Lubricant recommendations

The use of suitable lubricants is of outstanding importance for trouble-free operation of our presses and installations. The use of unsuitable lubricants will not only impair the operation and service life of the machine, but will also affect your guarantee claims.

In the following tables you will find a summary of the suitable lubricants, in alphabetical order. We check these lubricants regularly. We reserve the right to delete those products which no longer meet our requirements. We cannot assume responsibility for quality changes made by the producer without changing the product name, nor can we assume responsibility for the quality of the listed lubricants.

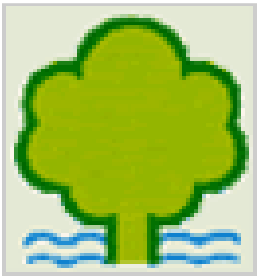
The lubricant must be checked prior to refilling our system, in order to ensure that it meets the required quality.

If you intend to use other brands not included in this list, you can have their suitability tested by us.

The oil purity classes (according to ISO 4406:1999) prescribed for our installations are function-related. For installations with common lubrication or hydraulic systems the purity class is 18/15/12 and for installations involving servo valve technology 16/13/10.
We would like to point out that oils of the required purity class are also available from the lubricant manufacturer.
The purity classes can also be reached by filling in through a filter and subsequently using bypass filtering for at least 4 hours to purify the volume filled in.

In addition to this general requirement, note the product-specific details in the operating manual, on the lubrication/pneumatic diagram and on the machine's lubrication unit.

The performance of Lubricants are improved by additives. Many additives are incompatible to each other, therefore it is not allowed to mix different oils and greases.



Environmental Protection

According to the water resources law, hydraulic oil is a water pollutant. Adequate precautions must be taken at the installation site of the press in order to avoid environmental pollution in the event of oil leakage. Adequate protection is obtained by providing the floor or foundation with an oil-resistant coating or by installing the press in a collecting trough.

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Abt. Qualitätssicherung/Tribologie
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http://www.schulergroup.com

Müller Weingarten AG
Niederlassung Umformtechnik Erfurt
99086 Erfurt, Schwerborner Str. 1
Phone +49 (0) 361 70 -0 / Fax +49 (0) 361 70 -1001
http://www.schulergroup.com

Schuler SMG GmbH + Co. KG
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Phone +49 (0) 711 939 - 50 / Fax +49 (0) 711 939 - 5279
http://www.schulergroup.com

Lubricating oil

Identification

CLP 68 **CLP 100** **CLP 150**

Identification acc. to	DIN 51 517-3
Classification of viscosity	ISO VG 68 / 100 / 150
Copper corrosion 3h, 100℃ (100 A3)	DIN EN ISO 2160, Degree of corrosion -1-
Loading capacity acc. Brugger	DIN 51 347-2, Oils for normal duty 50 N/mm² min., **Oils for heavy duty** **75 N/mm² min.** - Oil grade marked 1)

Lubricating oil - brands in alphabetical order

	Lubricating oil		
	CLP 68	**CLP 100**	**CLP 150**
ADDINOL		Getriebeöl CLP 100 MW	Getriebeöl CLP 150 MW
AGIP/ENI Group	Blasia 68	Blasia 100 Agip Precis CLP 100	Blasia 150 Agip Precis CLP 150
ARAL		Degol BG 100 plus	Degol BG 150 plus
AVIA	Avilub GMW 68 Avilub Gear GWK 68	Avilub GMW 100 Avilub Gear GWK 100	Avilub GMW 150 Avilub Gear GWK 150
BP	Energol GR-XP 68	Energol GR-XP 100	Energol GR-XP 150
BUGAROLAS (Spain)			Extra Gear 150
CASTROL	Alpha SP 68 Optigear® 68	Alpha SP 100 Optigear® 100 Tribol 1100/100	**Alpha CEP 150** 1) Alpha SP 150 Optigear® 150 Optigear® BM 150 Tribol 1100/150 **Tribol 1414/150 (CELP)** 1)
CEPSA (Spain)			Engranajes HP-150

