Gulf – A Tradition of Excellence

Commitment to excellence in customer service, product quality and leading edge technology have come to be symbolized around the world by the Gulf logo – and we remain committed to building on these strengths.

Gulf Oil blends the finest lubricants in the world. Every Gulf lubricant is tested to meet or exceed the most exacting international standards.

The wide range of Gulf lubricant brands, specially designed for the Saudi market needs, have delivered excellent performance for nearly four decades in the Kingdom.

Our lubricants are used by numerous prestigious Saudi industries, ranging from petro-chemical plants, steel mills, cement plants, brick factories, construction companies, fleet transport companies, international companies, to thousands of individual retail customers.

We trust this Gulf Lubricants Application Guide will make a helpful contribution in improving our relationship.

PREFACE

This Lubricants Application Guide has been produced as a quick and convenient reference aid for customers and distributors. All products are described in terms of their general properties and primary areas of service. The specifications show typical values only.

Due to continual product research and development and changes in industry and equipment builder requirements, the information listed here is subject to change.

The products described in this book cover the Gulf product range, but availability of a particular product can be determined by contacting your nearest Gulf Oil office or account manager.

For additional information on Gulf products or for recommendations, please contact your local Gulf Oil office or the account manager.

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SECTION

GASOLINE ENGINE OILS

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Gulf Formula G

Gasoline Engine Oil

DESCRIPTION

Gulf Formula G is a fully synthetic superior quality SAE 5W50 high quality shear stable multigrade passenger car motor oil. This oil gives outstanding thermal stability, improved viscosity-temperature characteristic and exceptionally low temperature fluidity.
GULF FORMULA G is fully approved by major international OEMs like Porsche, BMW, Mercedes Benz and Volkswagen. It also meets the JASO engine test requirements, Chrysler, General Motors, Ford, Honda, Nissan, Toyota and others manufacturers of the world.

GULF FORMULA G PROVIDES

- Superb prevention of deposits and sludge build-ups.
- Excellent engine cleanliness.
- Superb lubrication & wear protection for extreme driving conditions.
- Performance reserve for wide variation of temperature & suitable for hot desert climate.
- Minimise oil ageing & permits extended long drain interval enable long and clean engine life

PERFORMANCE LEVELS PROVIDED

API SJ/CF	MIL - L - 46152 E
ACEA A3/B3	GM 6049M
GM 4718M (for Corvettes)	Ford M2C 153 - E
Chrysler MS 6395D	Mercedes Benz 239.1
VW 500.00	

TYPICAL SPECIFICATIONS

Grade, SAE		5W50
Kinematic Viscosity	cSt at 40°C	114.4
	cSt at 100°C	18.6
Viscosity Index		182
Flash Point, COC, °C		204
Pour point	°C	-45

Gulf Max

Gasoline Engine Oil

DESCRIPTION

GULF MAX is premium quality multigrade engine oils designed to provide optimum performance in today's high output gasoline (including turbo charger and supercharger) engines in passenger cars, vans, sport utility vehicles and light trucks. Results in Energy conserving, Fuel economy and Long drain intervals.
GULF MAX SL can satisfy the service fill requirements of all major European Japanese and US passenger cars, vans, sport utility vehicles and light trucks manufacturers.

GULF MAX PROVIDES

- Ultimate protection. Control wear and deposits formation. Enhance Engine life.
- Prevents piston & ring sticking Excellent engine cleanliness
- High resistance to oxidation which reduces in sludge formation and oil thickening
- Exceptional shear stability results superior viscosity retention

PERFORMANCE LEVELS PROVIDED

API SL/CF	MIL - L - 46152 E
ACEA A2/B2	GM 6094M
CCMC - G5, PD2,	Ford M2C 153-E
Chrysler MS 6395D	Mercedes Benz 229.1

TYPICAL SPECIFICATIONS

Grade, SAE	10W30	20W/50
Specific Gravity 15.6°/15.6°C	0.880	0.890
Kinematic Viscosity cSt at 40°C	80.4	163.8
cSt at 100°C	10.8	18.0
Viscosity Index	121	121
Flash Point, COC, °C	213	225

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Gulfpride Super Special

Gasoline Engine Oil

DESCRIPTION

Superior quality multigrade engine oil using the latest additive technology and suitable for most modern passenger cars using gasoline engines. Designed for year round use in gasoline engines operating in the most arduous conditions in all climates.

Gulfpride Super Special can satisfy the service fill requirements of all major European Japanese and US car manufacturers.

GULFPRIDE SUPER SPECIAL PROVIDES

- Excellent protection against rust and corrosion
- High temperature oxidation resistance
- Reduction in sludge formation and oil thickening
- Exceptional shear stability results superior viscosity retention

PERFORMANCE LEVELS PROVIDED

API SL/CF	MIL - L - 46152 E
ACEA A2/B2	GM 6094M
CCMC - G5, PD2	Ford M2C 153 - E
Chrysler MS 6395D	Mercedes Benz 229.1

TYPICAL SPECIFICATIONS

Grade, SAE	10W30	20W/50
Specific Gravity 15.6°/15.6°C	0.880	0.890
Kinematic Viscosity cSt at 40°C	84.3	165.4
cSt at 100°C	11.2	18.1
Viscosity Index	121	121
Flash Point, COC, °C	210	222

Gulf Multi G

Gasoline Engine Oil

DESCRIPTION

A premium quality multi-viscosity motor oil exceeding the warranty requirements of many American, European and Japanese car manufacturers. Suitable for year round use in all four stroke petrol engines, including those with positive crankcase ventilation (PCV) and other environmental devices.

GULF MULTI G PROVIDES

- Excellent wear protection of engine components
- Suitability for older engines,
- Superior oil consumption control & high antiwear performance
- Reduced engine deposits, varnish and lacquer

PERFORMANCE LEVELS PROVIDED

API SH/CF
CCMC – G4, PD2, D1
Mercedes Benz 227.1
Chrysler MS 6395D
Volvo Cam and Tappet Test B20
MIL-L-2104D
MIL-L-46152E
GM 6094M,
Ford M2C 153-E

TYPICAL SPECIFICATIONS

SAE Grade	20W-50
Specific Gravity 15.6°/15.6°C	0.889
Kinematic Viscosity cSt at 40°C	171.0
cSt at 100°C	18.4
Viscosity Index	120
Flash Point, COC, °C	202
TBN, mg KOH/g, D2896	<5.0

Gulf Motor Oil H.D.

Gasoline Engine Oil

DESCRIPTION

High quality motor oil formulated with high quality base stocks. Provides good deposit control and has high chemical stability. Suitable for a wide range of different makes of motor cars and light commercial vehicles.

GULF MOTOR OIL H.D. PROVIDES

- Good detergency & dispersancy characteristics
- High antiwear performance
- Protection against sludge formation & varnish
- Protection against rust & corrosion

PERFORMANCE LEVELS PROVIDED

API SH
CCMC G2/D1
MIL-L-2104D

TYPICAL SPECIFICATIONS

Grade, SAE	40
Specific Gravity 15.6°/15.6°C	0.894
Kinematic Viscosity cSt at 40°C	154.2
cSt at 100°C	15.0
Viscosity Index	97
Flash Point, COC, °C	232
TBN, mg KOH/g, D2896	<5.0

SECTION

DIESEL ENGINE OILS

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Gulf Superfleet Supreme

Heavy Duty Diesel Engine Oils

DESCRIPTION

Gulf Superfleet Supreme, SAE 15W40, is a "Super High Performance Diesel" (SHPD) engine oil and provides superior performance and long service potential in high-output, high speed turbocharged diesel engines operating under severe conditions. This multi grade oil is formulated with highly refined mineral base oils and carefully selected additives to provide excellent detergency, dispersancy and anti-wear properties and is specially formulated to sustain engine durability where Exhaust Gas Recirculation (EGR) is used. This oil exceeds the requirements of major Us & Eouropean heavy duty diesel engine manufactures for extended drain intervals and complies to the strictest US & European emmission control

GULF SUPERFLEET SUPREME PROVIDES

- Reduces piston deposits
- Extended oil drain intervals
- Superior TBN retention
- Protects against cylinder bore polishing
- High/low temperature viscosity retention & volatility control
- Reduces Oil consumption
- Reduces filter plugging
- Superberb multigrade characteristics

PERFORMANCE LEVELS PROVIDED

API CI-4/CH-4/SL	MIL-L-2104E / 46152C
ACEA E5/E3/B4/B3	Mercedes Benz 228.3 Approved
CCMC D5, D4, PD-2	MAN QC 13-017 (M 3275), M 3277
Allison C-4	Volvo VDS-2 & VDS 3 long drain
Mack EO-M Plus , RVI D5R& E3R	Saab-Scania ELD *
Cummins 20071/76, 20078	DHD-1

TYPICAL SPECIFICATIONS

Grade, SAE	15W/40
Specific Gravity 15.6°/15.6°C	0.889
Kinematic Viscosity cSt at 40°C	114.2
cSt at 100°C	14.8
Viscosity Index	133
Flash Point, COC, °C	216
TBN, mg KOH/g, D2896	10.2
Dynamic Viscosity at –20 °C cP	6820
Sulphated Ash, % Wt	1.55

Gulf Superfleet ELD

Diesel Engine Oil

DESCRIPTION

A synthetic base ultimate quality, top tier, extended long drain SHPDO for severe application. This oil provides superb outstanding performance in latest and most modern, high-speed diesel engines including turbo-charged engines. Designed to offers proven benefits of reduced piston deposits, cylinder wear, oil consumption, oil thickening and bore polishing effectively fulfill the needs of high-output low emissions engine designs. Formulated to meet heavy-duty diesel engine manufacturer requirements of all diesel engines in trucks and off-highway vehicles, including the latest European high performance diesel engines.

GULF SUPERFLEET ELD PROVIDES

- Superb anti-wear protection
- Optimum engine life
- Superior TBN retention
- Outstanding protection against rust & Corrosion
- High temperature viscosity retention & volatility control
- Extended long drain intervals
- Iow oil consumption
- Improved low temperature fluidity

PERFORMANCE LEVELS PROVIDED

API CF/CE/	MIL-L-2104E / 46152C
ACEA E3	Mercedes Benz 228.5 Approved
CCMC D5, D4, PD-2	MAN QC 13-017 (M 3275), M 3277
Allison C-4	Volvo VDS-2 long drain
Mack EO-K/2, RVI D5R& E3R	Saab-Scania ELD *

TYPICAL SPECIFICATIONS

Grade, SAE	10W/40
Specific Gravity 15.6°/15.6°C	0.889
Kinematic Viscosity cSt at 40°C	91.0
cSt at 100°C	14.6
Viscosity Index	166
Flash Point, COC, °C	192
TBN, mg KOH/g, D2896	15.5
Dynamic Viscosity at –25 °C cP	6840

*ELD (Extended Long Drain)

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Gulf Supreme Duty LE

Diesel Engine Oil

DESCRIPTION

A Superior quality, heavy duty, top of the line crankcase oils. This oil provides superior performance in high-speed diesel engines, including turbo-charged engines. Designed to effectively combat sludge and varnish formation in high-output low emissions engine designs, these products are formulated to meet heavy-duty diesel engine manufacturer requirements for extended long drain intervals. Its meets the requirements of all diesel engines in trucks and off-highway vehicles, including the latest European high performance diesel engines.

GULF SUPREME DUTY LE PROVIDES

- All-year round protection,
- Extended long drain periods.
- Prolongs engine life
- Improved fuel economy
- Superior TBN retention
- Outstanding internal cleanliness
- Meets Exhaust Emission Std. 1998

PERFORMANCE LEVELS PROVIDED

API CH-4, CG-4, CF-4, CF-2, SJ
ACEA E3
CCMC D5, D4, PD-2
Allison C-4
MAN 271/QC 13-17
Cummins 20076
Cummins CES 20071/20072
MIL - L - 2104F
Caterpillar TO-2
Mercedes Benz 228.3/ 229.1
MTU Type 2
Volvo VDS-2
Mack EO-M / EO-M Plus
DDC Series 2000/4000 Type 2

TYPICAL SPECIFICATIONS

Grade, SAE	15W/40	20W /50
Specific Gravity 15.6°/15.6°C	0.889	0.890
Kinematic Viscosity cSt at 40°C	119.2	150.1
cSt at 100°C	15.4	18.2
Viscosity Index	135	135
Flash Point, COC, °C	216	219
TBN, mg KOH/g, D2896	13.5	13.5
Sulphated Ash, % Wt	1.65	1.65

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Gulf Superfleet Special

Diesel Engine Oil

DESCRIPTION

A premium quality Super High Performance Diesel (SHPD) engine oil which is among the highest quality diesel engine oils available. It meets the most demanding requirements of all diesel engines in trucks and off-highway vehicles, including the latest European high performance diesel engines. It also meets the requirements of the API CE service classification. This product provides the best possible performance in a wide range of diesel engines.

GULF SUPERFLEET SPECIAL PROVIDES

- Extended drain intervals
- Low oil consumption
- Outstanding internal cleanliness
- Prolong engine life
- Improved fuel economy
- Meets Exhaust Emission Std. 1998

PERFORMANCE LEVELS PROVIDED

API CH-4, CG-4, CF-4, CF-2, SJ
ACEA E3
CCMC D5, D4, PD-2
Allison C-4
MAN 271/QC13-17
Cummins 20076
Cummins CES 20071/20072
MIL - L - 2104F
Caterpillar TO-2
Mercedes Benz 228.3/ 229.1
MTU Type 2
Volvo VDS-2
Mack EO-M / EO-M Plus
DDC Series 2000/4000 Type 2

TYPICAL SPECIFICATIONS

Grade, SAE	15W/40
Specific Gravity 15.6°/15.6°C	0.889
Kinematic Viscosity cSt at 40°C	111.0
cSt at 100°C	14.8
Viscosity Index	138
Flash Point, COC, °C	216
TBN, mg KOH/g, D2896	13.5
Sulphated Ash, % Wt	1.65

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Gulf Superfleet Special M

Diesel Engine Oil

DESCRIPTION

A Super High Performance Diesel (SHPD) engine oil available as an SAE 40 viscosity grade and meets the most demanding requirements of all diesel engines in trucks and off-highway vehicles, including the latest European high performance diesel engines. It also meets the requirements of the API CE service classification. This product provides the best possible performance in a wide range of diesel engines where high sulfur fuel (>0.6% wt) is used.

