



Lube Oil Recommendations Survey

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Supersedes edition 11. 80

1. General

The gear unit lubricants recommended by L+S are CLP gear oils and HD motor oils.

The previously valid editions of lubricant group specifications SS, UU, PP, PP-U1, HH, HP, FF, FW are now replaced by LSN 935 1410 and LSN 935 1420.

2. LSN 935 1410 "L+S Lube Oil Recommendations; CLP 22 - 1000"

This specification includes CLP oils in accordance with DIN 51517, part 3. Other oils which meet or even surpass CLP requirements have also been included (e.g. hydraulic oils, motor oils or poly-alphaolefin oils).

It should be noted that not all of the oils included in these L+S specifications are suited for every conceivable application. For this reason L+S groups, LS1, LS2 and LS3 have been established (refer to Sheet 2).

Shop standard LSN 935 1410 is divided according to ISO viscosity classes.

LSN designation of a CLP oil:

CLP 100 / Group LS2 to LSN 935 1410

The required L+S groups have to be specified by the Design Division!

When selecting a certain oil brand it must be ensured that all the requirements of the L+S groups specified by the Design are satisfied.

In case that requirements of further L+S lubrication groups are met by a given oil, this oil can still be used for the application.

3. LSN 935 1420 "L+S Lube Oil Recommendations; Motor Oil HD SAE 20, 30 and 40"

This shop standard includes unigrade motor oils according to DIN E 51502 8.88 (plain or with additives) which do not significantly reduce the coefficient of friction in multiple disk clutches (sintered material or organic lining).

LSN designation of an HD oil:

HD SAE 20 to LSN 935 1420



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4. Requirements to be Met by CLP and HD Oils

4.1. CLP Oils

Mineral oils with additives increasing corrosion protection and ageing resistance as well additives which reduce wear in the area of mixed friction and polyalphaolefin oils (oils on the basis of synthetic hydrocarbons) which satisfy the demands specified for gear oils according to DIN 51517, part 3.

4.1.1 L+S Groups for CLP Oils

LS1: These oils have attained breakdown-load stage 12 in stringent FZG testing A16,6/90.

LS2: CLP oils compatible with multiple disks; when using these oils tested in accordance with Regulation 5021-40/0.6.2. of M/s Ortlinghaus under the conditions listed below the

friction coefficients : $\mu_{\text{stat}} = 0.12$
 $\mu_{\text{dyn}} = 0.08$
 are not fallen short of.

Friction couple : Steel/sintered lining (wet running)
 sintered material quality
 (5021-40 to Ortlinghaus)

Friction surface pressure: $p = 0.6 - 1.6 \text{ N/mm}^2$

Sliding velocity : $v = 6.7 - 16.7 \text{ m/s}$

Oil sump temperature : 60 to 80°C

LS3: Polyalphaolefin oils tend to foaming when mixing with preservation oil remnants (detergent, dispersive oils). Therefore, the unit is to be flushed out with a suitable purging oil or a mineral oil is to be used for running-in.

4.2 HD SAE Motor Oils

Unigrade motor oils (plain or with additives) which do not significantly reduce the coefficient of friction in multiple disk clutches (sintered material or organic lining); suitable for peak temperatures of up to 180°C arising in multiple disk clutches during actuation.

static friction coefficient $\mu_{\text{stat}} \geq 0.12$
 dynamic friction coefficient $\mu_{\text{dyn}} \geq 0.08$

Designation to DIN E 51502 8.88: HD SA-SF SAE 20,30 or 40
 HD CA-CD SAE 20,30 or 40



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5. Comparsion between Old and New Lube Oil Recommendations

Comparison between Groups	
Old	New
PP...	CLP...
PP....-U1	CLP...LS2
HP	CLP...
HH...	CLP...LS1
SS...	CLP...
FF...	CLP...
FW...*	CLP...*
UU 40	HD SAE 20
UU 63	HD SAE 30
-----	HD SAE 40 (new)

