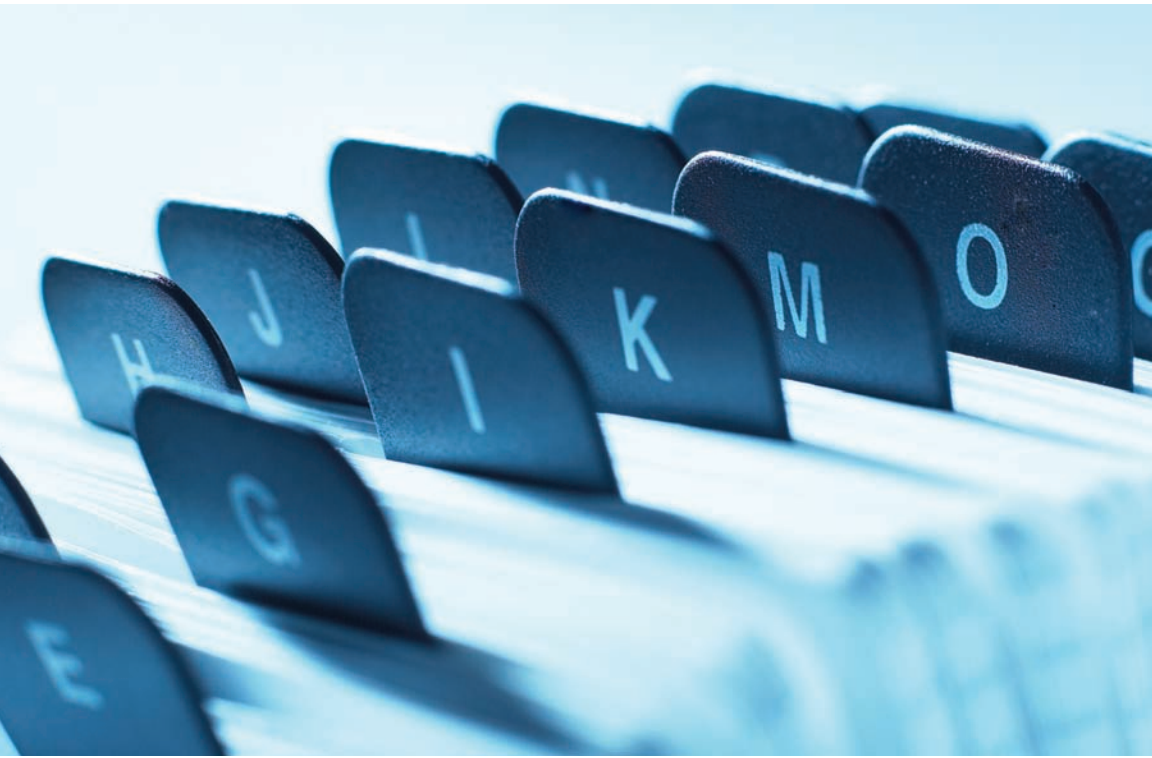


# Reference







### ENGINE OILS

BASED ON THE MOST CURRENT AVAILABLE INFORMATION

LSC	Chevron/ Texaco	Exxon/Mobil	Shell	Conoco	Description
Non-Detergent	-	Oilex (2)	Shell Motor Oil (2)	Kendall Non-Detergent Motor Oil	(1) SA (2) SB
Turbo Plus HP PCMO/High Mileage	Supreme Motor Oil 10W-40, 30, 40	Mobil 1 / Mobil Clean 5000 /High Mileage	Helix Super	Super All Season/High Mileage	API SM or SM/CF
XLD Super 15W40 Motor Oil	Delo 400 LE, Ursa LA, RPM LA 15W40	Delvac MX	Rotella T	Guardol ECT/Kendall Super-D XA	API CJ-4/SM
XLD Supreme 15W40	Delo 400, Ursa SAE, RPM Super Plus 15W40	Delvac 1200 Super, 1300 Super, XD-3 15W40, 10W30	Truck Gard 10W30, Super 2000 HP 10W30	Triton QLT/ Heavy Duty/ Hydroclear Power-D, HD Fleet Supreme	API CI-4/SM
XLD Supreme 30, 40	RPM Heavy Duty	Delvac 1200 Super, 1300 Super, XD-3	Rimula	HD Fleet Engine Oil	API CF, CF-2/SJ
Super HD HDDO 15W40, 30,40	Delo 300 or 350	Delvac 1200, XD-3	Rimula	HD Fleet Engine Oil	API CD-II/SG/SH
Low Smoke 2T Oil	-	Mobil 1 Racing 2T	Pennzoil 2 cycle	Scat 2 Cycle	API TC, JASO FC
TC-W3 Supreme 2-Cycle Motor Oil (Outboard)	2 Cycle Oil TC-W3	Mobil Outboard or SuperFlo 2 cycle	Nautilus 2 cycle	Scat 2 Cycle (NMMA approved)	NMMA-TC-W3

**Caution: Know customer end-use for product. Then read LSC data sheet to determine if LSC product is suitable for this application. Not all products are the same in both physical and chemical properties. Some competitive comparison are made on end-use basis only and products are not similar.**



## APPROXIMATE HISTORICAL COMPETITIVE COMPARISONS

### GREASES

BASED ON THE MOST CURRENT AVAILABLE INFORMATION

LSC	Chevron/ Texaco	Exxon/ Mobil	Shell	Conoco	Description
M.P. Lithium	-	Mobilux 1	Alvania	EP Conolith	General Purpose Lithium Grease NO EP
EP Lithium	Duralith EP	Mobilux EP/ Beacon P290	Alvania EP	EP Conolith/ Tacna 2000	Multipurpose EP Lithium Grease
Moly EP Lithium	Moly Grease	Beacon Q2	Super Duty	Moly Poly Grease	Multi-Purpose Moly EP Lithium Grease
L-600	-	-	-	Super STA, Super STA-M (with Moly)	Premium Multipurpose EP Lithium Grease
Red-I	Ultra Duty	-	-	Milube Grease	Tacky Premium MP EP Lithium Complex Grease
Red-I Contractor	-	-	-	Tacna M5 (5% Moly)	Tacky Premium MP EP Lithium Complex Grease Fortified with 3% Moly
White Lithium	-	-	-	-	White MP Lithium
Cotton Picker Spindle Grease	C.P. Grease	Mobil Grease A/ Picker Spindle	Shell Cotton Picker	-	C.P. Spindle Grease
Trac Roll	-	-	-	-	Crawler Tractor Grease
Bentone Grease	-	Mobil Temp.	Darina	Bentone Grease	Non-Soap High Temp
Moly Bentone	Sil X	Mobil Temp. 78	-	-	Non-Soap High Temp Grease with Moly
High Temp Grease	-	-	-	EP Conolith HT	High Temp Grease
Ultraplex	-	Mobilith AW	-	Super Lube M EP	Lithium Complex High Temp Grease