GULF SUPERFLEET SPECIAL M PROVIDES

- Extended drain intervals
- Low oil consumption
- Outstanding internal cleanliness
- Long engine life
- Improved fuel economy

PERFORMANCE LEVELS PROVIDED

API CF-4, CF, CE, SG
ACEA E2
CCMC D4, G4, PD-2
Allison C-4
MAN 271
Mack EO-K/2
MIL - L - 2104E
Caterpillar TO-2
Mercedes Benz 227.1/228.1
MTU Type 1
Volvo VDS

TYPICAL SPECIFICATIONS

Grade, SAE	40
Specific Gravity 15.6°/15.6°C	0.906
Kinematic Viscosity cSt at 40°C	155.2
cSt at 100°C	15.0
Viscosity Index	96
Flash Point, COC, °C	240
Sulphated Ash, % Wt	2.2

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Gulf Fleet XLD

Diesel Engine Oil

DESCRIPTION

A high quality engine oil for use in high output, turbo charged diesel engines. Meets the requirements of modern European high-speed high-output turbocharged diesel engine manufacturers for extended drain periods.

XLD (Extended Long Drain) is blended with highly refined base stocks and meets the Mercedes Benz 228.1 long drain requirements.
carefully selected additives to provide, dispersancy, anti-wear properties, controlled oil consumption, and less oil oxidation and thickening

GULFFLEET XLD PROVIDES

- Excellent detergency
- Superb antiwear performance and controlled oil consumption
- Protection against corrosion
- Reduced oil oxidation and thickening

PERFORMANCE LEVELS PROVIDED

API CF-4, CF, CE, SG	MIL - L - 2104E
ACEA E2	Caterpillar TO-2
CCMC D4, G4, PD-2	Mercedes Benz 227.1/228.1
Allison C-4	MTU Type 1
MAN 271	Volvo VDS
Mack EO-K/2	

TYPICAL SPECIFICATIONS

Grade, SAE	20W/40
Specific Gravity 15.6°/15.6°C	0.880
Kinematic Viscosity cSt at 40°C	134
cSt at 100°C	15.0
Viscosity Index	120
Flash Point, COC, °C	220
TBN, mg KOH/g, D2896	11.0

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Gulf Super Diesel Plus

Diesel Engine Oil

DESCRIPTION

Gulf Super Diesel Plus is a superior quality engine oil, suitable for mixed fleet use in naturally aspirated, turbocharged diesel engines, as well as four cycle-petrol engines including those with positive crankcase ventilation. This oil meets the requirements of the API CF-4 and SG engine oil service classification and contains high levels of detergency and dispersency to meet the needs of high performance transport fleets.

GULF SUPER DIESEL PLUS PROVIDES

- Tailored made for mixed fleets
- Excellent performance in gasoline engines
- Superior resistance to oxidation
- Improved engine durability
- Resistance to oil thickening

PERFORMANCE LEVELS PROVIDED

API CF-4, CF, CE /SF	MIL - L - 2104E
ACEA E2	MIL - L - 46152E
CCMC D4/G4/PD-2	Allison C-4
MAN 270/271	Daimler Benz 227.1/228.1
Mack EO-K/2	Caterpillar TO-2
Cummins NTC-400	Volvo VDS
MTU Type 1	

TYPICAL SPECIFICATIONS

Grade, SAE		15W/40
Specific Gravity 15.6°/15.6°C	0.888	
Kinematic Viscosity cSt at 40°C		120.8
cSt at 100°C		14.9
Viscosity Index		127
Flash Point, COC, °C		219
TBN, mg KOH/g, D2896		11.0
Sulphated Ash, % Wt		1.60

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Gulf Super Duty Plus

Diesel Engine Oil

DESCRIPTION

Gulf Super Duty Plus is a multi-grade viscosity oil, suitable for mixed fleet use in turbo-charged, supercharged and naturally aspirated heavy duty diesel engine operated under both low speed/high load and high speed/high load conditions. This oil is also suitable for two-cycle diesel engines, as well as four cycle-petrol engines including those with positive crankcase ventilation. Most suitable for trucks, stationary and farm equipment both gasoline & diesel engines. Also suitable for hydraulic and transmission systems of heavy construction equipment.

GULF SUPER DUTY PLUS PROVIDES

- Reduces wear & sludge formations
- Excellent protection against cylinder & bore polishing
- Superior Wear control
- Reduced engine deposits
- Minimizes oil consumption

PERFORMANCE LEVELS PROVIDED

API CF,CD/SF, CD-II	MIL - L - 2104D
ACEA E1	MIL - L - 46152C
CCMC D2/G2/PD-1	Mercedes Benz 227.0
MAN 270/271	Allison C-3
Mack EO-K	Caterpillar TO-2

TYPICAL SPECIFICATIONS

Grade, SAE	15W40
Specific Gravity 15.6°/15.6°C	0.883
Kinematic Viscosity cSt at 40°C	40.28
cSt at 100°C	6.5
Viscosity Index	112
Flash Point, COC, °C	212
TBN, mg KOH/g, D2896	11.8
Sulphated Ash, % Wt	1.65

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Gulf Super Duty Motor Oil

Diesel Engine Oil

DESCRIPTION

Superior quality engine oil, suitable for mixed fleet use in naturally aspirated, turbocharged, and two-cycle diesel engines, as well as four cycle-petrol engines including those with positive crankcase ventilation. This oil can be used with confidence in hydraulic and transmission systems of heavy construction equipment.

GULF SUPER DUTY MOTOR OIL PROVIDES

- Excellent wear control
- Reduced engine deposits
- Controlled oil consumption
- Suitability for mixed fleets

PERFORMANCE LEVELS PROVIDED

API CF,CD/SF, CD-II	MIL - L - 2104D
ACEA E1	MIL - L - 46152C
CCMC D2/G2/PD-1	Mercedes Benz 227.0
MAN 270/271	Allison C-3
Mack EO-K	Caterpillar TO-2

TYPICAL SPECIFICATIONS

Grade, SAE	10W	40
Specific Gravity 15.6°/15.6°C	0.883	0.900
Kinematic Viscosity cSt at 40°C	40.28	155.0
cSt at 100°C	6.5	15.35
Viscosity Index	112	100
Flash Point, COC, °C	212	240
TBN, mg KOH/g, D2896	11.8	11.8
Sulphated Ash, % Wt	1.65	1.65

Gulf Extra Diesel Motor Oil

Diesel Engine Oil

DESCRIPTION

High quality engine oil specially designed for use in naturally aspirated and turbocharged diesel engines using fuel with moderate sulphur content.

Gulf Extra Diesel Motor Oil fights engine wear and prevents sludge. Provides superior engine protection under extremes of temperature and is ideal for agricultural, contractors and fleet operators where good a
ll round lubricant performance is required.

GULF EXTRA DIESEL MOTOR OIL PROVIDES

- Excellent resistance to oxidation
- Superb detergent/dispersant properties
- High resistance to corrosion
- Compatibility with other motor oils

PERFORMANCE LEVELS PROVIDED

API CF/SF
MIL - L - 45199B
Allison C-3
CCMC D2,G2,G3
MIL - L - 2104D
MIL - L - 46152C
Caterpillar TO-2

TYPICAL SPECIFICATIONS

Grade, SAE	10W	30	40	50
Specific Gravity 15.6°/15.6°C	0.882	0.892	0.897	0.904
Kinematic Viscosity cSt at 40°C	40.5	105.5	159.5	248
cSt at 100°C	6.5	11.7	15.45	20.5
Viscosity Index	112	98	97	96
Flash Point, COC, °C	216	236	246	250
TBN, mg KOH/g, D2896	8.6	8.6	8.6	8.6
Sulphated Ash, % Wt	1.25	1.25	1.25	1.25

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Gulf Super Diesel Motor Oil

Diesel Engine Oil

DESCRIPTION

Premium quality engine oil designed for use in naturally aspirated four-cycle and turbocharged diesel engines using high sulphur fuels. The TBN of 20 assures effective neutralization of harmful combustion products, particularly where fuel containing 1% sulphur or more is used.

Gulf Super Diesel Motor Oil is suitable for Caterpillar pre-combustion engines.

GULF SUPER DIESEL MOTOR OIL PROVIDES

- Excellent TBN retention
- Neutralizes high sulphur fuel in engine combustion
- Good engine deposit control
- Excellent performance in Caterpillar PC engines

PERFORMANCE LEVELS PROVIDED

API CF/SF	MIL - L - 2104D
CCMC D2, G2, G3	MIL - L - 46152C
Allison C-3	MIL - L - 45199B
Caterpillar TO-2	

TYPICAL SPECIFICATIONS

Grade, SAE	40	50
Specific Gravity 15.6°/15.6°C	0.904	0.908
Kinematic Viscosity cSt at 40°C	156.3	242
cSt at 100°C	15.4	20.5
Viscosity Index	99	98
Flash Point, COC, °C	238	242
TBN, mg KOH/g, D2896	20	20
Sulphated Ash, % Wt	2.5	2.5

Gulf Super DD Oil

Two Stroke Diesel Engine Oil

DESCRIPTION

Formulated with high quality base stocks and selected additives to meet or exceed the requirements of API CF-2, CF, CD and SF and is recommended for Detroit Diesel Two stroke engines. Specifically developed for use in high speed diesel engines requiring low sulfated ash lubricants.

An excellent choice for stationary diesel engines used in industrial, farm equipment and marine diesel engine applications.

GULF SUPER DD OIL PROVIDES

- Protection against corrosion and control of engine deposits.
- Reduced engine deposits in the pistons
- Excellent wear control
- Controlled oil consumption

PERFORMANCE LEVELS PROVIDED

API CF-2, CF, CD Detroit Diesel 6V92TA
CCMC D2

TYPICAL SPECIFICATIONS

Grade, SAE	40	50
Specific Gravity 15.6°/15.6°C	0.895	0.898
Kinematic Viscosity cSt at 40°C	153	240
cSt at 100°C	15.4	20.5
Viscosity Index	98	97
Flash Point, COC, °C	240	244
TBN, mg KOH/g, D2896	8	8
Pour Point, °C	-15	-12
Sulphated Ash, % Wt	0.91	0.91

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Gulf Dieselmotive

Locomotive Diesel Engine Oil

DESCRIPTION

High quality detergent dispersant crankcase lubricating oil formulated to provide outstanding performance in a wide range of medium speed high-output locomotive diesel engines and stationary diesel engines fitted with silver alloy bearings for which zinc-free oils are required.

GULF DIESELMOTIVE PROVIDES

- Protection to pistons against deposits
- Protection against acidic combustion products
- Compatible with silver plated engine parts
- Good control against port blocking

PERFORMANCE LEVELS PROVIDED

API CF
EMD M.I. 1761D

TYPICAL SPECIFICATIONS

Grade, Designation	473	489 SH
Grade, SAE	40	40
Specific Gravity 15.6°/15.6°C	0.898	0.903
Kinematic Viscosity cSt at 40°C	153.3	151.9
cSt at 100°C	15.0	15.0
Viscosity Index	97	98
Flash Point, COC, °C	258	250
TBN, mg KOH/g, D2896	13	19.7
Sulphated Ash, % Wt	1.59	2.22

Gulf Super Tractor Oil

Tractor Engine Oil

DESCRIPTION

Premium quality multi-purpose "Super Tractor Oil Universal" (STOU) fluid recommended for use in all oil lubricated systems in most modern tractors. These systems include the engine, transmission, final drives, hydraulic system, wet brakes, power take off units, hydrostatic units and power steering. It provides the highest level of engine, gear and anti-squawk performance.

Specially developed to cope with all severe conditions and to give smooth performance with maximum protection throughout a long service life.

GULF SUPER TRACTOR OIL PROVIDES

- Excellent protection against oil oxidation
- Protection against acids, varnish and carbon deposits
-

PERFORMANCE LEVELS PROVIDED

API CF/CE/SF, CD-II		MIL - L - 2104D
CCMC G2/D2	D.Brown/J.I. Case JIC 187	MIL - L - 46152C
Allison C-4	Ford M2C86B, M2C134C, M2C159B2	MIL - L - 2105
John Deere JD 20C	Vickers Vane Pump 1-286-S	Messy Ferguson
API GL-4	Mercedes Benz 227-1	M1135/M1139

TYPICAL SPECIFICATIONS

Grade, SAE		15W/40		20W/40
Specific Gravity 15.6°/15.6°C	0.889		0.896	
Kinematic Viscosity cSt at 40°C		111.6		125.2
cSt at 100°C		14.2		14.2
Viscosity Index		128		112
Flash Point, COC, °C		210		218
TBN, mg KOH/g, D2896		10.9		10.9
Sulphated Ash, % Wt	1.33		1.33	

Gulf Tractor MP Oil

Tractor Engine Oil

DESCRIPTION

Gulf Tractor MP 20W-40 Oil is a high quality multi-purpose tractor lubricant suitable for all four-stroke normally aspired and turbocharged diesel engines.

It may be used with confidence in tractors, combine harvesters requiring a single oil for the hydraulic system, transmission, final drive, wet brakes and independent power take-off units.

GULF TRACTOR MP OIL PROVIDES

- Excellent performance in high output diesel engines
- Protection against acids, varnish and carbon deposits
- Protection against oil oxidation
- Good wet brake performance

PERFORMANCE LEVELS PROVIDED

API CF
API GL-4
Allison C-3
Caterpillar TO-2
Transmission antisquark performance

TYPICAL SPECIFICATIONS

Grade, SAE	20W/40
Specific Gravity 15.6°/15.6°C	0.86
Kinematic Viscosity cSt at 40°C	124
cSt at 100°C	14.9
Viscosity Index	120
Flash Point, COC, °C	218
Pour Point, °C	-24

Gulfpride 2000

Two Stroke Gasoline Engine Oil

DESCRIPTION

High quality, ashless, self-mixing oil for two-cycle gasoline engines which provides excellent protection against spark plug fouling, exhaust port blockage and bearing corrosion.

Recommended for high performance water-cooled marine outboard engines, for which a NMMA/TC-W II approved oil is required. Can be used for mixing with gasoline at 50:1 or according to manufacturers' recommendations. Gulfpride 2000 also offers excellent performance in air-cooled two-cycle gasoline engines including motorcycles, scooters, lawn mowers, chain saws etc.