1) Loading capacity acc. Brugger 75 N/mm² min.
2) Polyglykol

see next page

	Lubricating oil		
	CLP 68	**CLP 100**	**CLP 150**
FUCHS	Renolin AWD 68 Renolin CLP 68 Renolin CLP 68 Plus Renolin Unisyn CLP 68	Renolin CLP 100 Renolin CLP 100 Plus Renolin Unisyn CLP 100	**Renolin AWD 150** 1) Renolin CLP 150 Renolin CLP 150 Plus Renolin Unisyn CLP 150 Renolin ZAF 150 DT
FUCHS LUBRITECH	Gearmaster CLP 68	Gearmaster CLP 100	Gearmaster CLP 150
HÖLTEROL			Höltodur CLP 150
KUWAIT PETROLEUM	Q8 Goya 68	Q8 Goya 100	Q8 Goya 150
Lubrication Engineers®, INC.	**LE 1602 DUOLEC™** 1) **ISO 68/SAE 80**	**LE 1603 DUOLEC™** 1) **ISO 100/SAE 85**	**LE 1604 DUOLEC™** 1) **ISO 150/SAE 90**
MEGUIN **Oils of Germany**		Megol Getriebeöl CLP 100	Megol Getriebeöl CLP 150
MOBIL	Mobilgear 600 XP 68	Mobilgear 600 XP 100	Mobilgear 600 XP 150
MOGUL (KORAMO) (Czech Republic)			Mogul Intrans 150
OEST	Gearol CLP 68 B	Gearol CLP 100 B	Gearol CLP 150 B
OMV	OMV gear HST 68	OMV gear HST 100	OMV gear HST 150
PETROFER		Gearlubric VG 100-50	Gearlubric VG 150-50
REPSOL **(Spain)**			Super Tauro 150
SHELL			Shell Omala S2 G 150
SRS Schmier-stoff Vertrieb	SRS Ersolan 68 MW	SRS Ersolan 100 MW	SRS Ersolan 150 MW
TEXACO	Meropa 68	Meropa 100	Meropa 150
TOTAL	Carter EP 68	Carter EP 100	Carter EP 150 Carter SH 150 Carter Plus 150
ZELLER+GMELIN		Divinol ICL ISO 100	Divinol ICL ISO 150
ZEPF	**ZX-60 Synthex (CELP)** 1) **GR-68 (CLP/HLP)** 1)	**ZX-100 Synthex (CELP)** 1) **GR-100 (CLP)** 1)	**ZX-15 Synthex (CELP)** 1) **GR-150 (CLP)** 1)

1) Loading capacity acc. Brugger 75 N/mm² min.
2) Polyglykol

Lubricating oil

CLP 220 **CLP 320** **CLP 460**

Identification

Identification acc. to	DIN 51 517-3
Classification of viscosity	ISO VG 220 / 320 / 460
Copper corrosion 3h, 100℃ (100 A3)	DIN EN ISO 2160, Degree of corrosion -1-
Loading capacity acc. Brugger	DIN 51 347-2, Oils for normal duty 50 N/mm² min., **Oils for heavy duty** **75 N/mm² min.** - Oil grade marked 1)

Lubricating oil - brands in alphabetical order

	Lubricating oil		
	CLP 220	**CLP 320**	**CLP 460**
AGIP/ENI Group	Blasia 220	Blasia 320	Blasia 460
ARAL	Degol BG 220 plus	Degol BG 320 plus	Degol BG 460 plus
AVIA	Avilub GMW 220 Avilub Gear GWK 220	Avilub GMW 320 Avilub Gear GWK 320	Avilub Gear GWK 460
BP	Energol GR-XP 220	Energol GR-XP 320	Energol GR-XP 460
BRUGAROLAS (Spain)	Extra Gear 220		
CASTROL	**Alpha CEP 220** 1) Alpha SP 220 Optigear® 220 Tribol 1100/220	Alpha SP 320 Optigear® 320 Tribol 1100/320	Alpha SP 460 Optigear® 460 Tribol 1100/460
FUCHS	**Renolin AWD 220** 1) Renolin CLP 220 Renolin CLP 220 Plus Renolin Unisyn CLP220 Renolin PG 220 2)	**Renolin AWD 320** 1) Renolin CLP 320 Renolin CLP 320 Plus Renolin Unisyn CLP 320	Renolin CLP 460 Renolin CLP 460 Plus Renolin Unisyn CLP 460

