INTERNATIONAL STANDARD

ISO 4925

Second edition 2005-02-01

Road vehicles — Specification of non-petroleum-base brake fluids for hydraulic systems

Véhicules routiers — Spécifications pour liquides de frein à base non pétrolière pour systèmes hydrauliques

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 4925:2005 https://standards.iteh.ai/catalog/standards/sist/f699d7c3-9ba0-41e3-beb1-f47017801259/iso-4925-2005



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 4925:2005 https://standards.iteh.ai/catalog/standards/sist/f699d7c3-9ba0-41e3-beb1-f47017801259/iso-4925-2005

© ISO 2005

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Cont	Contents		
Forewo	ord	iv	
Introdu	ction	v	
1	Scope		
2	Normative references	1	
3	Materials	2	
4	Specifications	2	
5	Test methods	5	
5.1	Viscosity		
5.1.1	General	5	
5.1.2	Repeatability (single analyst)	5	
5.1.3	Reproducibility (multi-laboratory)	5	
5.2	Equilibrium reflux boiling point (ERBP)	5	
5.2.1	General	5	
5.2.2	Preparation of apparatus	5	
5.2.3	Test procedure		
5.2.4	Reproducibility (multi-laboratory)	6	
5.2.5	Reproducibility (multi-laboratory)	6	
5.2.6	Wet ERBP test	6	
5.3	Wet ERBP test (standards.itch.ai)	9	
5.4	Fluid stability	9	
5.4.1	High-temperature stability	9	
5.4.2	Chemical stability and ards. iteh.ai/catalog/standards/sist/f699d7c3-9ba0-41e3-beb1-	10	
5.5	Corrosion #47017801259/iso-4925-2005	10	
5.5.1	Metal strip characteristics prior to testing	10	
5.5.2	Preparation of joints		
5.5.3	Test procedure		
5.6	Fluidity and appearance at low temperatures		
5.6.1	At – 40 °C for 144 h		
5.6.2	At – 50 °C for 6 h		
5.7	Water tolerance		
5.7.1	At – 40 °C for 22 h		
5.7.1	At 60 °C for 22 h		
5.7.2 5.8	Compatibility/miscibility with ISO 4926 fluid		
5.8.1	At – 40 °C for 22 h		
5.8.2	At 60 °C for 22 h		
5.6.2 5.9	Resistance to oxidation		
5.9 5.10	Effect on rubber		
5.10	General	_	
	Test procedures		
	Repeatability (single analyst)		
	Reproducibility (multi-laboratory)		
	A (normative) ISO Styrene-butadiene rubber (SBR) brake cups for testing brake fluid		
	B (normative) Corrosion test strips		
	C (normative) Corrosion strip assembly		
	· · · · · · · · · · · · · · · · · · ·	19	
Annex	D (normative) Standard ethylene, propylene and diene (EPDM) terpolymer rubber slabstock	20	
A			
	E (normative) Triethylene glycol monomethyl ether (TEGME) brake fluid grade		
Bibliog	raphy	25	

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 4925 was prepared by Technical Committee ISO/TC 22, Road vehicles, Subcommittee SC 2, Braking systems and equipment.

This second edition cancels and replaces the first edition (ISO 4925:1978), which has been technically revised. (standards.iteh.ai)

ISO 4925:2005 https://standards.iteh.ai/catalog/standards/sist/f699d7c3-9ba0-41e3-beb1-f47017801259/iso-4925-2005

Introduction

The specifications for fluids given in this International Standard incorporate a range of performance standards in use throughout the world at the time of publication. The classes include fluids technically equivalent to those designated DOT 3, DOT 4 and DOT 5.1.

The major use of these fluids is in the hydraulic brake and clutch systems of road vehicles, but they can also be used in any suitable hydraulic system.

