



Ministry
of Defence

Defence Standard 91-090

Issue 5

Date: 14 December 2019

**Gasoline, Aviation, Grades UL91,
100/130 and 100/130 Low Lead.**

**JSD: AVGAS UL91, AVGAS 100 and
AVGAS 100LL**

Section 1

Foreword

Defence Standard Structure

Section 1

- Revision Note
- Historical Record
- Warning
- Standard Clauses

Section 2

- Title
- Introduction
- Contents List
- Scope
- Technical Information to include Tables and Figures
- Annexes

Section 3

- Normative References
- Definitions
- Abbreviations

REVISION NOTE

This standard has been raised to Issue 5 to include a minimum lead content of 0.28 gPb/l for Grades 100/130 and 100/130 Low Lead, and make provision for an optional minimum supercharge requirement of 98 PN for Grade UL91 if agreed between purchaser and supplier.

HISTORICAL RECORD

This standard supersedes the following:

Def Stan 91-90 Issue 4 dated 30 October 2015

Def Stan 91-90 Issue 3 dated 20 November 2009

Def Stan 91-90 Issue 2 dated 31 March 2006

Def Stan 91-90 Issue 1 dated 8 May 1996

DERD 2485 Issue 9 dated June 1983

WARNING

The Ministry of Defence (MOD), like its contractors, is subject to both United Kingdom and European laws regarding Health and Safety at Work. Many Defence Standards set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work.

DEF STAN 91-090 Issue 5

STANDARD CLAUSES

- a) This standard has been published on behalf of the Ministry of Defence (MOD) by UK Defence Standardization (DStan).
- b) This standard has been reached following broad consensus amongst the authorities concerned with its use and is intended to be used 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, DStan shall be informed so that a remedy may be sought.
- c) Please address any enquiries regarding the use of this standard in relation to an invitation to tender or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the invitation to tender or contract.
- d) Compliance with this Defence Standard shall not in itself relieve any person from any legal obligations imposed upon them.
- e) This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Section 2

Gasoline, Aviation, Grades UL91, 100/130 and 100/130 Low Lead.

JSD: AVGAS UL91, AVGAS 100 and AVGAS 100LL

0 Introduction

Defence Standard 91-090 is the standard for aviation gasoline intended primarily for use in aircraft spark ignition reciprocating engines, which the United Kingdom Civil Aviation Authority (CAA) has agreed is under the technical authority of the UK MOD Defence Strategic Fuels Authority (DSFA).

NOTE: The Technical/Specification Authority is the Head, Defence Strategic Fuels Authority, Larch 3B #2317, MOD Abbey Wood, Bristol, BS34 8JH.

Contents List

0	Introduction.....	2-1
1	Scope.....	2-1
2	Warning.....	2-2
3	Normative References.....	2-2
4	Materials.....	2-2
5	Quality Assurance.....	2-2
6	Testing.....	2-3
7	Containers and Marking of Containers.....	2-3

Annexes

Annex A	List of Qualified Additives.....	2-6
Annex B	Alternative Test Methods for Use with Table 1 Test Requirements.....	2-9

Tables

Table 1	Test Requirements.....	2-4
Table 2	Dye Requirements.....	2-7
Table 3	Alternative Test Methods for Use with Table 1 Test Requirements.....	2-9

1 Scope

1.1 This Defence Standard specifies the requirements for three grades (AVGAS UL91, AVGAS 100 and AVGAS 100LL) of gasoline type aviation fuel intended primarily for use in aircraft spark ignition reciprocating engines. Fuel provided to this specification shall possess satisfactory performance and properties when used in appropriate aircraft or engines operated by the Crown, or for which the CAA or EASA is the certificating agency.

2 Warning

2.1 See Section 1 for warnings.

3 Normative References

3.1 The documents and publications shown in **Section 3** are referred to in the text of this Standard. Publications are grouped and listed in alpha-numeric order.