1) Loading capacity acc. Brugger 75 N/mm² min.
2) Polyglykol

see next page

	Lubricating oil		
	CLP 220	**CLP 320**	**CLP 460**
FUCHS LUBRITECH	Gearmaster CLP 220	Gearmaster CLP 320	
KUWAIT PETROLEUM	Q8 Goya 220	Q8 Goya 320	Q8 Goya 460
Lubrication Engineers®, INC.	**LE 1605 DUOLEC™** 1) **ISO 220/SAE 110**	**LE 1606 DUOLEC™** 1) **ISO 320/SAE 140**	**LE 1607 DUOLEC™** 1) **ISO 460/SAE 190**
MOBIL	Mobilgear 600 XP 220	Mobilgear 600 XP 330	Mobilgear 600 XP 460
OEST	Gearol CLP 220 B	Gearol CLP 320 B	Gearol CLP 460 B
OMV	OMV gear HST 220	OMV gear HST 320	OMV gear HST 460
PETROFER	Gearlubric VG 220-50		
SHELL	Shell Omala S2 G 220	Shell Omala S2 G 320	Shell Omala S2 G 460
SRS Schmier-stoff Vertrieb	SRS Ersolan 220 MW	SRS Ersolan 320 MW	SRS Ersolan 460 MW
TEXACO	Meropa 220	Meropa 320	Meropa 460
TOTAL	Carter EP 220 Carter SH 220 Carter Plus 220	Carter EP 320 Carter SH 320 Carter Plus 320	Carter EP 460 Carter SH 460
ZEPF	**ZX-220 Synthex (CELP)** 1) **GR-220 (CLP)** 1)	**ZX-320 Synthex (CELP)** 1) **GR-320 (CLP)** 1)	**ZX-460 Synthex (CELP)** 1) **GR-460 (CLP)** 1)

1) Loading capacity acc. Brugger 75 N/mm² min.
2) Polyglykol

Hydraulic oil
Identification

HLP 46 **HLP 68**

Identification acc. to	DIN 51 524-2
Classification of viscosity	ISO VG 46, 68
Copper corrosion 3h at 100℃ (100 A3)	DIN EN ISO 2160, Degree of corrosion -1-
Loading capacity acc. Brugger	DIN 51 347-2, **30 N/mm² min. and >**

Hydraulic oil - brands in alphabetical order

	Hydraulic oil	
	HLP 46	**HLP 68**
ADDINOL	HLPD 46	HLPD 68
AGIP/ENI Group	OSO 46 OSO PM 46 Agip Precis BR-Fluid 46	OSO 68
ARAL	Vitam 4243	
AVIA	Avilub Hydraulic HMW 46 Avilub Hydraulic DD 46 Avilub Fluid SF 46	Avilub Hydraulic HMW 68 Avilub Hydraulic DD 68 Avilub Fluid SF 68
BP	Energol HLP 46 S	
BRUGAROLAS (Spain)	BESLUX LUDEP 46	
CASTROL	Alpha SP 46 Hyspin DSP 46 Hyspin DXP 46 (HLPD)	Hyspin DSP 68
CEPSA (Spain)	Hidraulico HLM-46	
FUCHS	Renolin MWB 46 (HLPD) Renolin ZAF 46 B (HLP) Renolin ZAF 46 D (HLPD) Renolin ZAF 46 MB (HLPD) Renolin ZAF 46 MC (HVLP) Renolin ZAF 46 D-LC (HLPD) Renolin ZAF 46 DT (HLPD)	Renolin MWB 68 (HLPD)

