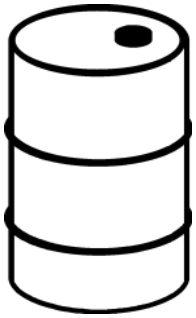
REISHAUER

Gear Grinding Technology

RZ x60 4.0

Operating fluids



Excerpt from the Installation- and Service Instructions

Inventory number:

Serial number:

Version: V-02.04

Original instructions

1 Operating fluids

A label near the filler opening provides information on the operating fluid used for initial filling.

NOTE

Warranty restriction

During the warranty period and without the written consent of Reishauer AG, switching to an operating fluid other than the one filled in the factory can render the warranty void!

If an unapproved operating fluid is to be used after expiry of the warranty period, it can be checked by Reishauer AG. However, it may only be used after a written individual approval has been issued.

Each time a different operating fluid is used, the previous operating fluid must be drained and the entire system flushed with the new operating fluid. Do not then use the operating fluid used for flushing, as it is contaminated with the residual operating fluid from the previous fill.

NOTE

Information label on the machine

If the operating fluid is switched to a different operating fluid, the information label on the machine must be replaced. The operating fluid filled in the machine and the information on the label must match.

1.1 Process cooling (cooling lubricant)

The correct choice of coolant is crucial for achieving a good grinding result. The coolant must therefore be selected with special care.

A coolant must satisfy the following requirements as a minimum:

- Compatibility with the materials processed in the machine, in particular elastomer and rubber materials (machine compatibility).
- Optimum cooling and lubrication in the grinding process to ensure a burn-free grinding result as well as minimal wear to the grinding tool and thereby achieve a large number of workpieces per dressing operation.

The coolants recommended by Reishauer AG have been subjected to extensive series of tests both in-house and by Reishauer customers. They satisfy the applicable requirements to the greatest possible extent. The machine user is not obliged to use the coolants recommended by Reishauer AG, which means that other coolants may be used in addition to those recommended. In such cases, it is advisable to have the machine compatibility tested by Reishauer AG on the basis of the product and safety data sheet for the coolant in question. Even if Reishauer AG confirms the machine compatibility, the grinding result that would normally be precalculated by Reishauer AG (grinding time while avoiding burning, number of workpieces that can be achieved per dressing operation, surface quality) still cannot be guaranteed; this must be verified by means of grinding tests or the tests involved in initial and final acceptance or by the customer.

When choosing the coolant, pay particular attention to the following points.

Viscosity

- Higher viscosity results in better surface quality and longer grinding tool service lives.
- Higher viscosity generally has a negative impact on filterability.
- Excessively high viscosity reduces the cooling effect.

- Low viscosity is more energy-efficient but reduces the cutting performance output and results in increased oil mist formation.
- If a centrifuge is used to clean the oil, the cleaning effect is poorer with higher viscosity.

Additives

- EP additives may only be used in the grinding process.
- Additives must not have any aggressive effect on machine materials and coatings.

Solid additives

Solids are added to the coolant to increase its wetting power. However, these must not cause any of the following negative side effects:

- Blocking the chip spaces of the grinding tool and delaying the settling of the swarf and grinding tool abrasion.
- Accelerating the aging of the coolant, resulting in excessive coolant consumption because of adhesive oil.

Foaming

Minimal foaming even after extended use is advantageous. A high level of foaming (air in the coolant) reduces the coolant pressure and the volumetric flow at the nozzle, which results in the following negative effects:

- Low cutting performance, longer grinding times
- Short service life of the grinding tool
- Thermal edge damage on the ground gear flanks (burning).

Coolant mist formation

- The hazardous effect of aerosols must be taken into account and largely eliminated. Primary irritation of the mucous membranes must be prevented. Additives which may cause allergies should be avoided as far as possible.

Flash point

- Only coolants with a flash point of > 145°C may be used.

1.1.1 Preferred cooling lubricants

The following cooling lubricants have been carefully selected and extensively tested by Reishauer AG.

Feature	Technical data
Manufacturer (Sales)	Oelheld
HSG - Grinding oil	DiaGrind 535/15
Kinematic viscosity at 40°C	15.0 mm²/s
Density at 15°C	0.88 g/cm³
Flash point	160°C
Water hazard class	1

Feature	Technical data
Manufacturer (Sales)	Quaker Houghton
Grinding oil	Dascolene 617
Kinematic viscosity at 40°C	18 mm²/s (ASTM D 7042)
Density at 20°C	860 kg/m³
Flash point	180°C (ASTM D 92)
Water hazard class	1

1.1.2 Alternative cooling lubricants

The following cooling lubricants have not been tested by Reishauer AG. They are recommended by Reishauer AG on the basis of positive experiences in practical application:

Feature	Technical data
Manufacturer (Sales)	Quaker Houghton
Grinding oil	Macron 2438 M-8
Kinematic viscosity at 40°C	8 mm²/s (ASTM D 445)
Density at 20°C	840 kg/m³
Flash point	165°C (ASTM D 92)
Water hazard class	1

Feature	Technical data
Manufacturer (Sales)	Quaker Houghton
Grinding oil	Macron 2425 S-14
Kinematic viscosity at 40°C	14 cSt ASTM D 445
Density at 20°C	860 kg/m³
Flash point	180°C ASTM D 92
Corrosion effect on copper	2 (EN ISO 2160)
Water hazard class	1

Feature	Technical data
Manufacturer (Sales)	Castrol (BP)
Grinding oil	Variocut G 650 HC
Kinematic viscosity at 40°C	9.4 mm²/s (9.4 cSt)
Density at 15°C	<1000 kg/m³ (<1 g/cm³)
Flash point	170°C

Feature	Technical data
Manufacturer (Sales)	Rhenus
Grinding oil	Rhenus CXS
Kinematic viscosity at 40°C	10.7 mm²/s DIN 51562
Density at 20°C	840 kg/m³ DIN 51557
Flash point	160°C
Water hazard class	1

Feature	Technical data
Manufacturer (Sales)	Oelheld
HPG - Grinding oil	DiaGrind RHM 850 (for non-ferrous metals)
Kinematic viscosity at 20°C	24.0 mm²/s (ASTM D 7042)
Kinematic viscosity at 40°C	11.2 mm²/s (ASTM D 7042)
Density at 15°C	870 kg/m³ (ASTM D 7042)
Flash point	150°C (EN ISO 2719)
Corrosion effect on copper	2 (EN ISO 2160)
Water hazard class	1

Feature	Technical data
Manufacturer (Sales)	Zeller+Gmelin
Grinding oil	Multicut SE 13

Feature	Technical data
Kinematic viscosity at 40°C	13.5 mm²/s (13.5 cSt) (ATSM D 7042)
Density at 15°C	850 kg/m³ (DIN EN ISO 12185)
Flash point	> 190°C (DIN ISO 2592)
Water hazard class	1

1.1.3 Cellulose

If the machine is supplied by a separate VAF or ASF coolant unit, it is necessary to add cellulose as a filter aid.
Reishauer AG recommends the following filter aids:

For ASF and VAF precoat filters from Hoffmann

Feature	Technical data
Cellulose fibers	**ARBOCEL NV 00**
Manufacturer (Sales)	J. Rettenmaier & Söhne GmbH + Co.
Use	Hoffmann precoat filters ASF...

For suction belt filters with cellulose dosing

Feature	Technical data
Cellulose fibers	**ARBOCEL BC 300**
Manufacturer (Sales)	J. Rettenmaier & Söhne GmbH + Co.
Use	Hoffmann suction belt filters HSF...

For detailed information on the coolant unit, see separate documentation for the coolant unit.

1.2 Spindle cooling

In order to prevent damage to the high-speed spindles, these are cooled by a closed cooling oil circuit. This spindle oil is cooled by a separate, external chiller. The separate, closed cooling oil circuit excludes the possibility of the spindle oil being contaminated by the machining process.

NOTE

Mixing up operating fluids

A spindle oil is used to cool the spindles. Coolant is not suitable for cooling the spindles and will cause damage to the machine and chiller.

a) Use only the **spindle oils** approved for spindle cooling.

For information regarding capacity, see documentation for the separate chiller.

1.2.1 Oil for spindle cooling (ISO VG-10)

The following hydraulic oils satisfy all prerequisites for use for spindle cooling. They have been approved by Reishauer AG.
Other hydraulic oils may only be used with the written approval of Reishauer AG.

Manufacturer	Product name	Zinc-free
ARAL	Vitam GF 10	X
AVIA	Avia Fluid RSL 10	
BP	Energol HLP-HM 10	
	Bartran 10	X

Manufacturer	Product name	Zinc-free
CASTROL	Hyspin AWS 10	
	Hyspin ZZ 10	X
CHEVRON (TEXACO)	Rando HD 10	
ENI (AGIP)	OSO 10	
EXXON MOBIL	[1.] **Velocite Oil no. 6**	
	DTE 21 Ultra	
FUCHS	Renolin DTA 10	X
	Renolin B 3 VG 10	
	Renolin ZAF B 10 HT	X
IPIRANGA	Eureka 10	
PETROBRAS	Lubrax Hydra XP 10	
Q8	Q8 Haydn 10	
TOTAL (ELF)	Azolla ZS 10	

Approved hydraulic oils in viscosity class ISO VG 10 and category HLP according to DIN 51524-1/-2 and HM according to ISO 6743-4.

