



MAK[®]
LUBRICANTS



MAK[®] HANDBOOK

AUTOMOTIVE LUBRICANTS



THE WINNING TEAM



2 / 3 WHEELER ENGINE OILS



PASSENGER CAR PETROL / DIESEL ENGINE OILS



COMMERCIAL VEHICLE DIESEL ENGINE OILS



TRANSMISSION & AXLE GEAR OILS



SPECIALITIES



GREASES



GAS ENGINE OILS & FARM EQUIPMENT OILS

PETROL ENGINE OILS: TWO WHEELERS/THREE WHEELERS

MAK 2T

A new generation semi-synthetic, extremely low smoke, environment friendly, two-stroke engine oil. Blended from highly refined mineral base oil and special synthetic component, and fortified with finely balanced low ash additives. A specially selected diluent is added to ensure instantaneous self-mixing of oil with fuel.

- Extremely low visible exhaust smoke levels
- Reduced spark plug fouling and exhaust system deposits
- Excellent lubrication under all working conditions, thereby, leading to longer engine life, increased fuel economy, reduced maintenance cost and, above all, reduced environmental pollution

Performance Level: JASO FC

Application:

- All types of 2 or 3 wheeler vehicles and outboard boats fitted with 2-stroke petrol engines/CNG engines
- Oil/Petrol mixing ratio: 20 ml in 1 litre for 2 wheelers
30 ml in 1 litre for 3 wheelers

For gear box application of 2 & 3 wheelers, use MAK MULTIGRADE 20W-40

This oil received On-file status JASO (Japanese Automotive Standards Organization) 2-Cycle Oil Standards Implementation Panel for Gasoline Engine Performance Classification (JASO M345).

| Grade Name | K. V. @100°C, cSt | Flash Point PMCC, °C | Colour (Visual) |
|------------|-------------------|----------------------|-----------------|
| MAK 2T | 7.5 | 85 | Orange |

MAK 4T NXT

This is dedicated new generation bike oils with excellent performance characteristics that are achieved by carefully blending high quality base oils and new generation additive technologies.

Key features of the MAK 4T NXT:

- Field proven semi-synthetic technology, designed to provide superior lubrication of engine, clutch and gear
- Optimized friction control for smoother clutch engagement & gear changes performance
- Enhanced shear stability of the oil helps in better dampening of vibrations and reduces noise at peak engine speed
- Unique viscometrics to ensure engine and gear durability without sacrificing on fuel economy
- Special formulation to provide outstanding engine cleanliness
- Additive technology used promotes quick engine response and increases the power output

This oil offers maximum driving comfort, maximum power, longer engine life and is environment friendly, with triple benefits of pickup, power and optimum mileage in one oil.

Performance Level: API SL; JASO MA2

MAK 4T STALLION

SAE GRADE: 20W-50

Superior quality 4T oil designed for modern high output motorcycles

Benefits:

- Ensures smooth clutch performance
- Higher viscometrics provides better lubrication at all operating temperatures and reduces engine noise
- Excellent oxidation stability reduces oil consumption and increases oil life
- Reduced maintenance & operating costs due to excellent wear protection to engine parts & gears

Performance Level: Exceeds API SL; JASO MA2

Application: Recommended for latest generation 4-stroke motorcycles. Also suitable for earlier models of 4-stroke motorcycles.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|------------------------|--------------------|-----|---------------------|----------------|
| MAK 4T STALLION 20W-50 | 17.89 | 130 | 240 | -21 |

MAK 4T PLUS

SAE Grade: 20W-40

MAK 4T PLUS is specially formulated for the high temperature operating conditions encountered in air cooled 4-stroke 2 Wheeler engines. These oils minimize engine deposits due to excellent sludge and varnish control. It is designed to provide better oxidation stability thereby ensuring cleaner engine and extended oil life. Further these oils possess special frictional properties required for smooth operation of wet clutches used in these vehicles.

Performance Level: API SL; JASO MA2

Application:

- Designed for high power modern 4-stroke motorcycles
- Also suitable for earlier models of 4-stroke motorcycles

| Grade Name | K. V. @100 ° C, cSt | VI | Flash Point COC, ° C | Pour Point, ° C |
|--------------------|---------------------|-----|----------------------|-----------------|
| MAK 4T Plus 20W-40 | 14.4 | 121 | 232 | -21 |

MAK 4T ZIPP

SAE GRADE: 10W-30

Premium quality 4T oil designed for modern 4-stroke motorcycles.