see next page

	Hydraulic oil	
	HLP 46	**HLP 68**
IMPERIAL OIL CANADA	Forum EP 46 (release of Canada/USA)	Forum EP 68 (release of Canada/USA)
KLÜBER LUBRICATION	Lamora HLP 46	Lamora HLP 68
KUWAIT PETROLEUM	Q8 Holst EP 46	Q8 Holst 68
Lubrication Engineers®, INC.	LE 1601 DUOLEC™ ISO 46/SAE 75 W	LE 1602 DUOLEC™ ISO 68/SAE 80
MEGUIN **Oils of Germany**	Megol Hydrauliköl HLP 46 AF	
MOBIL	Mobilfluid 424 Mobil Hydraulic Oil M 46	
MOGUL (KORAMO) **(Czech Republic)**	Mogul HM 46 ZF Mogul H-LPD 46 ZF	
OEST	HLP 46 B Hydrauliköl H-LP 46 BZ	HLP 68 B
OMV	OMV hyd HLP-D 46	OMV hyd HLP-D 68
ORLEN OIL	Hydrol HLPD ISO 46	Hydrol HLPD ISO 68
PETROFER **FAW SIHUAN-Petrofer (Japan)**	Isolubric VG 46-30 Isolubric VG 46-50	Isolubric VG 68-50
REPSOL **(Spain)**	Telex E - 46	
SHELL	Shell Tellus S2 MA 46	Shell Tellus S2 MA 68
SRS Schmierstoff Vertrieb	SRS Wiolan HX 46 MW SRS Wiolan HG 46 MW 50	SRS Ersolan 68 MW
STATOIL	HydraWay HM DE 46	
TOTAL	Azolla DZF 46	Azolla DZF 68

see next page

	Hydraulic oil	
	HLP 46	**HLP 68**
UNIL **Deutschland GmbH Bremen**	UNIL HYD HFF	
ZELLER+GMELIN	Divinol HLP 46 MWB	Divinol HLP 68 MWB
ZEPF	ZX-10 Synthex (HELP) GR-46 (HLP) Hydrauliköl ZVG 46 (HLP)	ZX-60 Synthex (HELP/CELP) GR-68 (HLP/CLP)

Note

Oils for wet-running clutches, brakes and clutch/brake assemblies in combination with bearing lubrication,
see pages 10 to 12

Oils for wet-running clutches, brakes and clutch/brake assemblies in combination with bearing lubrication

Oils for hydraulically operated, oil-cooled (wet-running) clutches, brakes and clutch/brake assemblies must have characteristics for ensuring the friction coefficients and also be suitable for bearing lubrication. For this, oils with load carrying capacity of 30 N/mm² (+10 %) according to Brugger, which only cause a low friction coefficient loss, are used.
Oils with load carrying capacity of 50 N/mm² according to Brugger have higher reserves in the case of mixed friction and must meet the requirements of the Ortlinghaus standard ON 9.2.19, see page 12

Hydraulic oil

Identification

HLP 46

Identification acc. to	DIN 51 524, part 2
Classification of viscosity	ISO VG 46
Copper corrosion 3h at 100℃ (100 A3)	DIN EN ISO 2160, Degree of corrosion -1-
Loading capacity acc. Brugger	DIN 51 347-2, **30 N/mm² (+10 %)**

Hydraulic oil - brands in alphabetical order

	Hydraulic oil
	HLP 46 30 N/mm² (+10 %)
AGIP/ENI Group	OSO 46 OSO PM 46
AVIA	Avilub Fluid SF 46
CASTROL	Hyspin DXP 46 (HLPD) (tested in accordance with ON 9.2.19)
CEPSA (Spain)	Hidraulico HLM-46
FUCHS	Renolin ZAF 46 B (HLP) Renolin ZAF 46 D-LC (HLPD) (tested in accordance with ON 9.2.19)
KUWAIT PETROLEUM	Q8 Holst EP 46

see next page

	Hydraulic oil
	HLP 46 30 N/mm² (+10 %)
OEST	HLP 46 B Hydrauliköl H-LP 46 BZ
ORLEN OIL	Hydrol HLPD ISO 46
PETROFER **FAW SIHUAN-Petrofer (Japan)**	Isolubric VG 46-30
REPSOL (Spain)	Telex E - 46
ZELLER & GMELIN	Divinol HLP 46 MWB
ZEPF	Hydrauliköl ZVG 46 (HLP)