[1.]Unless otherwise contractually agreed, this product is used as standard for the initial filling.
A label near the filler opening provides information on which product has been filled.

1.3 Central lubrication (lubrication oil)

The machine is equipped with a central lubrication system that automatically supplies the lubrication points with lubrication oil; see chapter "*Design and function - Central lubrication system*". Particularly stringent requirements apply to the lubrication oil in terms of its dynamic and static loading capacity as well as its lubricity.

1.3.1 Slideway lubrication oils for central lubrication (ISO VG-220)

The following slideway lubrication oils satisfy all prerequisites for use in the central lubrication system. They have been approved by Reishauer AG.
Other slideway lubrication oils may only be used with the written approval of Reishauer AG.

Manufacturer	Product name	Zinc-free
ARAL	Deganit B 220	
CASTROL (BP)	Magna SW 220	
	Magna SW D 220	
ENI (AGIP)	Exidia HG 220	X
EXXON MOBIL	Vactra Oil no. 4	
FUCHS	Renep CGLP 220	X
	Renep 5 K	
KLÜBER	Lamora D 220	
PANOLIN	Slideway 220	
PETRONAS	Slideway HG 220	
Q8	Wagner NS 220	
QUAKER HOUGHTON	Sta-Put G 220	
SHELL	Tonna S2 M 220	X
	[1.] **Tonna S3 M 220**	**X**
STRUB	Vulcoway 220	
TOTAL (ELF)	Drosera MS 220	X

Approved slideway lubrication oils in viscosity class ISO VG 220 and category CGLP according to DIN 51502.

[1.)]Unless otherwise contractually agreed, this product is used as standard for the initial filling.
A label near the filler opening provides information on which product has been filled.

1.4 Hydraulics

Hydraulic oil is used in the integrated hydraulic system. The operating pressures and consumers that are used are generally non-critical.

1.4.1 Hydraulic oil (ISO VG-46)

The following hydraulic oils satisfy all prerequisites for use in the machine hydraulic unit. They have been approved by Reishauer AG.
Other hydraulic oils may only be used with the written approval of Reishauer AG.

Manufacturer	Product name	Zinc-free
ARAL	Vitam GX 46	
	Vitam GF 46	X
AVIA	Avia Fluid RSL 46	
	Avia Fluid HYD-HLP 46	
	Avia Fluid RSL ZAD 46	X
BP	Bartran 46	X
	Energol HLP-HM 46	
	Energol HLP-S 46	X
CASTROL	Hyspin AWS 46	
	Hyspin ZZ 46	X
	Hyspin XP 46	X
CHEVRON (TEXACO)	Rando HD 46	
	Hydraulic Oil AW 46	
ENI (AGIP)	OSO 46	
	OSO-S 46	X
EXXON MOBIL	[1.)] **DTE 25 Ultra**	
FUCHS	Renolin B 15 VG 46	
	Renolin ZAF B 46 HT	X
IPIRANGA	Ipitur AW 46	
PETROBRAS	Lubrax Hydra XP 46	
PETRONAS	Tutela Hidrobak 46	
Q8	Q8 Haydn 46	
	Q8 Holst 46	X
SHELL	Tellus S2 MX 46	
	Tellus S3 M 46	X
	Tellus S4 ME 46	X
TOTAL (ELF)	Azolla ZS 46	
	Azolla AF 46	X

Approved hydraulic oils in viscosity class ISO VG 46 and category HLP according to DIN 51524-2 and HM according to ISO 6743-4.

[1.)]Unless otherwise contractually agreed, this product is used as standard for the initial filling.
A label near the filler opening provides information on which product has been filled.

1.5 Pneumatics

The machine requires a factory-fitted compressed air supply. This compressed air is routed into very sensitive areas of the machine where contamination can cause significant damage. A proper compressed air supply that meets minimum quality standards helps ensure long-lasting and fault-free operation of the machine. When connecting the machine to a compressed air supply, note the following with regard to the compressed air.

Particles

Too high a particle load can only be identified indirectly, as a result of the rapid blocking of the filter elements. Dirt particles can block valve functions and, in the case of moving components such as pneumatic cylinders, cause damage to the sliding surfaces. If the required particle concentration cannot be guaranteed, Reishauer AG recommends installing a 40 µm filter in front of the compressed air inlet.

Water content

Too high a water content in the compressed air can result in machine damage, repairs, and operational failures. For this reason, the pressure dew point is monitored and appropriate safety measures are introduced if this lies outside the limit values.