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### GEAR OILS

BASED ON THE MOST CURRENT AVAILABLE INFORMATION

LSC	Chevron/ Texaco	Exxon/ Mobil	Shell	Conoco	Description
Mineral Gear Oil 90 & 140	RPM Gear Oil 90, 140	Mobilube C-90, C-140	Dentax 80W-90, 85W-140	Transmission Oil 90	API GL-1 Straight Mineral Gear
Worm Gear Oil 250	-	-	-	-	API GL-2 Gear Lubricant
MP Gear Oil 90, 140	-	Mobilube 46 (90)	-	-	API GL-5 Gear Lubricants
Multipurpose 80W-90 / 80W-140 / 85W-140	Delo Gear Lube 80W-90, 85W-140 RPM Universal Gear Lubricant 80W-90, 85W-140	Mobilube HD 80W-90, 80W-140, 85W-140	Spirax HD 80W-140, 85W-140	Universal Gear Lubricant 80W-90 & 85W-140 or Syncon HP Synthetic Gear Oil series	API GL-5 Multigrade
Open Gear & Cable Lubricant	Open Gear & Cable Lubricant CB, SP, 100CB, 250CB	Mobiltac A	Surett Fluid 4K	Centak 11 /11W	Solvent Cut-Back Open Lubricants
Available Upon Request	Pinion Grease MS	Mobiltac QQ	Surett N 5K	-	Non-Cut-Back Open Gear Lubricants
Industrial EP Gear Oil 68, 100, 150, 220 320, 460, 680, 1000, 1500	Gear Compound EP 68, 100, 150, 220, 320, 460, 680, 1000, 1500	Mobilgear 626, 627, 629, 630, 632, 634, 636	Spartan EP 68, 150, 220, 320, 460, 680, 800 / H	Hydroclear EP Gear Oil 68 / 100 / 150 / 220 / 320 / 460	Non-Leaded Industrial Lubricants
ICH Machine Oil (LVI), 15, 22, 32, 46, 68, 100, 150	Machine Oil R&O (LVI) 32, 46, 68, 100, 150	Vectra Oil (HVI) Light / Medium / Heavy Med. / Heavy / Extra Heavy	Camea (LVI & MVI) 32 / 46 / 68 / 100	Hydroclear Industrial Oil (HVI) 79 / 90 / 115 / 250 / 350 / 2500	LVI, MVI, and General Purpose Machine Oils, Compressor Oils, and AW Hydraulic Oils.



## APPROXIMATE HISTORICAL COMPETITIVE COMPARISONS

### INDUSTRIAL OILS

BASED ON THE MOST CURRENT AVAILABLE INFORMATION

LSC	Chevron/Texaco	Exxon/Mobil	Shell	Conoco	Description
R&O Industrial Oils 10 / 22 / 32 / 46 / 68 / 77 / 100 / 150 / 220 / 320 / 460	Machine Oil R&O 22 / 32 / 46 / 68 / 100 / 150	DTE Light / Medium / Heavy / Medium / Heavy Extra / Heavy / BB / AA / HH	Tellus or Turbo 32 / 46 / 68 / 100 / 150 / 220 / 320 / 460	Hydroclear Multipurpose 32 / 46 / 68 / 100 / 150 / 220 / 320 / 460	R & O type
Long Life (Turbine Oil) 32 / 46 / 68 / 100	Turbine Oil 32 / 46 / 68 / 100	DTE 797 / 724	Tellus or Turbo 32 / 46 / 68 / 100 / 150 / 220 / 320 / 460	Hydroclear Turbine Oil 32 / 46 / 68 / 100	R & O HVI general purpose type
AW-Hydraulic Oil 22 / 32 / 46 / 68 / 100 / 150 / 220 / 320 / 460	Hydraulic Oil / Machine Oil AW 22 / 32 / 46 / 68 / 100 / 150 / 220 / 320	DTE Hydraulic Oil 24 / 25 / 26, etc.	Tellus 32 / 46 / 68 / 100	Hydroclear AW or Super Hyd. Oil / Megaflo 22 / 32 / 46 / 68 / 100 / 150	AW Hydraulic Oil
Multi-Vis AW Hyd. Oil 32, 46, 68, 100	Hydraulic Oil AW/MV 32, 46	DTE Oil 13 / 15 / 16 / 18	-	Hydroclear AW MV32 / MV46 / MV68 / MV100 / MV150	AW (Multi-Viscosity) High VI type Hydraulic Oil
Steam Cylinder Oil 320 / 460 / 680 / 1000	Cylinder Oil 460 / 680	Cylinder Oil 600W Super / Extra Helicaf	Valvata K 460 / 680	Inca 460 / 680 / 1000	Compounded Steam Cylinder Oils and Worm Gear Lubricants
HD Chain Oil	Chain Bar Oil 60, 150, 220	-	-	-	Tacky, no-drip, chain oils
Lube Tac 32 / 68 / 100 / 150 / 220 / 320 / 460 / 1000	Chain Oil 100 / 150	Viscolite Oil / Heavy / Extra Heavy / BB / AA / HH / SS	Torcula 32 / 100 / 150 / 220 / 320	Clarity or Bio Syn 32 / 100	No-drip, tacky machine oils