Benefits:

- Ensures quick start and rapid acceleration
- Smooth clutch performance allows better power to wheels
- Potential to reduce fuel consumption through oil viscometry
- Keeps engine components clean from harmful deposits, even at extreme operating conditions
- Reduced maintenance & operating cost due to excellent wear protection to engine parts & gears

Performance Level: Exceeds API SL; JASO MA2

Application: Recommended for latest generation 4-stroke motorcycles. Also suitable for earlier models of 4-stroke motorcycles.

| Grade Name | K. V. @100 ° C, cSt | VI | Flash Point COC, ° C | Pour Point, ° C |
|--------------------|---------------------|-----|----------------------|-----------------|
| MAK 4T ZIPP 10W-30 | 11.3 | 135 | 230 | -21 |

MAK 4T SCOOTECH NXT

MAK 4T SCOOTECH NXT is a semi-synthetic product designed to offer ultimate protection and performance reliability required for latest generation of gearless scooters of various engine capacities. Scooter engines undergo severe stress, as they typically run in dense traffic with very frequent stop / go conditions. Hence, these scooter engines are required to deliver high power, torque and require an oil to perform under arduous operating conditions.

Performance Level:

- API SL
- JASO MB

Application: MAK 4T SCOOTECH NXT is suitable for all 4-stroke gearless scooters and should not be used in wet clutch bike/motorcycle engines.

| Grade Name | K. V. @100 ° C, cSt | VI | Flash Point COC, ° C | Pour Point, ° C |
|---------------------|---------------------|-----|----------------------|-----------------|
| MAK 4T SCOOTECH NXT | 10.8 | 145 | 242 | -33 |

PETROL ENGINE OILS: OUTBOARD ENGINES

MAK MATSYA 2T

A semi-synthetic, low smoke, environment friendly oil for 2-stroke engines. Blended from highly refined mineral base oil and synthetic component fortified with finely balanced low ash additives. A high quality diluent is added to ensure instantaneous self-mixing of oil with fuel.

Benefits:

- Extremely low visible exhaust smoke levels
- Reduced spark plug fouling and silencer deposits

Performance Level: JASO FC

Application: Recommended for 2-stroke engines fitted in outboard boats like Yamaha, Suzuki etc.

| Grade Name | K.V. @100 °C, cSt | Flash Point PMCC, °C | Colour (Visual) |
|---------------|-------------------|----------------------|-----------------|
| MAK MATSYA 2T | 9.3 | 85 | Green |

PETROL ENGINE OILS: PASSENGER CARS

MAK PETROL ZENITH

SAE Grade: 5W-30

Premium semi-synthetic petrol engine oil formulated with severely hydro processed base oil and advanced additive chemistry for the demanding lubrication of modern passenger cars .The friction modifier technology in this oil offers improved fuel economy.

Benefits:

- Smoother Driving Experience so you can enjoy the road
- Proven for 4% fuel economy*
- Excellent protection against wear & tear of your car engine components**
- Better control on engine deposit
- Longer engine life and reduced maintenance cost

Performance Level: API SN / SAE 5W-30

Application: Suitable for all latest generation Passenger cars manufactured by Maruti Suzuki, Hyundai, Honda, GM, TATA, Toyota, Nissan, Ford etc.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|-------------------|--------------------|-----|---------------------|----------------|
| MAK PETROL ZENITH | 10.5 | 160 | 240 | -30 |

* Under test condition

** 4 times better wear protection than API SN industry standard

MAK CLASSIC

SAE Grade: 20W-50

MAK CLASSIC is formulated using superior quality base oils and specially selected additives to work under various operating conditions and temperatures.

