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**MIL-STD-1548H
w/ CHANGE 1
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**SUPERSEDING
MIL-STD-1548H
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**DEPARTMENT OF DEFENSE
STANDARD PRACTICE**

**INTO - PLANE SERVICING OF FUELS
AT COMMERCIAL AIRPORTS**



AMSC N/A

FSC 91GP

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MIL-STD-1548H
w/ CHANGE 1

FOREWORD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense (DoD).

2. Comments, suggestions, or questions on this document should be addressed to AFPET/PTMT, 2430 C Street, Building 70, Area B, Wright-Patterson AFB, OH 45433-7631 or e-mailed to AFPA/PTMT@us.af.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

MIL-STD-1548H
w/ CHANGE 1

CONTENTS

<u>PARAGRAPH</u>		<u>PAGE</u>
	FOREWORD	ii
1	SCOPE	1
1.1	Scope	1
1.2	Classification	1
2	APPLICABLE DOCUMENTS	1
2.1	General	1
2.2	Government documents	1
2.2.1	Specifications, standards, and handbooks	1
2.3	Non-Government publications	1
2.4	Order of precedence	3
3	DEFINITIONS	3
3.1	Definitions applicable in this standard	3
3.2	Full flow monitor cartridges	3
4	GENERAL REQUIREMENTS	3
4.1	Type I and Type II	3
4.1.1	Defueled product	3
4.1.1.1	Defueled JP8+100 product	4
4.1.2	Safety	4
5	DETAILED REQUIREMENTS	4
5.1	Type I	4
5.1.1	Jet fuel specification and purity standards	4
5.1.1.1	Additive injection	4
5.1.2	Hydrant system checks	4
5.1.3	Aircraft fueling equipment requirements	4
5.1.3.1	Electrostatic bonding	4
5.1.3.1.1	Grounding plug	4
5.1.3.1.2	Grounding clamp	5
5.1.3.2	Aircraft pressure refueling nozzle	5
5.2	Type II	5
5.2.1	Jet fuel specifications	5
5.2.1.1	Additive injection	5
5.2.2	Fueling operations	5
5.2.2.1	Electrostatic bonding	5
5.2.2.1.1	Grounding plug	5
5.2.2.1.2	Grounding clamp	5
5.2.2.2	Aircraft pressure refueling nozzle	5
5.2.3	Filtration equipment	5
5.2.3.1	Filtration requirements	5

MIL-STD-1548H
w/ CHANGE 1

CONTENTS

<u>PARAGRAPH</u>		<u>PAGE</u>
<u>6</u>	<u>NOTES</u>	<u>5</u>
<u>6.1</u>	<u>Intended use</u>	<u>5</u>
<u>6.2</u>	<u>Acquisition requirements</u>	<u>5</u>
<u>6.3</u>	<u>Publications</u>	<u>6</u>
<u>6.4</u>	<u>Subject term (key word) listing</u>	<u>6</u>
<u>6.5</u>	<u>Quality assurance requirements</u>	<u>6</u>
<u>6.6</u>	<u>Changes from previous issue</u>	<u>7</u>
<u>TABLE</u>		<u>PAGE</u>
<u>I</u>	<u>Defueled product quality criteria</u>	<u>3</u>
<u>II</u>	<u>Laboratories within the continental United States</u>	<u>6</u>
<u>III</u>	<u>Laboratories outside the continental United States</u>	<u>7</u>
	<u>CONCLUDING MATERIAL</u>	<u>8</u>

MIL-STD-1548H

w/ CHANGE 1

1. SCOPE

1.1 Scope. This standard establishes two types of standard practices for into-plane servicing of fuels at commercial airports.