4 Materials

4.1 The fuel shall consist wholly of hydrocarbon compounds and approved additives only as listed in **Annex A**. Only additives and non-petroleum fuel components approved by and on behalf of the UK MoD AFC shall be permitted.

4.1.1 Aviation gasoline is a complex mixture of hydrocarbons that varies depending on crude source and manufacturing process. Consequently, it is impossible to define the exact composition of aviation gasoline. This specification has therefore evolved primarily as a performance specification rather than a compositional specification. It is acknowledged that this largely relies on accumulated experience.

4.1.2 For operational performance Aviation Gasoline in this specification is a hydrocarbon based fuel. Ethanol is not permitted to ensure broad compatibility with aircraft fuel systems, good water separation characteristics and flight range.

4.2 Additives shall be identified by the appropriate RDE/A/XXX number or by name as shown in **Annex A**. The amount, including NIL additions, of all additive additions shall be reported to the purchaser on batch quality certificates or as otherwise directed by the purchaser and/or contract.

4.3 The Ministry of Defence and/or its appointed agent(s) reserves the right to require that the material and any components used are subject to toxicological and physiological tests to ascertain their suitability for use.

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 1** of this standard. Results shall be reported on the appropriate batch certificate to show compliance with all requirements of the standard. A batch of fuel is defined as a distinct quantity of fuel that can be characterised by one set of test results including types of additives and quantities added. Documentation shall be available on request for the Technical Authority, purchaser or end user to show that the fuel meets the requirements of this standard and show traceability to point of manufacture.

5.2 The Technical Authority, purchaser or end user 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.

DEF STAN 91-090 Issue 5

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

5.4 Materials used in refinery processing might be carried over in trace quantities into aviation fuels and have been known to cause operational problems in aircraft fuel systems. Appropriate management of change measures should be used at manufacturing locations to manage the risk of this type of contamination in aviation fuels (see **A.7**).

6 Testing

6.1 Properties of the product shall not exceed the maximum nor be less than the minimum values set out in **Table 1** when tested by the methods referred to therein or **Annex B**.

NOTE: To determine conformance to the specification requirement, a test result may be rounded to the same number of significant figures as in **Table 1**. The IP 367 procedure, which covers the use of precision data, may be used for the interpretation of test results in cases of dispute between purchaser and supplier.

6.2 Methods quoted in **Table 1** are referee methods. In cases of dispute the referee methods shall be used. Approved alternative methods are listed in **Annex B**.

7 Containers and Marking of Containers

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

7.2 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 05-052 (Part 1). The product identification shall be specified in the contract or order.

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

DEF STAN 91-090 Issue 5

Table 1 - Test Requirements

Test	Property	Units	Limits			Test Method
			Grade UL91	Grade 100	Grade 100LL	
1	Appearance		Clear, bright and visually free from solid matter and undissolved water at ambient temperature			Visual examination
2	Colour, visual (see NOTE 1)		Undyed	Green	Blue	
3	Corrosion Copper Strip		Max 1			IP 154/ ASTM D130
4	Density at 15 °C	kg/m ³	Report			IP 365/ ASTM D4052
5	Total Sulphur	% m/m	Max 0.05			IP 107/ ASTM D1266
6	Existent Gum	mg/100ml	Max 3.0			IP 131/ ASTM D381
7	Freezing Point	°C	Max minus 58.0			IP 16/ ASTM D2386 (see NOTE 2)
8	Specific Energy	MJ/kg	Min 43.50			IP 12
9	Reid Vapour Pressure at 37.8 °C	kPa	Min 38.0 Max 49.0			IP 69/ ASTM D323
10	Knock Rating:					
10.1	Lean Mixture Motor Method Octane Number		Min 91.0	Min 99.6	Min 99.6	IP 236/ ASTM D2700 (see NOTE 3)
10.2	Research Octane Number		Min 95.0	-	-	ASTM D2699 (see NOTE 3)
10.3	Performance Number		(see NOTE 4)	Min 130.0	Min 130.0	IP 119/ ASTM D909 (see NOTE 3)
11	Distillation:					IP 123/ ASTM D86 Group 2
11.1	Initial Boiling Point	°C	Report			
11.2	Temperature at % fuel evaporated					
11.2.1	10% vol %	°C	Max 75			
11.2.2	40 vol %	°C	Min 75			
11.2.3	50 vol %	°C	Max 105			
11.2.4	90 vol %	°C	Max 135			
11.3	Final Boiling Point	°C	Max 170			
11.4	Sum of 10% + 50% Evaporated Temperatures	°C	Min 135			
11.5	Residue	% v/v	Max 1.5			
11.6	Loss	% v/v	Max 1.5			