### INDUSTRIAL OILS

BASED ON THE MOST CURRENT AVAILABLE INFORMATION

LSC	Chevron/ Texaco	Exxon/ Mobil	Shell	Conoco	Description
Way Lube 32 / 46 / 68 / 100 / 150 / 220 / 320	Way Oil Vistac 68 / 220	Vectra Oil 1 / 2 / 3 / 4 OR Febis K 68 / 220	Tonna 68 / 220	Hydroclear TCS 32 / 68 / 220	Slide Way lubricants containing Tackness & EP additive
Pneumatic Tool Oil 32 / 46 / 100 / 150 / 220 / 320	Rock Drill Oil Vistac 32 / 46 / 100 / 150 / 320	Almo 525 / 529 / 532 or Arox EP 46 / 150	Torcula 32 / 100 / 150 / 320	Hydroclear 150 Rock Drill Oil	Air Tool or Pneumatic Oils
Edger Arbor Oil	Edger Arbor Oil	-	Edger Arbor Oil 100 / 150	-	Oil for Saw and Saw products
CP Oil 10 / 22 / 46 / 68	CP Oil 22 / 46	-	-	76 Oil 22 / 32	Cotton Picker Spindle Oils
Paper Machine Oil 150 / 220	Clarity Paper Machine Oil 150 / 220 / Industrial EP 46 / 100 / 220 / 320 / 460	Paper Machine Oil K / L or Teresstic N 150 / 220	Delima 150 / 220	Ecoterra Hyd. Oil or Synco R & O 32 / 68 / 150 / 220	Paper Machine Oils
Heat Transfer Fluid	Heat Transfer Oil 46	Mobiltherm 600 or Calonia HT 43	Thermia C	Heat Transfer Oil 32	Heat Transfer Fluids
USP 7 / 9 / 20 / 24 / 35 / 50 Technical Oil 70 / 100 / 200	Paralux 701 / 1001 / 2401 / 6001 Paramount Oils 1005 / 3005 / 6005	-	USP 7 / 9 / 20 / 24 / 35 / 50 / 1100	Heat Transfer Oil 32	Food Grade Oils USP / Technical White Oils
FM Hydraulic 32 / 46 / 68 / 100 FM Gear Oil 150 / 220 / 460 / 680	FM Lube Oil 32 / 46 / 68 / 100 / 220 / 460	-	Cassida HF 46 / 68 & Cassida 150 / 220 / 320	FM Oil 32 / 46 / 68 / 100 / 220 & 460	Food Grade Oils Hydraulic & Gear Oils

**Caution: Know customer end-use for product. Then read LSC data sheet to determine if LSC product is suitable for this application. Not all products are the same in both physical and chemical properties. Some competitive comparison are made on end-use basis only and products are not similar.**



## APPROXIMATE HISTORICAL COMPETITIVE COMPARISONS

### CUTTING OIL

BASED ON THE MOST CURRENT AVAILABLE INFORMATION

LSC	Chevron	Mobil	Shell	Exxon	Description
Dark Cutting Oil D-10	Metal Working Fluid 502, 31A	Mobilmet Sigma	Garia C	Pennex N-40 Dortan N-34	Active cutting oil for cutting ferrous & ferrous alloys. Easy to moderate machinery.
Dark Cutting Oil D-15 Clear Cutting Oil C-32 Piranha C-31, D-15 CF	Metal Working Fluid 503, 21D, 44A, 45B	Mobilmet Omega	Garia D Garia G	Pennex N-47 Dortan N-36	Active cutting oil for cutting ferrous & ferrous alloys. Moderate to difficult machinery.
Dark Cutting Oil D-20 Piranha C-20 CF	Metal Working Fluid 505, 44A	Mobilmet Alpha	Garia H Garia T	Pennex N-47 Dortan N-34	Active cutting oil for deep hole drilling, forming & trepanning on difficult to machine ferrous & ferrous alloys.
Dark Cutting Oil D-20 Piranha C-20 CF	Metal Working Fluid 11D	Mobilmet Alpha	Garia H	Pennex N-40 Dortan N-34	Active cutting or for honing, lapping and cutting non-ferrous & ferrous alloys from easy to difficult machinery.
Clear Cutting Oil D-30 Piranha C-20 CF	Metal Working Fluid 505, 31A	Mobilmet Upsilon	Mercon® M	Dortan N-14	Non-staining cutting oil used for cutting non-ferrous metals and easy to moderately difficult-to-machine ferrous metals.
Tri-Purpose Oil T-35 Piranha C-30 CF	Metal Working Fluid 504	Mobilmet Upsilon Mobilmet Nu	Mercon® M	-	Non-staining cutting oil. Combination cutting, hydraulic, and machine oil. Used for cutting non-ferrous metals and easy to moderately difficult-to-machine ferrous metals.
A.P. Soluble Oil S-40	Soluble Oil B, NB	Mobilmet, S-122, S-123, S-126	Dromus B	Kutwell 30, 40	All purpose, non-staining soluble oil.
HD Soluble Oil	Soluble Oil HD	Mobilmet 160, S-125	Dromus C	Kutwell 82	Extreme pressure soluble oil for difficult to machine ferrous and ferrous alloys
A.P. Soluble Oil S-50	Soluble Oil B, NB	Mobilmet S-122, S-123, S-126	Dromus B	Kutwell 30, 40	All purpose, non-staining soluble oil. Bio-resistant.
Quenching Oil 55	Quenching Oil	-	Voluta B	Fenso 51	Metal Quenching Oil

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## LSC ENGINE OIL QUICK-REFERENCE CHART