GULFPRIDFE 2000 PROVIDES

- Reduced piston varnish
- Less spark plug fouling
- Minimal exhaust port plugging
- Less ring sticking
- Reduced engine/bearing wear
- Better rust/corrosion protection

TYPICAL SPECIFICATIONS

	with solvent
Specific Gravity 15.6°/15.6°C	0.880
Kinematic Viscosity cSt at 40°C	35
cSt at 100°C	6.3
Flash Point, °C	>110
Pour Point, °C	-32
Colour	Blue

SECTION

MARINE OILS

GulfMar DPO

Marine Diesel Engine Oil

DESCRIPTION

Superior quality diesel engine oils specifically formulated for use in both normally aspirated and turbocharged medium speed engines. They meet performance of API CD, MIL - L - 2104C and also meet the requirements of all major marine engine builders.

Gulfmar DPO lubricants specifically developed for engines burning distillate fuel.

GULFMAR DPO PROVIDES

- Superior demulsibility and filterability
- Excellent sludge, lacquer and deposit control
- Neutralization of combustion acids
- Protection against bearing corrosion

PERFORMANCE LEVELS PROVIDED

API CD	Sulzer, MAN/B+W, MAK, Pielstick
MIL - L - 2104C	Wartsila, SWD, Grandi Motori Triesti
Alfa-Laval Centrifuge Rig	Mirrlees, Paxman, SACM (Uni Diesel)

TYPICAL SPECIFICATIONS

Gulfmar DPO	412	415
SAE Viscosity Grade	40	40
Specific Gravity 15.6°/15.6°C	0.8956	0.89
Kinematic Viscosity cSt at 40°C	166.33	168.0
cSt at 100°C	15.79	15.3
Viscosity Index	97	97
Flash Point, COC, °C	249	240
TBN, mg KOH/g, D2896	12	15
Sulphated Ash, % Wt	1.63	1.80

GulfMar Select

Marine Diesel Engine Oil

DESCRIPTION

High quality alkaline diesel engine oils formulated for use in both normally aspirated and turbocharged medium speed marine engines operating on high sulphur residual or distillate fuels. They meet the performance of API CD, MIL -L - 2104C as well as the requirements of major engine builders for highly alkaline engine oils. Special additives provide the superior demulsibility characteristics needed with on-board centrifuges.

GULFMA SELECT PROVIDES

- Good demulsibility and filterability
- Excellent sludge, lacquer and deposit control
- Neutralization of combustion acids
- Good protection against bearing corrosion

PERFORMANCE LEVELS PROVIDED

API CD/CF	Sulzer, MAN/B+W, MAK, Pielstick
MIL - L - 2104C	Wartsila, SWD, Grandi Motori Triesti
Alfa-Laval Centrifuge Rig	Mirrlees, Paxman, SACM (Uni Diesel)

TYPICAL SPECIFICATIONS

Gulfmar Select	430	440
SAE Viscosity Grade	40	40
Specific Gravity 15.6°/15.6°C	0.9122	0.9164
Kinematic Viscosity cSt at 40°C	163	164
cSt at 100°C	15.5	15.5
Viscosity Index	97	97
Flash Point, COC, °C	248	245
TBN, mg KOH/g, D2896	30	40

GulfMar AC

Two Stroke Marine Diesel Engine Oil

DESCRIPTION

Gulfmar AC oils are alkaline detergent crankcase system oils for use in modern low speed highly rated two-stroke marine diesel engines particularly where effective oil cooling of pistons in cross-head engines burning residual fuels is required. They meet the performance of
MIL-L-2104C and have sufficient alkalinity to neutralize acid combustion gases.

Gulfmar AC oils are also suitable for use in certain geared transmission and other ancillary equipment requiring SAE 30 or 40 grade oils.

GULFMAR AC OIL PROVIDES

- Good demulsibility and protection against bearing corrosion
- Mild alkalinity to neutralize combustion acids

TYPICAL SPECIFICATIONS

Gulfmar AC	305	307	407
SAE Viscosity Grade	30	30	40
Specific Gravity 15.6°/15.6°C	0.89	0.87	0.88
Viscosity cSt at 100°C	11.7	11.7	15.3
Flash Point, COC, °C	230	230	235
Pour Point, °C	-9	-9	-9
TBN, mg KOH/g	5	7	7

GulfMar Cyloil 570

Two Stroke Marine Diesel Engine Oil

DESCRIPTION

Gulfmar Cyloil 570 is a high alkaline lubricating oil for cylinder lubrication in large bore turbocharged two-stroke marine engines operating on residual fuels with high sulphur contents.

Gulfmar Cyloil 570 is a SAE 50 grade oil with a TBN of 70 which will provide effective neutralizing properties when high sulphur fuels are used. Keeps pistons clean and free from deposits.

GULFMAR CYLOIL 570 PROVIDES

- Strong detergency to neutralize combustion acids
- Good performance against exhaust port blocking

TYPICAL SPECIFICATIONS

Gulfmar CYLOIL	570
SAE Viscosity Grade	50
Specific Gravity 15.6°/15.6°C	0.91
Viscosity cSt at 100°C	19
Flash Point, COC, °C	260
Pour Point °C	-9
TBN mg KOH/g	70

SECTION

AUTOMOTIVE GEAR & TRANSMISSION OILS

your local global brand

GulfGear MP Lubricant

Automotive Gear Oil

DESCRIPTION

Superior quality multi-purpose gear and transmission lubricant recommended for use in differentials and final drives of the bevel or hypoid type found in automobiles, trucks, earthmoving and construction equipment.

Gulfgear MP meets API GL-5 has the additional performance of meeting the OEM requirements of Mercedes Benz 235.0 SAE 90. This is required for MB final drives and rear axles.

GULFGEAR MP LUBRICANT PROVIDES

- Rationalization of Gear and Transmission Oils
- High load carrying capacity
- Superior oxidation resistance
- Long service life & excellent low temperature performance

PERFORMANCE LEVELS PROVIDED

API GL-5	MIL - L - 2105C
UK Ministry of Defence CS3000B	MB 235.0

TYPICAL SPECIFICATIONS

Grade, SAE	80W/90	85W/140	90	140
Specific Gravity 15.6°/15.6°C	0.897	0.911	0.901	0.910
Kinematic Viscosity cSt at 40°C	143.1	488.0	201	474
cSt at 100°C	14.5	31.7	17.98	31.1
Viscosity Index	99	95	97	95
Flash Point, COC, °C	180	192	230	235
Pour Point, °C	-35	-15	-10	-10

GulfGear EP Lubricant

Automotive Gear Oil

DESCRIPTION

High quality gear and transmission lubricant suitable for cars, buses, and heavy construction equipment where an API GL-4 gear oil is required.

Gulfgear EP-DB has the additional performance of meeting MB 235.1 SAE 80W-85W for manual transmissions.

GULFGEAR EP LUBRICANT PROVIDES

- Superb load carrying ability
- Reduced gear wear
- Minimal spalling or welding
- Protection against rust and corrosion
-

PERFORMANCE LEVELS PROVIDED

API GL-4
MIL - L - 2105
MB 235.1

TYPICAL SPECIFICATIONS

Grade, SAE	90	140	85W-90
Specific Gravity 15.6°/15.6°C	0.897	0.905	0.89
Kinematic Viscosity cSt at 40°C	201	436	150
cSt at 100°C	17.98	29.45	16
Viscosity Index	97	95	98
Flash Point, COC, °C	230	235	190
Pour Point, °C	-10	-10	-25

Gulf Automtive Transmission Fluid DX III

Automatic Transmission Fluid

DESCRIPTION

Gulf ATF DX III is the latest product for use in automatic transmissions, power steering units and is recommended wherever a Dexron® III ATF is specified.

Gulf ATF DX III is superior quality fluid providing optimum fluidity at temperatures to -45°C and adequate viscosity for bearings gear lubrication at temperatures exceeding 160°C

GULF ATF DX III PROVIDES

- Excellent corrosion and rust protection
- Superior oxidation resistance
- Smooth gear changing
- High anti-foam properties

PERFORMANCE LEVELS PROVIDED

GM DEXRON III
Allison C-4
Ford New MERCON

TYPICAL SPECIFICATIONS

Specific Gravity @15.6°/15.6°C	0.8719
Kinematic Viscosity cSt at 40°C	34
cSt at 100°C	7.2
Dynamic Viscosity, cP at -40°C	16,900
Flash Point, COC, °C	190
Pour Point, °C	-45
Colour	Red

Gulf Automtive Transmission Fluid DX II E

Automatic Transmission Fluid

DESCRIPTION

A superior quality fluid for use in automatic transmissions and power steering units etc. which require the use of a fluid meeting General Motors DEXRON® IIE and Ford MERCON performance.

GULF ATF DX is recommended for the automatic transmissions of vehicles and construction plant built by European, Japanese and US manufacturers.

GULF ATF DX IIE PROVIDES

- Superior oxidation resistance
- Smooth gear changing
- Suitability for a wide range of applications
- Protection against varnish, gum and other harmful elements

PERFORMANCE LEVELS PROVIDED

Allison C-4
GM 6137M
Denison HF-O
Ford MERCON.
Caterpillar TO-2
Vickers M-2950-S, I-286-S
Sundstrand Axial Pump Test
Daimler Benz 236.6

TYPICAL SPECIFICATIONS

Specific Gravity @15.6°/15.6°C	0.872
Kinematic Viscosity cSt at 40°C	30.11
cSt at 100°C	6.31
Viscosity Index	167
Flash Point, COC, °C	210
Pour Point, °C	-45
Colour	Red

Gulf Universal Tractor Fluid

Tractor Transmission Fluid

DESCRIPTION

Gulf Universal Tractor Fluid is a sophisticated, high quality multifunctional tractor hydraulic and transmission fluid.

Especially formulated to use over a wide temperature range, this high quality multi-purpose hydraulic/transmission oil is recommended for modern tractors which require a single fluid to service hydraulic systems, transmissions, differentials, final drives and wet brakes. This product is not suitable for use as an engine oil.

GULF UNIVERSAL TRACTOR FLUID PROVIDES

- Multifunctional applications
- High resistance to oxidation
- Long fluid and component life
- Reduced "squawk" and excellent seal compatibility

PERFORMANCE LEVELS PROVIDED

John Deere JD 20C, 20D
Messy Ferguson M1127, M1135
Ford M2C86C, M2C134-D
International Harvester B-6
Denison HF-0, HF-1, HF-2
Allison C-4
White Q-1766
J.I.Case JIC-185
API GL-4

TYPICAL SPECIFICATIONS

Specific Gravity @15.6°/15.6°C	0.881
Kinematic Viscosity cSt at 40°C	60.1
cSt at 100°C	9.36
Viscosity Index	146
Flash Point, COC, °C	214
Pour Point, °C	-38

Gulf HT Fluid TO-4

Transmission Fluid

DESCRIPTION

Gulf HT Fluid TO-4 is a top quality transmission fluid for today's most sophisticated off-highway equipment which is expected to work at extreme ambient and operational conditions.

It has superb friction control performance, wear protection and low temperature fluidity. Compatibility with elastomeric materials ensures stable static and dynamic coefficients of friction and prevents noise generation in wet disc brakes. Excellent oxidative stability and sludge control provide longer drain capability.

SAE 50 is a general recommendation from Caterpillar in Saudi Arabia.

GULF HT FLUID PROVIDES

- Excellent resistance to oxidation and antiwear protection
- Protection against copper corrosion and extended service life
- Maximum foam prevention
- Very good low temperature fluidity

PERFORMANCE LEVELS PROVIDED

Allison C-4
Caterpillar TO-4

TYPICAL SPECIFICATIONS

Grade, SAE	10W	30	50
Density at 15°C, kg/dm^3	0.87	0.89	0.895
Viscosity cSt at 100°C	6.0	11.7	18.5
Flash Point, °C, min	205	235	250
Pour Point, °C, max	-30	-18	-12

Gulf HD 10W Hydraulic Oil

Automotive Hydraulic Oil

DESCRIPTION

Gulf HD 10W Hydraulic Oil has exceptional antiwear properties and low pour point which makes this oil especially beneficial for use in Hydraulic systems of agriculture and mobile equipment and hydraulic actuators on vehicles used on tipping equipment.

GULF HD 10W OIL PROVIDES

- Cost effective performance
- Low pump wear
- Long fluid life
- Effective oxidation and antiwear protection

TYPICAL SPECIFICATIONS

Specific Gravity @15.6°/15.6°C	0.883
Kinematic Viscosity cSt at 40°C	40.28
cSt at 100°C	6.5
Viscosity Index	112
Flash Point, COC, °C	212
TBN, mg KOH/g,	11.8
Sulphated Ash, % Wt	1.57

SECTION

INDUSTRIAL HYDRAULIC OILS

your local global brand

Gulf Harmony AW

Hydraulic Oil

DESCRIPTION

Gulf Harmony AW are made from highest quality base stocks. They are premium quality anti-wear hydraulic oils possessing outstanding oxidation and thermal stability. Suitable for use in high pressure hydraulic systems.
Gulf Harmony AW are further fortified with effective antiwear agent to enhance their usefulness for critical newer types of high-output hydraulic systems.

GULF HARMONY AW OIL PROVIDES

- Low pump wear
- Excellent demulsibility
- High oxidation resistance
- Long fluid life

PERFORMANCE LEVELS PROVIDED

Denison HF-0, HF-1, HF-2
DIN 51524 Part II
B.F. Goodrich 0152
Afnor E 48-603
Vickers M-2950-S, 1-286-S
Racine Model S
Ford M2C-32

MIL - L - 46001C
U.S. Steel 127, 136
Cincinnati Milacron P-68 (32), P-69 (68), P-70 (46)
Commercial Hydraulics
Lee-Norse 100-1

TYPICAL SPECIFICATIONS

ISO	Spec. Gravity	Kin. Viscosity, cSt		Viscosity	Flash Pt.
Grade	15.6°/15.6°C	40°C	100°C	Index	COC, °C
10	0.856	10.05	2.75	115	160
15	0.862	15.20	3.53	112	184
22	0.867	22.08	4.42	110	206
32	0.871	32.00	5.40	102	208
46	0.876	46.00	7.19	102	216
68	0.881	68.00	8.75	100	226
100	0.886	100.00	11.34	99	230
150	0.891	150.00	14.96	99	336

Gulf Hydraulic Oil 37

Hydraulic Oil

DESCRIPTION

Gulf Hydraulic Oil 37 (ISO VG 32) is formulated primarily as heavy duty, antiwear hydraulic oil with excellent demulsibility. Suitable for use in most modern hydraulic control systems incorporating a wide variety of pump designs (vane, axial, piston, gear) and other types of hydraulic pumps and motors.

