RE 15414/08.2019
Replaces: 01.2015

rexroth
A Bosch Company

Hydraulic fluid quick reference Hägglunds products

Contents

1 Hydraulic fluid quick reference

Bosch Rexroth's Hägglunds radial piston hydraulic motors are primarily designed to operate on conventional petroleum based hydraulic fluids.

To get a well working drive system it is very important to follow the recommendations given in this instruction. Improper hydraulic fluid might cause a shorter service life or in worst case lead to instant failure.

NOTICE

Wrong hydraulic fluid for Hägglunds motors
Risk of damage to equipment and impact on service life for Hägglunds motors
- Fluids HFDU other than polyol esters are not allowed

Wrong hydraulic fluid for Hägglunds accessories
Risk of damage to equipment and impact on service life for accessories Hägglunds MDA brakes
- Fluids HFB, HFC and HFD are not allowed

Wrong hydraulic fluid for CBm motors
Risk of damage to equipment and impact on service life for CBM motors
- Fluids HFDR are not allowed

1.1 Applicable fluids

Only hydraulic fluids by the standards given in *Table 1* are suggested. Fluids complying to other standards only, are not approved.

Table 1: Standards for detailed requirements of respective fluid group.

ISO 11158	ISO 15380	ISO 12922
Mineral oil based and mineral oil related hydraulic fluids	Environmentally acceptable hydraulic fluids	Fire resistant hydraulic fluids

Within these standards, not all fluid classes are allowed, and only some are recommended (see *Table 2*).

Table 2: Applicable fluids by designation according to ISO 6743-4.

Recommended	Allowed	Not allowed
HM	HV [mineral] 1)	HH
HV no VI improver [e.g. PAO]	HEPR	HL
HEES [saturated]	HETG	HR
	HEES [un-saturated]	HG
	HFB 2) 3)	HFA (HFAE and HFAS)
	HFC 2) 3)	HEPG
	HFDU 2) 3) 5)	HFDU [Non-polyol ester]
	HFDR 2) 3) 4)	

1) Recommended to be without VI improver.

2) Not allowed for accessories Hägglunds MDA brakes.

3) Special precautions apply, see chapter 1.4 Down-rating.

4) HFDR is not allowed for use with CBM-motors.

5) Only HFDU of polyol ester base are allowed.

ISO and DIN standards for hydraulic fluids are similar, but some of the corresponding classes has different designation.(see *Table 3*)

Table 3: Fluid type designation translator

ISO 6743-4	DIN 51524
HL	HL
HM	HLP
HV	HVLP

1.2 Viscosity Limits

The actual viscosity of the fluid, at the current motor case temperature, controls the fluid's ability to lubricate contacts under high pressure and high shear. Shear induced viscosity loss must be taken into account as well. For viscosity limits see *Table 4*. A visualization of the temperature limits of different straight viscosity grades is seen in *Fig. 1*.

Table 4: Viscosity limits

[cSt]	Recommended		Intermittent	Start-up
	Min_{rec}	Max_{rec}	Min_{int}	Max_{start} 2)
Motors	40	150	20 1)	10000
SP pumps	40	150	20	2000
HD pumps	40	150	20	1600

1) A lower viscosity limit may apply depending on motor configuration, please contact your Bosch Rexroth representative for further information.

2) Short period at start-up.

