



Ministry of Defence

Defence Standard

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1 August 1997

FLUIDS, AVIATION, THRUST AUGMENTATION

JOINT SERVICE DESIGNATION: AL-28 AND WTA

This Defence Standard supersedes
DERD 2491 Issue 3
dated September 1974

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FLUIDS, AVIATION, THRUST AUGMENTATION

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JOINT SERVICE DESIGNATION: AL-28 AND WTA

PREFACE

<p>This Defence Standard supersedes DERD 2491 Issue 3 dated September 1994</p>
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- i** This Defence Standard specifies the requirements for aircraft engine Thrust Augmentation Fluid intended primarily for military applications.
- ii** The technical authority and sponsor of this Defence Standard is the Director of Future Systems (Air), Procurement Executive, Ministry of Defence.
- iii** This Standard has been produced on behalf of the Defence Engineering and Equipment Standardization Committee (DEESC) by the Joint Petroleum Products Subcommittee (JPPSC) (E10).
- iv** This Standard has been agreed by the authorities concerned with its use and shall be incorporated whenever relevant in all future designs, contracts, orders etc and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of the Defence Standard, the Directorate of Standardization shall be informed so that a remedy may be sought.
- v** Any enquiries regarding this Standard in relation to an invitation to tender or a contract in which it is incorporated are to be addressed to the responsible Technical or Supervising authority named in the invitation to tender or contract.
- vi** This Standard has been devised for the use of the Crown and its contractors in the execution of contracts for the Crown. The Crown hereby excludes all liability (other than liability for death or personal injury) whatsoever and howsoever arising (including, but without limitation, negligence on the part of the Crown its servants or agents) for any loss or damage however caused where the Standard is used for any other purpose.

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FLUIDS, AVIATION, THRUST AUGMENTATION
JOINT SERVICE DESIGNATION: AL-28 and WTA

1 Scope

1.1 This Defence Standard specifies the requirements for aircraft engine thrust augmentation fluid intended primarily for military applications.

1.2 Fluids provided to this Standard shall possess satisfactory performance and properties when used in appropriate vehicles and/or gas turbines and ancillary equipment operated by the Crown.

2 WARNING

This Standard calls for the use of substances and/or procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and in no way absolves either the designer, the producer, the supplier or the user from statutory and all other legal obligations relating to health and safety at any stage of manufacture or use.

3 Related Documents

3.1 The documents and publications referred to in this Standard are listed in annex A.

3.2 Reference in this Standard to any related document means in any invitation to tender or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated.

4 Materials

4.1 The material shall consist of either a mixture of methanol and water, or water, as detailed in Table A.

Table A

Material Requirements

FLUID	% Volume (nominal)		% WEIGHT METHANOL
	METHANOL	WATER	
AL-28	43.8	56.2	37.1
WTA	0	100	0

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4.2 Methanol shall comply with requirements of BS 506

4.3 The water shall comply in all respects with the requirements of table B.

5 Quality Assurance

5.1 Representative samples of each batch of the finished product shall be tested to show batch homogeneity and compliance with the requirements of clause **4** and table B of this Standard.

5.2 The responsible technical or supervising authority named in the contractor order reserves the right to require additional testing of the product at any time and to sample and test the product and/or ingredients at any time during or after manufacture.

5.3 If any sample taken from the consignment be found not to comply with the requirements of this Standard, the whole consignment may be rejected.

5.4 The provision of this clause shall apply equally to the contractor and any subcontractor.

6 Testing

6.1 Properties of the product shall not exceed the maximum nor be less than the minimum values set out in table B.

6.2 Methods quoted in Table B are referee methods. Alternatively, technically equivalent methods eg ISO or ASTM may be used by agreement. In cases of dispute the referee methods shall be used.

6.3 The test methods specified in table B generally contain a statement of precision (repeatability and reproducibility). Attention is drawn to BS EN ISO 4259/ IP 367, which covers the use of precision data in the interpretation of test results and this procedure shall be used in cases of dispute.