Its excellent performance characteristics as a hydraulic oil also makes it equally suitable as lubricating oil in a wide range of industrial applications including air line lubricators, bearings, high speed spindles, hydrostatic transmissions, hydraulic couplings and some gear units.

GULF HYDRAULIC 37 OIL PROVIDES

- Cost effective performance
- Low pump wear and high fluid life
- Excellent water separating properties
- Protection against rust and corrosion

PERFORMANCE LEVELS PROVIDED

DIN 51524/2
AFNOR NFE 48 603 HM
P-68, P-69, P-70
US Steel 127
Denison HF-0, HF-1, HF-2 Cincinnati Milacron

TYPICAL SPECIFICATIONS

ISO Viscosity Grade	32
Specific Gravity @ 15.6°/15.6°C	0.87
Kinematic Viscosity cSt at 40°C	32.0
cSt at 100°C	5.45
Viscosity Index	105
Flash Point, COC, °C	192
Pour Point, °C	-9

your local global brand

Gulf Harmony HVI

Mutigrade Hydraulic Oil

DESCRIPTION

Premium quality low pour point, very high viscosity index paraffinic hydraulic oils, formulated to satisfy wide temperature variation requirements for hydraulic systems of certain equipment.

GULF HARMONY HVI PROVIDES

- Multigrade viscosity characteristics
- Excellent oxidation, thermal and shear stability
- Long pump and component life
- Suitability for vane, axial piston and gear pump

PERFORMANCE LEVELS PROVIDED

Denison HF-1, HF-2
DIN 51525

TYPICAL SPECIFICATIONS

Grade, ISO	22	46	100
Specific Gravity @ 15.6°/15.6°C	0.867	0.874	0.89
Kinematic Viscosity cSt at 40°C	22.0	46.0	100
cSt at 100°C	4.93	8.42	11.3
Viscosity Index	156	161	120
Flash Point, COC, °C	181	214	220

SECTION

TURBINE OILS

your local global brand

Gulf Gas Turbine Oil HT-2

Gas Turbine Oil

DESCRIPTION

A premium quality lubricant designed specifically to provide superior performance in high output gas turbines such as the General Electric Frame 7000 and 9000 units. This oil provides excellent thermal and oxidation stability and meets GE specification GEK-32568A.

GULF GAS TURBINE HT-2 OIL PROVIDES

- Maximum service life through outstanding oxidation resistance
- Excellent protection against corrosion
- Excellent fluidity at all operating temperatures
- Good demulsibility

PERFORMANCE LEVELS PROVIDED

General Electric GEK-32568A

TYPICAL SPECIFICATIONS

ISO Grade	32
Specific Gravity @ 15.6°/15.6°C	0.871
Kinematic Viscosity cSt at 40°C	31.46
cSt at 100°C	5.36
Viscosity Index	103
Flash Point, COC, °C	218
Neutralization No. D-974	0.23
Oxidation, D-943, Hours	4000+

Gulf Harmony

Turbine Oil

DESCRIPTION

Premium quality multi-purpose lubricating and circulating oils manufactures from highly refined base oils and inhibited against oxidation, corrosion, and foaming. Available in a wide range of viscosities for turbine lubrication, compressor, bearing and gear lubrication, circulation systems, and low pressure hydraulic systems. Gulf Harmony oils possess an excellent oxidation stability of more than 2500 hours in the ASTM D943 turbine oil oxidation test in the ISO 32, 46 & 68 grades.

GULF HARMONY OIL PROVIDES

- Superior oxidation stability and long fluid life
- Excellent demulsibility characteristics
- Effective control of foam and air release
- Protection against rust and corrosion

PERFORMANCE LEVELS PROVIDED

Denison HF-1
DIN 51524 Part I
Afnor NFE 48-603 HL
P-54 (68), P-55 (46), P-57 (150)
MIL - H - 17672D
U.S. Steel 126
Cincinnati Milacron P-38 (32)

TYPICAL SPECIFICATIONS

ISO Grade	Spec. Gravity 15.6°/15.6°C	Kin. Viscosity, cSt 40°C	100°C	Viscosity Index	Flash Pt. COC, °C
32	0.871	32.0	5.39	101	202
46	0.875	46.0	6.75	99	220
68	0.881	68.0	8.67	98	238
100	0.884	100.0	11.22	97	262
150	0.889	150.0	14.68	96	266
220	0.894	220.0	18.94	96	266
320	0.898	320.0	24.20	96	280
460	0.902	460.0	30.50	95	304
680	0.903	680.0	39.10	95	318

SECTION

COMPRESSOR OILS

your local global brand

Gulf Fidelity

Air Compressor Oil

DESCRIPTION

A superior quality lubricant for air and inert gas compressors. It meets all the performance levels of Gulf Compressor oils, but has enhanced oxidation stability as measured by the Pneurop oxidation test requirement (DIN 51352, Part 2)

Gulf Fidelity is recommended for the cylinder and crankcase lubrication of air or inert gas reciprocating compressors operating at high discharge temperatures, and minimizes the carbon deposits in the air discharge system.

GULF FIDELITY OIL PROVIDES

- Exceptional resistance to oxidation
- Reduced formation of deposits
- Minimal risk of fire and explosion
- Long oil service life, and increased compressor life

PERFORMANCE LEVELS PROVIDED

DIN 51506 VD-L
DIN 51352, Part 2

TYPICAL SPECIFICATIONS

Grade, ISO	32	46	68	100
Specific Gravity @ 15.6°/15.6°C	0.87	0.8745	0.8800	0.8849
Kinematic Viscosity cSt at 40°C	33.5	46	68	100
cSt at 100°C	5.5	6.75	8.67	11.22
Viscosity Index	99	99	98	97
Flash Point, COC, °C	215	224	238	262

Gulf Super Compressor Oil

Compressor Oil

DESCRIPTION

Superior quality compressor lubricant manufactured from polyalpholefin synthesized hydrocarbons. They are fortified with a careful balanced blend of additives which minimize wear while providing outstanding oxidation stability and rust and corrosion protection. The low carbon forming properties reduce the possibility of build up on valves and in pipe elbows which could be a source of explosion hazard.

GULF SUPER COMPRESSOR OIL PROVIDES

- Extended oil drain intervals
- Lower maintenance costs
- Superior performance
- Reduced oil consumption
- Reduced fire hazard
- Outstanding oxidation stability

PERFORMANCE LEVELS PROVIDED

DIN 51506 VDL
DIN 51517, Part 3

Approved by ATLAS COPCO for the ISO 46 grade.

TYPICAL SPECIFICATIONS

ISO Grade	Density@ 15 °C, g/ml	Kin. Viscosity, cSt 40°C	100°C	Viscosity Index	Flash Pt. COC, °C
32	0.83	32.05	5.8	125	234
46	0.84	42.10	7.1	130	240
68	0.84	68.00	10.2	135	260
100	0.84	100.0	13.4	146	262

Gulf LPG Compressor Oil

Synthetic Compressor Oil

DESCRIPTION

A polyalkylene glycol synthetic oil specifically designed to lubricate machinery parts in a gas filled atmosphere where normal mineral oils would absorb the gases and quickly become unsuitable for service. It is also suitable for LNG, ammonia, vinyl chloride monomer, butadiene, ethylene, propylene and butylene.

GULF LPG COMPRESSOR OIL PROVIDES

- Low gas solubility
- Good protection against corrosion
- Long service life
- Good resistance to gas foaming

PERFORMANCE LEVELS PROVIDED

Sulzer Burckhart AG
Linde AG

TYPICAL SPECIFICATIONS

Grade, ISO	150/220
Relative Density @ 25°C	1.05
Kinematic Viscosity cSt at 40°C	185
cSt at 100°C	35
Viscosity Index	200
Flash Point, COC, °C	260
Pour Point, °C	-30

Gulf Eskimo

Refrigerator Compressor Oil

DESCRIPTION

Highest quality refrigeration compressor lubricants, possess low pour points, very low floc points with freon and extremely low wax contents which prevent deposit formation in expansion valves.

Recommended for refrigeration compressors utilizing freon, ammonia, carbon dioxide, or sulphur dioxide as refrigerants (R-12 and R-22).

GULF ESKIMO OIL PROVIDES

- Excellent low temperature performance
- Eliminates wax crystal separation
- Low floc point
- Good oxidation resistance

PERFORMANCE LEVELS PROVIDED

BS 2626 (1975)
DIN 51 503 KC

TYPICAL SPECIFICATIONS

Grade, ISO	32	46	68
Specific Gravity @ 15.6°/15.6°C	0.86	0.87	0.88
Kinematic Viscosity cSt at 40°C	32.0	46	68
cSt at 100°C	5.4	6.0	8.0
Viscosity Index	45	43	41
Flash Point, PMC, °C	180	190	195
Pour Point, °	-45	-40	-33

SECTION

ELECTRICAL OILS

your local global brand

Gulf Transcrest H

Electrical Insulating Oil

DESCRIPTION

A premium quality transformer oil and switchgear insulation oil and coolant meeting the requirements of most transformer and switchgear manufacturers. It possesses excellent oxidation stability, high dielectric strength and resistance to acid and sludge formation.

GULF TRANSCREST H OIL PROVIDES

- Good oxidation stability
- High Impulse strength
- Gas absorbing
- Low electrostatic charging in operation
-

PERFORMANCE LEVELS PROVIDED

BS 148
IEC 296 Class 1
DIN 57370 Part 1, Class A

TYPICAL SPECIFICATIONS

Specific Gravity @ 15.6°/15.6°C	0.849
Kinematic Viscosity cSt at 40°C	7.5
Flash Point, PMCC, °C	148
Dielectric Strength, kv	60
Power Factor, 60 Hz 80°C	0.003
Pour Point, °C	-45

Note:- Ask our Area Sales anager for detail PDS.

your local global brand

Gulf Transcrest X

Electrical Insulating Oil

DESCRIPTION

A premium quality transformer oil and switchgear insulation oil and coolant meeting the requirements of most transformer and switchgear manufacturers. It possesses excellent oxidation stability, high dielectric strength and resistance to acid and sludge formation. This is a oxidation inhibited transformer oil.

GULF TRANSCREST X OIL PROVIDES

- Good oxidation stability and Gas absorption
- Resistance to acid and sludge formation
- High dielectric impulse strength
- Resistance to breakdown voltage and low electrostatic charging

PERFORMANCE LEVELS PROVIDED

IEC 296 Class I A
ASTM 3487 type II

TYPICAL SPECIFICATIONS

Specific Gravity @ 15.6°/15.6°C	0.900
Kinematic Viscosity cSt at 40°C	10.0
Flash Point, PMCC, °C	145
Dielectric Strength, kv	>70
Power Factor, 60 Hz 80°C	0.003
Pour Point, °C	-45

Note:- Ask our Sales Engineer for detail PDS.

SECTION

HEAT TREATMENT OIL

GulfTherm

Heat Transfer Fluid

DESCRIPTION

Selected paraffinic heat transfer fluids for use in closed unpressurized heat transfer systems operating at bulk oil temperatures up to 250°C. They provide excellent resistance to thermal cracking and chemical oxidation and are non-toxic, have a very low odor level and have no detrimental effect on seals. They provide high specific heat and thermal conductivity at all temperatures and therefore give rapid heating and efficient operation of the heat transfer system.

GULFTHERM OIL PROVIDES

- High heat transfer efficiency
- Long service life
- God resistance to sludge formation
- Good flow characteristics at low temperatures

TYPICAL SPECIFICATIONS

Grade, ISO	32	46	68
Specific Gravity @ 15.6°/15.6°C	0.867	0.877	0.880
Kinematic Viscosity cSt at 40°C	32.0	46.0	68.0
cSt at 100°C	5.34	6.77	8.71
Viscosity Index	99	100	99
Flash Point, COC, °C	212	224	238

SECTION

SPINDLE OIL

your local global brand

GulfSpin

Spindle Oil

DESCRIPTION

Low viscosity, dispersant type spindle lubricants having good anti-wear and special load carrying characteristics. Gulfspin oils provide excellent resistance to the formation of sludge, gum and resin deposits. They are recommended for high-speed spindle lubrication, particularly in the textile industry and in certain machine tools.

GULFSPIN OIL PROVIDES

- Exceptional resistance to oxidation and deposit formation
- Easy start-up and minimum power loss
- Protection against rust and corrosion
- Easy removal of textile contamination by washing
- Excellent lubrication of high speed bearings
- Excellent load carrying capabilities

TYPICAL SPECIFICATIONS

Grade, ISO	10	22
Specific Gravity @ 15.6°/15.6°C	0.856	0.867
Kinematic Viscosity cSt at 40°C	10.05	22.08
cSt at 100°C	2.75	4.42
Viscosity Index	115	110
Flash Point, COC, °C	160	206

SECTION

GENERAL PURPOSE OIL

your local global brand

Gulf Security

Industrial Bearing & Circulating Oil

DESCRIPTION

Good quality paraffinic straight mineral oils especially suitable for bearing lubrication systems, gear cases, general purpose use and total loss systems, and water pump bearings.

They have high viscosity indexes, high natural resistance to oxidation, and good water separating characteristics.

GULF SECURITY OIL PROVIDES

- A wide range of viscosities
- Good oxidation stability
- Excellent water separation characteristics
- Resistance to sludge formation

TYPICAL SPECIFICATIONS

ISO	Spec. Gravity	Kin. Viscosity, cSt		Viscosity	Flash Pt.
Grade	15.6°/15.6°C	40°C	100°C	Index	COC, °C
32	0.870	32.0	5.40	102	216
46	0.875	46.0	6.77	100	224
68	0.880	68.0	8.71	99	238
100	0.885	100.0	11.28	98	256
150	0.889	150.0	14.78	97	262
220	0.894	220.0	18.94	96	270
320	0.898	320.0	24.20	96	278
460	0.901	460.0	30.50	95	292

SECTION

MACHINE SLIDEWAY OIL

GulfWay

Machine Tool Slideway Oil

DESCRIPTION

Specially compounded lubricating oil, primarily for the slideways of machine tools and similar applications. This oil possesses a tough lubrication film, and exceptional load carrying, and anti stick-slip capabilities.