1.2 Classification. Classification of into-plane servicing is as follows:

Type I (see 5.1)	Into-Plane refueling guidance per ATA Specification 103, Standard for Jet Fuel Quality Control at Airports
Type II (see 5.2)	Aviation Fuel Quality Control and Operating Standard for Into-Plane Fueling Services (JIG 1)

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections [3](#), [4](#), or [5](#) of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections [3](#), [4](#), or [5](#) of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-83413/4	Connectors and Assemblies, Electrical, Aircraft Grounding, Plugs, for Types I and II Grounding Assemblies
MIL-DTL-83413/7	Connectors and Assemblies, Electrical, Aircraft Grounding: Grounding Clamp Connector for Types I and III Grounding Assemblies, Clip, Electrical
MIL-PRF-52308	Filter-Coalescer Element, Fluid Pressure

(Copies of these documents are available online at <http://quicksearch.dla.mil/>.)

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 these documents are those cited in the solicitation or contract.

AIRLINES FOR AMERICA (A4A)

ATA SPEC 103	Standard for Jet Fuel Quality Control at Airports
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(Copies of this document are available from <http://www.airlines.org/>.)

ASTM INTERNATIONAL

ASTM D56	Standard Test Method for Flash Point by Tag Closed Cup Tester (DoD Adopted)
ASTM D93	Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester (DoD Adopted)

MIL-STD-1548H
w/ CHANGE 1

ASTM D1298	Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method (DoD Adopted)
ASTM D1655	Standard Specification for Aviation Turbine Fuels (DoD Adopted)
ASTM D2276	Standard Test Method for Particulate Contaminant in Aviation Fuel by Line Sampling (DoD Adopted)
ASTM D2624	Standard Test Methods for Electrical Conductivity of Aviation and Distillate Fuels (DoD Adopted)
ASTM D3828	Standard Test Methods for Flash Point by Small Scale Closed Cup Tester (DoD Adopted)
ASTM D4052	Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter (DoD Adopted)
ASTM D5452	Standard Test Method for Particulate Contamination in Aviation Fuels by Laboratory Filtration (DoD Adopted)

(Copies of these documents are available from [http://www.astm.org/.](http://www.astm.org/))

ENERGY INSTITUTE (EI)

EI Specification 1581	Specifications and Qualification Procedures for Aviation Jet Fuel Filter/Separators
EI Specification 1583	Laboratory Tests and Minimum Performance Levels for Aviation Fuel Monitors
EI Specification 1590	Specifications and Qualification Procedures for Aviation Fuel Microfilters

(Copies of these documents are available from [http://www.energyinst.org/.](http://www.energyinst.org/))

JOINT INSPECTION GROUP (JIG)

JIG 1	Aviation Fuel Quality Control and Operating Standards for Into-Plane Fueling Services
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(Copies of this document are available from [http://www.jigonline.com.](http://www.jigonline.com/))

NATIONAL FIRE PROTECTION ASSOCIATION

NFPA 407	Standard for Aircraft Fuel Servicing (DoD Adopted)
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(Copies of this document are available from [http://www.nfpa.org.](http://www.nfpa.org/))

SAE INTERNATIONAL

SAE AS5877	Detailed Specification for Aircraft Pressure Refueling Nozzle (DoD Adopted)
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(Copies of this document are available from [http://www.sae.org.](http://www.sae.org/))

**MIL-STD-1548H
w/ CHANGE 1**

UNITED KINGDOM MINISTRY OF DEFENCE (UK MOD)

STANDARD 91-91 Turbine Fuel, Kerosine Type, Jet A-1, NATO Code: F-35,
Joint Service Designation: AVTUR

(Copies of this document are available from <https://www.dstan.mod.uk/>.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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. DEFINITIONS

3.1 Definitions applicable in this standard. The definitions for terms used in this standard are in accordance with ATA Specification 103 and the JIG 1, with the following additional terms noted herein.

3.2 Full flow monitor cartridges. Fuse-type or fuel monitor elements, which remove free water and solid contaminants in the fuel. As the elements retain solids and water through absorption, fuel flow is restricted or shutoff.

4. GENERAL REQUIREMENTS

4.1 Type I and Type II. Receipt, storage, and issue of aviation products shall comply with ATA Specification 103 or the JIG 1, respectively, except as noted herein.

