International Standard

ISO 4925

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

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

Fourth edition
2026-06

Reference number
ISO 4925:2026(en)

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Published in Switzerland

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee 33, *Vehicle dynamics, chassis components and driving automation systems testing*.

This fourth edition cancels and replaces the third edition (ISO 4925:2020 [1]), which has been technically revised.

The main changes are as follows:

— lubrication requirement for noise test is added as a pass/fail criterion 6.12;

— lubrication requirement for wear test is added as a pass/fail criterion 6.13.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The specifications for fluids given in this document incorporate a range of performance standards in use throughout the world at the time of publication. Further lubrication requirements are added for all classes 3, 4, 5–1, 6 and 7.

These fluids are mainly used in the hydraulic brake and clutch systems of road vehicles, but they can also be used in any suitable hydraulic system.

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

1 Scope

This document provides the specifications, requirements and test methods for non-petroleum-based 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 48-2, *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 2: Hardness between 10 IRHD and 100 IRHD*

ISO 812, *Rubber, vulcanized or thermoplastic — Determination of low-temperature brittleness*

ISO 815-1, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

ISO 815-2, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 2: At low temperatures*

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

ISO 4926, *Road vehicles — Hydraulic braking systems — Non-petroleum-based reference fluid*

ASTM A 624, *Standard specification for tin mill products, electrolytic tin plate, single reduced*

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

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

ASTM D 865, *Standard 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 1121, *Standard test method for reserve alkalinity of engine coolants and antirusts*

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

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

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

ASTM D 3185, *Standard test methods for rubber — Evaluation of SBR (Styrene-Butadiene Rubber) including mixtures with oil*

ASTM D 3185:2006, *Standard test methods for rubber — Evaluation of SBR (Styrene-Butadiene Rubber) including mixtures with oil*

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

DIN 51834-5:2024, *Testing of lubricants - Tribological test in the translatory oscillation apparatus - Part 5: Quantification of the friction-induced noise development of brake fluids in EPDM-metal contacts*

DIN 51834-5, *Testing of lubricants - Tribological test in the translatory oscillation apparatus - Part 5: Quantification of the friction-induced noise development of brake fluids in EPDM-metal contacts*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 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 document and that uniformity of performance is ensured. Fluids may be dyed, provided no confusion is possible between them and other types of fluids.

5 Specifications

The product shall meet the requirements for the appropriate class in accordance with Table 1, using the test methods according to Clause 6.

Table 1 — Brake fluid specifications — Tests and requirements

Test method (subclause)	Test description		Unit	Requirement(s)				
				Class 3	Class 4	Class 5–1	Class 6	Class 7
6.1	Viscosity							
		at −40 °C	mm^2/s	≤1 500		≤900	≤750	≤750
		at 100 °C	mm^2/s	≥1,5				
6.2	Equilibrium reflux boiling point (ERBP)		°C	≥205	≥230	≥260	≥250	≥260
6.2.6		Wet ERBP	°C	≥140	≥155	≥180	≥165	≥180
6.3	pH		—	7 to 11,5				
6.4	Fluid stability							
6.4.1		High-temperature stability	°C	±5 °C				
6.4.2		Chemical stability	°C	±5 °C				
6.5	Corrosion							
		Metal strip characteristics after testing						
		Mass change						

Table 1 *(continued)*

Test method (subclause)	Test description	Unit	Requirement(s) Class 3	Class 4	Class 5–1	Class 6	Class 7
	Tinned iron	mg/cm²	−0,2 to 0,2				
	Steel	mg/cm²	−0,2 to 0,2				
	Aluminium	mg/cm²	−0,1 to 0,1				
	Cast iron	mg/cm²	−0,2 to 0,2				
	Brass	mg/cm²	−0,4 to 0,4				
	Copper	mg/cm²	−0,4 to 0,4				
	Aspect	—	No pitting or roughness outside contact area				
	Staining/discolouration	—	Permitted				
	Liquid characteristics after testing						
	Aspect	—	No gel, none adhering crystals				
	pH	—	7 to 11,5				
	Sediment	% vol.	≤0,1				
	Rubber cup characteristics after testing						
	Blisters or carbon black separation at surface	—	None				
	Hardness decrease	IRHD	≤15				
	Base diameter increase	mm	≤1,4				
	Volume increase	%	≤16				
6.6	Fluidity and appearance at low temperatures						
6.6.1	at −40 °C for 144 h						
	Aspect	—	Clear and homogeneous				
	Bubble flow time	s	≤10				
	Sediments	—	Absence				
6.6.2	at −50 °C for 6 h						
	Aspect	—	Clear and homogeneous				
	Bubble flow time	s	≤35				
	Sediments	—	Absence				
6.7	Water tolerance						
6.7.1	at −40 °C for 22 h						
	Aspect	—	Clear and homogeneous				
	Bubble flow time	s	≤10				
	Sediments	—	Absence				
6.7.2	at 60 °C for 22 h						
	Aspect	—	Clear and homogeneous				
	Sediments	% vol.	≤0,05				
6.8	Compatibility/miscibility with ISO 4926 fluid						
6.8.1	at − 40 °C for 22 h						
	Aspect	—	Clear and homogeneous				
	Sediments	—	Absence				
6.8.2	at 60 °C for 22 h						
	Aspect	—	Clear and homogeneous				
	Sediments	% vol.	≤0,05				