Indian Standard

SPECIFICATION FOR FIRE-RESISTANT HYDRAULIC FLUIDS

PART 3 WATER GLYCOL TYPE

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

SPECIFICATION FOR FIRE-RESISTANT HYDRAULIC FLUIDS

PART 3 WATER GLYCOL TYPE

0. FOREWORD

0.1 This Indian Standard (Part 3) was adopted by the Indian Standards Institution on 12 April 1983, after the draft finalized by the Lubricants and Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 The use of fire-resistant hydraulic fluids is increasing due to a growing awareness of the dangers inherent in using mineral oils for applications where there is a fire risk. There are four types of fire-resistant hydraulic fluids, namely, dilute emulsions, invert emulsions, water glycols and synthetic fluids. Water glycols are true solutions of water, glycols and high molecular mass thickners to increase viscosity. Additives, such as antiwear, anti-corrosion, antioxidant and antifoam are also added to obtain improved performance. In view of being true solutions, their stability characteristics are good. Their working temperatures are -10 to $+60°C$. These are normally compatible with all kinds of seals, hoses and gaskets commonly used in mineral oil systems. Use of magnesium, cadmium and zinc metals should be avoided with these systems.

0.3 Other parts of the standard published so far are as follows:

(Part 1)-1983 Dilute emulsions for powered supports

(Part 2)-1983 Invert emulsions (water-in-oil) type

(Part 4)-1983 Phosphate esters type

0.4 Selection and use of the fire-resistant hydraulic fluids are covered in IS : 10531-1983* while determination of their fire-resistant characteristics is given in IS : 7895-1975†.

*Code of practice for selection and use of fire-resistant hydraulic fluids.

†Tests for fire-resistant characteristics of hydraulic fluids used in mining machinery.

0.5 In the preparation of this standard considerable assistance has been derived from NCB Specification No. 570/1970 published by the National Coal Board, U.K.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 3) prescribes the requirements and methods of sampling and test for fire-resistant hydraulic fluids, water glycol type suitable for use in hydraulic systems.

2. GRADES

2.1 The material shall be in two viscosity grades namely, VG 22 and VG 46 designated as HF — C 22 and HF — C 46 respectively.

3. REQUIREMENTS

3.1 Description — The material shall be a clear fluid, free from foreign matter, sediment and visible impurities. It shall not contain any ingredients injurious to persons using or handling it.

3.2 Composition — The material shall be composed of glycols, polymeric thickners, water and additives necessary for desirable antiwear, anticorrosive and antifoaming properties. It shall not be corrosive to ferrous and non-ferrous metals.

3.3 The material shall also comply with the requirements prescribed in Table 1, when tested according to the appropriate methods specified in col 5 of the table.

4. PACKING AND MARKING

4.1 Packing — The material shall be packed in suitable containers as agreed to between the purchaser and the supplier. Galvanized drums/ barrels shall not be used for packing these fluids.

*Rules for rounding off numerical values (*revised*).

TABLE 1 REQUIREMENTS FOR FIRE-RESISTANT HYDRAULIC FLUIDS—WATER GLYCOL TYPE

(*Clause* 3.3)

Sl No.	Characteristic	Requirement		Methods of Test, Ref to (P :) Methods of IS : 1448*
		Grade HF-C 22	Grade HF-C 46	
(1)	(2)	(3)	(4)	(5)
i)	Appearance	Clear, practically colourless	Clear, practically colourless	—
ii)	Kinematic viscosity, cSt at 40°C	19·8 to 24·2	41·4 to 50·6	P : 25
iii)	*p*H value	8·5 to 10·5	8·5 to 10·5	IS : 5741-1970†
iv)	Foaming stability, ml, at 24°C	Nil	Nil	P : 67
v)	Pour Point, °C, *Max*	−10	−10	P : 10
vi)	Relative density at 15°/15°C	1·05 to 1·09	1·05 to 1·09	P : 32
vii)	Water content, percent by volume	40 to 60	40 to 45	P : 40
viii)	Rust preventive characteristics	Shall pass the test after 24 h		P : 96‡
ix)	Pump wear test:			
	a) Total ring and vane mass loss, mg, *Max*	500	500	P : §
	b) Fire resistant characteristics	Shall pass the test A, B and C		IS : 7895-1975‖

*Methods of test for petroleum and its products.
†Methods for determination of *p*H.
‡Fluid alone is to be taken for this test.
§Under preparation. Till such time ASTM D 2882-74 may be followed.
‖Tests for fire resistant characteristics of hydraulic fluids used in mining machinery.

4.1.1 The containers, together with associated bungs, caps, seals and other fittings shall not be made from aluminium, magnesium or titanium nor from alloys containing these metals as major constituents. The containers and their fittings shall not be painted with aluminium paints.

4.1.2 The internal cleanliness of all containers before they are filled shall be of a high standard. Any coating of the internal surfaces of the barrels shall have no deleterious effect on the fluid.

4.2 Marking — The containers shall be securely closed and marked with the name of manufacturer; name, type, grade and mass of the material; recognized trade-mark if any; and with identification in code or otherwise to enable the lot of consignment or manufacture to be traced back; and the instructions for use.

4.2.1 The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING

5.1 Representative samples of the material shall be drawn as prescribed in IS : 1447-1966*.

6. STORAGE

6.1 The material shall be stored and handled, strictly in accordance with the suppliers instructions.

*Methods of sampling of petroleum and its products.

(*Continued from page* 2)

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

AMENDMENT NO. 1 JULY 1988

TO

IS:10532(Part 3)-1983 SPECIFICATION FOR FIRE-RESISTANT HYDRAULIC FLUIDS

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(Page 6, clause 5.1) - Add the following new clause after 5.1:

'5.2 Criteria for Conformity

5.2.1 The lot shall be declared as conforming to the requirements of the specification if all the test results on the composite sample meet the relevant specification requirements.'

AMENDMENT NO. 2 JULY 1996
TO
IS 10532 (Part 3) : 1983 SPECIFICATION FOR FIRE-RESISTANT HYDRAULIC FLUIDS
PART 3 WATER GLYCOL TYPE

[*Page* 5, *Table* 1, *Sl No.* (v), *col* 3 *and* 4] — Substitute the following for the existing:

'(3)	(4)
-9	-9'

(PCD 4)

Reprography Unit, BIS, New Delhi, India