Benefits:

- Enhanced protection against wear due to its ability to maintain lubricating oil film at all operating temperatures
- Increased viscosity and volatility control help lower oil consumption
- Excellent resistance to oxidation and formation of sludge and deposits
- Shields engine components against rust and corrosion
- Ensures smooth running in all climatic conditions
- Compatible with catalytic converters

Performance Level: API SG / CD

Application: Recommended for all petrol cars, especially older petrol cars.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|--------------------|--------------------|-----|---------------------|----------------|
| MAK CLASSIC 20W-50 | 18.3 | 126 | 240 | -21 |

MAK ELITE

SAE Grade: 15W-40

Premium quality petrol engine oil especially developed for use in latest generation passenger cars. MAK ELITE is formulated using superior quality base oil and latest additive chemistry which keeps excellent control on sludge, wear & deposit formation and prevents rust & corrosion.

Benefits:

- Excellent thermo-oxidative stability throughout the operating temperatures
- Ensures smooth running of engine in all climatic conditions
- Excellent harmonization with catalytic converters
- Enhanced protection against wear due to its ability to form lubricating oil film at all operating temperatures

Performance Level: API SJ / CF

Application: Recommended for use in latest generation petrol cars that operate under higher speed & temperatures.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|------------------|--------------------|-----|---------------------|----------------|
| MAK ELITE 15W-40 | 14.3 | 135 | 238 | -24 |

MAK SUPREME

SAE Grade: 10W-30

High performance Petrol Engine Oil exclusively developed for use in Ultra modern petrol cars to meet stringent lubrication requirement of Hi-tech passenger car models manufactured by General Motors, Ford, Daimler Chrysler etc. It's formulated using superior quality high viscosity index base oils and state-of-the-art additive technology ensuring maximum realization of engine power due to improved oxidation stability and high temperature deposit control.

Benefits:

- Longer engine and oil life
- Enhanced fuel economy
- Enhanced protection to catalytic exhaust system
- Excellent engine cleanliness and wear control

Performance Level: API SM

Application:

- Recommended for fuel efficient petrol engine cars fitted with advanced catalytic exhaust system required to meet stringent emission norms

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|--------------------|--------------------|-----|---------------------|----------------|
| MAK SUPREME 10W-30 | 10.4 | 137 | 224 | -27 |

DIESEL ENGINE OILS: PASSENGER CARS/COMMERCIAL VEHICLES

MAK DZL ZENITH

SAE Grade: 10W-30

This is premium quality semi-synthetic diesel engine oil designed exclusively for diesel passenger cars, multi utility vehicles (MUVs) and sports utility vehicles (SUVs).

Performance Level: Exceeds API CI-4 specifications

Application: Recommended for use in latest diesel passenger cars, multi utility vehicles (MUVs) and sports utility vehicles (SUVs).

It is proven for 2% fuel economy under test condition.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|----------------|--------------------|-----|---------------------|----------------|
| MAK DZL Zenith | 11.10 | 137 | 230 | -27 |

MAK MULTIGRADE

SAE Grade: 20W-40

Superior quality multigrade oil, blended using superior quality high viscosity index base oil, and contains well balanced group of additives, to provide high detergency, and anti-oxidation characteristics.

Benefits:

- Better resistance against wear of moving engine parts at all operating conditions
- Excellent thermal and oxidation stability and less formation of oxidation related deposits
- Protects engine components against rust and corrosion due to built-in alkaline reserves
- Ensures smooth running of engine in all climatic conditions

Performance Level: API CF

Application: Recommended for use in all diesel engine vehicles operating under moderate service conditions and small stationary diesel engines. Also recommended for earlier models of petrol cars.

| Grade Name | K. V. @100°C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|-----------------------|-------------------|-----|---------------------|----------------|
| MAK MULTIGRADE 20W-40 | 14.1 | 109 | 236 | -21 |

MAK GOLD

SAE Grade: 30 & 40

These are heavy duty diesel engine oils formulated from superior quality High Viscosity Index base oil and carefully selected detergent-dispersant inhibitors, anti-wear additives and special oil thickening control agent.