Continued on page 2-5

DEF STAN 91-090 Issue 5

Table 1 - Test Requirements (concluded)

Test	Property	Units	Limits			Test Method
			Grade UL91	Grade 100	Grade 100LL	
12	Oxidation Stability, 16 Hours:					IP 138/ASTM D873
12.1	Potential Gum	mg/100ml		Max 6		
12.2	Precipitate	mg/100ml		Max 2		
13	Tetraethyl Lead Content	gPb/l	Max 0.013 (See NOTE 5)	Min 0.28 Max 0.85	Min 0.28 Max 0.56	IP 270/ ASTM D3237 (See NOTE 6)
14	Water Reaction					IP 289/ASTM D1094
14.1	Volume Change	ml		Max 2		
15	Electrical Conductivity	pS/m	(See NOTE 7)			IP 274/ASTM D2624
16	Colour, Lovibond					IP 569 (See NOTE 8)
16.1	Blue		-	Min 1.7 Max 3.5	Min 1.7 Max 3.5	
16.2	Yellow		-	Min 1.5 Max 2.7	- -	
			-			

NOTE 1: The visual colour must also comply with test 16 of this table.

NOTE 2: If no crystals appear when the thermometer indicates a temperature of -58°C , the freezing point shall be recorded as below -58°C .

NOTE 3: Knock rating shall be reported to the nearest 0.1 for Octane Number and Performance Number.

NOTE 4: If mutually agreed upon between the purchaser and supplier, a minimum 98 octane requirement as per test method IP119 / ASTM D909 may be specified.

NOTE 5: For grade UL91 the maximum lead limit applies at point of manufacture.

NOTE 6: For Grade UL91 ASTM D3237 is applicable. For Grades 100LL and 100/130 IP270 is applicable.

NOTE 7: When a Static Dissipator Additive has been added to the fuel the conductivity at the point, time and temperature of delivery to the purchaser shall be in the range 50 to 600 pS/m.

NOTE 8: IP 17 has been replaced by IP 569. A 50.8 mm cell shall be used. IP 17 is allowed as an alternative method, see Table 3.

DEF STAN 91-090 Issue 5

Annex A

List of Qualified Additives

A.1 Antioxidants

A.1.1 Antioxidants or mixtures of antioxidants, of a type detailed in **A.1.2** and at a concentration detailed in **A.1.3**, may be added to the fuel.

A.1.2 The following antioxidant formulations are qualified:

<u>Formulation</u>	<u>Qualification Reference</u>
(a) 2,6-ditertiary-butyl-phenol	RDE/A/606
(b) 2,6 ditertiary-butyl-4-methyl-phenol	RDE/A/607
(c) 2,4-dimethyl-6-tertiary-butyl-phenol	RDE/A/608
(d) 75 percent minimum, 2,6-ditertiary-butyl-phenol 25 percent maximum, tertiary and tritertiary-butyl-phenols	RDE/A/609
(e) 55 percent minimum, 2,4-dimethyl-6-tertiary-butyl-phenol 15 percent minimum, 4 methyl-2,6-ditertiary-butyl-phenol Remainder, 30 percent maximum, as a mixture of monomethyl and dimethyl-tertiary-butyl-phenols	RDE/A/610
(f) 72 percent minimum, 2,4-dimethyl-6-tertiary-butyl-phenol 28 percent maximum, mixture of tertiary-butyl-methyl- phenols and tertiary-butyl dimethyl phenols	RDE/A/611

A.1.3 The total concentration of active material(s) shall not exceed 24.0 mg/l.