4.1.1 Defueled product. Defueled product from other than U.S. Government aircraft shall not be used to refuel U.S. Government aircraft. Product defueled from U.S. Government aircraft may be returned to an authorized user and shall meet the defueled product quality criteria in [Table I](#).

TABLE I. Defueled product quality criteria.

Property	Requirement	Test Method
Density at 15 °C (or API Gravity)	0.775-0.840 kg/L (37-51)	ASTM D1298 or D4052
Particulate contamination (1) Particulate content before filtration, or: (2) Particulate content after filtration into plane, or: (3) Color rating	1.0 mg/L, max 0.5 mg/L, max A1, A2, B1, B2, G1, or G2	ASTM D5452 ASTM D5452 ASTM D2276
Conductivity Without conductivity additive With conductivity additive	10 pS/m, max 50-700 pS/m	ASTM D2624 ASTM D2624
Water content (into plane)	15 ppmv, max	See JIG 1 or ATA 103
Appearance	Clear and Bright	Visual
Flash point	38 °C (100 °F), min	ASTM D56, D93, or D3828

MIL-STD-1548H w/ CHANGE 1

4.1.1.1 Defueled JP8+100 product. Deleted.

4.1.2 Safety. Safety requirements as specified in NFPA 407 shall apply to Type I.

5. DETAILED REQUIREMENTS

5.1 Type I. Type I refueling at commercial airports shall be performed as specified in ATA Specification 103 (latest edition), except as noted herein.

5.1.1 Jet fuel specification and purity standards. The requirements of ATA Specification 103 shall apply except for the following.

5.1.1.1 Additive injection. There may be a requirement to add additives to the fuel. The additives are Fuel System Icing Inhibitor (FSII) or Static Dissipater Additive (SDA). The only authorized FSII for Department of Defense aircraft is diethylene glycol monomethyl ether. The following additive blending guidance is provided in order to assure proportional injection of the additives. The two basic methods for adding additives into fuel are manual blending and use of an injector.

a. The preferred method is proportional injection using a fuel driven design injector. This type injects additives proportionately at various flow rates. Fuel additives should not be mixed together in neat form, as a cocktail blend, prior to injection.

b. Manually blending additives at various points in the system can be accomplished by several techniques, some of which are described below. When manual blending is performed, additive should first be diluted with the fuel. The greater the dilution, the easier it is for the additive to mix properly. Fuel additives should not be mixed together in neat form as a cocktail blend for injecting into fuel.

1. Blending additives into bulk airfield tanks can be done by pouring the required quantity of additive into the tank heel prior to a receipt. Care should be taken when manually introducing additive to tank heels to avoid over/under additizing resulting from variations in anticipated vs. actual quantities received. The required quantity of additive may also be added to the delivery tank trucks just prior to offloading into bulk tanks.

2. Blending into refueling units can be performed by introducing the required amount through the top hatch using a funnel and a length of hose with one end submerged below the surface of the fuel. This can best be accomplished by pouring the additive into the refueler, filled to not more than one-third of its capacity and then filling the unit with fuel. Wait approximately 10 minutes and then circulate fuel for at least three minutes before servicing to aircraft. If additives are put into a full refueler, circulate at least 150 percent of the refueler capacity prior to issue.

c. When required, fuel system icing inhibitor (FSII) may be added using the 590 mL (20 ounce) aerosol can during over-wing refueling. Determine the fuel load and calculate the amount of additive required. It should be added gradually during filling to permit proper blending in the fuel. One can of aerosol additive will inhibit 680 liters (180 gallons) of fuel to 0.087% by volume.

d. When FSII and/or SDA is injected into fuel, the following limits apply: FSII content shall be 0.04 – 0.15 volume % and electrical conductivity shall be 50 – 700 pS/m.

5.1.2 Hydrant system checks. The requirements of ATA Specification 103 shall apply, except that for any modifications, changes, or construction work to hydrant systems, the contractor shall also notify the contracting officer.

5.1.3 Aircraft fueling equipment requirements. The requirements of ATA Specification 103 shall apply, except for electrostatic bonding, the following specific equipment shall be required.