PRODUCTS	TURBO HP API SM	TURBO HD API SL	TURBO HD API SL	XJD SUPER API CJ-4/SL	XPD SUPER API CI-/SL	XPD SUPER PREMIUM API CI-4/5J	XPD PLUS API CI-4/SL
SAE GRADE	5W-20, 30, 10W-30, 40	5W-20, 30, 10W-30, 40	10W, 30, 40 20W-50	30, 40, 15W-40	30, 40, 15W-40	30, 40, 15W-40	30, 40, 15W-40
API SC							
API SD							
API SE							
API SF							
API SG							
API SH							
API SJ							
API SL							
API SM				<sup>1</sup> API			
ILSAC GF-4	<sup>2</sup> 5W-20, 30, 10W-30						
ILSAC GF-4 or ILSAC GF-4/SM/CF	<sup>2</sup> 5W-20, 30, 10W-30						
MIL-L-2104A, Supplement 1, API CC							
MIL-L-2104B, API CC							
SERIES 3 MIL-L45199B, API CD							
API CF							
API CF-2							
API CF-4							
API CG-4							
API CH-4							
API CI-4					15W-40	15W-40	15W-40
API SJ-4				15W-40			
MACK EO-K/2							
MACK EO-N Premium Plus '06					15W-40	15W-40	15W-40
MACK EO-O Premium Plus '07				15W-40			
Cummins CES 20078				15W-40	15W-40	15W-40	15W-40
Cummins CES 20081				15W-40			
Caterpillar ECF 1 & 2				15W-40	15W-40	15W-40	15W-40
Caterpillar ECF 3				15W-40			
MAN 271					15W-40	15W-40	15W-40
MAN 3275				15W-40			
MB 228.3				15W-40	15W-40	15W-40	15W-40
Volvo VDS-2 & 3					15W-40	15W-40	15W-40
Volvo VDS 4				15W-40			
MTU Type 2				15W-40	15W-40	15W-40	15W-40
ACEA E5 or E7				15W-40	ACEA E5 15W-40	ACEA E5 15W-40	ACEA E5 15W-40

Note: When specific viscosity grades are shown, they are required by specification.

<sup>1</sup> API CJ-4/ SM can be provided.

<sup>2</sup> 0W-20, 5W-20, 5W-30, & 10W-30

■ Applies    
 ■ Does Not Apply    
 ■ Applies to certain grades

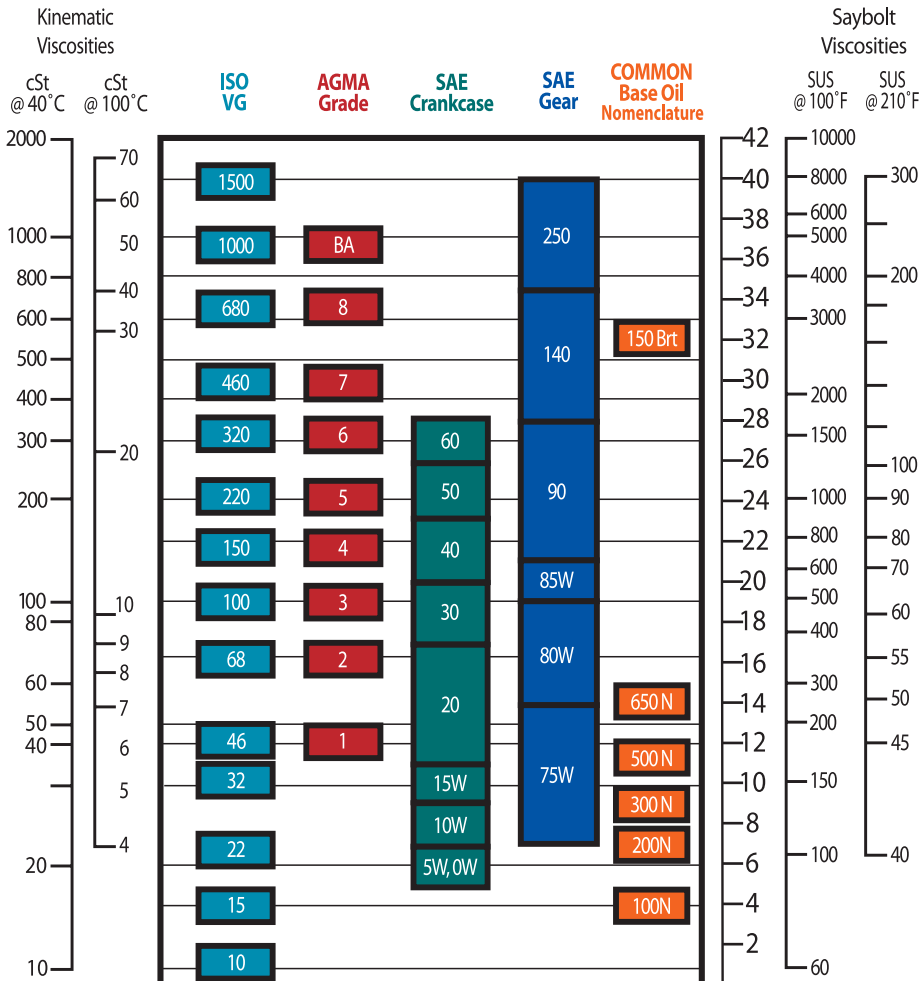


## SAE VISCOSITY RECOMMENDATIONS

Climactic Condition	Climatic Code	Minimum Low Temp. °F	Minimum Low Temp. °C	Maximum High Temp. °F	Maximum High Temp. °C	Typical Coolant Temp. °F	Typical Coolant Temp. °C	Ideal SAE Viscosity
Very Hot	AA	>80°	>26°	>110°	>43°	212°	100°	60
Hot	A	>60°	>16°	>110°	>43°	200°	93°	50
Warm	B	>50°	>10°	<110°	<43°	190°	87°	40
Normal	C	>40°	>4°	<97°	<36°	170°	77°	30
Normal	D	>20°	>-7°	<85°	<29°	170°	77°	10W-30
Cold	E	<20°	<-7°	<69°	<21°	170°	77°	5W-30
Winter		4°	-20°	32°	0°	160°	71°	10W
Freezing		-13°	-25°	32°	0°	160°	71°	5W
Sub-Zero		-22°	-30°	0°	-18°	160°	71°	0W
All Climate		-13°	-25°	>110°	>43°	160°-200°	71°-93°	5W-50, 5W-60