A.2 Antiknock Additive

A.2.1 Tetraethyl lead shall be present in Grades 100/130 and 100LL and added in the form of an antiknock mixture containing not less than 61% mass of tetraethyl lead and sufficient ethylene dibromide to provide two atoms of bromine per atom of lead. The balance shall contain no added ingredient other than kerosene, an approved oxidation inhibitor and blue dye as specified in **Clause A3**. The maximum lead concentration limit for each grade is specified in **Table 1**.

A.3 Dye (Grade Identification)

A.3.1 The following dye shall be used where applicable, within the concentration limits prescribed in **Table 2**, to give the finished fuel the appropriate grade identification colour:

- (a) Blue essentially 1,4 dialkylamino-anthraquinone
- (b) Yellow essentially diethylaminoazobenzene or 1,3-benzenediol 2,4-bis [alkyl (phenol) azo-]

DEF STAN 91-090 Issue 5
Table 2 - Dye Requirements

Dye	Maximum Concentration (mg/l)	
	Grade 100	Grade 100LL
Blue	2.7	2.7
Yellow	2.8	None

A.4 Static Dissipator Additive (SDA)

A.4.1 An SDA of a type detailed in **A.4.2** and at a concentration detailed in **A.4.3** may be added to the fuel to impart electrical conductivity in accordance with test 15 of **Table 1**.

A.4.2 The following material is qualified:

<u>Product</u>	<u>Manufacturer</u>	<u>Qualification Reference</u>
Stadis® 450	Innospec LLC	RDE/A/621

A.4.3 The concentration of SDA shall not exceed 3.0 mg/l.

A.5 Fuel System Icing Inhibitor

A.5.1 An FSII, of a type detailed in **A.5.2** and at concentrations detailed at **A.5.3** and **A.5.4**, may be added to the fuel by agreement between purchaser and supplier.

A.5.2 The following materials are qualified and must comply with Def Stan 68-252:

<u>Product</u>	<u>Qualification Reference</u>
Diethylene Glycol Monomethyl Ether (DiEGME)	RDE/A/630
Propan-2-ol (Isopropyl Alcohol)	ASTM D4171 (Type II)

A.5.3 The concentration of DiEGME shall not be less than 0.10% and not more than 0.15% by volume at the time of the delivery to the purchaser. A suitable method for determining DiEGME concentration is ASTM D5006.

NOTE: Concentrations of less than 0.02% by volume can be considered negligible and do not require agreement/notification. The assent to allow these small quantities of FSII without agreement/notification is to facilitate the changeover from fuels containing FSII to those not containing FSII where the additive may remain in the fuel system for a limited time. This does not allow the continuous addition of FSII at these low concentrations.

A.5.4 The concentration of Isopropyl Alcohol shall be recommended by the aircraft manufacturer at the time of delivery to the purchaser and typically not exceeding 1% v/v. Suitable methods for determining Isopropyl Alcohol concentration are IP 566 and ASTM D4815.

A.6 Corrosion Inhibitor Additive

A.6.1 The following corrosion inhibitors may be added to the gasoline in concentrations not to exceed the maximum allowable concentration listed for each additive.