Comparison of the Viscosity of CLP Oils				
Old			New (ISO-VG) to DIN 51519	
Viscosity Range	Viscosity at 50°C mm²/s (cSt)	Viscosity at 40°C mm²/s (cSt)	ISO viscosity Class	Viscosity at 40°C mm²/s (cSt)
16	12,5 - 20	17 - 28	ISO-VG 22	19,8 - 24,2
25	20 - 31,5	28 - 49	ISO-VG 32	28,8 - 35,2
40	31,5 - 50	49 - 80	ISO-VG 46	41,4 - 50,6
63	50 - 80	80 - 135	ISO-VG 68	61,2 - 74,8
100	80 - 125	135 - 220	ISO-VG 100	90 - 110
160	125 - 200	220 - 360	ISO-VG 150	135 - 165
250	200 - 315	360 - 600	ISO-VG 220	198 - 242
400	315 - 500	600 - 1050	ISO-VG 320	288 - 352
			ISO-VG 460	414 - 506
			ISO-VG 680	612 - 748
			ISO-VG 1000	900 - 1100

* The old lubrication group FW related to low temperature applications.

This oil brand is to be selected from the CLP... range to suit the individual application and this choice must be verified.

The pour point may serve as an indication.

It must, however, not be confused with the lowest temperature of the application range !!!



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CLP 32

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Old LSN Designation: PP 25

CLP Oils

Mineral oils with additives increasing corrosion protection and ageing resistance as well as additives which reduce wear in the area of mixed friction and polyalphaolefin oils (oils on the basis of synthetic hydrocarbons) which satisfy the demands specified for gear oils according to DIN 51517, part 3.

Designation to DIN 51517, part 3 : CLP 32

ISO viscosity acc. to DIN 51519 : ISO - VG 32

Kinematic viscosity at 40 °C : min. 28,8 mm²/s (cSt)
: max. 35,2 mm²/s (cSt)

FZG testing A8,3/90 to DIN 51354/2 : min. breakdown-load stage 12

Oil-Comp.	Oil Brand	Pourp.* in °C	L+S Group**		
			LS1	LS2	LS3
Agip	BLASIA 32 OSO 32	-29 -30		x x	
Aral	Degol BG 32	-24	x	x	
AVIA	AVILUB RSL 32	-30		x	
BP	Energol HLP 32	-33		x	
Castrol	Hyspin SP 32 Alphasyn T 32	-24 -51	x	x	x
DEA	Astron HLP 32	-30		x	
ELF	ELFOLNA DS 32 ELFOLNA HMD 32	-24 -30		x x	
ESSO	HYDRAULIKOEL HLP 32	-27		x	
FINA	HYDRAN 32	-30		x	
Fuchs	RENOLIN B 32 HVI RENOLIN B 10 RENOLIN MR 32 MC RENOLIN MWB 32	-45 -27 -39 -33		x	



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KUWAIT	Q8 SCHUMANN 32	-54			x
Mobil	Mobil DTE 24 Mobil SHC 624	-30 -54		x x	x
Optimol	OPTIGEAR 32	-37	x		
Shell	Tellus Öl 32 Tellus Öl T 32 Tegula Öl 32	-30 -45 -36	x	x x	
TOTAL	AZOLLA 32	-33		x	
Wintershall	Wiolan HS 32 Wiolan HF 32	-27 -27			

* The pour point must not be confused with the lowest temperature of the application range !

** If for the gearbox lubricant to be used there is no indication as to a specific L+S group, any of the oil brands specified above may be used.

L+S lubrication groups to be in accordance with LSN 935 1400



Lube Oil Recommendations

CLP 46

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Old LSN Designation: PP 25

CLP Oils

Mineral oils with additives increasing corrosion protection and ageing resistance as well as additives which reduce wear in the area of mixed friction and polyalphaolefin oils (oils on the basis of synthetic hydrocarbons) which satisfy the demands specified for gear oils according to DIN 51517, part 3.