## COMPARATIVE VISCOSITY CHART





## GREASE APPLICATION GUIDE

Properties	Aluminum	Sodium	Calcium Conventional	Calcium Anhydrous	Lithium
Dropping Point (°F)	230	325-350	205-220	275-290	350-400
Dropping Point (°C)	110	163-177	96-104	135-143	177-204
Maximum Usable temp (°F)	175	250	200	230	275
Maximum Usable temp (°C)	78	121	93	110	135
Water Resistance	Good to Excellent	Poor and fair	Good to Excellent	Excellent	Good
Work Stability	Poor	Fair	Fair to good	Good to Excellent	Good to Excellent
Oxidation	Excellent	Poor to good	Poor to Excellent	Fair to Excellent	Fair to Excellent
Protection Against Rust	Good to Excellent	Good to Excellent	Poor to Excellent	Poor to Excellent	Poor to excellent
Pumpability (in centralized system)	Poor	Poor to fair	Good to Excellent	Fair to Excellent	Fair to Excellent
Oil Separation	Good to Excellent	Fair to excellent	Poor to good	Good	Good to Excellent
Appearance	Smooth and clear	Smooth and fibrous	Smooth and Buttery	Smooth and Buttery	Smooth and Buttery
Other Properties		Adhesive & Cohesive	EP Grades Available	EP Grades Available	EP Grades Available, Reversible
Production Volume and Trend (1)	No change	Declining	Declining	No Change	The Leader
Principal Uses (2)	Thread Lubricants	Rolling Contact bearings	General uses For economy	Military Multiservice	Multiservice automotive & industrial

**Caution: Know customer end-use for product. Then read LSC data sheet to determine if LSC product is suitable for this application. Not all products are the same in both physical and chemical properties. Some competitive comparison are made on end-use basis only and products are not similar.**



Properties	Aluminum Complex	Lithium Complex	Calcium Complex	Polyurea	Organo-Clay
Dropping Point (°F)	500+	500+	500+	470	500+
Dropping Point (°C)	260+	260+	96-104	135-143	177-204
Maximum Usable temp (°F)	350	350	350	350	350
Maximum Usable temp (°C)	177	177	177	177	177
Water Resistance	Good to Excellent	Fair to excellent	Good to Excellent	Good to Excellent	Fair to Excellent
Work Stability	Good to Excellent	Fair to good	Good to Excellent	Good to Excellent	Good to Excellent
Oxidation	Fair to Excellent	Poor to good	Fair to excellent	Good to Excellent	Good
Protection Against Rust	Good to Excellent	Fair to good	Fair to excellent	Good to Excellent	Poor to excellent
Pumpability (in centralized system)	Fair to Excellent	Poor to fair	Good to Excellent	Good to Excellent	Good
Oil Separation	Good to excellent	Good to excellent	Good to excellent	Good to excellent	Good to Excellent
Appearance	Smooth and Buttery	Smooth and Buttery	Smooth and Buttery	Smooth and Buttery	Smooth and Buttery
Other Properties	EP Grades Available, Reversible	EP and Antiwear Inherent	EP Grades Available	EP Grades Available	
Production Volume and Trend (1)	Increasing	Declining	Increasing	No Change	Declining
Principal Uses (2)	Multiservice Industrial	Multiservice automotive and industrial	Multiservice automotive and industrial	Multiservice automotive and industrial	Multiservice (Frequent re-lube)

**Caution: Know customer end-use for product. Then read LSC data sheet to determine if LSC product is suitable for this application. Not all products are the same in both physical and chemical properties. Some competitive comparison are made on end-use basis only and products are not similar.**



## PRODUCT APPLICATION CHART

### Binary Greases Mixtures Compatibility Chart

LSC Grease Products	Soap Types	Aluminum Complex	Barium	Barium Complex	Calcium	Calcium 12 Hydroxy Stearate	Calcium Complex	Clay
MP Lithium	Lithium 12 Hydroxy Stearates	X	X	X	B	C	X	X
EP Lithium	Lithium 12 Hydroxy Stearates	X	X	X	B	C	X	X
Ultraplex EP	Lithium Complex	C	X	X	C	C	C	X
L-600	Lithium 12 Hydroxy Stearates	X	X	X	B	C	X	X
Red-i Contractor	Lithium Complex	C	X	X	C	C	C	X
Red-i Biodegradable	Lithium Complex	C	X	X	C	C	C	X
Red-i Power Cat Heavy Duty	Lithium Complex	C	X	X	C	C	C	X
Red-i Premium CV Joint	Lithium Complex	C	X	X	C	C	C	X
Red-i Watersport Marine Utility	Lithium Complex	C	X	X	C	C	C	X
Red-i PT Cable Coating	Lithium	X	X	X	B	C	X	X
Moly EP Lithium	Lithium 12 Hydroxy Stearates	X	X	X	B	C	X	X
White Lithium	Lithium 12 Hydroxy Stearates	X	X	X	B	C	X	X
Color Picker Spindle	Lithium 12 Hydroxy Stearates	X	X	X	B	C	X	X
Trac Roll	Lithium 12 Hydroxy Stearates	X	X	X	B	C	X	X
Bentone	Clay	X	X	X	C	C	X	C
Moly Bentone	Clay	X	X	X	C	C	X	C
Moly Cat	Lithium 12 Hydroxy Stearates	X	X	X	B	C	X	X
Grizzly Grease III	Lithium 12 Hydroxy Stearates	X	X	X	B	C	X	X
High Temperature	Synthetic Gel	X	X	X	X	X	X	X
Bigfoot	Lithium Complex	C	X	X	C	C	C	X
Food Machinery	Aluminum Complex	C	X	X	X	C	X	X

**X** Incompatible

**C** Compatible

**B** Borderline



### Binary Greases Mixtures Compatibility Chart

LSC Grease Products	Soap Types	Lithium	Lithium 12 Hydroxy Stearate	Lithium Complex	Polyurea	Sodium	Silca
MP Lithium	Lithium 12 Hydroxy Stearates	C	C	C	X	X	X
EP Lithium	Lithium 12 Hydroxy Stearates	C	C	C	X	X	X
Ultralex EP	Lithium Complex	C	C	C	X	B	X
L-600	Lithium 12 Hydroxy Stearates	C	C	C	X	B	X
Red-i Contractor	Lithium Complex	C	C	C	X	B	X
Red-i Biodegradable	Lithium Complex	C	C	C	X	B	X
Red-i Power Cat Heavy Duty	Lithium Complex	C	C	C	X	B	X
Red-i Premium CV Joint	Lithium Complex	C	C	C	X	B	X
Red-i Watersport Marine Utility	Lithium Complex	C	C	C	X	B	X
Red-i PT Cable Coating	Lithium	C	C	C	X	B	X
Moly EP Lithium	Lithium 12 Hydroxy Stearates	C	C	C	X	X	X
White Lithium	Lithium 12 Hydroxy Stearates	C	C	C	X	X	X
Color Picker Spindle	Lithium 12 Hydroxy Stearates	C	C	C	X	X	X
Trac Roll	Lithium 12 Hydroxy Stearates	C	C	C	X	X	X
Bentone	Clay	X	X	X	X	X	X
Moly Bentone	Clay	X	X	X	X	X	X
Moly Cat	Lithium 12 Hydroxy Stearates	C	C	C	X	X	X
Grizzly Grease III	Lithium 12 Hydroxy Stearates	C	C	C	X	X	X
High Temperature	Synthetic Gel	X	X	X	X	X	C
Bigfoot	Lithium Complex	C	C	C	X	B	X
Food Machinery	Aluminum Complex	X	X	C	X	X	X