GULFWAY OIL PROVIDES

- Elimination of stick-slip on machine tool slideways
- Excellent demulsibility characteristics in the presence of water
- Good oxidation resistance
- Excellent load carrying capabilities

PERFORMANCE LEVELS PROVIDED

Cincinnati Milacron P-47 (68), P-50 (220)

TYPICAL SPECIFICATIONS

Grade, ISO	32	68	220
Specific Gravity @ 15.6°/15.6°C	0.872	0.882	0.895
Kinematic Viscosity cSt at 40°C	32.0	68.0	220.0
cSt at 100°C	5.53	8.95	19.74
Viscosity Index	109	105	102
Flash Point, COC, °C	206	230	268

SECTION

FLUSHING OIL

Gulf Flushing Oil

Flushing Oil

DESCRIPTION

Gulf Flushing Oil is manufactured with light-viscosity paraffinic oil and is used for flushing of engines, manual gearboxes and axles.

GULF FLUSHING OIL PROVIDES

- Good solvency to remove deposits
- Low viscosity for better oil penetration

TYPICAL SPECIFICATIONS

ISO Grade	32
Specific Gravity @ 15.6°/15.6°C	0.871
Kinematic Viscosity cSt at 40°C	30.0
Flash Point, PMC, °C	5.13
Viscosity Index	98
Flash Point, COC, °C	210

SECTION

METAL WORKING FLUID

GulfCut Soluble Oil

Water Extendable Cutting Oil

DESCRIPTION

Specially compounded emulsifying oils which readily mix with water, forming homogeneous and exceptionally stable emulsions. These products contain rust and corrosion inhibitors and are mainly used in the machining of both ferrous and non-ferrous metals.

Suitable for a wide variety of machining operations includes milling, turning and drilling.

Depending on the particular application, Gulf Soluble Oil is designed to be mixed at a ratio of between 15 and 25 parts of water to 1 part oil.

GULFCUT SOLUBLE OIL PROVIDES

- Stable emulsification
- Good protection against corrosion
- Excellent cooling and lubrication properties
- Economical to use

TYPICAL SPECIFICATIONS

Specific Gravity @ 15.6°/15.6°C	0.884
Kinematic Viscosity cSt at 40°C	40.27
cSt at 100°C	6.18
Flash Point, COC, °C	130

SECTION

INDUSTRIAL GEAR OILS

Gulf E.P. Lubricant HD

Industrial Gear Oil

DESCRIPTION

Premium quality industrial gear oils containing extreme pressure additives. Gulf E.P. Lubricants HD provide good load-carrying, rust preventive, and anti-foam characteristics and are suitable for all types of industrial gears requiring an E.P. oil.

GULF E.P. LUBRICANT HD OIL PROVIDES

- Superior load carrying ability
- Protection against rust & corrosion
- Reduced Gear wear
- Minimal spalling & welding
- Excellent oxidation stability

PERFORMANCE LEVELS PROVIDED

AGMA 250.04 DIN 51517 Part III
U.S. Steel 222, 224 David Brown SL. 53.101
Cincinnati Milacron P-63 (68),
P-76 (100) P-77 (150) P-74 (220)
P-59 (320) P-35 (460)

TYPICAL SPECIFICATIONS

ISO Grade	Spec. Gravity 15.6°/15.6°C	Kin. Viscosity, cSt 40°C	100°C	Viscosity Index	Flash Pt. COC, °C
32	0.872	32.0	5.38	101	204
46	0.877	46.0	6.77	100	212
68	0.882	68.0	8.67	98	222
100	0.888	100	11.28	98	230
150	0.893	150	14.78	97	234
220	0.898	220	18.94	96	240
320	0.902	320	24.20	96	246
460	0.906	460	30.50	95	250
680	0.907	680	39.61	96	252

Gulf Synthetic Gear Oil

Synthetic Industrial Gear Oil

DESCRIPTION

Superior quality polyglycol based industrial gear oil suitable for use in industrial worm gear units as well as auxiliary worm drives on automotive equipment. They offer superior lubrication characteristics to mineral oil based products, especially at elevated temperatures.

GULF SYNTHETIC GEAR OIL PROVIDES

- Minimal wear and extended oil life
- Longer oil drains and reduces maintenance costs
- Excellent load carrying properties
- Superior lubrication over wide temperature range

PERFORMANCE LEVELS PROVIDED

David Brown Type G
Foden Rear Axles (150 Grade)
Kirkstall Worm Gear (150 Grade)

TYPICAL SPECIFICATIONS

Grade, ISO	150	220	320	460
Specific Gravity @ 15.6°/15.6°C	0.820	0.837	0.889	0.900
Kinematic Viscosity cSt at 40°C	133.0	208.2	331	458.0
cSt at 100°C	21.0	28.64	37.1	67.0
Viscosity Index	192	180	160	223
Flash Point, COC, °C	240	245	250	255
Pour Point, °	-18	-18	-18	-18

Gulf Rock Drill Oil

Rock Drill & Pneumatic Machinery Oil

DESCRIPTION

Special pneumatic tool lubricant formulated with additives to impart anti-rust, extreme pressure, oxidation stability, tackiness, oiliness and emulsifying characteristics. Recommended for airline lubrication of pneumatic equipment such as jack hammers, quarry drills, and lighter duty equipment such as impact wrenches, rivet hammers etc.

GULF ROCK DRILL OIL PROVIDES

- Longer equipment life
- Excellent tackiness and oiliness
- Non-toxic characteristics
- Low deposit formation
- Protection to drill surfaces operating in wet conditions
- Protection against rust

TYPICAL SPECIFICATIONS

Grade, ISO	32	100	150	220
Specific Gravity @ 15.6°/15.6°C	0.874	0.888	0.893	0.897
Kinematic Viscosity cSt at 40°C	32.0	100.8	148.6	220.7
cSt at 100°C	5.44	11.19	14.5	18.92
Viscosity Index	104	96	96	96
Flash Point, COC, °C	188	236	242	249

SECTION

GREASES

your local global brand

Gulfcrown Grease E.P.

Extreme Pressure Multipurpose Industrial Grease

DESCRIPTION

A multi-functional extreme pressure lithium soap grease offering excellent oxidation stability, rust protection, water resistance, and wear protection, capable of carrying high loads. Recommended for the lubrication of grease-filled gear boxes (E.P. No. O) and heavily loaded anti-friction and plain bearings on industrial, automotive and construction type equipment.

GULFCROWN GREASE E.P.PROVIDES

- Excellent EP properties
- Resistance to water wash-out
- Good pumpability and mechanical stability
- Multifunctional use in wide temperature range

TYPICAL SPECIFICATIONS

NLGI Grade	No.0	No.1	No.2	No.3
Soap Type	Lithium	Lithium	Lithium	Lithium
Penetration, 25°C, Wk., 60Str	375	325	280	245
Drop Point, °C	182	185	190	193
Base Oil Viscosity cSt at 40°C	220	220	220	220
Timken OK Load, Kg	20	20	27	27

your local global brand

Gulfcrown Grease

Multipurpose Industrial Grease

DESCRIPTION

A multi-functional premium quality lithium soap grease offering excellent oxidation stability, rust protection and water resistance. Recommended for the lubrication of electric motor bearings, other anti-friction and plain bearings, and for use in centralized grease systems.

GULFCROWN GREASE PROVIDES

- Good resistance to oxidation
- Resistance to water wash-out
- Good pumpability and mechanical stability
- Multifunctional use in wide temperature range

TYPICAL SPECIFICATIONS

NLGI Grade	No.1	No.2	No.3
Soap Type	Lithium	Lithium	Lithium
Penetration, 25°C, Wk., 60Str	322	277	230
Drop Point, °C	190	195	196
Base Oil Viscosity cSt at 40°C	200	200	200

(Properties may vary according to geographical area)

Gulfcrown LC

Multipurpose High Temperature Grease

DESCRIPTION

A premium quality multipurpose lithium-complex base grease recommended for an extensive array of automotive and industrial applications particularly suitable for high temperatures and severe working conditions. Gulfcrown LC grease is available in NLGI grades 2 and 3 and recommended for use at temperatures from -30°C to 150°C depending on NLGI grade.

GULFCROWN LC GREASE PROVIDES

- Suitability in wide temperature range
- Good mechanical stability
- Multifunctional use
- Good resistance to oxidation

TYPICAL SPECIFICATIONS

NLGI Grade	No.2	No.3
Soap Type	Lithium	Lithium
Penetration, 25°C, Wk., 60Str	280	235
Drop Point, °C	>260	>260
Texture	Smooth	Smooth

GulfLex Moly E.P.

Muti-Functional Automotive Grease

DESCRIPTION

Gulflex greases are multi-functional lithium soap automotive greases offering excellent water and oxidation resistance. Gulflex Moly contains molybdenum disulfide which make it an excellent lubricant for shackle pins, ball joints, and fifth wheels. Gulflex greases are also recommended for lubrication of chassis steering linkage, wheel bearings, universal joints and water pumps.

GULFLEX MOLY E.P. GREASE PROVIDES

- Ideal boundary lubrication
- Excellent lubrication under oscillating conditions
- Extended intervals between re-lubrication
- Suitable for use up to 120 °C

TYPICAL SPECIFICATIONS

	Moly
NLGI Grade	No.2
Soap Type	Lithium
Penetration, 25°C, Wk., 60Str	285
Drop Point, °C	188
Base Oil Viscosity cSt at 40°C	168
Four Ball EP, welt point, kg, D2596	315 min
Molybdenum Disulphide, %wt	3

Gulf Supreme Grease

Water Resistant Grease

DESCRIPTION

Good quality calcium soap based grease which is resistant to water and protects against corrosion. This product can be applied with a grease gun or by automatic dispensing equipment and is suitable for plain bearings and slow running ball and roller bearings as long as the operating temperatures do not exceed 60°C. It is also suitable for vehicle chassis lubrication.

GULF SUPREME GREASE PROVIDES

- Excellent resistance against water washout
- Good protection in wet operating conditions

TYPICAL SPECIFICATIONS

NLGI Grade	No.2	No.3
Soap Type	Ca	Ca
Penetration, 25°C, Wk., 60Str	275	235
Drop Point, °C	98	99
Base Oil Viscosity cSt at 40°C	48.5	48.5

Gulf High Temperature Grease

High temperature Grease

DESCRIPTION

Gulf High Temperature Greases are a range of clay thickened greases recommended specially for extreme high temperature working conditions. They contain oxidation and corrosion inhibitors and have excellent EP properties. Gulf High Temperature Greases are available in NLGI grades 2 and 3 and recommended for use at temperatures from -20°C to 220 °C.

Gulf High Temperature Grease is recommended for applications such as furnace doors and kiln trolley grease applications. Ideal for Steel Mill roll- neck bearings where resistance to water washing is an important requirement.

GULF HIGH TEMPERATURE GREASE PROVIDES

- Excellent EP properties
- Superior anti-wear characteristics
- Protection against rust, corrosion and oxidation
- Resistance to softening at high temperatures

TYPICAL SPECIFICATIONS

NLGI Grade	No. 2	No. 3
Thickener Type	Bentone Clay	Bentone Clay
Penetration, 25°C, Wk., 60Str	280	235
Drop Point, °C	None	None
Corrosion, Copper Strip		
24 Hrs @ 212F	No corrosion	No corrosion
Rust Test, ASTM D 1743	1	1

Gulf Lubcote

Open Gear & Wire Rope Lubricant

DESCRIPTION

Gulf Lubcote are high viscosity asphaltic open gear lubricants having excellent adhesive properties. Gulf Lubcote No.0 and 1 can be applied at room temperature, while heat must be utilized to apply Gulf Lubcote No.3. Gulf Fluid Lubcote No. 3 and 5 are solvent cutback products and can be applied at room temperature without heating. Upon evaporation of the solvent a tenacious film remains to protect the open gear teeth from wear.

GULF LUBCOTE PROVIDES

- Long lasting lubricated surface
- Effective lubrication under extreme operating and climatic conditions

TYPICAL SPECIFICATIONS

NLGI Grade	No.1	No.2	No.3
Kinematic Viscosity, cSt @ 100°C	81.0	240.0	647.0
Flash Point, COC°C	230	238	268
Fire Point, COC°C	240	248	260
Pour Point, °C	0	9	40
Carbon Residue, RAMS: %	8.9	12.6	-

	FLUID NO.3	FLUID No. 5
Kinematic Viscosity, cSt @ 40°C	1640	1680
Pour Point, °C	-6	-6

Gulf Graphite Grease

Graphite grease For Heavy Duty Application

DESCRIPTION

A calcium soap thickened grease containing flake graphite. Recommended for the lubrication of low speed heavy duty plain bearings and Steel mill applications. This grease should not be used in anti-friction bearings. Prevents water washout.

GULF GRAPHITE GREASE PROVIDES

- Excellent load carrying
- Long lasting lubricated surface

TYPICAL SPECIFICATIONS

NLGI Grade	No.2
Soap Type	Calcium
Penetration, 25°C, Wk., 60Str	275
Drop Point, °C	100
Base Oil Viscosity cSt at 40°C	58.1

SECTION

SPECIALITY PRODUCTS

your local global brand

Gulf Universal Brake Fluid DOT 4

Brake Fluid

DESCRIPTION

Blended with superior quality synthetic fluids and corrosion and oxidation inhibitors, Gulf Universal Brake Fluid is a superior performance brake and clutch fluid conforming to FMVSS DOT 4 specifications.

Gulf Universal Brake Fluid has a high boiling point in excess of 260°C and with low water absorption characteristics ensures firm, positive braking under sustained and severe conditions. It is suitable for all passenger cars, trucks, tractors, buses, and heavy duty vehicles where the manufacturer recommends DOT 4 or DOT 3 brake fluids be used.