5.1.3.1 Electrostatic Bonding.

5.1.3.1.1 Grounding plug. When the aircraft being serviced is equipped with grounding receptacles, a grounding plug conforming to or equivalent in design to MIL-DTL-83413/4 shall be used.

MIL-STD-1548H w/ CHANGE 1

5.1.3.1.2. Grounding clamp. When the aircraft being serviced is not equipped with grounding receptacles or a plug is not available, a grounding clamp conforming to or equivalent in design to MIL-DTL-83413/7 shall be used on the bonding cables of the refueling equipment. When a grounding clamp is used, it shall be connected to a bare metal surface of the aircraft. Do not secure/attach to external doors, latches or hinges.

5.1.3.2 Aircraft pressure refueling nozzle. Aircraft pressure refueling nozzles shall meet the requirements of SAE AS5877.

5.2 Type II. Type II Refueling at Commercial Airports shall be performed as specified in the JIG 1, except as noted herein.

5.2.1 Jet fuel specifications. Defence Standard 91-91, ASTM D1655, or applicable specification cited in the contract, shall be used with the following additional requirements.

5.2.1.1 Additive injection. When additives are required, see paragraph [5.1.1.1](#).

5.2.2 Fueling operations. The requirements of the JIG 1 apply in their entirety with exceptions noted herein.

5.2.2.1 Electrostatic Bonding.

5.2.2.1.1. Grounding plug. When the aircraft being serviced is equipped with a grounding receptacle, a grounding plug conforming to or equivalent in design to MIL-DTL-83413/4 shall be used.

5.2.2.1.2. Grounding clamp. When the aircraft being serviced is not equipped with grounding receptacles or a plug is not available, a grounding clamp conforming to or equivalent in design to MIL-DTL-83413/7 shall be used on the bonding cables of the refueling equipment. When a grounding clamp is used, it shall be connected to a bare metal surface of the aircraft. Do not secure/attach to external doors, latches or hinges.

5.2.2.2 Aircraft pressure refueling nozzle. Aircraft pressure refueling nozzles shall meet the requirements of SAE AS5877.

5.2.3 Filtration equipment. The filtration equipment requirements in the JIG 1 apply in their entirety with exceptions noted.

5.2.3.1 Filtration requirements. All aviation fuel shall pass through two filters. One filter shall be on the refueler loading rack or hydrant delivery line. The initial filter must be a filter separator. The final filtration of jet fuel shall be through a filter separator or a full flow monitor. The filter separator referred to for both products shall meet the requirement of EI 1581 or MIL-PRF-52308. The full-flow monitor shall meet the requirements of EI 1583. The micronic filter shall meet the requirement of EI 1590. Filtration equipment shall be designed so that fuel bypass is not possible. EI 1583 full-flow monitors shall not be used when fuel contains FSII.

6. NOTES

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

6.1 Intended use. The purpose of this standard is to ensure government aircraft are provided specification fuel at commercial facilities where a US Government Into-Plane Servicing Contract is in force. Additive injection procedures mentioned in this standard are military unique as the additive package required in fuel used by DoD aircraft is not used in commercial fuels - the additive package required in fuel destined for DoD aircraft is required as it provides additional safeguards against fuel system icing and fuel system static charges.

6.2 Acquisition requirements. Acquisition documents should specify the title, number, and date of this standard.

**MIL-STD-1548H
w/ CHANGE 1**

6.3 Publications. The JIG 1 publication referred to in Type II of the detailed requirements is prepared by and for members of the Joint Inspection Group. Participants of the JIG can obtain the document through corporate channels or <http://www.jigonline.com>.

6.4 Subject term (key word) listing.

Aircraft pressure refueling nozzle

Defueled product

6.5 Quality assurance requirements. Quality assurance requirements imposed as part of any contract may include sample submission to one of the laboratories listed in [Table II](#) or [Table III](#) of this standard.

TABLE II. Laboratories within the continental United States.