**X** Incompatible

**C** Compatible

**B** Borderline



## INDUSTRIAL LUBRICANT REFERENCE CHART

LUBRICANT	VISCOSITY	APPLICATION	FEATURES
Hydraulic Oil	ISO 22	Hydraulic Systems	Excellent Antiwear
Hydraulic Oil	ISO 32	General Purpose	Superior Demulsibility
Hydraulic Oil	ISO 46	Lubrication	Excellent Rust & Oxidation Resistance
Hydraulic Oil	ISO 68		
Hydraulic Oil	ISO 100		
Flameproof 200	ISO 46	High Temperature	Fire Resistance
R&O Turbine Oil	ISO 32	Gas Turbines	Excellent Oxidation Stability
R&O Turbine Oil	ISO 46	Steam Turbines	Excellent Demulsibility
R&O Turbine Oil	ISO 68	Electric Turbines	Non-Foaming
R&O Turbine Oil	ISO 100	General Turbines	Superior Rust Protection
R&O Turbine Oil	ISO 150	Lubrication	
R&O Turbine Oil	ISO 220		
Waylube	ISO 32	Machine Way	Eliminates stick-slip
Waylube	ISO 68	Lubrication	High Precision and Finish
Waylube	ISO 100		Excellent Load Carrying Properties
Waylube	ISO 150		Excellent Antiwear Performance
Waylube	ISO 220		Low Odor, Light Color
Spindle Oil 3	ISO 5	High Speed Spindle	Long Service Life
Spindle Oil 6	ISO 10	Bearings	Excellent Rust Protection
Spindle Oil 8	ISO 15	Pneumatic Tools	Excellent Wear Protection
Spindle Oil 10	ISO 22	Airline Oilers	Light Colored
EP Gear Oil	ISO 68	Industrial Gear Box	Multipurpose Gear Oil
EP Gear Oil	ISO 100	Lubricant	Comparable w/ Brass & Bronze and Copper Alloys
EP Gear Oil	ISO 150		Excellent Antiwear Performance
EP Gear Oil	ISO 220		
EP Gear Oil	ISO 320		Excellent EP and Antiwear Properties
EP Gear Oil	ISO 460		
EP Gear Oil	ISO 680		
Synlube FM	ISO 32	Long Life Synthetic	Exceptionally Long Life
Synlube FM	ISO 46	Oil for Gear Box	High and Low Temperature Service
Synlube FM	ISO 68		Exceptional Oxidation Resistance
Synlube FM	ISO 100		
Synlube FM	ISO 150		
Synlube FM	ISO 220		
Synlube FM	ISO 320		
Synlube FM	ISO 460		
ICH Machine Oil		Reciprocating Air	Low Wax Content for Low Temperatures
ICH Machine Oil		Compressor using Ammonia as a	Low Carbon Residue Formation
ICH Machine Oil		Refrigerant.	Multi-Use Industrial Oil
ICH Machine Oil			
ICH Machine Oil		Not for use in Freon Systems	
ICH Machine Oil			
Air Compressor Oil	ISO 100	Reciprocating Air Compressor	Outstanding Wear Protection
			Excellent Rust and Corrosion Protection
Syncom FM	ISO 32	Long Life Synthetic Oil for Rotary Screw	
Syncom FM	ISO 46	Compressors (R12, R11 & Ammonia)	Deposit Free Operation
Syncom FM	ISO 68		
Synoil FM	ISO 32		
Synoil FM	ISO 46	Refrigeration	Exceptionally Long Life
Synoil FM	ISO 68	Compressor	Synthetic Oil
Synthetic Oven	ISO 100	Lubrication of Oven Chain & Sprockets	Controlled Volatility
Chain Oil			Dry Film Lubrication with Synthetic Carrier Oil
Vacuum Pump Oil	ISO 68	High Vacuum Rotary	Low Vapor Pressure High Purity
Duratherm Pump Oil	ISO 22	Pumps	Exceptional Thermal Stability
		High Temp. Heat Transfer Systems	Outstanding Oxidation Resistance





## AIR COMPRESSOR LUBRICATION GUIDE

MAKE	TYPE	SYNCOM FM 32	SYNCOM FM 46	SYNCOM FM 68	SYNCOM FM 100	MINERAL AIR COMPRESSOR
<b>ATLAS - COPCO</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Vane			<b>X</b>		
	Rotary Screw	<b>X</b>				
<b>ALLIS CHALMER</b>	Rotary Vane				<b>X</b>	<b>X</b>
<b>BAUER</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Screw		<b>X</b>			
<b>CHAMPION</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Screw			<b>X</b>		
<b>CHICAGO PNEUMATIC</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Vane			<b>X</b>		
	Rotary Screw			<b>X</b>		
<b>COMPAIR-KELLOG</b>	Reciprocating (Air)				<b>X</b>	<b>X</b>
	Reciprocating (Water)			<b>X</b>		
	Rotary Vane				<b>X</b>	<b>X</b>
	Rotary Screw			<b>X</b>		
<b>CURTIS</b>	Reciprocating				<b>X</b>	<b>X</b>
<b>DAVEY</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Vane			<b>X</b>		
<b>FULLER</b>	Rotary Vane					
<b>GARDNER DENVER</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Vane			<b>X</b>		