Designation to DIN 51517, part 3 : CLP 46

ISO viscosity acc. to DIN 51519 : ISO - VG 46

Kinematic viscosity at 40 °C : min. 41,4 mm²/s (cSt)
: max. 50,6 mm²/s (cSt)

FZG testing A8,3/90 to DIN 51354/2 : min. breakdown-load stage 12

Oil-Comp.	Oil Brand	Pourp.* in °C	L+S Group**		
			LS1	LS2	LS3
Agip	OSO 46	-27		x	
Aral	Degol BG 46	-36	x	x	
AVIA	AVILUB RSL 46	-27		x	
BP	Energol GR-XP 46	-21	x	x	
Castrol	Hyspin SP 46 Alphasyn T 46	-24 -51		x	x
DEA	Astron HLP 46	-27		x	
ELF	ELFOLNA DS 46 ELFOLNA HMD 46	-21 -30		x x	
ESSO	HYDRAULIKOEL HLP 46	-24		x	
FINA	HYDRAN 46	-30		x	
Fuchs	RENOLIN B 46 HVI RENOLIN B 15 RENOLIN MR 46 MC RENOLIN MWB 46	-42 -27 -33 -33		x x	
Klüber	LAMORA 46	-35		x	



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KUWAIT	Q8 GOYA 46 Q8 SCHUMANN 46	-30 -54			x
Mobil	Mobil DTE 25 Mobil DTE 15	-27 -43		x x	
Optimol	OPTIGEAR 46	-29	x		
Shell	Tellus Öl 46 Tellus Öl T 46	-27 -45		x x	
TOTAL	CARTER EP 46	-28	x	x	
Wintershall	Ersolan 46	-21			

* The pour point must not be confused with the lowest temperature of the application range !

** If for the gearbox lubricant to be used there is no indication as to a specific L+S group, any of the oil brands specified above may be used.

L+S lubrication groups to be in accordance with LSN 935 1400



Lube Oil Recommendations

CLP 68

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Old LSN Designation: PP 40

CLP Oils

Mineral oils with additives increasing corrosion protection and ageing resistance as well as additives which reduce wear in the area of mixed friction and polyalphaolefin oils (oils on the basis of synthetic hydrocarbons) which satisfy the demands specified for gear oils according to DIN 51517, part 3.

Designation to DIN 51517, part 3 : CLP 68

ISO viscosity acc. to DIN 51519 : ISO - VG 68

Kinematic viscosity at 40 °C : min. 61,2 mm²/s (cSt)
: max. 74,8 mm²/s (cSt)

FZG testing A8,3/90 to DIN 51354/2 : min. breakdown-load stage 12

Oil-Comp.	Oil Brand	Pourp.* in °C	L+S Group**		
			LS1	LS2	LS3
Agip	BLASIA 68 OSO 68	-27 -24	x	x x	
Aral	Degol BG 68 Degol TU 68	-30 -27	x	x x	
AVIA	AVILUB RSL 68 AVILUB RSX 68	-24 -30	x	x x	
BP	Energol GR-XP 68	-33	x	x	
Castrol	Alphasyn T 68 Alpha SP 68 Alpha ZN 68 Hyspin SP 68	-48 -18 -19 -24	x x x x	x x x	x
Chevron	NL-Gear Compound 68	-26	x	x	
DEA	Falcon CLP 68 Trion EP 68	-27 -24	x	x x	
ELF	REDUCTELF SP 68 ELF EPONA Z 68 ELFOLNA DS 68 ELFOLNA HMD 68	-21 -27 -18 -25		x x x x	
ESSO	SPARTAN EP 68 UNIVIS N 68 NUTO H 68	-24 -42 -30	x	x x	



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CLP 68

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FINA	GIRAN L 68	-21	x	x	
Fuchs	RENEP AWD 68 RENEP COMPOUND 102 RENOLIN MR 68 MC RENOLIN MWB 68	-21 -24 -27 -33	x	x	
Klüber	LAMORA 68	-27		x	
KUWAIT	Q8 GOYA 68 Q8 SCHUMANN 68	-30 -54			x
Mobil	Mobilgear 626 Mobil DTE 26 Mobil SHC 626 Mobil DTE 16	-25 -24 -50 -46	x	x	x
Optimol	OPTIGEAR 68	-29	x		
Shell	Omala Öl 68 Tellus Öl T 68 Tellus Öl 68	-30 -45 -24	x	x	x
TOTAL	CARTER EP 68	-28	x	x	
Tribol	Tribol 1100/68	-34		x	
Wintershall	Ersolan 68	-21			

* The pour point must not be confused with the lowest temperature of the application range !

** If for the gearbox lubricant to be used there is no indication as to a specific L+S group, any of the oil brands specified above may be used.

