

Rating of hydraulic fluids for Rexroth hydraulic components (pumps and motors)

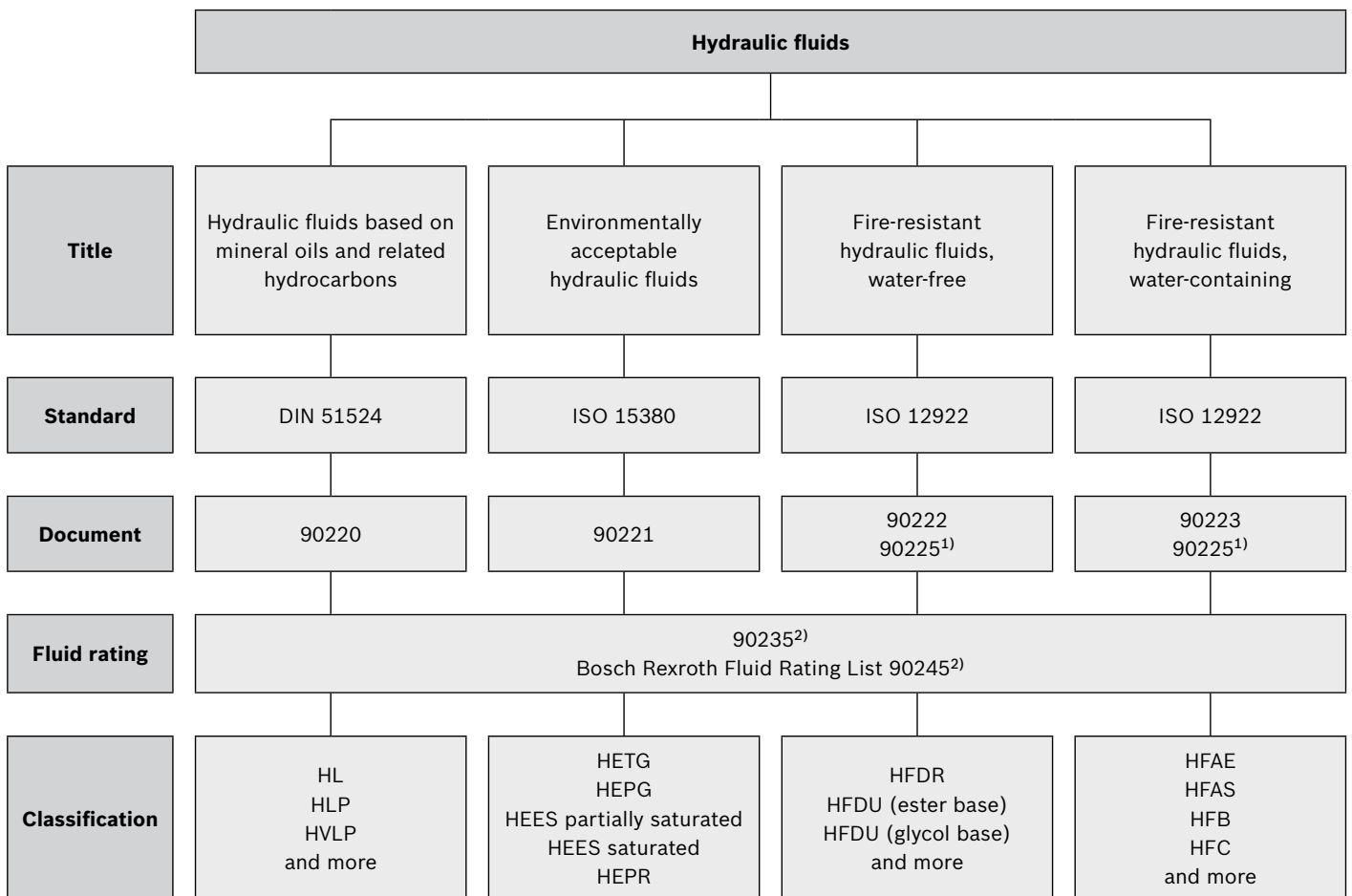
RE 90235

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Bosch Rexroth offers the rating of hydraulic fluids as service – inclusive assistance and consulting of experienced engineers.