MAKE	TYPE	SYNCOM FM 32	SYNCOM FM 46	SYNCOM FM 68	SYNCOM FM 100	MINERAL AIR COMPRESSOR
<b>INGERSOLL- RAND</b>	Reciprocating Type 3044				<b>X</b>	<b>X</b>
	Rotary Vane ESV, ESH				<b>X</b>	<b>X</b>
	Rotary Screw XLE,XHE				<b>X</b>	<b>X</b>
	Reciprocating PHE				<b>X</b>	<b>X</b>
	Reciprocating LLE				<b>X</b>	<b>X</b>
	Pacair				<b>X</b>	
	SSR (out of warranty)			<b>X</b>		
Gyro - F./O	<b>X</b>					
<b>JOY</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Screw			<b>X</b>		
<b>KAESER</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Screw		<b>X</b>			
<b>LEROI</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Screw		<b>X</b>			
<b>QUINCY</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Screw		<b>X</b>			
<b>SCHRAMM</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Screw		<b>X</b>			
<b>SULLAIR</b>	Rotary Screw (Except 24KT)	<b>X</b>				
<b>WORTHINGTON</b>	Reciprocating				<b>X</b>	<b>X</b>
	Rotary Screw			<b>X</b>		
	Rotary Vane			<b>X</b>		



REFRIGERATION OILS COMPARISON CHART

TYPICAL INSPECTIONS

ISO Grade	Gravity API	Viscosity cSt. @ 40°C	Viscosity cSt. @ 100°C	Flash Point COC, °F	Fire Point COC, °F	Pour Point, °F	Color, D1500	Floc Point, °F
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ICH Machine Oil

32	23.2	32	4.6	315	355	-35	2.5	.....
46	23.5	46	5.7	345	385	-35	3.0	.....
68	23.8	68	6.7	360	395	-25	3.5	.....
100	24.1	100	8.9	370	415	-10	4.0	.....
150	24.4	150	10.8	400	459	-5	4.0	.....

JD Refrigeration Oil

32	27.7	32	5.0	315	354	-56	1.5	.....
46	28.7	46	6.2	345	385	-50	1.5	.....
56	25.6	56	7.6	352	390	-40	2	.....
68	25.5	68	8.3	360	396	-36	2	.....

**Note:** ICH Machine Oils and JD Refrigeration Oils are not for use in Freon Systems.



## FOOD GRADE CROSS-OVER CHART

LSC	Behnke Lubricants (JAX)	Fiske Bros. Refing. (Lubriplate)	Lubrication Eng.	Chevron Texaco	CITGO	Petro Canada	Calumet (Penreco)
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### CHAIN OILS

FM Chain Oil 100	Magna-Plate 76	FP-150L	2701 Oven Chain Oil	Lubricating Oil FM-E 100	—	Purity FG Chain Oil L	—
FM Chain Oil 200	Magna-Plate 76	—	—	—	—	Purity FG Chain Oil H	—
High Temp FM Chain Oil	—	—	—	—	—	—	—
—	—	FP-150 (VG 460)	—	—	—	—	—

### HYDRAULIC OILS

FM Hyd. Oil 32	Magna-Plate 60	FMO 150 AW	—	Lubricating Oil FM32/Cygnus Hyd	Clarion FG 32	Purty FG AW Oil 32	—
FM Hyd. Oil 46	Magna-Plate 62	FMO 200 AW	Quinplex 4010	Lubricating Oil FM46/Cygnus Hyd	Clarion FG 46	Purty FG AW Oil 46	—
FM Hyd. Oil 68	Magna-Plate 64	FMO 350 AW	Quinplex 4020	Lubricating Oil FM68/Cygnus Hyd	Clarion FG 68	Purty FG AW Oil 68	—
FM Hyd. Oil 100	Magna-Plate 66	FMO 500 AW	Quinplex 4030	Lubricating Oil FM100/Cygnus Hyd	Clarion FG 100	Purty FG AW Oil 100	—

### GEAR OILS

—	—	FMO 85AW (VG 22)	—	—	—	—	—
FM Gear Oil 150	—	FMO 900AW	—	Seamer Oil FM 150	—	Purity FG EP Gear Oil 150	—
FM Gear Oil 220	Magna-Plate 220-FG	FMO 1100AW	Quinplex 4090	Lubricating Oil FM 220/ Cygnus Gear	—	Purity FG EP Gear Oil 220	—
FM Gear Oil 320	—	FMO 1700AW	—	—	—	Purity FG EP Gear Oil 320	—
FM Gear Oil 460	Magna-Plate 460-FG	FMO 2400AW	Quinplex 4140	Lubricating Oil FM 460/ Cygnus Gear	—	Purity FG EP Gear Oil 460	—
FM Gear Oil 680	—	FMO 3800AW	—	—	—	—	—

### WHITE OILS

Tech. White Oil 70	White Mineral Oil	FMO Series	—	White Oil AFP	Clarion FG WMO 70	Purity FG WO WMO	—
Tech. White Oil 100	White Mineral Oil 100	FMO Series	—	White Oil 8T or 9T	Clarion FG WMO 90	Purity FG WO WMO	—
USP White Oil №. 7	White Mineral Oil	FMO Series	—	Superla White Oil 7	Clarion FG WMO 200	Purity FG WO WMO	—
USP White Oil №. 9	White Mineral Oil	FMO Series	—	Superla White Oil 9	—	Purity FG WO WMO	—
USP White Oil №. 20	White Mineral Oil 22	FMO Series	—	Superla White Oil 21	Clarion FG WMO	Purity FG WO WMO	Drakeol 21
USP White Oil №. 24	White Mineral Oil	FMO Series	—	—	—	Purity FG WO WMO	—
USP White Oil №. 35	White Mineral Oil 46	FMO Series	—	Superla White Oil 35	—	Purity FG WO WMO	Drakeol 35
USP White Oil №.50	White Mineral Oil 68	—	—	Superla White Oil 50	—	—	—
USP White Oils №.100	—	—	—	—	—	—	—

### SPECIALTY OILS

Egg Spray Oil	—	—	—	—	—	—	—
Food & Grain Dust Stop	—	—	—	Superla DCO	—	—	—

### DEEP WELL PUMP OILS

Aqualube AW 32	—	—	—	—	—	—	—
Aqualube AW 46	—	—	—	—	—	—	—
Aqualube AW 68	—	—	—	—	—	—	—