GULF UNIVERSAL BRAKE FLUID DOT 4 PROVIDES

- High and consistent brake performance
- Low absorption of moisture
- Inhibition of rust, oxidation and wear
- High wet and dry boiling points

PERFORMANCE LEVELS PROVIDED

DOT 4 SAE J1703 Nov. 83 FMVSS 116 DOT 4 VV-B-680B ISO 4925

TYPICAL SPECIFICATIONS

ERBP°C	>260
WET BP°C	>160
Kinematic Viscosity cSt at -40°C max.	1800
cSt at 100°C min.	2.0 - 2.6
pH Value	7.0 - 11.5
Density at 20°C (g/cm^3)	1.035-1.055
Flash Point, °C	>220

Gulf Super HD Brake Fluid DOT 3

Brake Fluid

DESCRIPTION

Gulf Super HD Brake Fluid is a good quality synthetic base brake and clutch fluid suited to systems operating in moderate conditions.

Gulf Super HD Brake Fluid is suitable for all passenger cars, trucks, tractors, buses, and heavy duty vehicles where the manufacturer recommends DOT 3 brake fluids be used.

GULF SUPER HD BRAKE FLUID PROVIDES

- Excellent low temperature stability
- High wet boiling point
- Excellent corrosion protection
- Excellent thermal stability

PERFORMANCE LEVELS PROVIDED

SAE J1703 Nov. 83 FMVSS 116 DOT 3 ISO 4925

TYPICAL SPECIFICATIONS

ERBP°C	>205
WET BP°C (min.)	>140
Kinematic Viscosity cSt at -40°C max.	1500
cSt at 100°C min.	1.5
pH Value	7.0 - 11.5
Density at 20°C (g/cm^3)	1.035-1.060
Flash Point, °C	>220

Gulf Summer Coolant

Coolant for Gasoline & Diesel Engines

DESCRIPTION

Gulf Summer Coolant is a high quality coolant for year round use, suitable for both gasoline and diesel engines which use both iron and aluminum materials in the engine construction.

Formulated from monoethylene glycol and containing 8-metal protection inhibitors, it gives outstanding rust and corrosion protection to all cooling system materials and is fully compatible with flexible hoses and seals etc.

Gulf Summer Coolant also increases the boiling point of water, thus giving better cooling performance in the high temperature conditions of Saudi Arabia and the Gulf region.

GULF SUMMER COOLANT PROVIDES

- Year round cooling and protection
- High performance under extreme conditions
- Protection against excessive evaporation
- Outstanding rust and corrosion protection

PERFORMANCE LEVELS PROVIDED

BS 6580

TYPICAL SPECIFICATIONS

MEG Base (min.)	40%	50%	90%
Specific Gravity 15.5°C/15.5°C	1.055	1.07	1.12
Boiling Point, °C	105°C	110°C	190°C
Avg. pH 25.0% volume in water	7	9	9
Freezing Point	< -15C	< -15C	< -15C

Gulf Caliberation Fluid

Caliberation Fluid

DESCRIPTION

Gulf Calibration Fluid is designed for the calibration of diesel engine fuel injection equipment (F.I.E.). It is blended from high viscosity index paraffinic oils, having a closely controlled viscosity, and containing rust, corrosion, and foam inhibitors.

GULF CALIBERATION FLUID PROVIDES

- Controlled viscosity for constant flow
- High viscosity index
- Good resistance to corrosion
- Good resistance to rust and foaming

TYPICAL SPECIFICATIONS

Specific Gravity 15.6°C/15.6°C	0.820
Kinematic Viscosity cSt @ 40°C	5.0
Flash Point, PMC, °C	135
Pour Point, °C	-24

Gulf Mineral Seal Oil

Mineral seal Oil

DESCRIPTION

A hydrofinished close cut, straight run distillate manufactured from paraffinic crude oils. This oil, which does not contain additives, is recommended for a variety of applications such as burning oil, dielectric fluid, gas absorption oil, nylon yarn conditioner, and as a base oil for aluminum rolling oils.

GULFMINERAL SEAL OIL PROVIDES

- Low viscosity straight run mineral oil
- Low vapor forming
- Non staining on aluminum
- Good nylon yarn conditioning

TYPICAL SPECIFICATIONS

Specific Gravity @ 15.6°/15.6°C	0.820
Kinematic Viscosity cSt at 40°C	5.0
Flash Point, PMC, °C	135
Pour Point, °C	-24

USEFUL TABLES AND INFORMATION

- API ENGINE OIL CLASSIFICATIONS
- API MOTOR SERVICE DESIGNATIONS - GASOLINE ENGINES
- API COMMERCIAL AND FLEET ENGINE DESIGNATIONS
- API / NMMA TWO STROKE ENGINE DESIGNATIONS
- ACEA EUROPEAN SPECIFICATIONS
- CLASSIFICATION OF GEAR LUBRICANTS
- SAE VISCOSITY GRADES CRANKCASE OIL
- AXLE AND MANUAL TRANSMISSION LUBRICANT VISCOSITY
- ISO VISCOSITY GRADES
- COMPARISON VISCOSITY CLASSIFICATIONS
- NLGI GREASE CONSISTENCY GRADES
- VISCOSITY AND TEMPERATURE CONVERSIONS
- MEASUREMENT CONVERSION TABLES
- LUBRICANTS HANDLING & STORAGE GUIDE

API ENGINE OIL CLASSIFICATIONS

The API (American Petroleum Institute) Engine Oil Classification system was set up as a joint effort by API, ASTM (American Society for Testing Materials) and SAE (Society of Automotive Engineers).

The API Engine Oil Classifications are divided into two major categories indicated by the first letter.

(1) The "S" series designation stands for Services Station (or *Spark*), and is used to designate products for use in gasoline engines.

(2) The "C" series designation stands for Commercial (or *Compression*), and is used to designate oils for use in diesel engines.

The second letter indicates the performance capability of engine oils as defined by series of engine tests that must be passed. Periodically, as more severe engine requirements emerge, new API service classification designations are added, proceeding further into the alphabet.

In 1992, changes were introduced to tighten up the API testing procedure. A code of practice was devised by the CMA (Chemical Manufacturers Association) which defined a new procedure for the engine testing and evaluation of the lubricant approval according to the API classification. API SH, CF, CF-2, CF-4, CG-4 classifications are now part of the new procedure which will provide more consistent proof of performance.

The API classification should not be used as a strict measure of engine oils quality but rather as guide to its applications.

API MOTOR SERVICE DESIGNATIONS - GASOLINE ENGINE

DESIGNATION	DESCRIPTION
SA	For utility gasoline and diesel engine service where compounded oils are not required. Oil is without additives except pour and/or foam depressants.
SB	Minimum-duty oils provide some anti-oxidant and anti-scuff capabilities.
SC 1964	Intended for requirements of manufacturers of 1964-1967 automobiles. Such oils provide low-temp anti-sludge and anti-rust performance.
SD 1968	For warranty maintenance service of 1968-1970 models, mostly passenger cars, as well as some 1971 and later cars. Provides more protection against high and low-temperature engine deposits, rust and corrosion than SD or SC classification oils; may be used when either of these are recommended.
SE 1972	For gasoline engines and some trucks beginning with 1972 and certain 1971 through 1979. Provides more protection against oil oxidation, high temperature engine deposits, rust and corrosion than SD or SC; may be used either of these are recommended.
SF 1980	For gasoline engines in passenger cars and some trucks. Provides increased oxidation stability and improved anti-wear performance than SE classified oils. SF oils may be used where SE, SD or SC oils are recommended.
SG 1989	For gasoline engines in passenger cars, vans and light trucks beginning with the 1989 model year. API SG quality oils include the performance properties of API CC. Provides vastly improved control of engine deposits, oil oxidation and engine wear relative to earlier service categories. SG oils may be used where API SF, SF/CC or SE/CC are recommended.
SH 1994	For Gasoline engines first mandated in 1993. It is for use in engines in passenger cars, vans and light trucks operating under vehicle manufacturers' recommended maintenance procedures. Provides performance exceeding the minimum requirements of API SG in the areas of deposit control, oil oxidation, wear, rust, and corrosion. May be used where API Service Category SG and earlier categories are recommended.
SJ 1997	Category SJ was adopted in 1996 for Gasoline engines in current and earlier passenger cars, sport utility vehicles, vans, and light trucks. SJ oils may be used where API SH and earlier categories have been recommended.
SL 2001	Category SL was adopted to describe engine oil use in 2001. For Gasoline engines in current and earlier passenger cars, sport utility vehicles, vans, and light trucks.. SL requirements have been tested according to American Chemistry council (ACC) Product Approval Code of practice and may utilize the API Base oil Interchange and Viscosity Grade Engine Testing Guidelines. API SH and earlier categories have been recommended. SL oils may be used where SJ and earlier categories have been recommended

API COMMERCIAL AND FLEET ENGINE OIL DESIGNATIONS

DESIGNATION	DESCRIPTION
CA	For light-duty diesel engine service using high quality fuels. Provides protection from bearing corrosion and from high temperature deposits in diesel engines.
CB	For service of diesel engines operated in mild to moderate duty, but with lower quality fuels that necessitate more protection from wear and deposits. Provides protection in normally aspirated diesel engines with higher sulfur fuels.
CC	For service of naturally aspirated or lightly supercharged diesel engines operated in moderate to severe duty. These oils provide protection from high- temperature deposits in light supercharged diesels and also from rust & corrosion.
CD	For supercharged or turbocharged diesel engines of high-speed, high-output duty requiring highly effective control of wear and deposits. These oils provide protection from bearing corrosion and from high-temp deposits in supercharged or turbocharged diesel engines when using fuels of a wide quality range.
CD-II	For 2-stroke cycle diesel engines requiring highly efficient control over wear and deposits. Oil designed for this service also meets all requirements of API CD.
CE 1983	Service typical of turbocharged or supercharged heavy duty diesel engines manufactured since 1983 and operated under both low-speed, high load and high-speed, high-load conditions. Oils designed for this service may also be used when previous API engine service categories for diesel engines are recommended.
CF	This classification has been introduced to cover older types of indirect injection (pre-chamber) off-road diesel engines operated on normal to higher sulfur level fuels. API CF oils meet also requirements of API CD.
CF-2	Describes service typical for two-stroke cycle Detroit diesel engines requiring highly effective control of wear and deposits. These oils demonstrate improved performance can be used wherever CD-II oils are recommended.
CF-4 1990	Covers service in high-speed, four-stroke cycle diesel engines. API CF-4 oil exceeds the requirements for the API CE category, providing improved control of oil consumption and piston deposits (CF-4 oils can therefore also be used where CE oils are recommended). Due to relatively low sulfated ash content, they are primarily suitable for US vehicles and are also used European engine.
CG-4 1994	Sever Duty Diesel Engine oil API CG-4 addresses engine wear and deposits issues linked to use of new “clean fuels” and new engine designs inview of 1990 US emissions regulations. These oils are formulated primarily for latest US four stroke on- and off-highway, high-speed heavy-duty applications where low emission engines and fuel sulfur level of 0.5% weight is used. API CG-4 provides effective control over high-temperature piston deposits, wear, corrosion, foaming, oxidation stability and soot accumulation.

CH-4 1998	Severe Duty Diesel Engine Oils API CH-4 are suitable for high speed, four stroke diesel engines designed to meet 1998 exhaust emission standards and are specifically compounded for use with diesel fuels ranging sulfur up to 0.5% weight. CH-4 oils are superior performance and exceed the requirements those meeting API CF, CF-4, CG-4 and can effectively lubricate the engines calling for those API Services Categories.
CI-4 2002	The API CI-4 services category describes oils for use in those high-speed, four stroke cycle diesel engines designed to meet 2004 exhaust emission standards, to be implemented in October 2002. These oils are compounded for use in all application with diesel fuels ranging sulfur up to 0.05% weight. These oils are especially effective at sustaining engine durability where Exhaust Gas Recalculation (EGR) and other exhaust emission componentry may be used. Optimum protection is provided for control of corrosive wear tendencies, low and high temperature stability, soot handling properties, piston deposit control, valvetrain wear, oxidative thickening, foaming and viscosity loss due to shear. API CH-I oils are superior in performance to those meeting API CH-4, CG-4 and CF-4 and can effectively lubricate engines calling for those API Services categories.

API / NNMA TWO STROKE - ENGINE OIL DESIGNATIONS

DESIGNATION	DESCRIPTION
TA	Mopeds and other very small engines, typically <50cc
TB	Obsolete
TC	Various high performance engines (excluding outboard) typically between 20cc to 500cc
TD	Obsolete
NMMA (BIA) TC-W	Outboard engines
NMMA TC-WII®	Outborad engines
NMMA TC-W3™	Outboard engines

EUROPEAN AUTOMOTIVE SPECIFICATIONS - ACEA

A1-96	For modern engines designed to use low viscosity oils for fuel economy. These have moderate high temperature/ high shear characteristics (2.9 and 3.5 mPa.s)
A2-96	Conventional viscosity oils. These oils are similar to CCMC G4 with oxidation stability equivalent to G5
A3-96	Specifically for high performance or conventional engines with long drain intervals and low oil consumption - these will probably be synthetic oils. Requirements for 'stay in grade' shear stability exceeds CCMC G5

LIGHT DUTY DIESEL ENGINES

B1-96	High temperature high shear viscosity more severe than required in CCMC PD2
B2-96	'Stay in grade' viscometrics
B3-96	'Stay in grade' viscometrics, more severe control of soot-induced viscosity increase and camshaft wear in the OM602A

HEAVY DUTY DIESEL ENGINES

E1-96	OM 364A at MB p227 level, OM 602A replaces OM 616
E2-96	OM 364A at MB p228.1 level, Mack T8 is 'rate and report'
E3-96	OM 364A at MB p228.3 level, Mack T8 is API CG-4 level
E4	Will be at MB 228.5 level approximately

CLASSIFICATION OF GEAR LUBRICANTS

API CATEGORIES OF PERFORMANCE

As in the case of engine oils, the American Institute of Petroleum has devised a system of classification for automotive gear lubricants in which ascending levels of minimum performance, and performance tests, are identified. With the possible exception of API GL-1, lubricants for each API designation are formulated with performance additives.

As performance requirements of many modern equipment builders exceeded the GL-4 / GL-5 specifications, recently a new gear lubricant category MT-1 has been developed to reflect present and future needs.