1) Valid for Bosch Rexroth axial piston units

2) Valid for Bosch Rexroth Business Unit “Mobile Applications” – pumps and motors

2 Rating of hydraulic fluids

Description

The safe and reliable operation of industrial and mobile equipment is only possible if the hydraulic fluid used is selected with respect to the application. The main tasks of the hydraulic fluid are e.g. transmission of power, lubrication of the components, reduction of friction, corrosion prevention and heat dissipation. Unfortunately the common element "hydraulic fluid" is often disregarded during conceptual design.

Increased requirements on machines and equipment constantly raise the quality requirements on the hydraulic fluid used. For using a suitable hydraulic fluid, adequate knowledge and experience of this are necessary.

Therefore Bosch Rexroth offers the rating of hydraulic fluids for Rexroth hydraulic components as service.

Bosch Rexroth defines hydraulic fluids on the basis of the illustration on page 1. Application notes and requirements for Rexroth hydraulic components can be taken out of the data sheets mentioned in this illustration on page 1.

1 Description

Minimum requirements

At present the standards conformity for the minimum requirement on fluids is defined in our Bosch Rexroth component data sheets. The fluid manufacturers' technical data sheets have to include that the specific standards are met. The plausibility and correctness of the fluid data are not reviewed by Bosch Rexroth.

Bosch Rexroth Fluid Rating

Fluid data of the manufacturer has to be according to ISO (selected characteristic values of standards) and Bosch Rexroth requirements (tightened values of standards and extended Bosch Rexroth requirements). Bosch Rexroth demands the data to be confirmed in writing. The plausibility and correctness of the fluid data is reviewed by Bosch Rexroth.

The extended Bosch Rexroth requirements are beneath others specific fluid tests, that show suitability of the hydraulic fluid with defined Rexroth components and which are constituents of the respective specification.

Depending on the utilized Rexroth hydraulic components and the oil type, the corresponding fluid test has to be passed prior to the assignment of the Bosch Rexroth fluid rating.

Retention samples (finished oil, base oil) are furthermore saved. The hydraulic fluids that fulfill the Bosch Rexroth Fluid Rating requirements will be listed on the following Bosch Rexroth document.