DEF STAN 91-090 Issue 5

<u>Product</u>	<u>Manufacturer</u>	<u>Qualification Reference</u>	<u>Maximum mg/l</u>
Hitec 580	Afton Chemical Ltd.	RDE/A/661	22.5
Octel DCI-4A	Innospec LLC	RDE/A/662	22.5
Octel DCI-6A	Innospec LLC	RDE/A/663	9.0
Nalco 5403	Nalco Chemical Co.	RDE/A/664	22.5
Tolad 4410	Baker Petrolite	RDE/A/665	22.5
Tolad 351	Baker Petrolite	RDE/A/666	24.0
Unicor J	Dorf Ketal Chemicals	RDE/A/667	22.5
Nalco 5405	Nalco Chemical Co.	RDE/A/668	11.0
Spec Aid 8Q22	GE Betz	RDE/A/669	24.0

A.7 Contamination by Processing Additives

A.7.1 Experience has shown that refinery processing additives, such as corrosion inhibitors, might be carried over in trace quantities into aviation fuel during refinery production. In some cases, this has resulted in operational problems in aircraft fuel systems. Moreover, these additives can cause problems at levels which may not be detected by the standard specification testing detailed in **Table 1**. Whilst the standard (**4.1**) states that non-approved additives are not permitted, defining a zero level is not straightforward; particularly given that:

- (a) modern analytical techniques are capable of detecting extremely low levels of chemical species;
- (b) there could be a wide range of materials involved; and
- (c) in most cases there are no data on their effects in aircraft systems to use to define a no-harm level.

A.7.2 It is therefore not practical for this standard to require detailed chemical analysis of each production batch of aviation fuel beyond the requirements listed in this standard. Instead, it is recommended that manufacturing locations ensure that they have adequate quality assurance and management of change procedures in place to ensure that refinery processing additive use is well defined and controlled. Any changes in additive composition/manufacturing source or refinery processing conditions should be subject to a formal risk assessment to ensure maintenance of finished product quality.

A.7.3 Due to known problems arising from the carry over of the refinery processing additive (corrosion inhibitor) 1,2-diaminoethane (ethylene diamine), its use is specifically not recommended in the manufacture of aviation gasoline.

DEF STAN 91-090 Issue 5

ANNEX B

Alternative Test Methods for Use with Table 1 Test Requirements

Table 3: Alternative Test Methods

Table 1 Test Number	Property	Alternative
1	Appearance	ASTM D4176 Procedure 1
4	Density at 15 °C	IP 160/ ASTM D1298
5	Total Sulphur	IP 243 ASTM D2622 ASTM D5453
8	Specific Energy	ASTM D3338 ASTM D4809
9	Vapour Pressure	See NOTE 1 IP 394 ASTM D5191
13	Tetraethyl Lead Content	IP 228/ASTM D5059 IP 428/ASTM D3341
16	Colour, Lovibond	IP 17, see NOTE 2 ASTM D2392, see NOTE 3

NOTE 1: Results shall be reported as dry vapour pressure equivalent (DVPE), as defined in the approved alternative method used.

NOTE 2: Use test method IP 17 (Method A) using a 50.8 mm cell.

NOTE 3: When ASTM D2392 is utilised, the fuel shall meet the requirements of the test and not require the reporting of Lovibond colour units.

Section 3

Normative References

1 The publications shown below are referred to in the text of this standard. Publications are grouped and listed in alpha-numeric order.

Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting <http://dstan.uwh.diif.r.mil.uk/> for those with RLI access or <https://www.dstan.mod.uk> for all other users. All referenced standards were correct at the time of publication of this standard (see 2, 3 & 4 below for further guidance), if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

Def Stans

Number	Title
05-052, Pt 01, Iss 03	Markings for the Identification of Fuels, Lubricants and Associated Products - Containers Holding 216.5 Litres or Less
68-252, Iss 03	Fuel System Icing Inhibitor NATO Code: S-1745 Joint service Designation: AL-41

STANAGs

Number	Title
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Allied Publications

Number	Title
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Other References

Standard Type	Standard Name
CIVIL	ASTM D86 - Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure
CIVIL	ASTM D130 - Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
CIVIL	ASTM D323 - Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)
CIVIL	ASTM D381 - Standard Test Method for Gum Content in Fuels by Jet Evaporation