Benefits:

- Cleaner engine due to reduction of engine deposits
- Better soot handling capacity
- Longer engine and oil life

Performance Level: API CF; Mack T-7/T-8A Test; IS 13656:2002 Type EDL3; (MIL- L-2104 C)

Application:

- They are recommended for high speed Naturally Aspirated / Turbo / Supercharged diesel engines operating at low speed and high torque conditions prevalent in prolonged city stop & go driving conditions and also in hilly regions
- Recommended for use in heavy duty commercial vehicles, light commercial vehicles and multi utility vehicles

This oil was evaluated in "Double Decker" buses of M/s. BEST, Mumbai, and oil drain interval of 22,000 kms was established. Also demonstrated the Long Drain capability in APSRTC buses.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|-------------|--------------------|-----|---------------------|----------------|
| MAK GOLD 30 | 11.4 | 96 | 230 | -6 |
| MAK GOLD 40 | 14.4 | 100 | 240 | -6 |

MAK GOLD PLUS

SAE Grade: 20W-40

Heavy duty diesel engine oil specially formulated with superior quality base oil and carefully selected additives. This oil is recommended for all turbo-charged and naturally aspirated engines fitted in trucks, tractors, buses, goods carriers (LCVs), off high equipments, 3-wheelers and gensets.

Benefits:

- Provides excellent protection against piston deposit and keeps engine parts clean
- Prevents oil sludging at elevated temperatures by virtue of excellent oxidation stability
- Ensures protective film on engine parts to reduce wear & tear even under stressful situation
- The viscometry enables less variation in viscosity at all temperatures

Performance Level: Meets API CF-4 specifications

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|---------------|--------------------|-----|---------------------|----------------|
| MAK GOLD PLUS | 14.5 | 120 | 232 | -21 |

MAK DIAMOND

SAE Grade: 15W-40

Premium quality multigrade diesel engine oil formulated with superior quality base oil and high shear stable VI Improver. The unique detergent-dispersant inhibitor used in this oil helps in keeping the engine clean, preventing premature oil thickening besides improving the TBN retention power thereby offering excellent protection against corrosive wear. This oil is suitable for use in all seasons and helps in reducing oil consumption.

This multigrade oil provides excellent lubrication for diesel engines in road transport, mining earthmoving industry, construction industry and power units for constant high speed or stop-start service under severe conditions.

This oil has been specially formulated to address the most arduous operating conditions of Indirect (IDI) engines.

Benefits:

- High powered due to its outstanding combination of base oil & additive
- Enhanced engine life due to its improved stability of lubricating film which bonding to metal surfaces to make engine parts more resistance to wear
- Less maintenance and more trips due to its PREMIUM detergent and dispersant additive technology leading to a cleaner and cooler engine for all the seasons
- Long oil service life due to its excellent resistance to heat leading to lowering the tendency of oil thickening
- Field trials, conducted on Tata Motors and Ashok Leyland vehicles, established a drain period of 24,000 kms

Performance Level: API CF-4 / SJ; IS: 13656; 2002 Type EDL5 & EPL2; MB228.1; MIL-L-2104E

Application: Recommended for all types of diesel passenger cars, commercial vehicles and earth moving machinery. It is specially recommended for use in vehicles meeting EURO I & II norms.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|--------------------|--------------------|-----|---------------------|----------------|
| MAK DIAMOND 15W-40 | 14.4 | 137 | 226 | -24 |

MAK-CG4

SAE Grade: 15W-40

An advanced heavy duty diesel engine oil specially developed to meet low exhaust emission standards. The unique dispersants, used in this oil, provide superior soot handling capacity. Further, this oil has an exceptional ability to maintain engine cleanliness and protect engine parts, thereby extending engine life and reducing maintenance costs. This oil is suitable for use in all seasons and helps in reducing oil consumption.

Performance Level: API CG-4/SJ; IS 13656; 2002 Type EDL6; Volvo VDS; MTU Type 1; MB 228.1

Application: Recommended for use in heavy duty diesel engines using low sulphur (0.05% max) diesel, for on-highway and off-highway applications: demanding an advanced grade. However, this oil can also be used in vehicles requiring API CF-4 type of oil.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|---------------|--------------------|-----|---------------------|----------------|
| MAK-CG4 15W40 | 14.3 | 139 | 228 | -27 |

MAK DIAMOND PLUS

SAE Grade: 15W-40

MAK DIAMOND PLUS is Premium diesel engine oil formulated to meet the stringent lubrication requirements of low emissions BS-I, BS-II, BS-III engines fitted with turbo charged / naturally aspirated diesel engines.