► 90245: Bosch Rexroth Fluid Rating List

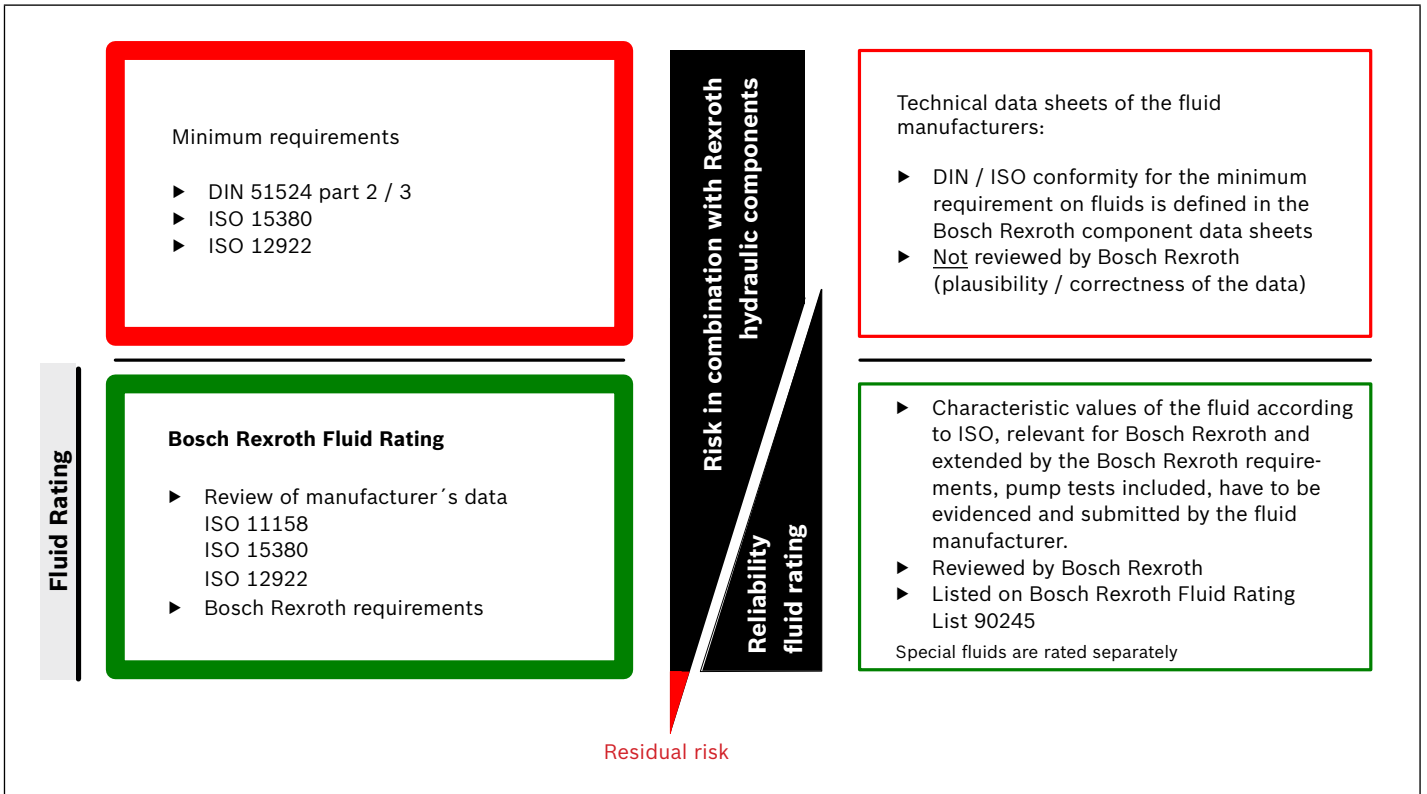
Note

The Bosch Rexroth Fluid Rating requirements cannot cover all machine and system-dependent conditions (see residual risk on rating scheme on page 3). Only single Rexroth components pumps/motors can be examined in the fluid tests. Bosch Rexroth Fluid Rating does not cover all systems and applications.

Releases for special applications are excluded from the Bosch Rexroth Fluid Rating.

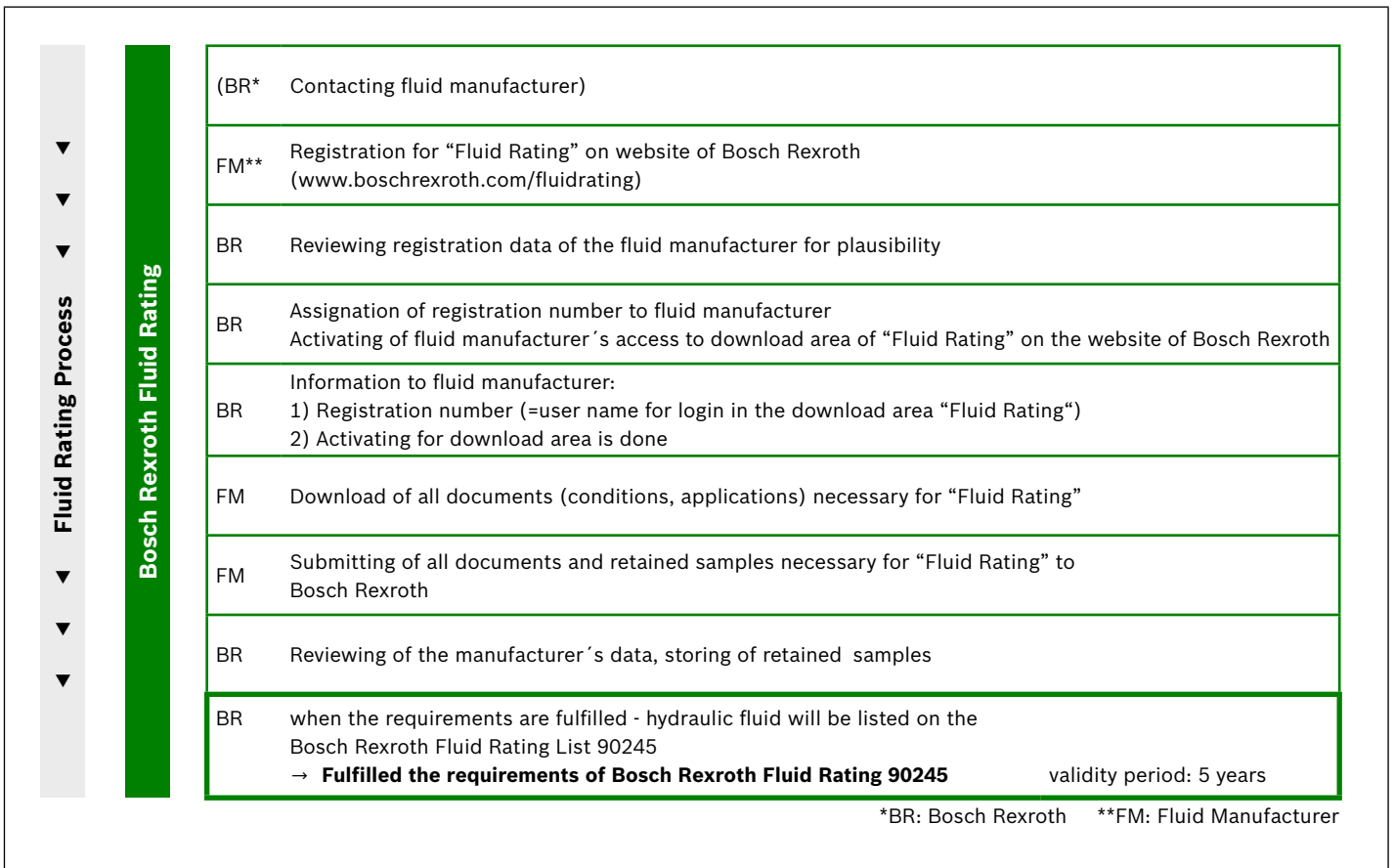
The responsibility for selection of the hydraulic fluid remains with the equipment/machinery operator and the fluid manufacturer.