DEF STAN 91-090 Issue 5

CIVIL	ASTM D873 - Standard Test Method for Oxidation Stability of Aviation Fuels (Potential Residue Method)
CIVIL	ASTM D909 - Standard Test Method for Supercharge Rating of Spark-Ignition Aviation Gasoline
CIVIL	ASTM D1094 - Standard Test Method for Water Reaction of Aviation Fuels
CIVIL	ASTM D1266 - Standard Test Method for Sulfur in Petroleum Products (Lamp Method)
CIVIL	ASTM D1298 - Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
CIVIL	ASTM D2386 - Standard Test Method for Freezing Point of Aviation Fuels
CIVIL	ASTM D2392 - Standard Test Method for color of Dyed Aviation Gasolines
CIVIL	ASTM D2622 - Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry
CIVIL	ASTM D2624 - Standard Test Methods for Electrical Conductivity of Aviation and Distillate Fuels
CIVIL	ASTM D2699 - Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel
CIVIL	ASTM D2700 - Standard Test Method for Motor Octane Number of Spark-Ignition Engine Fuel
CIVIL	ASTM D3237 - Standard Test Method for Lead in Gasoline by Atomic Absorption Spectroscopy
CIVIL	ASTM D3338 - Standard Test Method for Estimation of Net Heat of Combustion of Aviation Fuels
CIVIL	ASTM D3341 - Standard Test Method for Lead in Gasoline - Iodine Monochloride Method
CIVIL	ASTM D4052 - Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
CIVIL	ASTM D4171 - Standard Specification for Fuel System Icing Inhibitors
CIVIL	ASTM D4176 - Standard Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)
CIVIL	ASTM D4809 - Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)

DEF STAN 91-090 Issue 5

CIVIL	ASTM D4815 - Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography
CIVIL	ASTM D5006 - Standard Test Method for Measurement of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels
CIVIL	ASTM D5059 - Standard Test Methods for Lead in Gasoline by X-ray Spectroscopy
CIVIL	ASTM D5191 - Standard Test Method for Vapor Pressure of Petroleum Products and Liquid Fuels (Mini Method)
CIVIL	ASTM D5453 - Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence
CIVIL	IP 12 - Determination of Specific Energy
CIVIL	IP 16 - Determination of the freezing point of aviation fuels — Manual method
CIVIL	IP 17 - Determination of Colour - Lovibond Tintometer Method
CIVIL	IP 69 - Determination of Vapour Pressure - Reid Method
CIVIL	IP 107 - Determination of Sulfur - Lamp Combustion Method
CIVIL	IP 119 - Knock Characteristics of Aviation Gasoline by the Supercharged Method
CIVIL	IP 123 - Petroleum products — Determination of distillation characteristics at atmospheric pressure
CIVIL	IP 131 - Petroleum products - Gum content of light and middle distillate fuels - Jet evaporation method
CIVIL	IP 138 - Determination of oxidation stability of aviation fuel Potential residue method
CIVIL	IP 154 - Petroleum Products - Corrosiveness to Copper - Copper Strip Test
CIVIL	IP 160 - Crude petroleum and liquid petroleum products - Laboratory determination of density - Hydrometer method
CIVIL	IP 228 - Determination of Lead Content of Gasoline - X-ray Spectrometric Method
CIVIL	IP 236 - Petroleum products - Determination of knock characteristics of motor and aviation fuels - Motor method
CIVIL	IP 243 - Petroleum products and hydrocarbons- Determination of sulfur content- Wickbold combustion method

