or documentation repository, or from the procuring activity.*

KSC-GP-425	Fluid Fitting Engineering Standards
KSC-SPEC-Z-0008	Fabrication and Installation of Flared Tube Assemblies and Installation of Fittings and Fitting Assemblies, Specification for
MIL-PRF-27617	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant

NASA-STD-6001 Flammability, Offgassing, and Compatibility Requirements and Test Procedures

### **3. REQUIREMENTS**

#### **3.1 Lubrication of Hydraulic Systems**

Fittings in hydraulic systems shall be lubricated either in accordance with 3.3, or with the system fluid, provided the fluid meets the particulate contamination requirements of the system.

*Dipping the fitting in the hydraulic fluid is an acceptable method of lubrication.*

#### **3.2 Lubrication of Refrigerant Systems**

Fittings in refrigerant systems shall be lubricated with Brayco 815 Z or Braycote 601 EF oil, the lubricant used in the refrigerant system, or a lubricant specified by the refrigerant manufacturer.

*Due to binder compatibility, care must be taken when choosing lubrication compounds for refrigerant systems.*

#### **3.3 Lubrication of Other Systems**

##### **3.3.1 Lubricant Compounds**

Lubricant compounds for systems other than hydraulic and refrigeration systems shall be in accordance with MIL-PRF-27617, Type II, III, or IV, and meet the requirements for liquid oxygen service in accordance with NASA-STD-6001.

*Examples of approved lubrication compounds include Krytox 240AC, Tribolube 16, and Christolube MCG 111.*

##### **3.3.2 Lubricant Dispenser**

The lubricant compound shall be dispensed from a nozzle-equipped tube or syringe with a maximum tip opening of 1/16 inch.

##### **3.3.3 Application of Lubricant**

- a) The lubricant compound shall be applied only to external threads in longitudinal streaks.
- b) For nominal tube sizes 1/2 inch and smaller, two streaks shall be applied, approximately 180 degrees apart.
- c) For nominal tube sizes greater than 1/2 inch, one streak per 1/4 inch of nominal fitting size shall be applied, approximately equally spaced.

- d) Assemblies that become contaminated during application of lubricant (i.e., lubricant enters the flow passage) shall be re-cleaned.

*Lubricant must be applied sparingly to prevent contamination.*

#### **3.3.3.1 Tubing Coupling Nuts and Boss Fitting Ends**

The first thread of the fitting end shall be engaged into the mating female thread and the lubricant compound applied to the remaining exposed threads. Refer to Figure 1(a), (b), and (d).

#### **3.3.3.2 Locknuts and Washers on Adjustable Boss Fitting Ends**

The captive nut shall be turned until the washer bottoms against the outer external threads. The lubricant compound shall be applied to the exposed inner set of external threads. The nut shall be turned over the lubricated threads until the washer can be bottomed against the inner external threads. The outer set of external threads shall not be lubricated. Refer to Figure 1(c).