Performance Level:

- Exceeds API CH-4
- MB 228.3

Application: Recommended for use in BS-I, BS-II & BS-III heavy duty trucks, buses, LCVs of TATA Motors, ASHOK LEYLAND, MAHINDRA, VOLVO, SWARAJ MAZDA, EICHER etc.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|-------------------------|--------------------|-----|---------------------|----------------|
| MAK DIAMOND PLUS 15W-40 | 14.5 | 135 | 232 | -27 |

MAK-CH4

SAE Grade: 15W-40

This latest generation heavy duty diesel engine oil is formulated for lubrication of modern diesel engines meeting the latest emission norms (Euro-III) and operating under severe conditions to meet stringent emission norms. The latest generation dispersants used in this oil helps in handling higher amount of soot and thereby controlling the viscosity increase. It is fortified with superior quality high viscosity index improvers and unique anti-wear additives to protect heavily loaded engine parts such as valve train. The specially selected inhibitors ensure excellent protection against oxidation, rust and corrosion. Further, this oil exhibits superior anti-foam characteristics.

Performance Level: API CH-4 /SJ; MB 228.3

Application: Recommended for use in latest generation diesel engine vehicles to meet Euro-II and Euro-III emission norms. However, this oil can also be used in vehicles requiring API CG-4 or CF-4 oil. This oil has been licensed by American Petroleum Institute (API) to market under their 'DONUT' symbol.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|----------------|--------------------|-----|---------------------|----------------|
| MAK CH4 15W-40 | 14.2 | 139 | 236 | -24 |

MAK-CI4

SAE Grade: 15W-40

This top-of-the-line diesel engine oil is designed to meet the latest global specifications and exceeds the lubrication requirements of the latest ultra low emission diesel engines. It is specially effective at sustaining engine durability where Exhaust Gas Recirculation is used and protecting after treatment exhaust devices. This oil is fortified with state-of-the-art performance additives to control the viscosity increase, handle higher soot level due to EGR and protects engine parts against the corrosive action of combustion gases.

This oil is suitable for use in all seasons and helps in reducing oil consumption.

Performance Level: API CI-4, VOLVO VDS-3

Application: Recommended for engines fitted with Exhaust Gas Recirculation (EGR) technology to meet Euro-II & Euro-III emission norms.

| Grade Name | K. V. @100°C, CSt | VI | Flash Point COC, °C | Pour Point, °C |
|----------------|-------------------|-----|---------------------|----------------|
| MAK-CI4 15W-40 | 14.2 | 137 | 236 | -24 |

MAK PLATINUM
SAE Grade: 15W-40

This top-of-the-line diesel engine oil is designed to meet the latest global specifications and exceeds the lubrication requirements of the latest ultra low emission diesel engines. It is specially effective at sustaining engine durability where Exhaust Gas Recirculation is used and protecting after treatment exhaust devices. This oil is fortified with state-of-the-art performance additives to control the viscosity increase, handle higher soot level due to EGR and protects engine parts against the corrosive action of combustion gases. This oil is suitable for use in all seasons and helps in reducing oil consumption.

Performance Level: API CI-4, VOLVO VDS-3

Application: Recommended for engines fitted with Exhaust Gas Recirculation (EGR) technology to meet Euro-II & Euro-III emission norms. Expected drain period of 60,000 kms in non EGR engines under ideal operating conditions & appropriate filtration system.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|-------------------------|--------------------|-----|---------------------|----------------|
| MAK PLATINUM CI 415W-40 | 14.2 | 137 | 236 | -24 |

MAK PLATINUM PLUS
SAE Grade: 15W-40

Premium diesel engine oil designed to meet the stringent requirements of the latest ultra low emission diesel engines where Exhaust Gas Recirculation and protecting after treatment exhaust devices are used.

Performance Level:

- Meets API CI-4 Plus specifications
- Meets VOLVO VDS 3
- Global DHD 1
- Cummins 20078
- ACEA E 7
- MB 228.3

Application: Recommended for use in modern high performance diesel engines in light & heavy duty trucks, buses, SUVs & passenger cars, off-highway and agricultural equipments fitted with Exhaust Gas Recirculation (EGR) technology to meet Euro II & Euro III emission norms.