By means of the requirements contained in the Bosch Rexroth Fluid Rating the risk of using hydraulic fluid in combination with Rexroth hydraulic components can be considerably reduced and the reliability significantly increased.



2 Process

The process of a Fluid Rating includes the following steps:



3 Fluid tests

3.1 Requests for Fluid Tests

Two different fluid tests may presently be requested by Bosch Rexroth:

- ▶ RFT-APU-CL Rexroth Fluid Test Axial Piston Unit Closed Loop (see **3.2**)
- ▶ RFT-APU-OL-HFC Rexroth Fluid Test Axial Piston Unit Open Loop-HFC (see **3.3**)

These tests may be requested independent of the Bosch Rexroth Fluid Rating. They are, however, a permanent specification of the Bosch Rexroth Fluid Rating.

Prior to the request for the Bosch Rexroth Fluid Rating the fluid test, required in the respective specification, has to be terminated positively.

The process of the fluid test includes the following steps:

FM	Request for quotation for fluid test by Bosch Rexroth (fluidrating@boschrexroth.de)			
FM	Commissioning of fluid test, submission of further documents and supplying of the fluid for the test			
BR	Implementation of the requested fluid test using defined Rexroth components	RFT-APU-CL Rexroth Fluid Test - Axial Piston Unit Closed Loop	RFT-APU-OL-HFC Rexroth Fluid Test - Axial Piston Unit Open Loop-HFC	Further fluid tests in preparation

*BR: Bosch Rexroth **FM: Fluid Manufacturer

3.2 Rexroth fluid test RFT-APU-CL
(Rexroth Fluid Test Axial Piston Unit Closed Loop)

Fluid test for closed loop applications using a combination of units consisting of a hydraulic pump A4VG045EP and a hydraulic motor A6VM060EP. This fluid test represents the requirements on a hydrostatic transmission.

Features of the fluid test

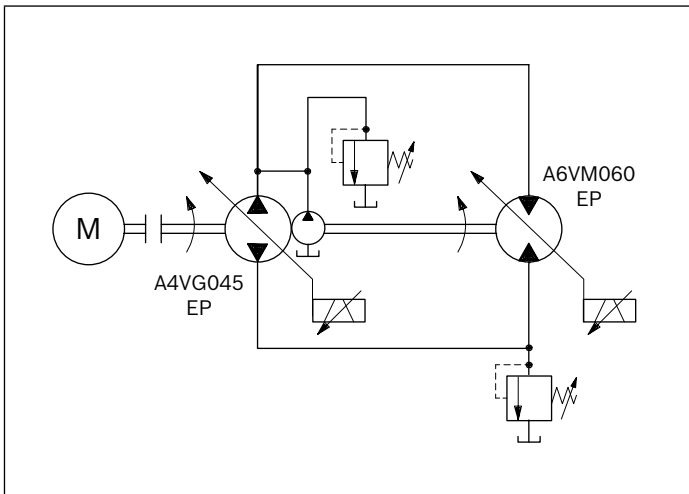
The suitability of the hydraulic fluid is tested at high stress under laboratory conditions. The fluid test consists of a break-in test, swivel cycle test and a corner power test.