L+S lubrication groups to be in accordance with LSN 935 1400



Lube Oil Recommendations
CLP 100

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Old LSN Designation: PP 63

CLP Oils

Mineral oils with additives increasing corrosion protection and ageing resistance as well as additives which reduce wear in the area of mixed friction and polyalphaolefin oils (oils on the basis of synthetic hydrocarbons) which satisfy the demands specified for gear oils according to DIN 51517, part 3.

Designation to DIN 51517, part 3	: CLP 100
ISO viscosity acc. to DIN 51519	: ISO - VG 100
Kinematic viscosity at 40 °C	: min. 90,0 mm ² /s (cSt) : max. 110,0 mm ² /s (cSt)
FZG testing A8,3/90 to DIN 51354/2	: min. breakdown-load stage 12

Oil-Comp.	Oil Brand	Pourp.* in °C	L+S Group**		
			LS1	LS2	LS3
Agip	BLASIA 100 OSO 100	-24 -24	x	x x	
Aral-	Degol BG 100 Degol TU 100	-24 -24	x	x x	
AVIA	AVILUB RSL 100 AVILUB RSX 100	-18 -27	x	x x	
BP	Energol GR-XP 100	-24	x	x	
Castrol	Alphasyn T 100 Alpha SP 100 Alpha ZN 100 Hyspin SP 100	-57 -18 -19 -20	x x x x	x x x	x
Chevron	NL-Gear Compound 100	-24	x	x	
DEA	Falcon CLP 100 Trion EP 100	-27 -24	x	x x	
ELF	REDUCTELF SP 100 ELF EPONA Z 100	-18 -24		x x	
ESSO	SPARTAN EP 100 UNIVIS N 100 NUTO H 100	-24 -42 -24	x	x x	



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CLP 100

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FINA	GIRAN L 100	-21	x	x	
Fuchs	RENEP AWD 100 RENEP COMPOUND 103	-21 -27	x	x	
Klüber	LAMORA 100	-22		x	
KUWAIT	Q8 GOYA 100 Q8 SL GEAR LUBRIC.100 Q8 SCHUMANN	-30 -30 -48	x		x
Mobil	Mobilgear 627 Mobil DTE 18 Mobil DTE 27	-25 -41 -21	x	x x	
Optimol	OPTIGEAR 100	-25	x		
Shell	Omala Öl 100 Tellus Öl T 100 Tellus Öl 100	-27 -42 -21	x	x x	
TOTAL	CARTER EP 100	-25	x	x	
Tribol	Tribol 1100/100 Tribol 1510/100	-31 -49	x	x x	x
Wintershall	Ersolan 100	-18			

* The pour point must not be confused with the lowest temperature of the application range !

** If for the gearbox lubricant to be used there is no indication as to a specific L+S group, any of the oil brands specified above may be used.

L+S lubrication groups to be in accordance with LSN 935 1400



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CLP 150

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Old LSN Designation: PP 100

CLP Oils

Mineral oils with additives increasing corrosion protection and ageing resistance as well as additives which reduce wear in the area of mixed friction and polyalphaolefin oils (oils on the basis of synthetic hydrocarbons) which satisfy the demands specified for gear oils according to DIN 51517, part 3.

Designation to DIN 51517, part 3 : CLP 150

ISO viscosity acc. to DIN 51519 : ISO - VG 150

Kinematic viscosity at 40 °C : min. 135,0 mm²/s (cSt)
: max. 165,0 mm²/s (cSt)

FZG testing A8,3/90 to DIN 51354/2 : min. breakdown-load stage 12

Oil-Comp.	Oil Brand	Pourp.* in °C	L+S Group**		
			LS1	LS2	LS3
Agip	BLASIA 150 OSO 150	-22 -24	x	x x	
Aral	Degol BG 150 Degol TU 150	-24 -21	x	x x	
AVIA	AVILUB RSX 150	-24	x	x	
BP	Energol GR-XP 150	-24	x	x	
Castrol	Alphasyn T 150 Alpha SP 150 Alpha ZN 150	-48 -18 -15	x x x	x x x	x
Chevron	NL-Gear Compound 150	-21	x	x	
DEA	Falcon CLP 150 Trion EP 150	-21 -20	x	x x	
ELF	REDUCTELF SP 150 ELF EPONA Z 150	-18 -21		x x	
ESSO	SPARTAN EP 150	-24	x		