Oils for wet-running clutches, brakes and clutch/brake assemblies in combination with bearing lubrication

Oils with load carrying capacity of 50 N/mm² according to Brugger have higher reserves in the case of mixed friction and must meet the requirements of the Ortlinghaus standard ON 9.2.19

Hydraulic oil

HLP 46

Identification

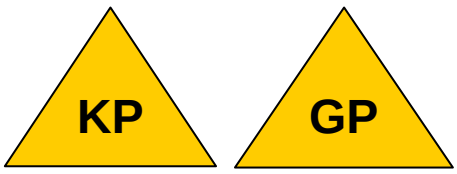
Identification acc. to	DIN 51 524, part 2
Classification of viscosity	ISO VG 46
Copper corrosion 3h at 100℃ (100 A3)	DIN EN ISO 2160, Degree of corrosion -1-
Loading capacity acc. Brugger	DIN 51 347-2, **50 N/mm²**
Approval for wet-running clutch/brake assemblies	**Ortlinghaus standard ON 9.2.19**

Hydraulic oil - brands in alphabetical order

	Hydraulic oil
	HLP 46 50 N/mm²
CASTROL	Hyspin DXP 46 (HLPD)

Lubricating grease

Identification



Identification acc. to	DIN 51 825:1990-08;2004-06, DIN 51 826:2005-01
NLGI consistency grades	DIN 51 818 / 00,0,1,2
Upper operating temperature	≥ 100°C
Lower operating temperature	-10°C or lower
Copper corrosion	DIN 51 811, Degree of corrosion 1 at 60℃
	DIN 51 811, Degree of corrosion 2 at 100℃
Loading capacity acc. Brugger	DIN 51 347-2, **30 N/mm² min.**

Attention! Use in central lubrication systems

Grease types that are suitable for lubrication systems with long lines (20 m and line diameter DN 6 (8x1) and needle bearings, e.g. for decoiler, coil cleaning machine, levelling machine, etc. are marked in the following table.

Lubricating grease - brands in alphabetical order

	Lubricating grease	
	KP0 to 2 G to U / GP00 to 2 G to K	
AGIP/ENI Group	Agip GR MU/EP 1	
ARAL	Aralub FDP 00	(suitable for lubrication systems)
AVIA	Avialith 0 EP Avialith 1 EP	(suitable for lubrication systems) (suitable for lubrication systems)
BP	Energrease LS-EP1	
BRUGAROLAS (Spain)	G. Aguila Nr. 850 EP-0	(suitable for lubrication systems)