DEF STAN 91-090 Issue 5

CIVIL	IP 270 - Petroleum Products - Determination of Lead Content of Gasoline - Iodine Monochloride Method
CIVIL	IP 274 - Determination of Electrical Conductivity of Aviation and Distillate Fuels
CIVIL	IP 289 - Determination of Water Reaction of Aviation Fuels
CIVIL	IP 365 - Crude petroleum and petroleum products - Determination of density - Oscillating U-tube method
CIVIL	IP 367 - Petroleum products - Determination and application of precision data in relation to methods of test (ISO 4259: 1992/Cor 1:1993)
CIVIL	IP 394 - Liquid petroleum products - Vapour pressure - Part 1: Determination of air saturated vapour pressure (ASVP) and calculated dry vapour pressure equivalent (DVPE)
CIVIL	IP 428 - Liquid Petroleum Products - Petrol - Determination of Low Lead Concentrations by Atomic Absorption Spectrometry
CIVIL	IP 566 - Liquid petroleum products - Determination of hydrocarbon types and oxygenates in automotive-motor gasoline and in ethanol (E85) automotive fuel - Multidimensional gas chromatography method
CIVIL	IP 569 - Determination of Colour in Lovibond Units - Automatic Method

2 Reference in this Standard to any normative references 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. Care should be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards the most recent editions shall always apply due to safety and regulatory requirements.

3 In consideration of clause 2 above, users shall be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an Invitation to Tender or contract. Correct identification of standards is as defined in the ITT or contract.

4 DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Defence Standards.

Definitions

For the purpose of this standard, ISO/IEC Guide 2 'Standardization and Related Activities – General Vocabulary' and the definitions shown below apply.

Definition	Description
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Abbreviations

Abbreviation	Description
% m/m	Percentage Mass
% v/v	Percentage Volume
°C	Degrees Celsius
AFC	Aviation Fuels Committee
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
ASVP	Air Saturated Vapour Pressure
AVGAS	Aviation Grade Gasoline
CAA	Civil Aviation Authority
Def Stan	Defence Standard
DiEGME	Diethylene Glycol Monomethyl Ether
DIPE	Diisopropylether
DSFA	Defence Strategic Fuels Authority
DStan	UK Defence Standardization
DVPE	Dry Vapour Pressure Equivalent
EASA	European Air Safety Agency
ETBE	Ethyl Tert-Butyl Ether
FSII	Fuel System Icing Inhibitor
gPb/l	Grams of Lead per Litre
IEC	International Electrotechnical Commission
IP	Institute Petroleum
ISO	International Standard Organisation
ITT	Invitation To Tender
JSD	Joint Service Designation

DEF STAN 91-090 Issue 5

kg/m ³	Kilograms per cubic metre (Unit of Density) defined by mass in kilograms divided by volume in cubic metres
kPa	Kilopascal (Unit of Pressure)
LL	Low Lead
mg/100ml	Miligrams per 100 Millilitres
MJ/kg	Megajoule per Kilogram
ml	Millilitre
MoD	Ministry of Defence
MTBE	Methyl Tert-Butyl Ether
NATO	North Atlantic Treaty Organisation
PN	Performance Number
pS/m	Pico-Siemens per metre (Fluids which have low electrical conductivity (below 50 pS/m), are called Accumulators. Fluids having conductivities above 50 pS/m are called Non-Accumulators)
SDA	Static Dissipator Additive
TAME	Tert-Amyl Methyl Ether
UL	Unleaded

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File Reference

The DStan file reference relating to work on this standard is 91/90.

Contract Requirements

When Defence Standards are incorporated into contracts, users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

Revision of Defence Standards

Defence Standards are revised as necessary by an up-issue or amendment. It is important that users of Defence Standards ensure that they are in possession of the latest issue or amendment. Information on all Defence Standards can be found on the DStan Websites <https://www.dstan.mod.uk> and <http://dstan.uwh.diif.r.mil.uk/>, updated weekly. Any person who, when making use of a Defence Standard, encounters an inaccuracy or ambiguity is encouraged to notify UK Defence Standardization (DStan) without delay in order that the matter may be investigated and appropriate action taken.