Rating criteria

- ▶ Examination of the interaction fluid / component
 - Measurement of the component weight change respectively dimensional change
 - Material compatibility
 - Visual inspection of components /component surfaces
 - Oil analysis (start of test (SOT), during test, end of test (EOT))
- ▶ Evidence of endurance performance
- ▶ Determination of efficiency (SOT, EOT)

Test bench

▼ Schematical hydraulic circuit diagram of the RFT-APU-CL



Technical data of the test components

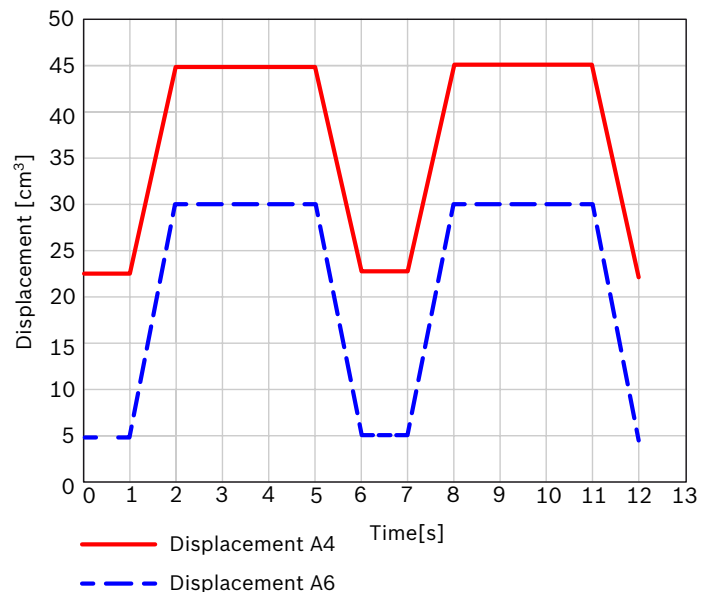
Type	A4VG045 EP	A6VM060 EP
Data sheet	92004	91610
Operation mode	pump	motor
Nominal volume	45 cm ³	62 cm ³
Maximum speed (at V _{g max})	4300 min ⁻¹	4450 min ⁻¹
Maximum pressure	500 bar	500 bar
Control	electric (EP)	electric (EP)

Operating data

1. Break-in test	A4VG045 EP	A6VM060 EP
Speed	2000 min ⁻¹	2000 min ⁻¹
Operating pressure	250 bar	250 bar
Leakage temperature Hydraulic motor		60 °C at port T
Operating time	10 h	10 h

2. Swivel cycle test	A4VG045 EP	A6VM060 EP
Speed	4000 min ⁻¹	4000 min ⁻¹
Operating pressure	450 bar	450 bar
Leakage temperature Hydraulic motor		100 °C at port T
Operating time	300 h	300 h

▼ Swivel cycle (schematic diagram)



3. Corner power test	A4VG045 EP	A6VM060 EP
Speed	4000 min ⁻¹	4000 min ⁻¹
Operating pressure	500 bar	500 bar
Leakage temperature Hydraulic motor		100 °C at port T
Operating time	200 h	200 h

3.3 Rexroth fluid test RFT-APU-OL-HFC
(Rexroth Fluid Test Axial Piston Unit Open Loop-HFC)

Fluid test for open loop applications using a combination of units consisting of a A4VSO swashplate axial piston combination unit (hydraulic pump and hydraulic motor) as well as an EA10VSO/31 hydraulic pump. This fluid test represents the requirements on applications demanding water-containing, fire-resistant hydraulic fluids of the HFC classification.