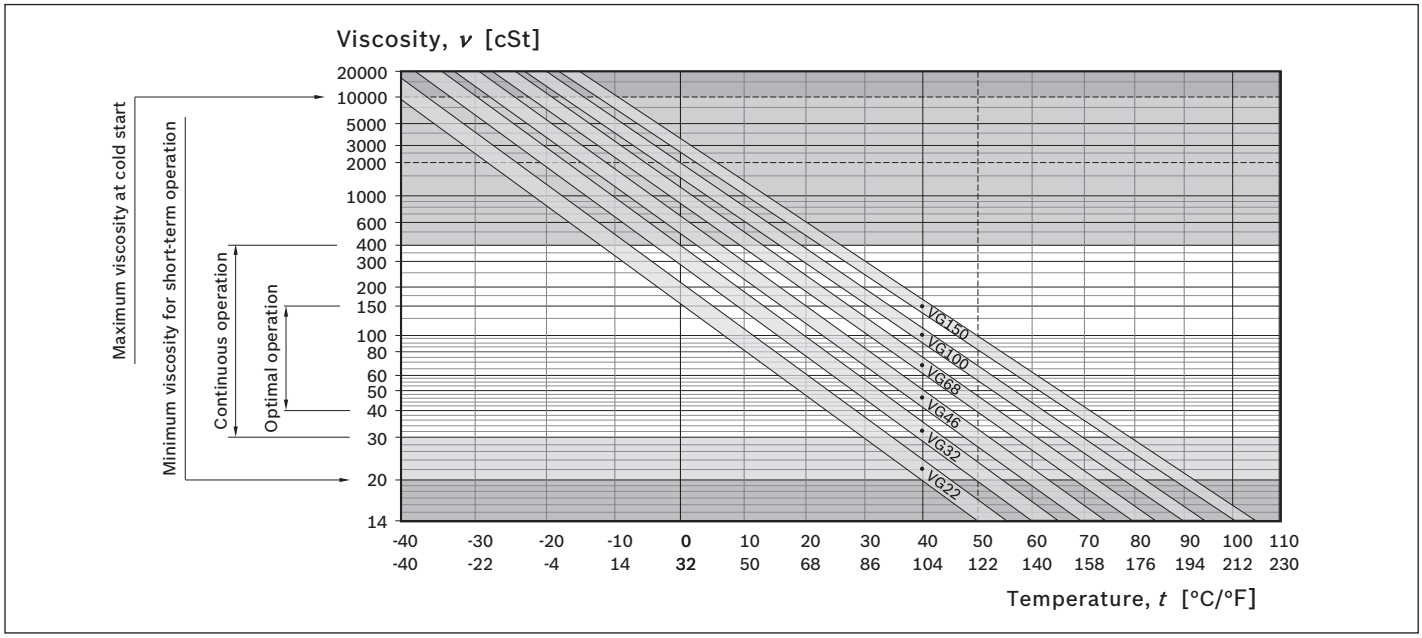

Fig. 1: Selection diagram for viscosity ranges with straight fluids, i.e. viscosity index 100

1.3 Down-rating

There are fluids with lesser lubricity, or characteristics incompatible with the system components, that needs specific precautions.

For these fluids, maximum pressure and rated life must be down-rated. See *Table 5* for fluids that are subject to down-rating.

Table 5: Down-rating factors

Fluid group	Down-rating	
	Pressure 1)	Rated life 2)
HFB (>40% water in oil)	0.7 × stated	0.26 × L_{HM}
HFC (>35% water in glycol)	0.7 × stated	0.24 × L_{HM}
HFDR (phosphate esters)	0.9 × stated	0.8 × L_{HM}
HFDU (other water free)	0.9 × stated	0.8 × L_{HM}

1) Pressure as stated on the motor number plate.

2) L_{HM} is the rated life expectancy with a straight mineral oil, fluid group HM.

1.4 Seal and primer compatibility

For some fluids, specific sealing materials are recommended, and some fluids may require the primer inside the motor to be removed. See *Table 6*.

Table 6: Recommended seal material and primer removal

Fluid group	Recommended seal	Primer removed 1)
HM	NBR/FPM	No
HV	NBR/FPM	No
HFB	NBR	Yes
HFC	NBR	Yes
HFDR	FPM	Yes
HFDU	NBR/FPM	Yes
HEES	NBR/FPM	Yes
HETG	NBR/FPM	Yes
HEPR	NBR/FPM	No

1) Must be specified on order unless available as option in ordering code.

1.5 Additional demands

In addition to the fluid standards, we have demands and recommendations for some fluid characteristics (see *Table 7*).

Table 7: Additional properties exceeding respective fluid standard

Property	Standard	Misc info.	Range	Unit	Value
Gear endurance	ISO 14635-1	FZG (A/8.3/90)	Min	fail stage	11
Shear stability	ISO 26422	KRL, 20h, Visc. reduction	Max [1)]	%	10
Oxidation stability	ISO 4263-1	TOST	Min [2)]	hours	2000
	ISO 4263-3	“Dry” TOST	Min [2)]	hours	2000
Cleanliness	ISO 4406	Particle count	Max	class	18/16/13
Filter Grade	ISO 16889	β10	Min	grade	75
Water content	ISO 12937	Solved and free (*m/m*)	Max [3)]	ppm	200

1) The reduction must be considered when calculating actual viscosity.

2) Recommended limits, undershooting these values calls for more frequently recurring fluid samples.

3) Not applicable for fluid types with intended water content, like HFB and HFC (see section *1.3*).

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