API CLASSIFICATION	DESCRIPTION
GL-1	For automotive manually operated gear boxes, spiral bevel, and worm axles under such mild conditions that a straight mineral oil can be used satisfactorily. They may contain anti-oxidants, anti-rust and corrosion inhibitors, anti-foam and pour point depressants, but no EP agents or friction modifiers.
GL-2	For worm gear axles where conditions are too severe for API GL-1.
GL-3	For manual transmissions and spiral bevel axles under moderately severe conditions where a mild EP agent is required.
GL-4	For manual transmissions and spiral bevel gears. The performance level is met by the requirements of U.S. service specification MIL-L-2105. (Now obsolete for approval purposes).
GL-5	A higher performance level than API GL-4 for use under more severe conditions of service and for hypoids with extreme offset i.e. very high sliding speeds. The service specification is MIL-L-2015C or the near British equivalent MOD CS3000B.
GL-6	Obsolete
MT-1	ASTM "PG1" has become API MT-1. It is to meet the requirements of non synchronized manual transmission gearboxes in heavy duty service but does not replace GL-4. A better quality lubricant (API MT-1) was needed because of better thermal/oxidation stability to reduce deposits which cause seal problems.

SAE VISCOSITY GRADES
CRANKCASE OIL
J-300 (DEC 99)

	LOW TEMPERATURE VISCOSITIES		HIGH TEMPERATURE VISCOSITIES		
	Cranking (cP)	Pumping (cP)	Kinematic (cSt) at 100°C	High-Shear (cP) at 150°C and 10^6 s-1	
SAE VISCOSITY GRADE	max. at temp. (°C)	max. with no yield stress at temp. (°C)	min.	max.	min.
0W	6200 at –35	60 000 at -40	3.8	-	-
5W	6600 at –30	60 000 at -35	3.8	-	-
10W	7000 at –25	60 000 at -30	4.1	-	-
15W	7000 at –20	60 000 at -25	5.6	-	-
20W	9500 at –15	60 000 at -20	5.6	-	-
25W	13,000 at -10	60 000 at -15	9.3	-	-
20	-	-	5.6	< 9.3	2.6
30	-	-	9.3	<12.5	2.9
40	-	-	12.5	<16.3	2.9*
40	-	-	12.5	<16.3	3.7**
50	-	-	16.3	<21.9	3.7
60	-	-	21.9	<26.1	3.7

* (0W-40, 5W-40 and 10W-40 grades)
**(15W-40, 20W-40, 25W-40, 40 grades)

Note :
1 cp = mPa*s; 1 cSt = $1mm^2/S$

VISCOSITY - MILITARY GRADES

	10W	30	40	5W-30	10W-30	15W-40
Cranking Viscosity[a] (cP) at temperature °C min	3500 at -25	---	---	3250 at -30	3500 at -25	3500 at -20

AXLE AND MANUAL TRANSMISSION LUBRICANT VISCOSITY CLASSIFICATION

SAE Viscosity Grade	Max. temp. for 150,000 cP, °C	Kinematic Viscosity at 100°C, cSt	
		min.	max.
70W	-55	4.1	-
75W	-40	4.1	-
80W	-26	7	-
85W	-12	11	-
90	-	13.5	< 24.0
140	-	24	< 41.0
250	-	41	-

MIL - L - 2105D SPECIFICATIONS

SAE Viscosity Grade	Max. temp. for 150,000 cP, °C	Kinematic Viscosity at 100°C, cSt	
		min.	max.
75W	-40	4.1	-
80W-90	-26	13.5	< 24.0
85W-140	-12	24.0	< 41.0

ISO VISCOSITY GRADES

ISO Viscosity Grade	Midpoint Kinematic Viscosity cSt at 40°C	Kinematic Viscosity Limits cSt at 40°C	
		min.	max.
ISO VG 2	2.2	1.98	2.42
ISO VG 3	3.2	2.88	3.52
ISO VG 5	4.6	4.14	5.06
ISO VG 7	6.8	6.12	7.48
ISO VG 10	10	9.00	11.0
ISO VG 15	15	13.5	16.5
ISO VG 22	22	19.8	24.2
ISO VG 32	32	28.8	35.2
ISO VG 46	46	41.4	50.6
ISO VG 68	68	61.2	74.8
ISO VG 100	100	90.0	110
ISO VG 150	150	135	165
ISO VG 220	220	198	242
ISO VG 320	320	288	352
ISO VG 460	460	414	506
ISO VG 680	680	612	748
ISO VG 1000	1000	900	1100
ISO VG 1500	1500	1350	1650

NLGI* GREASE CONSISTENCY GRADES

NLGI Consistency No.	ASTM Worked (60 Strokes) Penetration at 25°C (77°F) tenths of millimetre	Appearance at room temperature
000	445 to 475	very fluid
00	400 to 430	fluid
0	355 to 385	semi fluid
1	310 to 340	very soft
2	265 to 295	soft
3	220 to 250	medium hard
4	175 to 205	hard
5	130 to 160	very hard
6	85 to 115	extremely hard

* National Lubricating Grease Institute

Based on the degree of penetration achieved by allowing a standard cone to sink into the grease at a temperature of 25°C for a period of 5 seconds. The depth of penetration is measured on a scale in tenths of millimeters (10^{-1} mm) and the higher the number the softer the grease.

COMMON TERMS

Acid Number	A measure of the amount of potassium hydroxide (KOH) needed to neutralize all or part of the acidity of a petroleum product.
Additive	Any material added to a base stock to change its properties, characteristics or performance.
Antifoam Agent	An additive used to suppress the foaming tendency of petroleum products in service. May be a silicone oil break up surface bubbles or a polymer to decrease the number of small entrained bubbles.
Antiwear Agents	Additives or their reaction products, which form thin, tenacious films on highly loaded parts to prevent metal-to-metal contact.
Ash	Metallic deposits formed in the combustion chamber and on other engine parts during high temperature operation.
Base Number	The amount of acid (perchloric or hydrochloric) needed to neutralize all or part of a lubricant's alkalinity, expressed as potassium hydroxide (KOH) equivalent.
Base Stock	The base fluid, usually a refined petroleum fraction or a selected synthetic material, into which additives are blended to produce finished lubricants.
Black Oils	Asphaltic materials which are added to lubricants used for open gears and steel cables to impart extra adhesiveness, giving them the characteristic black color.
Bleeding	The tendency of a liquid component to separate from liquid-solid or liquid-semisolid mixture, an an oil from a grease.
Blow-by	Passage of unburnt fuel and combustion gases past the piston rings of an engine, resulting in fuel dilution and contamination of the oil.
Bore Polishing	Excessive smoothing out of the surface finish of the cylinder bores in an engine to a mirror-like appearance, resulting in reduced piston ring sealing and increased oil consumption.
Boundary Lubrication	Lubrication between two rubbing surfaces without a full fluid lubricating film. It occurs under high loads and requires the use of antiwear or EP additives to prevent metal to metal contact.
Carbon Residue	Coked material remaining after an oil has been exposed to high temperatures under controlled conditions.
Centistoke (cSt)	The measurement of kinematic viscosity. One one-hundredth of a stoke. *See* Stoke.
Cetane Number	A measure of the ignition quality of a diesel fuel. The higher the Cetane Number, the easier a diesel engine will start, and the less "white smoke" and "diesel knock" occur after start-up.
Cetane Improver	An additive (usually an organic nitrate) which boosts the Cetane Number of a diesel fuel.
Cetane Index	An approximation of *cetane number* based on diesel fuel density (kilograms/litre) at 15°C and distillation temperatures.

Cloud Point	The temperature at which a cloud of wax crystals appear when a lubricant or a distillate fuel is cooled under standard conditions. Indicates the tendency of the petroleum product to plug filters or small orifices under cold weather conditions.
Copper Strip Corrosion	A qualitative measure of the tendency of a petroleum product to corrode pure copper.
Demulsibility	A measure of a fluid's ability to separate from water.
Density	Mass per unit of volume at a certain temperature.
Dilution of Engine Oil	Contamination of crankcase oil by unburnt fuel, leading to a reduction of viscosity and flash point. May indicate component wear or fuel system malfunctioning.
Distillation	Laboratory method used to characterize the volatility of petroleum products, mostly fuels.
Drop Point	The temperature at which grease sample when heated will begin to flow through an opening (measured per DIN ISO 2176).
Dynamic (or absolute) Viscosity	Is a measure of the force needed to shear one fluid layer over another. Shear stress (applied force/unit area) Dynamic vis. = ---------- Shear rate (fluid velocity/gap)
End Point	Highest liquid temperature recorded at the end of a distillation test of petroleum stock.
Engine Deposits	Hard or persistent accumulation of sludge, varnish and carbonaceous residues due to blow-by of unburnt or partially burnt fuel, or from partial breakdown of the crankcase lubricant. Water from condensation of combustion products, carbon, residues from fuel or lubricating oil additives, dust and metal particles also contribute to engine deposits.
Flash Point	Minimum temperature at which petroleum oil will support instantaneous combustion (a flash) but before it will burn continuously (fire point). Flash point is an important indicator of a possible fire hazard associated with a petroleum product.
Fluid Friction	Occurs between the molecules of a liquid in motion, and is expressed as shear stress. The viscosity of the liquid is an important factor determining the degree of fluid friction occurring.
Friction	The resistance to motion and material of one object sliding over another. Friction is dependent on the smoothness of the contacting surfaces, the force with which they are pressed together and the presence of a lubricant.
Gravity	In petroleum products, the mass/volume relationship expressed as: Mass/unit volume product @ 60°F Specific Gravity = ---------- Mass/unit volume water @ 60°F 141.5

	API Gravity = ---------- - 131.5 Specific Gravity @ 60°F/60°F
Induction Period	In an oxidation test, the time period during which oxidation proceeds at a constant and relatively low rate. It ends at a point where oxidation rate increases sharply.
Initial Boiling Point	Temperature at which the first condensation of vapors is visible at the beginning of a distillation test of a petroleum fluid, also called "overpoint".
Insolubles	Contaminants found in used oils due to dust, wear particles and/or oxidation products. Often measured as pentane or benzene insolubles to reflect the character of the insolubles.
Kinematic Viscosity	Measure of liquid's resistance to flow under the force of gravity at a specific temperature (usually 40°C or 100°C).
Lead	• Commonly used name for tetra ethyl or tetra methyl lead, an additive used in gasoline to improve octane number. • Elemental lead is commonly used in sleeve bearings and bushings alloys.
Lubrication	Control of friction and wear by introduction of a friction-reducing lubricant film between moving surfaces in contact. May be a fluid, solid or plastic substance.
Multigrade Oil	Engine or gear oil that meets the requirements of more than one SAE (Society of Automotive Engineers) viscosity grade and can be used over a wider temperature range than a single grade (monograde) oil. The multigrade effect is usually obtained by means of a Viscosity Index improver additive.
Neutralization Number	See Acid Number.
Nitration	The process whereby nitrogen oxides attack petroleum fluids at high temperatures, often resulting in viscosity increase and deposit formation.
Octane Number	A measure of a fuel's ability to prevent detonation in a spark ignition engine. Measured in a standard single cylinder, variable compression engine by comparison with primary reference fuels.
Oxidation	Occurs when oxygen attacks petroleum fluids. The process is accelerated by heat, light, metal catalysts and the presence of water, acids or solid contaminants and leads to viscosity increases and deposit formation.
Oxidation Stability	Resistance of a petroleum product to oxidation and, therefore, a measure of its potential service or storage life.
Permanent Viscosity Loss (PVL)	Difference between the viscosity of fresh oil and that of the same oil after engine operation or special test conditions of polymer degradation
pH	Measure of the acidity or alkalinity of an aqueous solution. The pH scale ranges from 0 (very acidic) to 14 (very alkaline), with a pH of 7 indicating a neutral solution equivalent to the pH of distilled water.

Pour Point	An indicator of the ability of an oil or distillate fuel to flow at low temperatures. It is the lowest temperature at which the fluid will flow when cooled under conditions described.
Preignition	Ignition of the fuel/air mixture in a gasoline engine before the spark plug fires. Often caused by incandescent fuel or lubricant deposits in the combustion chamber. It wastes power and may damage the engine.
Pumpability	The low temperature, low shear stress-shear rate viscosity characteristics of an oil that permit satisfactory flow to and from the engine oil pump and subsequent lubrication of moving parts.
Ring Sticking	Freezing of a piston ring in its groove due to heavy deposits in the piston ring area.
Scuffing	Local welding of rubbing surfaces due to high loads or absence or collapse of a separating lubricant film.
Shear rate	Rate at which adjacent layers of a fluid move with respect to each other. When the fluid is placed between two parallel surfaces moving relative to each other: $\text{Shear rate} = \frac{\text{Relative velocity of surface (meters/second)}}{\text{distance between surfaces (meters)}} = (\text{seconds})^{-1}$
Shear Stress	Fricitonal force overcome in sliding one "layer" of fluid along another, as in any fluid flow.
Sludge	A thick, dark residue, normally of mayonnaise consistency, that accumulates on non-moving engine interior surfaces. Generally removable by wiping, unless baked to a carbonaceous consistency. Its formation is associated with insolubles overloading the lubricant or insufficient engine oil detergency/dispersency.
Specific Gravity	See Gravity.
Stoke (St)	Kinematic measurement of a fluid's resistance to flow defined by the ratio of the fluid's dynamic viscosity to its density.
Sulphated Ash	The ash content of oil determined by charring the oil and treating the residue with sulfuric acid and evaporating to dryness. Expressed as % by mass.
Synthetic Lubricant	Lubricating fluids, typically esters, polyalphaolefins or polyglycols synthesized from chemical feedstocks rather than refined from oil.
Viscosity	A measure of a fluid's resistance to flow.
Viscosity Index (VI)	Relationship between viscosity and temperature of a fluid. High viscosity index fluids display less change in viscosity with temperature than low viscosity index oils.
Viscosity Index Improver	Lubricant additive, usually a high molecular-weight polymer, that reduces the tendency of an oil to change viscosity with temperature.
Volatility	Is the expression of evaporation tendency of a petroleum product.
White Oil	Highly refined lubricant stock used for specialty applications such as

	cosmetics and medicines.
Zinc (ZDP)	Element determined in engine oils as representative for its zinc dithiophosphate content, a commonly used antiwear/oxidation inhibitor additive.

ADDITIVES USED IN LUBRICATING OILS

Most modern lubricating oils require the use of chemical additives to improve their performance capabilities beyond those of the base oils used. There are hundreds of additives which, when blended with base oils, change their characteristics significantly.