Mailing Address	Shipping Address	Telephone Numbers	FAX Numbers	Area of Responsibility
Aerospace Fuels Laboratory AFPET/PTPLA 2430 C St, Bldg. 70, Area B Wright-Patterson AFB, OH 45433-7631	Aerospace Fuels Laboratory (FP2070) AFPET/PTPLA 2430 C St, Bldg. 70, Area B Wright-Patterson AFB, OH 45433-7631	DSN 785-0739 COM (937) 255-0739	DSN 986-7744 COM (937) 656-7744	AL, AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, WV
Aerospace Fuels Laboratory AFPET/PTPLE 1747 Utah Ave, Bldg 6670 Vandenberg AFB, CA 93437-5220	Aerospace Fuels Laboratory (FP2075) AFPET/PTPLE 1747 Utah Ave, Bldg 6670 Vandenberg AFB, CA 93437-5220	DSN 276- 5873/5039/2149 COM (805) 606- 5873/2149	DSN 276-2756 COM (805) 606-2756	AZ, CA, CO, ID, MT, ND, NM, NV, OR, UT, WA, & WY

MIL-STD-1548H
w/ CHANGE 1

TABLE III. Laboratories outside the continental United States.

Mailing Address	Local Shipping Address	Telephone Numbers	Fax Numbers
Aerospace Fuels Laboratory AFPET/PTPLF Unit 5025 Box 495 APO AE 09459-5025	Aerospace Fuels Laboratory (FP2080) AFPET/PTPLF Bldg. 1546 West Row Gate #6 RAF Mildenhall Suffolk, UK IP28 8NF	DSN 314-238-2043/5960/5961 COM 011-44-163-854-5960	DSN 314-238-3626 COM 011-44-163-854-3626
Aerospace Fuels Laboratory AFPET/PTPLG Unit 5161 Bldg. 854 APO AP 96368-5161	Aerospace Fuels Laboratory (FP2083) AFPET/PTPLG Unit 5161 Bldg. 854 Kadena AB Okinawa, Japan APO AP 96368-5161	DSN 315-634-1602/3394/0322/9560 COM 011-81-611-734-1602	DSN 315-634-0584 COM 011-81-611-734-0584
DLA Energy Pacific Okinawa Laboratory Attention: Laboratory Manager Unit 5110 APO AP 96368-5110	DLA Energy Pacific Okinawa Laboratory Chibana Compound RTE #74 BLDG 53145 Chibana Okinawa City, Okinawa, Japan 904-2143	DSN 315-632-4728	
FISC Pearl Harbor POL Lab Code 704 1942 Gaffney St, Suite 100 Pearl Harbor HI 96860-4549	FISC Pearl Harbor POL Laboratory 300 Neches Avenue Bldg 1685, Code 704 Pearl Harbor, HI 96860	DSN 315-473-7989 COM (808) 473-7989	DSN 315-473-7981 COM (808) 473-7981
DLA Energy Alaska Attn: Laboratory 10480 Sijan Street, Suite 300 JBER, AK 99506-2507	DLA Energy Alaska Petroleum Laboratory Bldg. 986 Warehouse St. JBER, AK 99505	DSN 317-384-7180 COM (907) 384-7180	DSN 317-384-2447 COM (907) 384-2447
DLA Energy Europe/Africa Petroleum Laboratory CMR 422 APO AE 09067	DLA Energy Europe/Africa Petroleum Laboratory Rhein Ordnance Barracks Bldg 320 AM Opelkreisel 67663 Kaiserslautern, Germany	DSN 314-493-2286/4/8 COM 49-631-3406-2286/4/8	DSN 314-493-2349 COM 49-631-3406-2349

6.6 Changes from previous issue. The margins of this standard are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders

MIL-STD-1548H
w/ CHANGE 1

and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the previous issue.

CONCLUDING MATERIAL

Custodians:

Army – AV
Navy – AS
Air Force – 68
DLA – PS

Preparing activity:

Air Force – 68
(Project 91GP-2016-001)

Review activities:

Army – CD
Navy – SA
DLA – CC

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.