### COOKER MACHINE OIL

—	—	FGCO VG 150	—	—	—	—	—
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### BOTTLE FILLING MACHINE OIL

—	—	STO-FG (VG 68)	—	—	—	—	—
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### SYNTHETIC COMPRESSOR OILS (REFRIGERATION)

Synoil FM 32	—	SFGO Ultra 32	—	—	—	—	—
Synoil FM 46	—	SFGO Ultra 46	—	—	—	—	—
Synoil FM 68	—	RCO 68*	—	—	—	—	—
Synoil FM 100	—	—	—	—	—	—	—



## FOOD GRADE CROSS-OVER CHART (continued)

LSC	Behnke Lubricants (JAX)	Fiske Bros. Refing. (Lubriplate)	Lubrication Eng.	Chevron Texaco	CITGO	Petro Canada	Calumet (Penreco)
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### SYNTHETIC COMPRESSOR OILS (REFRIGERATION) *continued*

Synoil FM 220	—	SFGO Ultra 220	—	—	—	—	—
Synoil FM 460	—	SFGO Ultra 460	—	—	—	—	—

### SYNTHETIC GEAR OILS

Synlube 32	—	—	—	—	—	—	—
Synlube 46	—	—	Quinplex 4046	—	—	—	—
Synlube 68	—	—	—	—	—	—	—
Synlube 100	—	—	—	—	—	—	—
Synlube 150	—	Synax EP 150	—	—	—	—	—
Synlube 220	—	Synax EP 220	—	—	—	—	—
Synlube 320	Magna-Plate 250-FG	Synax EP 320	—	—	—	—	—
Synlube 460	Magna-Plate 85W140-FG	Synax EP 460	Quinplex 4007	—	—	—	—
—	—	—	Quinplex 4008 (680)	—	—	—	—

### SYNTHETIC COMPRESSOR OILS (ROTARY)

Syncom FM 32	Syncomp FG 32	SFGO Ultra 32	—	—	—	Purity FG Oil 32
Syncom FM 46	Syncomp FG 46	SFGO Ultra 46	—	Syn Compressor Oil FM 46	—	Purity FG Oil 46
Syncom FM 68	Syncomp FG 68	SFGO Ultra 68	—	—	Clarion Comp. Guard FG 66	Purity FG Oil 68
—	Syncomp FG 100	SFGO Ultra 100	—	—	—	Purity FG Oil 100

### HEAT TRANSFER OILS

Syntherm FM 32	—	—	—	—	—	Cailo FG Heat Transfer Fluid
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### GREASES

—	—	FGL 00	—	—	—	—
—	—	FGL CC	—	—	—	—
—	Magna-Plate 44-0	FGL-0	Quinplex 4023	FM Grease EP #0	—	Purity FG Gear #0
—	Magna-Plate 44-1	FGL-1	Quinplex 4024	FM Grease EP #1	—	Purity FG Gear #1
Al Complex	Magna-Plate 44-2	FGL-2/Pure Tac #2	Quinplex 4025	FM Grease EP#2	Clarion FG Grease #2	Purity FG Gear #2
—	—	—	—	Cygnus Grease 1 (Poly Urea)	—	—

### SYNTHETIC GREASES

—	—	Synxtreme FG-2	—	—	—	—
—	—	—	—	Cygnus Grease 2 (Poly Urea)	—	—
Crystal FM #0	—	—	—	—	—	—
Crystal FM #1	—	—	—	—	—	—
Crystal FM #2	—	—	—	—	—	—
Crystal FM #3	—	—	—	—	—	—

### MINERAL

Li Complex	—	Magna-Plate 44-0, 44-1, 44-2	FGL 00, CC, 0, 1	Quinplex 402, 340, 244, 025	—	—	Purity FG & FG 00
Al Complex	FM Grease #2	—	—	—	—	Clarion FG HTEP NLGI #2	—
Calcium	—	—	—	—	—	—	White FM #2

### SYNTHETIC

Li Complex	—	—	—	—	—	—	—
Calcium Sul.	—	—	—	—	—	—	—
Al Complex	—	—	—	—	—	—	—
Polyurea Complex	—	—	—	—	—	—	—
Inorganic	—	—	—	—	—	—	—
In-Organic	—	—	—	—	—	—	—



## CUTTING OIL RECOMMENDATIONS

### CHLORINE-FREE

MACHINABILITY CLASS/INDEX

TYPE OF OPERATION Decreasing Severity	Class 1 Ferrous over 70%	Class 2 Ferrous 50-70%	Class 3 Ferrous 45-50%	Class 4 Ferrous below 40%	Class 5 & 6 Nonferrous
Broaching	- C-31	- C-31	- C-31	- C-31	T-35 C-31
Pipe Threading	- C-31 -	- C-31 C-31	- C-31	- C-31	C-31 T-35 C-30
Plain Threading	-	- C-31	- C-31	- C-31	C-31 C-30 T-35
Gear Shaving	- C-31	- C-31	- C-31	- C-31	
Reaming	- C-30	- C-30	- C-31	- C-31	C-31 T-35 C-30
Gear Cutting	- C-30	- C-30	- C-31	- C-31	C-31 T-35 C-30
Deep Hole Drilling	D-20	D-20	D-20	D-20	T-35 C-30
Milling	S-40	S-40			S-40 T-35 C-30 C-32
Boring and Turning	- C-31 -	- C-31 -	- C-31	- C-31	T-35 C-30
Automatic Screwing Machines and Turret Lathes	- C-30	- C-30	- C-31 -	- C-31	T-35 C-30
High Speed Automatic Screw Machines	- C-30	- C-30	- C-31	- C-31	T-35 C-30 C-32
Shape Planning	S-40	S-40	S-40	S-40	S-40
Plain Drilling	- C-30	- C-30	- C-31	- C-31	C-30 C-30 C-32
Single Plain Turning	-	-	-	- C-31	S-40 T-35
Circular Sawing and Hack Sawing	S-40	S-40	S-40	S-40	S-40 C-32
Grinding: Plain, Cylindrical Surface, & Centerless	S-40	S-40	S-40	S-40	S-40
Thread and Form Grinding	- C-31	- C-31	- C-31	- C-31	
Thread Rolling	- C-31	- C-31	- C-31	- C-31	T-35 C-32