The oil has potential to go up to 100000 kms in BS-II/BS-III engines fitted with additional centrifugal oil cleaner. Please be guided by OE recommendations for oil drain period.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|-------------------|--------------------|-----|---------------------|----------------|
| MAK Platinum Plus | 14.4 | 130 | 232 | -24 |

MAK-CI4 Plus
SAE Grade: 15W-40

This long life diesel engine oil is designed to meet the latest global specifications and exceeds the lubrication requirements of the latest ultra low emission diesel engines. It is specially effective at sustaining engine durability where Exhaust Gas Recirculation is used and protecting after treatment exhaust devices. This oil is fortified with state-of-the-art performance additives to control the viscosity increase, handle higher soot level due to EGR and protects engine parts against the corrosive action of combustion gases. This oil is suitable for use in all seasons and helps in reducing oil consumption.

Performance Level: Meets API CI-4 Plus specifications; VOLVO VDS-3; Global DHD-1; Cummins 20078; ACEA E 7

Application: Recommended for engines fitted with Exhaust Gas Recirculation (EGR) technology to meet Euro-II & Euro-III emission norms.

This oil has been evaluated in one of the leading transport companies and oil drain period of 1,00,000 kms has been established. This has been achieved due to healthy maintenance practices and usage of externally fitted centrifugal oil filter.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|----------------------|--------------------|-----|---------------------|----------------|
| MAK CI-4 Plus 15W-40 | 14.4 | 135 | 236 | -24 |

MAK AUTO XL

SAE Grade: 15W-40

A premium Diesel Engine Oil for lubrication of 4-stroke auto rickshaws running on diesel. Formulated using severely hydro-processed base oils and appropriate additive chemistry.

Benefits:

- Keeps engine components clean
- Provides excellent protection from wear, corrosion and deposits
- Enhanced oxidation stability ensures reduced oil thickening and extends engine & oil life
- Being Multigrade oils, these are suitable for use in all seasons

Performance Level: API CF-4

Application: Suitable for BAJAJ, PIAGGIO & MAHINDRA 4-stroke auto rickshaws and small cargo carriers running on diesel under normal operating conditions.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|--------------------|--------------------|-----|---------------------|----------------|
| MAK AUTO XL 15W-40 | 14.3 | 135 | 228 | -24 |

MAK BOAT XP

SAE Grade: 15W-40

High performance diesel engine oil, formulated using superior quality base oil and unique additive technology to provide excellent protection under all operating conditions, especially under marine environment, thereby reducing maintenance.

Benefits:

- Ensures cleanliness of engine parts and outstanding oxidation stability by reducing harmful deposits and sludge
- Provides there by ensuring cleaner engine and extended oil life
- Good wear protection
- Minimizes engine deposits due to excellent sludge and varnish control
- Being multigrade oils, these are suitable for use in all seasons

Performance Level: API CH-4; MB 228.3

Application:

- Recommended for naturally aspirated or turbo-charged diesel engines
- Recommended for models of Ashok Leyland - 411 & 412 and other OEMs powering all fishing boats and trawlers

| Grade Name | K. V. @100°C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|--------------------|-------------------|-----|---------------------|----------------|
| MAK BOAT XP 15W-40 | 14.2 | 135 | 236 | -24 |

MAK CHHAKADA XP

SAE Grade: 20W-40

This is superior quality multigrade 4-stroke diesel engine oil, specially developed for heavy duty chhakadas, keeping in view the severe conditions of heavy load, high temperature, dust & dirt in which they operate. This oil is blended using top-quality base oils and additives.

Benefits:

- Better resistance against wear of moving engine parts at all operating conditions
- Excellent thermal and oxidation stability and less formation of oxidation related deposits
- Protects engine components against rust and corrosion due to built-in alkaline reserves
- Provides better pulling power even under heavy load operating conditions
- Potential to increase oil drain period with minimum oil top-ups
- Ensures smooth running of engine in all climatic & operating conditions

Performance Level: API CF; IS 13656:2002 Type EDL2 & EPL2

Application: Recommended for use in all Heavy Duty Chhakadas / Multi-utility vehicles fitted with diesel engines working under all operating conditions.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|------------------------|--------------------|-----|---------------------|----------------|
| MAK CHHAKADA XP 20W-40 | 13.95 | 127 | 236 | -21 |

MAK AUTO GREEN

MAK AUTO GREEN is specifically developed engine oil for 2-stroke 3-wheelers running on CNG or LPG. It is a new generation 2-stroke engine oil formulated with ultra pure severely hydrocracked base oils and highly advanced additive technology to help to minimizing port blockage, combustion chamber deposits and also spark plug deposits. This oil provides excellent lubrication under all working conditions, thereby leading to longer engine life and helps to reduce maintenance cost.