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CLP 150

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FINA	GIRAN L 150	-21	x	x	
Fuchs	RENEP AWD 150 RENEP COMPOUND 104	-21 -24	x	x	
Klüber	LAMORA 150	-17		x	
KUWAIT	Q8 GOYA 150 Q8 SL GEAR LUBRIC.150 Q8 SCHUMANN 150	-27 -27 -45	x		x
Mobil	Mobilgear 629 Mobil SHC 629 Mobil DTE 19	-24 -40 -36	x	x x x	x
Optimol	OPTIGEAR 150	-24	x		
Shell	Omala Öl 150	-24	x		
TOTAL	CARTER EP 150	-22	x	x	
Tribol	Tribol 1100/150 Tribol 1510/150	-28 -46	x	x x	x
Wintershall	Ersolan 150	-18			

* The pour point must not be confused with the lowest temperature of the application range !

** If for the gearbox lubricant to be used there is no indication as to a specific L+S group, any of the oil brands specified above may be used.

L+S lubrication groups to be in accordance with LSN 935 1400



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CLP 220

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CLP Oils

PP 100/PP 160

Mineral oils with additives increasing corrosion protection and ageing resistance as well as additives which reduce wear in the area of mixed friction and polyalphaolefin oils (oils on the basis of synthetic hydrocarbons) which satisfy the demands specified for gear oils according to DIN 51517, part 3.

Designation to DIN 51517, part 3 : CLP 220

ISO viscosity acc. to DIN 51519 : ISO - VG 220

Kinematic viscosity at 40 °C : min. 198,0 mm²/s (cSt)
: max. 242,0 mm²/s (cSt)

FZG testing A8,3/90 to DIN 51354/2 : min. breakdown-load stage 12

Oil-Comp.	Oil Brand	Pourp.* n °C	L+S Group**		
			LS1	LS2	LS3
Agip	BLASIA 220	-20	x		
Aral	Degol BG 220 Degol TU 220	-21 -18	x		
AVIA	AVILUB RSX 220	-21	x		
BP	Energol GR-XP 220	-21	x		
Castrol	Alphasyn T 220 Alpha SP 220 Alpha ZN 220	-45 -18 -15	x x		x
Chevron	NL-Gear Compound 220	-21	x		
DEA	Falcon CLP 220 Trion EP 220	-18 -15	x		
ESSO	SPARTAN EP 220	-21	x		
FINA	GIRAN L 220	-18	x		
ELF	REDUCTELF SP 220 ELF EPONA Z 220 REDUCTELF SYNTHESE 220	-18 -21 -45	x x x		x



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CLP 220

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Fuchs	RENEP AWD 220 RENEP COMPOUND 106	-18 -21			
Klüber	LAMORA 220	-17			
KUWAIT	Q8 GOYA 220 Q8 SL GEAR LUBRIC.220	-21 -21	x		
Mobil	Mobilgear 630 Mobilgear SHC 220	-21 -51	x x		x
Optimol	OPTIGEAR 220 OPTIGEAR HT 220	-23 <-40	x		x
Shell	Omala Öl 220	-24	x		
TOTAL	CARTER EP 220	-21	x		
Tribol	Tribol 1100/220 Tribol 1510/220	-25 -41	x		x
Wintershall	Ersolan 220	-15	x		

* The pour point must not be confused with the lowest temperature of the application range !

** If for the gearbox lubricant to be used there is no indication as to a specific L+S group, any of the oil brands specified above may be used.

L+S lubrication groups to be in accordance with LSN 935 1400



Lube Oil Recommendations

CLP 320

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Old LSN Designation: PP 160

CLP Oils

Mineral oils with additives increasing corrosion protection and ageing resistance as well as additives which reduce wear in the area of mixed friction and polyalphaolefin oils (oils on the basis of synthetic hydrocarbons) which satisfy the demands specified for gear oils according to DIN 51517, part 3.