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 4925:2005 https://standards.iteh.ai/catalog/standards/sist/f699d7c3-9ba0-41e3-beb1-f47017801259/iso-4925-2005

© ISO 2005 - All rights reserved

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 4925:2005

https://standards.iteh.ai/catalog/standards/sist/f699d7c3-9ba0-41e3-beb1-f47017801259/iso-4925-2005

Road vehicles — Specification of non-petroleum-base brake fluids for hydraulic systems

1 Scope

This International Standard gives the specifications — requirements and test methods — for non-petroleum-base fluids used in road-vehicle hydraulic brake and clutch systems that are designed for use with such fluids and equipped with seals, cups or double-lipped type gland seals made of styrene-butadiene rubber (SBR) and ethylene-propylene elastomer (EPDM).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IT eh S'I'ANDARD PREVIEW

ISO 37:1994, Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties (standards.iteh.ai)

ISO 48:1994, Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)

ISO 4925:2005

https://standards.iteh.ai/catalog/standards/sist/f699d7c3-9ba0-41e3-beb1-ISO 812:1991, Rubber, vulcanized — Determination of low-temperature brittleness

ISO 815:1991, Rubber, vulcanized or thermoplastic — Determination of compression set at ambient, elevated or low temperatures

ISO 3104:1994, Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity

ISO 4926:1978, Road vehicle — Hydraulic brake systems — Non petroleum base reference fluids

ASTM D 91, Standard test method for precipitation number of lubricating oils

ASTM E 298, Standard test methods for assay of organic peroxides

ASTM D 395, Standard test methods for rubber property — Compression set

ASTM D 412, Standard test methods for vulcanized rubber and thermoplastic elastomers — Tension

ASTM D 664, Standard test method for acid number of petroleum products by potentiometric titration

ASTM D 746, Standard test method for brittleness temperature of plastics and elastomers by impact

ASTM D 865, Test method for rubber — Deterioration by heating in air (test tube enclosure)

ASTM D 1120, Standard test method for boiling point of engine coolants

ASTM D 1123, Standard test method for water in engine coolant concentrate by the Fisher reagent method

© ISO 2005 – All rights reserved

ASTM D 1209, Standard test method for colour of clear liquids (platinum-cobalt scale)

ASTM D 1364, Standard test method for water in volatile solvents (Karl Fischer reagent titration method)

ASTM D 1415, Standard test method for rubber property — International hardness

ASTM D 1613, Standard test method for acidity in volatile solvents and chemical intermediates used in paint, varnish, lacquer and related products

ASTM D 3182, Standard practice for rubber — Materials, equipment and procedures for mixing standard compounds and preparing standard vulcanized sheets

SAE J 1703, Motor vehicle brake fluid

3 Materials

On visual inspection, the fluid shall be clear and free of suspended matter, dirt and sediment. The quality of the materials used shall be such that the resulting product conforms to the requirements of this International Standard and that uniformity of performance is ensured. Fluids may be dyed, provided no confusion is possible between them and other types of fluids.

4 Specifications

The product shall meet the requirements for the appropriate class in accordance with Table 1, using the test methods according to Clause 5. (standards.iteh.ai)

NOTE It is intended that a stroking test be added to a future revision of this International Standard.

https://standards.iteh.ai/catalog/standards/sist/f699d7c3-9ba0-41e3-beb1-Table 1 — Brake fluid specifications, 5-4 Tests and requirements

Test			Requirement(s)				
method (subclause)	Test description		Unit	Class 3	Class 4	Class 5-1	Class 6
5.1	Viscosity						
		at – 40 °C	mm ² /s	≤ 1	500	≤ 900	≤ 750
		at 100 °C	mm ² /s		≥	1,5	
5.2	Equilibrium reflux boiling point (ERBP)		°C	≥ 205	≥ 230	≥ 260	≥ 250
5.2.6		Wet ERBP	°C	≥ 140	≥ 155	≥ 180	≥ 165
5.3	рН		_	7 to 11,5			
5.4	Fluid stability	/					
5.4.1		High-temperature stability	°C	±5°C			
5.4.2		Chemical stability	°C	±5°C			

Table 1 — Brake fluid specifications — Tests and requirements (continued)