Performance Level: Proprietary grade

Application:

MAK AUTO GREEN is recommended for use in 2-stroke auto rickshaws running on CNG/ LPG.

| Grade Name | K. V. @100°C, cSt | Pour Point, °C | Appearance |
|----------------|-------------------|----------------|----------------|
| MAK AUTO GREEN | 8.62 | -15 | Clear & Bright |

MAK GE ULTRA 15W-40

SAE Grade: 15W-40

MAK GE ULTRA 15W-40 is a premium quality gas engine oil specially formulated for passenger cars / taxis running on CNG/LPG/dual fuel. It provides excellent protection against oxidation and nitration thereby increasing engine & oil life. Its premium additive technology inhibits sludge formation in the oil and keeps engine clean.

Performance Level: API SJ/CF

Application: Recommended for cars/taxis running on CNG/LPG/dual fuels

| Grade Name | K. V. @100 ° C, cSt | VI | Flash Point COC, ^o C | Pour Point, ^o C |
|---------------------|---------------------|-----|---------------------------------|----------------------------|
| MAK GE ULTRA 15W-40 | 15 | 130 | 232 | -24 |

MAK GE

SAE Grade: 20W-50

Superior quality gas engine oil, specially developed for vehicles operating on Compressed Natural Gas (CNG), LPG and dual fuel, extends oil life due to excellent oxidation and nitration. Optimized ash content prolongs the life of valves and spark plugs. Keeps piston and engine clean thus ensuring smooth engine operation. Compatible with catalytic exhaust system fitted in the vehicle.

Performance Level: API SF/CD

Application: Recommended for use in buses, taxis, cars, auto rickshaws (4-stroke) running on Compressed Natural Gas (CNG), LPG and Dual Fuel.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|---------------|--------------------|-----|---------------------|----------------|
| MAK GE 20W-50 | 18.5 | 120 | 242 | -21 |

SAE Grade: 15W-40 & 20W-50

It is premium quality, low ash heavy duty Gas Engine Oil suitable for highly rated spark ignition 4-stroke mobile engines requiring low ash level. It is a blend of specially selected high viscosity index base oils and carefully balanced performance additive consisting of ash-containing and ash-less detergents, dispersants, anti-oxidation, anti-wear, anti-corrosion and anti-foaming agents.

Performance Level: API CF
Application:

- Specially designed for use in Mobile Gas Engines having slider follower. Also suitable for use in Mobile Gas Engines having roller followers
- MAK GEM 20W-50 has been approved by M/s Ashok Leyland for buses and commercial vehicles operating on CNG
- MAK GEM 15W-40 has been approved for use in Cummins B & C series engine

Some of the credentials of additive technology used in this oil are as follows:

- Meets specifications for engines with slider followers
- Meets the ash and TBN requirements of major OEMs

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C | Sulphated Ash, %wt. |
|----------------|--------------------|-----|---------------------|----------------|---------------------|
| MAK GEM 15W-40 | 14.5 | 137 | 238 | -24 | 0.54 |
| MAK GEM 20W-50 | 19.3 | 120 | 240 | -21 | 0.54 |

GAS ENGINE OILS: STATIONARY APPLICATION
MAK GES 2S 40
SAE Grade: 40

MAK GES 2S 40 is premium quality stationary gas engine oil designed for lubrication of 2-stroke gas engines requiring "ashless" type oils. This oil is a combined state-of-the-art premium quality ashless additive package with severely hydro treated high viscosity index base oils. This premium quality additive technology provides exceptional film strength, lubricity and superior deposit control.

Performance Level: Proprietary grade

Application: This oil is recommended for use in 2-stroke gas engines operating on natural gas. It is also recommended for use in 2-stroke engines of Copper Bessmer, Ajax, Dresser Rand, Ingersoll etc.

| Grade Name | K. V. @100 °C, cSt | Flash Point COC, °C | Pour Point, °C | Sulphated ash |
|---------------|--------------------|---------------------|----------------|---------------|
| MAK GES 2S 40 | 14.5 | 260 | -18 | <0.1 |

MA GES-LA
SAE Grade: 30, 40 & 15W-40

These are premium quality, low ash gas engine oils, which are a blend of specially selected high viscosity index base oils and carefully balanced performance additives consisting of ash-containing and ash less detergents, dispersants, anti-oxidation, anti-wear, anti-corrosion and anti-foaming agents. These oils provide an excellent oxidation, nitration, deposit and wear control. These oils meet the catalyst manufacturers limit of phosphorus content of less than 300 ppm.