Features of the fluid test

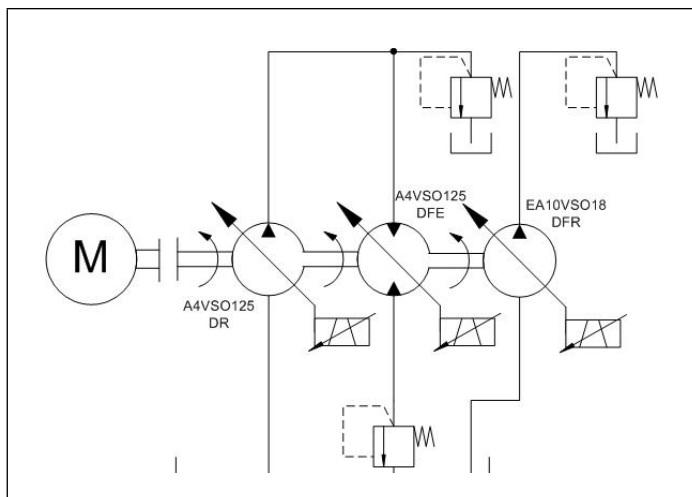
The suitability of the hydraulic fluid is tested at high stress under laboratory conditions. The fluid test consists of a constant and swivel cycle test.

Rating criteria

- ▶ Examination of the interaction fluid / component
 - Wear and cavitation behaviour
 - Material compatibility
 - Visual inspection of components /component surfaces
 - Measuring records of functional relevant component surfaces
 - Oil analysis (SOT, during test, EOT)
- ▶ Evidence of endurance performance

Test bench

▼ Schematical hydraulic circuit diagram of the RFT-APU-OL-HFC



Technical data of the test components

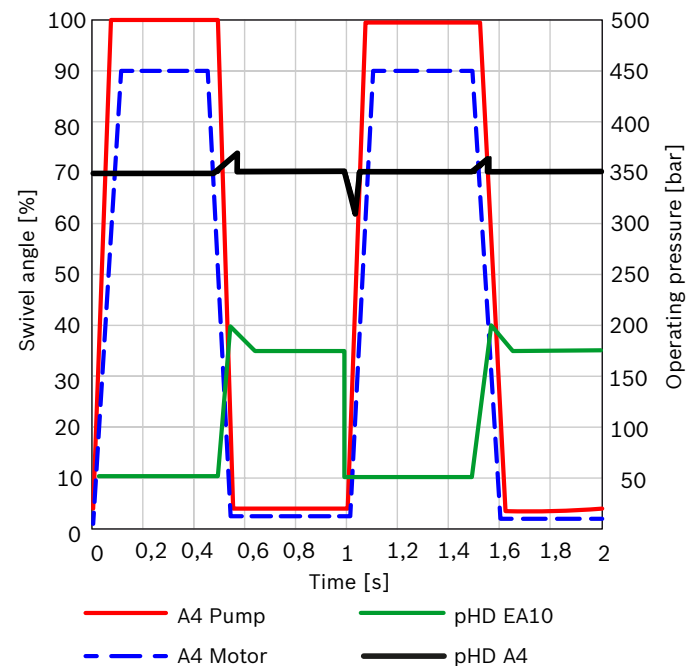
Type	A4VSO125 DR	A4VSO125 DFE	EA10VSO18 DFR/31
Data sheet	92053	92053	92711
Operation mode	pump, self-priming	motor	pump, self-priming
Nominal volume	125 cm ³	125 cm ³	18 cm ³
Maximum speed	2200 min ⁻¹	2200 min ⁻¹	3300 min ⁻¹
Maximum pressure	400 bar	400 bar	350 bar

Operating data

1. Constant test	A4VSO125 DR/DFE	EA10VSO18 DFR/31
Speed	1800 min ⁻¹	1800 min ⁻¹
Operating pressure	350 bar	175 bar
Displacement	V _{g max} /V _{g min}	V _{g max} /V _{g min}
Temperature	50 °C	50 °C
Operating time	100/100 h	100/100 h

2. Swivel cycle test	A4VSO125 DR/DFE	EA10VSO18 DFR/31
Speed	1800 min ⁻¹	1800 min ⁻¹
Operating pressure	350 bar	50 / 175 bar
Displacement	0,5 sec V _{g min} / 0,5 sec V _{g max}	0,5 sec V _{g min} / 0,5 sec V _{g max}
Temperature	50 °C	50 °C
Operating time	800 h	800 h

▼ Swivel cycle (schematic diagram)



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