Designation to DIN 51517, part 3 : CLP 320

ISO viscosity acc. to DIN 51519 : ISO - VG 320

Kinematic viscosity at 40 °C : min. 288,0 mm²/s (cSt)
 : max. 352,0 mm²/s (cSt)

FZG testing A8,3/90 to DIN 51354/2 : min. breakdown-load stage 12

Oil-Comp.	Oil Brand	Pourp.* in °C	L+S Group**		
			LS1	LS2	LS3
Agip	BLASIA 320	-18	x		
Aral	Degol BG 320 Degol TU 320	-18 -15	x		
AVIA	AVILUB RSX 320	-18	x		
BP	Energol GR-XP 320	-18	x		
Castrol	Alphasyn T 320 Alpha SP 320 Alpha ZN 320	-42 -18 -15	x x		x
Chevron	NL-Gear Compound 320	-18	x		
DEA	Falcon CLP 320 Trion EP 320	-18 -15	x		
ESSO	SPARTAN EP 320	-15	x		
ELF	REDUCTELF SP 320 ELF EPONA Z 320	-15 -18	x x		
FINA	GIRAN L 320	-18	x		
Fuchs	RENEP AWD 320 RENEP COMPOUND 108	-15 -18	x		



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Klüber	LAMORA 320	-17			
KUWAIT	Q8 GOYA 320 Q8 SL GEAR LUBRIC.320	-18 -18	x		
Mobil	Mobilgear 632 Mobilgear SHC 320	-19 -48	x x		x
Optimol	OPTIGEAR 320 OPTIGEAR HT 320	-14 -38	x		x
Shell	Omala Öl 320	-18	x		
TOTAL	CARTER EP 320	-20	x		
Tribol	Tribol 1100/320 Tribol 1510/320	-23 -38	x		x
Wintershall	Ersolan 320	-12	x		

* The pour point must not be confused with the lowest temperature of the application range !

** If for the gearbox lubricant to be used there is no indication as to a specific L+S group, any of the oil brands specified above may be used.

L+S lubrication groups to be in accordance with LSN 935 1400



Lube Oil Recommendations

CLP 460

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Old LSN Designation: PP 250

CLP Oils

Mineral oils with additives increasing corrosion protection and ageing resistance as well as additives which reduce wear in the area of mixed friction and polyalphaolefin oils (oils on the basis of synthetic hydrocarbons) which satisfy the demands specified for gear oils according to DIN 51517, part 3.

Designation to DIN 51517, part 3 : CLP 460

ISO viscosity acc. to DIN 51519 : ISO - VG 460

Kinematic viscosity at 40 °C : min. 414,0 mm²/s (cSt)
: max. 506,0 mm²/s (cSt)

FZG testing A8,3/90 to DIN 51354/2 : min. breakdown-load stage 12

Oil-Comp.	Oil Brand	Pourp.* n °C	L+S Group**		
			LS1	LS2	LS3
Agip	BLASIA 460	-14	x		
Aral	Degol BG 460 Degol TU 460	-18 -12	x		
AVIA	AVILUB RSX 460	-15	x		
BP	Energol GR-XP 460	-12	x		
Castrol	Alphasyn T 460 Alpha SP 460 Alpha ZN 460	-39 -3 -9	x x		x
Chevron	NL Gear Compound 460	-18	x		
DEA	Falcon CLP 460	-15	x		
ESSO	SPARTAN EP 460	-15	x		
ELF	REDUCTELF SP 460 ELF EPONA Z 460 REDUCTELF SYNTHESE 460	-15 -15 -45	x x x		x
FINA	GIRAN L 460	-18	x		
Fuchs	RENEP COMPOUND 110	-15	x		



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CLP 460

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Klüber	LAMORA 460	-17			
KUWAIT	Q8 GOYA 460 Q8 SL GEAR LUBRIC.460	-15 -15	x		
Mobil	Mobilgear 634 Mobilgear SHC 460	-11 -46	x		x
Optimol	OPTIGEAR 460	-12	x		
Shell	Omala Öl 460	-15	x		
TOTAL	CARTER EP 460	-18	x		
Tribol	Tribol 1100/460 Tribol 1510/460	-21 -33	x		x
Wintershall	Ersolan 460	- 9	x		

* The pour point must not be confused with the lowest temperature of the application range !

** If for the gearbox lubricant to be used there is no indication as to a specific L+S group, any of the oil brands specified above may be used.

L+S lubrication groups to be in accordance with LSN 935 1400