Test method (subclause)	Test description	Unit	Requirement(s)							
			Class 3	Class 4	Class 5-1	Class 6				
5.5	Corrosion	•								
	Metal strip characteristics after testing									
	Mass change									
	Tinned iron	mg/cm ²	- 0,2 to 0,2							
	Steel	mg/cm ²	- 0,2 to 0,2							
	Aluminium	mg/cm ²	- 0,1 to 0,1							
	Cast iron	mg/cm ²	- 0,2 to 0,2							
	Brass	mg/cm ²	- 0,4 to 0,4							
	Copper	mg/cm ²	- 0,4 to 0,4							
	Aspect	_	No pitting or roughness outs contact area							
	Staining/discoloration	_	Permitted							
	Liquid characteristics after testing									
	TASPECT TANDARD PREV		No gel, none adhering crys							
	рН		7 to 11,5							
	Sediment tandards. Iten.al)	% vol.	≤ 0,1							
	Rubber cup characteristics after testing									
	https://staBilisters or carbon black separation at surfacea-	41e3-beb	1-	No	ne					
	Hardness decrease	IRHD	0 ≤ 15							
	Base diameter increase	mm		€	1,4					
	Volume increase	%	≤ 16							
5.6	Fluidity and appearance at low temperatures		.L							
5.6.1	at – 40 °C for 144 h									
	Aspect	_	Clear and homogeneous			ous				
	Bubble flow time	s	≤ 10							
	Sediments	_	Absence							
5.6.2	at – 50 °C for 6 h									
	Aspect	_	Clea	ar and ho	mogene	ous				
	Bubble flow time	s		€	35					
	Sediments	_	Absence							

Table 1 — Brake fluid specifications — Tests and requirements (continued)

Test	Test description		Requirement(s)						
method (subclause)			Class 3	Class 4	Class 5-1	Class 6			
5.7	Water tolerance								
5.7.1	at – 40 °C for 22 h								
	Aspect	_	Clear and homogeneous						
	Bubble flow time	s	≤ 10						
	Sediments	_	Absence						
5.7.2	at 60 °C for 22 h								
	Aspect	_	Clea	ar and h	omogene	eous			
	Sediments	% vol.),05				
5.8	Compatibility/miscibility with ISO 4926 fluid								
5.8.1	at – 40 °C for 22 h								
	Aspect	_	Clea	ar and h	omogene	eous			
	Sediments	_		Abs	ence				
5.8.2	at – 60 °C for 22 h								
	Aspect ANDARD PR	EVI	Cle	ar and h	omogene	eous			
	Sediments (standards.iteh.a	wol.		€ (),05				
5.9	Resistance to oxidation								
	ISO 4925:2005 Metal strip aspect teh.ai/catalog/standards/sist/f699d76 f47017801259/iso-4925-2005	c3- <u>9b</u> a0-			r roughn a trace c				
	Staining/discoloration	_		Pern	nitted				
	Mass change of aluminium strip	mg/cm ²		- 0,05 t	o + 0,05				
	Mass change of cast iron strip	mg/cm ²		– 0,3 t	o + 0,3				
5.10	Effect on rubber								
5.10.2.1	Styrene Butadiene Rubber (SBR)								
	at 120 °C								
	Cup diameter increase	mm		0,15	to 1,4				
	Hardness change	IRHD		- 15	to 0				
	Volume increase	%	1 to 16						
	Blisters or carbon black separation at surface	_		No	ne				
5.10.2.2	Ethylene Propylene Diene Monomer (EPDM)								
	at 120 °C								
	Hardness change	IRHD		- 15	to 0				
	Volume change	%		0 to	10				

5 Test methods

5.1 Viscosity

5.1.1 General

Determine the kinematic viscosity of the fluid in accordance with ISO 3104.

Report the viscosity to the nearest 1 mm 2 /s at - 40 °C and to the nearest 0,01 mm 2 /s at + 100 °C. Duplicate runs that agree within 1,2 % relative are acceptable for averaging (95 % confidence level).

5.1.2 Repeatability (single analyst)

The coefficient of variation of results (each the average of duplicates) obtained by the same analyst on different days shall not be greater than 0,4 % at 47 degrees of freedom. Two such values shall be considered unacceptable (95 % confidence level) if they differ by more than 1,2 %.