see next page

	Lubricating grease **KP0 to 2 G to U / GP00 to 2 G to K**	
CASTROL	CLS Grease	
	Longtime PD 1	(suitable for lubrication systems)
	Tribol 3020/1000 - 1	(suitable for lubrication systems)
	Tribol 3020/1000 - 0	(suitable for lubrication systems)
	Tribol 3020/1000 - 00	(suitable for lubrication systems)
FUCHS	Renolit GL - 1	
	Renolit EHF 1	(suitable for lubrication systems)
	Renolit EPLITH 00	(suitable for lubrication systems)
FUCHS LUBRITECH	Notropeen LXG 00	
	Urethyn E/M 1	
HOUGHTON IBERICA, Barcelona	Cosmolube LI EPX-00	
	Cosmolube LI EPX-000	(suitable for lubrication systems)
KLÜBER LUBRICATION	Microlube GB 0	
	Klüberlub BE 71-501	
KUWAIT PETROLEUM	Q8 Rembrandt EP 1	
MOBIL	Mobiltemp SHC 32	
	Mobilux EP 1	
	Mobilgrease XHP 005	(suitable for lubrication systems)
	Mobilith SHC 007	(suitable for lubrication systems)
	(release of Canada)	
	Chassis Brease LBZ (00)	(suitable for lubrication systems)
	(release of Tschechien)	
OEST	Oest Getriebefett EP 0.2 A	(suitable for lubrication systems)
	Spezialfett EP	
OMV	OMV lithplex EP00	(suitable for lubrication systems)
SHELL	Shell Gadus S2 V220 1	(suitable for lubrication systems)
	Shell Gadus S2 V220 0	(suitable for lubrication systems)
	Shell Gadus S2 V220 00	(suitable for lubrication systems)
TEXACO/Chevron	Hytex EP 1	
	Multifak EP 0	
	Texando FO 0	
	Delo Grease EP 00 (release of USA)	
TOTAL	Multis EP 1	
ZEPF	AR - 1 EP	(suitable for lubrication systems)
	AR - 2 MW EP	

Fire-resistant hydraulic fluids

HFC 46

Identification

Identification acc. to	DIN 51 502
Viscosity range	DIN 51 562-1 38-46 mm²/s (cSt) at 40 ℃
pH - range	DIN 51 369, ph 8,5 - 10
Loading capacity acc. Brugger	DIN 51 347-2, **30 N/mm² min.**

Tested and approved as per Luxemburg report

The product specific values must be maintained

Only a weak, tinted version of the HFC hydraulic fluid is to be used.

The hydraulic fluid must not corrode or attack sealing materials such as Polyurethane, NBR, Viton, PTFE etc., as well as hoses and other materials (e.g. non-ferrous heavy metals and 2-component coatings, etc.).

As it is possible that alterations can be made to the receipt used for the hydraulic fluids, the operator of the plant is responsible for the correct composition and suitability of the hydraulic fluids that he will be using.

Details regarding the lubricant that is most suitable for our system can be found in the lubrication or pneumatic system diagrams as well as the details regarding the lubrication device that should be used.

HFC hydraulic fluid - brands in alphabetical order

	Hydraulic fluid
	HFC 46
ARAL	Montral 44
AVIA	Fluid HFC 46
BP	Enersyn SF - C 14
CHEM-TREND	HFC HF-28 (Freigabe für USA/Kanada)
FLEISCHER	Pyrosafe 27
FRAGOL	Hydrolub 125 Hydrolub 125 G Hydrolub 125 CG Hydrolub 125 CG rot Hydrolub 125 SGC Hydrolub 125 SGC rot
FUCHS	Hydrotherm 46 M
HOUGHTON	Houghto Safe 620 NC Houghto Safe 620 BU
MOBIL	Hydrofluid LT
PETROFER	Ultra-Safe 620 Ultra-Safe 440 *(old designation of HFC 620)* Ultra-Safe 150 *(designation for Japan)* Ultra-Safe 43 *(Japan, identical with HFC 620)*
STUART	Hydrocor CC 44 MF
TEXACO	Glytex HFC 46
TOTAL	Hydransafe HFC 146

Thermal oil

Main function: Transferring thermal energy

Identification acc. to	DIN 51522
Operating temperatures	from 180 to over 300 ℃
Copper corrosion 3h at 100℃ (100 A3)	DIN EN ISO 2160, Degree of corrosion - 2 -
Flash point	DIN EN 22719, Plash point > 100 ℃
Viscosity range	Low-viscosity oil, refer to e) >10 to 46 mm²/s

Important characteristics of thermal oil

a) Good evaporation characteristics

b) Good oxidation stability

c) Low formation of coke and sludge

d) High ignition and flash point

e) Low viscosity
The lower the viscosity, the more efficient is the heat transfer.

Caution: Low-viscosity oils have a low flash point and tend to evaporate easily.
Choose products with a flash point > 100 ℃.