In regions in which humidity can exceed 70%, Reishauer AG recommends the use of a refrigeration dryer in the compressed air supply. Reishauer AG will be happy to provide support in the selection of the necessary peripheral devices. Where the conditions are particularly critical, we recommend installing an independent air supply.

Oil content

Too high an oil content in the compressed air can result in machine damage, repairs, and operational failures. In order to protect the air purge area, the fine filtration system features an activated carbon filter. This activated carbon filter reduces the oil content to the required value (provided the oil content in the compressed air network does not exceed 5 mg/m³). Activated carbon filters generally only adsorb the oil content until the element is saturated with oil, however. Once this level of saturation is reached, the oil-laden compressed air can flow freely into the air purge area and this cannot be monitored. The activated carbon filter must therefore be regularly replaced before it becomes saturated. See chapter "Maintenance - Replacing the pneumatic filter".

1.5.1 Purity of the compressed air

In order to guarantee trouble-free machine operation, a minimum air quality is prescribed at the compressed air inlet.
The compressed air must satisfy the ISO 8573-1:2010 [7:4:4] specification as a minimum.

NOTE

If the limit values of the specified class are exceeded, this will result in machine damage, repairs, and operational failures.

In the event of heavy contamination, the entire pneumatic system, including all air-carrying components and measuring systems, must be replaced!

Criterion	Class	Measured variable	Maximum value
Particles	7	Mass concentration	≤ 5 - 10 mg/m³
Water content	4	Pressure dew point	≤ + 3°C
Oil content	4	Oil concentration	≤ 5 mg/m³

If one or more air purity criteria cannot be guaranteed, appropriate measures must be taken to ensure that the required air quality is achieved.

1.6 Nitrogen (N2) for pressure accumulator

Gas-filled pressure accumulators are filled with nitrogen (N2). The nitrogen used for testing and refilling must have the following properties:

Feature	Metric	SI	US
Minimum pressure in N2 bottle	100 bar	10 MPa	1450 psi
Operating temperature range	-10 - +80°C	263 - 353°K	14 - 176°F
Class	4.0 extremely pure		
Composition	99.99 vol% N2		

1.7 Extinguishing medium (CO2)

Using water, extinguishing powder, extinguishing foam, etc. to control fires causes considerable damage to the machine. These must not be used as the extinguishing medium.

Reishauer AG only recommends using carbon dioxide (CO2) to control fires.
The machine operator is responsible for damage resulting from the use of unsuitable extinguishing media.

For detailed information on the fire extinguishing system, see separate documentation for the fire extinguishing system.

1.8 Cooling water (optional)

No water cooling is required for the Reishauer grinding machine itself. However, in an air-cooled system, the cooling lubricant filter system emits up to 23 kW of thermal power into the environment. By using water cooling, this thermal power can be largely dissipated. Water cooling should be designed together with Reishauer from the outset and ordered with the machine. Subsequent installation of water cooling is possible in principle, but is costly.

A wide variety of materials is used for the water-carrying installations, such as brass, bronze, red brass, stainless steel, nickel-plated and galvanized components, soldered connections, PTFE, NBR, FKM, etc. Poor cooling water quality can result in individual materials being chemically attacked or corroding. To ensure long-term and fault-free operation of water-cooled systems, the cooling water must at least meet the following requirements. Reishauer AG accepts no liability for consequential damage and production downtimes due to failure to comply with the specified minimum requirements.

Visual and aromatic test

- clear, transparent, colorless
- odorless
- no floating components (including no oil patches)
- no visible suspended solids (e.g., organic residues)
- no visible deposits of solids (such as sand, lime, corrosion residues, etc.)

If these criteria are not observed, the cooling water does not meet the minimum requirements. However, this alone is not sufficient. At least the following specifically measurable parameters must also be observed.

Easily verifiable characteristic values

Feature	Metric
pH value (pH)	7 - 8.5
Conductivity (σ)	0.03 - 0.3 S/m
Oxygen content	< 0.02 mg/l

Solids

Feature	Metric
Maximum particle size	< 250 µm
Nominal pre-filtration (for factory-fitted water filtration)	100 µm
Suspended particles	< 3 mg/l
Evaporation residue	< 2 g/l

Cooling water quality

To ensure sustainable use of industrial cooling water, we urgently recommend compliance with the relevant standard publications.

Publication	Title
ISO 22449-1:2020	Use of reclaimed water in industrial cooling systems
Cooling water guideline R455	Water treatment and the use of materials in cooling systems, publication by the VGB (www.vgb.org)
VDI 3803	Hydrological minimum requirements

Reishauer AG
Industriestrasse 36
8304 Wallisellen
T +41 44 832 22 11
F +41 44 832 23 90
reishauer.com

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