#### **3.3.3.3 Flared Tube Bulkhead Fittings**

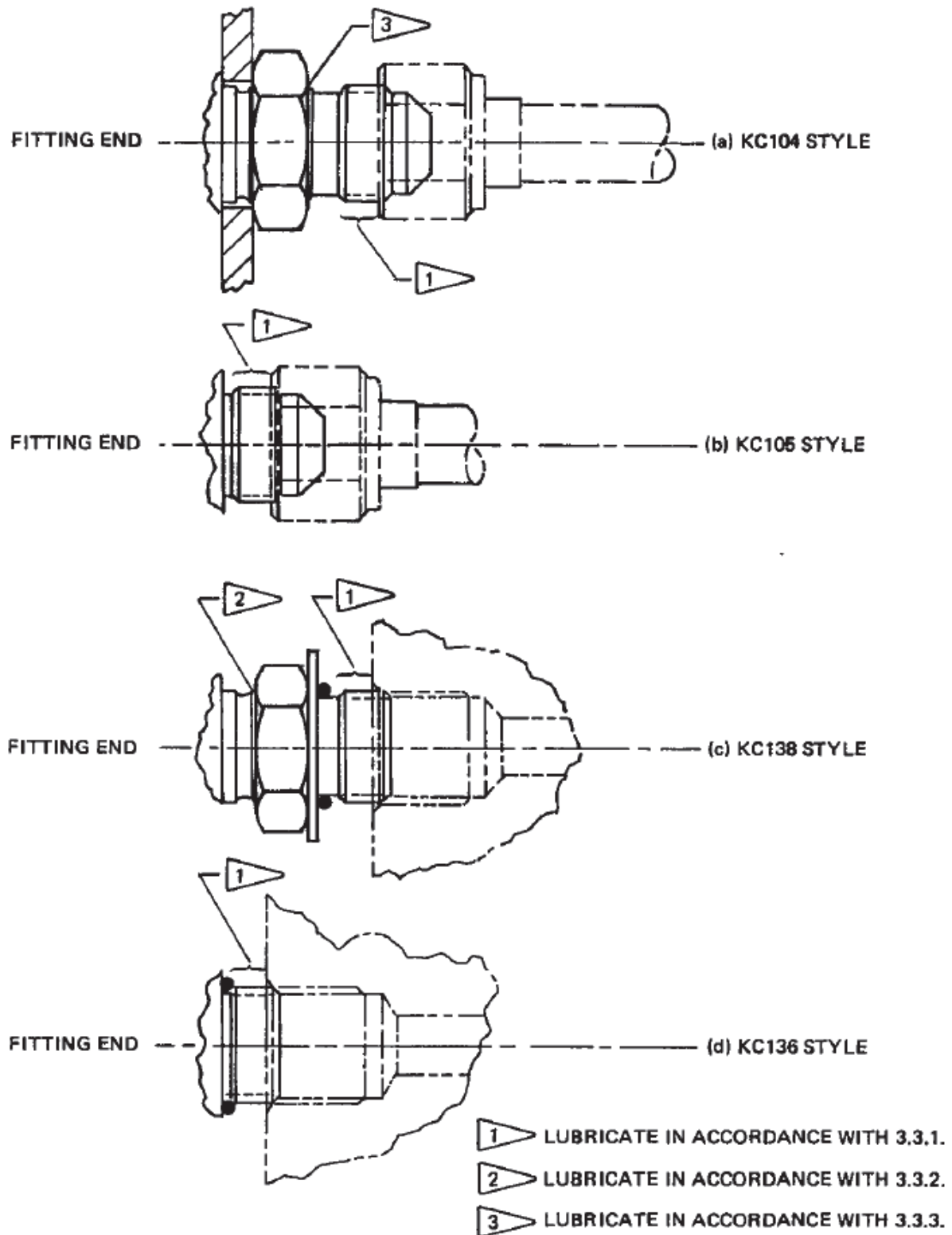
The fitting through the bulkhead shall be installed with the required washers and the locknut started on the outer set of external threads. The lubricant compound shall be applied to the inner set of external threads and the locknut advanced to secure the fitting to the bulkhead. Refer to Figure 1(a).

*Special care is required to prevent contamination of the flow passage when installing a locknut on bulkhead fittings.*

#### **3.3.3.4 Swivel Fittings**

The threads shall first be lubricated in accordance with 3.3.3. Next, the lubricant container nozzle shall be placed against the swivel nut retaining wire hole, and the lubricant squeezed into the hole to help prevent galvanic corrosion of aluminum fittings when in contact with the corrosion-resistant steel retaining wire.

*The lubricant helps to prevent water or other potential electrolytic solutions from entering the hole, and helps to prevent galling in stainless steel fittings.*



Refer to KSC-GP-425 for fitting details.

Figure 1. Lubricant Application Details



### 3.4 Assembly of Joint

After application of lubricant, the joint shall be assembled in accordance with KSC-SPEC-Z-0008.

### 3.5 Torque of Joint

Lubricated joints shall be torqued in accordance with KSC-SPEC-Z-0008.

## 4. QUALITY ASSURANCE AND WORKMANSHIP

- a) The performing activity shall be responsible for the performance of all inspection requirements as specified herein. The Government reserves the right to perform any of the inspections set forth in this specification to assure that the requirements specified herein have been met.
- b) Workmanship shall be a level of quality to ensure the processed products meet performance requirements of the engineering documentation and the requirements of this specification.

## 5. NOTES

### 5.1 Intended Use

Lubrication in accordance with this specification is intended to minimize galling of mating surfaces. Strict adherence to this specification is required to prevent fluid system contamination.

### 5.2 Citation Data

Contract documents should cite this specification by number, title, and date. Drawings should cite this specification by number in a general note.

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