

Table 4 — Specifications for types HEES hydraulic fluids, synthetic esters

Lubricants, Industrial Oils and Related Products
Group HE: Environmentally Acceptable Hydraulic Fluids

Characteristics of test	Units	Requirements					Test method or Standard
		22	32	46	68	100	
Viscosity grade							
Density at 15 °C	kg/m ³	— ^a	— ^a	— ^a	— ^a	— ^a	ISO 12185 ISO 3675
Colour ^b		— ^a	— ^a	— ^a	— ^a	— ^a	ISO 2049
Appearance at 25 °C ^c		Clbr	Clbr	Clbr	Clbr	Clbr	
Ash content, max.	% (m/m)	— ^d	— ^d	— ^d	— ^d	— ^d	ISO 6245
Flash point Cleveland open cup, min.	°C	165	175	185	195	205	ISO 2592
Kinematic viscosity							ISO 3104
at – 20 °C, max.	mm ² /s	— ^d	— ^d	— ^d	— ^d	— ^d	
at 0 °C, max.	mm ² /s	300	420	780	1 400	1 500	
at 40 °C, min. to max.	mm ² /s	19,8 to 24,2	28,8 to 35,2	41,4 to 50,6	61,2 to 74,8	90,0 to 110	
at 100 °C, min.	mm ² /s	4,1	5,0	6,1	7,8	10,0	
Pour point, max.	°C	– 21	– 18	– 15	– 12	– 9	ISO 3016
Low temperature fluidity after 7 days	°C	— ^d	— ^d	— ^d	— ^d	— ^d	ASTM D2532
Acid number ^e , max.	mg KOH/g	— ^d	— ^d	— ^d	— ^d	— ^d	ISO 6618
Water content, max.	mg/kg	1 000	1 000	1 000	1 000	1 000	ISO 12937 ISO 6296
Copper corrosion, 100 °C, 3 h, max.	rating	2	2	2	2	2	ISO 2160
Rust prevention, procedure A		Pass	Pass	Pass	Pass	Pass	ISO 7120
Foam							
at 24 °C, max.	ml	150/0	150/0	150/0	150/0	150/0	
at 93 °C, max.		75/0	75/0	75/0	75/0	75/0	ISO 6247
at 24 °C, max.		150/0	150/0	150/0	150/0	150/0	
Air release, 50 °C, max.	min	7	7	10	10	14	ISO 9120
Water separation							
Time to 3 ml emulsion at 54 °C, max.	min	— ^d	— ^d	— ^d	— ^d	— ^d	ISO 6614