The following are general definitions of some of the major types of additives used in the manufacture of modern lubricating oils:

1. Antifoam Agents - promote more rapid break-down of foam bubbles by weakening oil films between them.

2. Antiseptic Agents/bactericides - prevent the growth of micro-organisms and bacteria in oil/water emulsions.

3. Antistatic Additive - increases the conductivity of a hydrocarbon fuel to hasten the dissipation of electrostatic charges during high speed dispensing, thereby reducing the fire/explosion hazard.

4. Antiwear Agents - are usually added to oils to reduce wear of machine or engine parts operating under boundary lubrication conditions.

5. Colour Stabilizers - react chemically with the base oil to stabilize its colour.

6. Corrosion Inhibitor - Additive that protects lubricated metal surfaces from chemical attack by water or other contaminant.

7. Demulsifiers - assist the natural ability of the oil to separate rapidly from water. These agents are also helpful in rust inhibition.

8. Detergent-Dispersant Agents - prevent the formation of deposits on metal surfaces. Detergents suspend contaminants by reacting with them to form compounds which remain in suspension in the oil. Dispersants absorb onto contaminants, keeping them dispersed in the oil.

9. Emulsifiers - are surface-active chemicals added to base oils to reduce intermolecular forces and permit intimate mixing of very small oil droplets in water.

10. Extreme Pressure Additives - react with rubbing metal surfaces which are not sufficiently separated by the oil film, to form antiweld compounds which prevent complete seizure.

11. Friction Modifiers - act to reduce the friction between the oil molecules and therefore increase the lubricity or slipperiness of the oil.

12. Pour Point Depressant - Modifies wax crystal formation to reduce interlocking thus enabling lubricant to flow at low temperatures.

13. Inhibitor - additive that improves the performance of a petroleum product by controlling undesirable chemical reactions, i.e. oxidation inhibitor, rust inhibitor, etc.

14. Metal Deactivators - form a film over metal surfaces to prevent participation of these metals as catalysts in promoting oxidation of the oil.

15. Oxidation Inhibitors - prevent or retard oxidation of the oil thereby reducing viscosity increase and the formation of sludge, varnish, and acids.

16. Pour Point Depressants - lower the pour point of paraffinic oil by modifying the form of wax crystallization.

17. Rust and Corrosion Inhibitors - prevent rust and corrosion of metal surfaces in contact with the lubricant.

18. Tackiness Agents - improve the adhesive qualities of an oil.

19. Viscosity Index Improvers - are high molecular weight polymers added to oils to increase the viscosity index.

ABBREVIATIONS OF ORGANIZATION NAMES

AAMA	American Automobile manufacturers Association (formerly MVMA)
ACEA	Association des Constructeurs Européens de l'Automobile (Association of European Automotive Manufacturers)
ACS	American Chemical Society
AFNOR	Association Français Petroles de Normalisation
AGMA	American Gear Manufacturers' Association
AHEM	Association of Hydraulic Equipment Manufacturers
ANFAVEA	Auto Manufacturers Association (Brazil)
ANSI	American National Standards Institute
APE	Association of Petroleum Engineers, USA
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATC	Technical Committee of Petroleum Additive Manufacturers (Europe)
ATIEL	Association Techniqué de l'Industries Européenne des Lubrifiants
BHRA	British Hydromechanics Research Association
BLF	British Lubricants Federation
BNP	Bureau de Normalisation des Petroles
BTC	British Technical Council of the Motor and Petroleum Industries (member CEC)
CARB	California Air Resources Board
CCMC	Comité des Constructeurs d'Automobiles du Marché Commun (replaced by ACEA)
CEC	Conseil Européen de Coordination pour les Developments des Essais de Performance des Lubrifiants et des Combustibles pour Moteurs (Coordinating European Council for the Development of Performance Tests for Transportation Fuels, Lubricants & Other Fluids)
CEFIC	European Chemical Industry Council
CEN	Conseil Européen de Normalisation

CIMAC	International Council on Combustion Engines
CLR	Cooperative Lubrication Research
CMA	Chemical Manufacturers Association
CONCAWE	Conservation of Clean Air and Water (Europe)
CRC	Coordinating Research Council (USA)
CUNA	Comissione Tecnica di Unificazione nel l'Autoveicolo (member CEC)
DIN	Deutsche Industrie Norm
DKA	Deutscher Koordinierungsausschuss im Coordinating European Council (member CEC)
DOT	Department of Transport, Washington (USA)
ECE	Economic Commission for Europe
EEB	Europe Environmental Board
EEC (CEE)	European Economic Community (Conseil Europeen Economique)
EFTC	Engine Fuels Technical Committee (of CEC)
ELTC	Engine Lubricants Technical Committee (of CEC)
EMA	Engine Manufacturers Association
EPA	Environmental Protection Agency
ETLP	Engine Tests of Lubricants Panel (of IP)
FZG	Forschungstelle für Zahnrader und Getriebau
GFC	Groupement Français de Coordination (member CEC)
GRPE	Group of Rapporteurs on Pollution and Energy
IChemE	Institute of Chemical Engineers (UK)
ICOMIA	International Council for marine Industry Associations
IFP	Institute Français du Petrole
IGL	Investigation Group Lubricants (of CEC)
ILSAC	International Lubricant Standardization and Approval Committee
IP	Institute of Petroleum (UK)

ISO	International Organization for Standardization
JAMA	Japan Automobile Manufacturers Association Inc.
JARI	Japan Automobile Research Institute
JASO	Japan Automobile Standards Organization
JAST	Japan Society of Tribologists
JIS	Japanese Industrial Standards
JSAE	Society of Automotive Enginers (Japan)
LRI	Lubricants Review Institute (USA)
MITI	Ministry of International Trade and Industry
NCM	National Comite Motorproeven (Netherlands) (memebr CEC)
NMMA	National Marine Manufacturers Association
NPRA	National Petroleum Refiners Association
OSHA	Occupational Safety and Health Administration, USA
PAJ	Petroleum Association of Japan
SAE	Society of Automotive Engineers
SASO	Saudi Arabian Standards Organization
SMR	Svenska Mekanisters Riksforenig (member CEC)
SNV	Schweizerische Normenvereiniung (member CEC)
STLE	Society of Tribologists and Lubvricants Engineers
TUV	Technischer Uberwachungs Verien (Germany)
UEIL	European Union of Independant Lubricant Manufacturers
US MIL	United States Military

LUBRICANTS HANDLING & STORAGE

1. INTRODUCTION

Gulf Oil blends the finest lubricants in the world. From manufacturing and packaging to transporting, the process is strictly monitored to ensure that our products are free from contaminants and fully meet or exceed their stated specifications.

This section will attempt to familiarize the reader with basics of good lubrication practice by maintaining Gulf lubricants in a good, clean condition, which is essential for effective service. Poor storage or handling can affect the suitability and effectiveness of the lubricants and increases the possibility of breakdowns, expensive repairs, downtime, and lost production.

2. THE LUBRICANTS STORE

- Ideally, lubricants should be stored indoors. In practice, this may not be possible, so the lubricants store will have a combination of some covered area and some outside storage space

- The objective is to keep lubricants contamination free. The site should be clean and as much dust free as possible. This is particularly important where unsealing and dispensing lubricants take place.

- Some other important factors to consider are (a) good access for delivery vehicles; (b) spacious vehicle loading/unloading area; and (c) space for empty and returnable containers.

3. OUTDOOR STORAGE

- If adequately protected from extremes of temperature and from ingress of water, most lubricants are unaffected by climatic conditions and may be stored outdoors for limited periods.

- IMPORTANT: Transformer oils, Refrigerator oils and Greases should *never* be stored in the open.

- If drums have to be stored outside, they should be stored horizontally with bungs "east and west." That way water can not enter. Water standing around a bung or moisture in the air can be drawn in by vacuum as the drum cools, even through the drum seal.. Also, condensation or water ingress is more likely when a drum is only part-full. Therefore, partly filled drums should be stored indoors.

- In every case, drums should be stored off the ground on wood or in racks and well clear of the ground. They must never lay directly on corrosive clinker or wet surface.

- Special care should also be taken with the storage of smaller lubricants packages such as pails as they are not designed to withstand severe weather. They should be protected from the sun. All small packs in cartons must be stored under cover.

4. INDOOR STORAGE

- Lubricants should be stored inside to prevent contamination with dirt and water and to protect against temperature extremes. The lubricants store should be kept dry and free from dust at all times.

- A clean, well lit room or building is advisable. It should be specifically kept for lubricant storage and lubricating equipment.

- Indoor storage is always preferable. However, if space is limited, it should be designated for small packages, lubricants that can be affected by dust, for opened packages/drums and for special categories of lubricants listed as not suitable for outdoor storage.

5. DRUM HANDLING

- The standard Gulf 208 liter drums are designed to withstand re-usage several times but bad handling can damage the drum and can reduce its useful life.

- To ensure smooth operation and to avoid injury, the ideal method to handle drums are:
    - Forklift trucks -either horizontally on the standard fork, or vertically with single/multiple drum handling attachments
    - Two-wheel trucks
    - Triangular drum dolly

- Ideally, drums should be stored on horizontal stillages. If space does not allow, they may be vertically stacked on pallets *inside* the store.

6. BULK STORAGE

- Bulk storage provides benefits in improved efficiency, reduced handling costs, reduced risk of contamination, and simplified inventory.

- Bulk storage tanks should preferable be indoors, but can be in the open if they have all openings water-tight.

- Label all tanks, fill pipes and off-take pipes with full grade name of the product to avoid crossovers. Please contact the Gulf Sales Engineer who will be able to provide appropriate assistance.

- Again, moisture is the key element to be kept away from the product. Mild steel tanks must have silica gel breathers on air vents to remove moisture.

- Tanks without silica gel breathers can accumulate water from the atmospheric moisture. Water should periodically be drained from a stop cock positioned so that it is the lowest point on the tank.

7. DELIVERIES

- All deliveries should be properly supervised particularly in the case of bulk supply, to ensure that tank labeling is in place and that correct quantity and grade of lubricant is delivered.

- The customer must sign the delivery note as proof of acceptance of the correct grade and quantity.

8. GREASE STORAGE & HANDLING

- Grease should be stored and handled just as carefully as any lubricant.

- Grease drums should be stored upright. The top of a standard Gulf 180 kg drum can be removed for dispensing the grease. Careless handling can damage the drum-top seal resulting in leakage from a horizontally stored drum.

- To keep dirt out, tops should be removed with care, and the container kept closed when not in use so to avoid the accumulation of dirt or other contaminants.

- Grease, when mixed with dirt or grit, acts as an abrasive. Grease guns should be cleaned before loading and must be filled in a clean dirt free environment.

- Some greases can be contaminated by other grades of greases. Care must be exercised when refilling a partially filled grease gun to avoid commingling.

- When storing grease, ageing should be avoided. Use "First-In-First-Out" (FIFO) or Rotation" where old grease is moved to the front of the storage area so it will be used before new grease.

9. GOOD STOREKEEPING

- Lubricants/greases should be stored in a clean and dirt free environment to control contamination.

- "Clean-As-You-Go" policy should be adopted and employees encouraged to keep the area clean at all times.

- On receiving deliveries, new containers should be wiped clean around the bungs, the labeling checked and any marked variation from the products normal color, smell or consistency reported.

- To avoid contamination, securely replace bungs and lids of lubricant containers once they are opened.

- A drip tray should be placed under each drum tap, and any spill should be cleaned without delay.

- Lubricants must only be dispensed from clean, dedicated containers. To avoid contamination and severe equipment damage, *never* re-use empty lubricant packages as empty packages are usually used as storage for water, fuels or other lubricants and then inadvertently used in place of the service/correct lubricant.

10. FIRE PRECAUTION

- The possibility of fire in a well-planned lubricant storage area is extremely remote.

- Always check the flash point of a lubricant. Lubricants with flash point of more than 61°C, which is the case for most lubricants, require no special fire precautions, but should be stored away from heat, heating systems and other combustible material and fuel.

- Oil-soaked sawdust, rags or cleaning paper can ignite. As such, they must not be allowed to accumulate.

- All storage places must be equipped with CO_2, dry chemical or foam type extinguishers, and with sand filled fire buckets. In case of fire, do not use water as burning lubricant may float on the surface and spread the fire. OBTAIN EXPERT HELP IMMEDIATELY.

- In addition, the following check-list should help in minimizing risk of fire hazard:
    - Casual visits from other plant personnel are prohibited
    - Oil drip/spill is prevented or cleaned up promptly
    - Waste or wiping rags are stored in metal containers and in minimum quantity
    - Sparking or arcing tools are used only under conditions of good ventilation.

11. HEALTH & SAFETY

Gulf lubricants are safe to handle and use provided reasonable care is taken to keep them off the skin and away from the eyes. Avoid ingestion or breathing oil vapors and mists.

The following simple Health and Safety precautions provide very effective safeguards:

Workshops

- Provide protective devices on machines, overall, and gloves, etc. to eliminate all unnecessary contact with oil.
- Provide arrangements for the extraction of fine sprays or oil mists.
- Provide adequate washing facilities - easily accessible wash-basins and supply of soap, clean towels and non-hazardous skin cleansers.
- Provide first-aid advice backed up by adequate medical facilities.
- Clean up spilt oil without delay!

Individual Workers

- Seek first-aid treatment immediately for any injury, however slight. Report any skin complaint without delay.
- Use protective clothing, ensure machine splash guards are adjusted.
- Use impermeable gloves or suitable oil repellent creams
- Do not put oily rags in pockets, especially trouser pockets
- Avoid using dirty rags for wiping oil off the skin
- Wash regularly, especially after work to remove oil from the skin. Do not use gasoline or kerosene etc. to remove oil.
- Do not wear oil-soaked clothing. Change and dry clean work clothes regularly.

12. WASTE OIL DISPOSAL

When a lubricant has finished its useful life, it is drained from the equipment and is called waste oil. Waste oil should be collected prior to disposal in specially marked waste oil drums or tanks.

Various options to consider include recycling, burning, and re-fining. The most appropriate method, ofcourse, depends on local and state environment protection agencies' regulations. The Gulf Sales Engineer can assist you in finding the best solution in waste oil disposal.

Always remember:

"Our environment is only as clean and healthy as we keep it"