Table B

Test Requirements

TEST NO	PROPERTY	UNITS	LIMITS		TEST METHOD
			WATER (WTA)	AL-28	
1	Appearance		Visually clear and free from soiled matter		Visual examination
2	pH Value		Min 5.0 Max 7.5	-	BS 2690: Part 109
3	Dissolved solid	mg/l	Max 10 (NOTE 1)	Max 10 (NOTE 2)	BS 2690: Part 121
4	Electrical Conductivity at (20±5)°C	µS/m	Max 1100	Max 1100	BS EN 27888
5	Silica Content (as SiO ₂)	mg/l	Max 3	-	BS 2690 Part 104
6	Acidity, as Formic Acid	% m/m	-	Max 0.0015	BS 506 Part 2
7	Density at 15°C	Kg/m ³	-	Min 941 Max 945	BS 718
<p>NOTE 1: If the product meets the requirements of tests 4 and 5 then it is not necessary to carry out test 3.</p> <p>NOTE 2: If the product meets the requirement of test 4 then it is not necessary to carry out tests 3 and 6.</p>					

7 Keeping Qualities

The product, when suitably stored in its original sealed containers, shall retain the properties described in this Standard for a period, from the date of filling, of not less than 12 months in temperate climates and not less than 6 months in tropical climates.

8 Containers and Marking of Containers

8.1 The product shall be supplied in sound, clean and dry containers suitable for the product and in accordance with the requirements of the contractor order.

8.2 Coatings and paint finishes shall comply with the requirements of the contract or order. Markings shall be in accordance with the requirements of Def Stan 05-52 (Part 1). The product identification shall be specified in the contractor order.

8.3 It shall be the responsibility of the contractor to comply with any legal requirements for the marking of containers.

Related Documents List

A.1 The following documents and publications are referred to in this Standard:

BS EN ISO 4259	Petroleum Products. Determination and Application of Precision Data in Relation to Methods of Test.
BS EN 27888	Water Quality. Method for the Determination of Water Conductivity.
BS 506 (Part 2)	Methanol for Industrial Use. Methods of Test.
BS 718	Specification for Density Hydrometers.
BS 2690 (Part 104)	Methods of Testing Water Used in Industry. Silica: Reactive, Total and Suspended.
(Part 109)	Alkalinity, Acidity, pH Value and Carbon Dioxide
(Part 121)	Dissolved Solids: Gravimetric Method (After Evaporation).
Def Stan 05-52 (Part 1)	Markings for the Identification of Fuels, and Associated Products, Containers Holding 210 Litres or Less.
IP 367	Determination and Application of Precision Data in Relation to Methods of Test.

A.2 Related documents can be obtained from:

DOCUMENT	SOURCE
British Standards BS and ISO	British Standards Institution Sales Department 389 Chiswick High Road LONDON W4 4AL
Defence Standards	Directorate of Standardization Kentigern House 65 Brown Street GLASGOW G2 8EX
IP Standards	Institute of Petroleum 61 New Cavendish Street LONDON WIM 8AR

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The following Defence Standard file reference relates to the work on this Standard - D/D Stan 344/11/5

Contract Requirements

When Defence Standards are incorporated into contract users are responsible for their correct application and for complying with contract requirements.

Revision of Defence Standard

Defence Standards are revised when necessary by the issue either of amendments or of revised editions. It is important that users of Defence Standards should ascertain that they are in possession of the latest amendments or editions. Information on all Defence Standards is contained in Def Stan 00-00 (Part 3) Section 4, Index of Standards for Defence Procurement - Defence Standards Index published annually and supplemented periodically by Standards in Defence News. Any person who, when making use of a Defence Standard encounters an inaccuracy or ambiguity is requested to notify the Directorate of Standardization without delay in order that the matter may be investigated and appropriate action taken.