5.1.3 Reproducibility (multi-laboratory)

The coefficient of variation of results (each the average of duplicates) obtained by analysts in different laboratories shall not be greater than 1,0 % at 15 degrees of freedom. Two such values shall be considered unacceptable (95 % confidence level) if they differ by more than 3,0 %.

5.2 Equilibrium reflux boiling point (ERBPRD PREVIEW

5.2.1 General (standards.iteh.ai)

Determine the ERBP of the fluid in accordance with ASTM D 1120¹⁾, but with the following changes to the procedure and to the apparatus (see Figures 1 and 2). In the standard such arcalabor standard sixty for the second s

- Thermometer: immersion shall be 76 mm and the thermometer shall be calibrated.
- Heat source: use either a suitable variac-controlled heating mantle designed to fit the flask, or an electric heater with rheostat heat control.

5.2.2 Preparation of apparatus

Thoroughly clean and dry all glassware before use. Attach the flask to the condenser. When using a heating mantle, place the mantle under the flask and support it with a suitable ring clamp and laboratory-type stand, holding the whole assembly in place by a clamp. When using a rheostat controlled heater, centre a standard porcelain or other suitable refractory having a diameter opening of 32 mm to 38 mm over the heating element of the electric heater and mount the flask on the refractory so that direct heat is applied to the flask only through the opening in the refractory. Place the whole assembly in an area free from draughts or other causes of sudden temperature changes.

© ISO 2005 – All rights reserved

-

¹⁾ Boiling chips for use with ASTM D 1120 can be obtained from Electro Minerals Co. (US) Inc, PO Box 423, Niagara Falls, NY 14302, USA, or from the Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale Pa 15096, USA (RM-75).

This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.

5.2.3 Test procedure

Turn on the condenser water and apply heat to the flask at such a rate that the fluid is refluxing within (10 ± 2) min at a rate higher than one drop per second. The reflux rate shall not exceed five drops per second. Immediately adjust the heat input to obtain a specified equilibrium reflux rate of one drop per second to two drops per second over the next (5 ± 2) min period. Maintain a timed and constant equilibrium reflux rate of one drop per second to two drops per second for an additional 2 min; record the average value of four temperature readings taken at 30 s intervals at the equilibrium reflux boiling point.

Report the boiling point to the nearest degree Celsius. Duplicate results that agree within 3 °C are acceptable for averages (95 % confidence level).

5.2.4 Repeatability (single analyst)

The standard deviation of results (each the average of duplicates), obtained by the same analyst on different days shall not be greater than 1,3 °C at 34 degrees of freedom. Two such values shall be considered unacceptable (95 % confidence level) if they differ by more than 4 °C.

5.2.5 Reproducibility (multi-laboratory)

The standard deviation of results (each the average of duplicates), obtained by analysts in different laboratories, shall be not greater than 3,5 °C at 15 degrees of freedom. Two such values shall be considered unacceptable (95 % confidence level) if they differ by more than 10,5 °C.

5.2.6 Wet ERBP test iTeh STANDARD PREVIEW

5.2.6.1 Apparatus (standards.iteh.ai)

- **5.2.6.1.1 Two corrosion test jars** or equivalent screw-top, straight-sided, round glass jars each having a capacity of about 475 ml and approximate inner dimensions of 100 mm height by 75 mm diameter, with matching lids having new, clean inserts providing water-proof and vapour-proof seals²).
- **5.2.6.1.2 Desiccator and cover:** bowl-form glass desiccator with 250 mm inside diameter, having a matching tubulated cover fitted with a No. 8 rubber stopper (see Figure 3).
- **5.2.6.1.3 Desiccator plate** of 230 mm diameter, perforated porcelain desiccator plate, without feet, glazed on one side (No.18 or equivalent)³⁾.

_

²⁾ Suitable corrosion test jars (RM-49) and tinned steel lids (RM-63) can be obtained from the Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, Pa 15096, USA.

³⁾ Desiccator plates (No. 08-641C) can be obtained from Fischer Scientific, Springfield, New Jersey, USA or CeramTec AG (No. 602786), Glaswerk Wertheim KG (No. 911743431) or equivalents, according to DIN/ISO 12911, diameter 235 mm.

This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.