Performance Level: API CF

Application: Recommended for use in highly rated spark ignition stationary natural gas engines used for gas gathering / compression, power generation requiring low ash oil.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|-------------------|--------------------|-----|---------------------|----------------|
| MAK GES-LA 30 | 11.0 | 105 | 230 | -9 |
| MAK GES-LA 40 | 14.5 | 105 | 234 | -9 |
| MAK GES-LA 15W-40 | 14.5 | 135 | 238 | -24 |

MAK GES XLA

SAE Grade: 40

This is a premium quality gas engine oil for use in spark ignition stationary engines requiring “low ash” oil. It is a blend of specially selected high quality base oils and carefully balanced performance additives. It contains ash and ash less detergents, dispersants and also contains anti-oxidation, anti-wear and anti-corrosion additives which provide an excellent oxidation, nitration deposit and wear control.

Performance Level: API CF

Application: Recommended for use in highly rated spark ignition stationary natural gas engines used for power generation/gas gathering/compression requiring “low ash” oil.

MAK GES XLA 40 has been approved by Wartsila Finland for the engine types Wartsila®220 SG, Wartsila®25 SG, Wartsila®28 SG, Wartsila®34 SG, Wartsila®50 SG, Wartsila®20DF, Wartsila®32DF, Wartsila®34DF, Wartsila®50DF

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|-------------|--------------------|-----|---------------------|----------------|
| MAK GES XLA | 14.6 | 105 | 252 | -18 |

MAK GES-MA

SAE Grade: 40

MAK GES-MA are medium ash engine oils blended with high viscosity index base oil. They also contain specially selected additives imparting better anti-wear, anti-oxidation, anti-corrosion & anti-foaming properties to the lubricant.

Benefits

These oils provide an excellent oxidation, nitration, deposit and wear control.

- Contains anti-oxidation, anti-wear and anti-corrosion additives
- Good anti-foaming agents

Performance Level: API CD

Application: Recommended for use in gas engines running on landfill gas having a total organic halide as chloride (TOHCL) levels below 240 micrograms/ltr

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|---------------|--------------------|----|---------------------|----------------|
| MAK GES MA 30 | 11 | 95 | 226 | -9 |
| MAK GES MA 40 | 14.5 | 95 | 232 | -9 |

AUTOMOTIVE GEAR OILS

SAE Grade: 15W-40

MAK SIDE GEAR 2S is premium quality side-gear oil specially developed for use in 2-stroke mopeds with centrifugal wet-type clutch and single speed gearbox. Designed with "Friction Control Formula" to provide overall better performance.

Performance Level: Proprietary grade

Application:

Recommended for use in 2-stroke mopeds with centrifugal wet-type clutch and single speed primary drive gear box.

MAK SPIROL EP

SAE Grade: 80W, 90, 140, 80W-90

These are superior quality, multipurpose extreme pressure gear oils. These oils are designed for use in gear boxes requiring extreme pressure properties particularly for hypoid and bevel gears. Multigrade gear oils facilitate easy gear shifting especially at low ambient temperatures.

Performance Level: API GL-4; IS 1118:1992 (EP Type GL-4); MIL-L-2105

Application:

- Recommended for gear boxes of all types of vehicles requiring EP type of oils
- It can also be used in rear axles wherever OEMs recommend GL-4 type of oils

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|----------------------|--------------------|-----|---------------------|----------------|
| MAK SPIROL EP 80W | 9.3 | 100 | 200 | -27 |
| MAK SPIROL EP 90 | 14.7 | 96 | 204 | -9 |
| MAK SPIROL EP 140 | 26.4 | 95 | 218 | -6 |
| MAK SPIROL EP 80W-90 | 14.0 | 96 | 208 | -24 |

MAK SPIROL HD

SAE Grade: 80W, 90, 140, 80W-90 & 85W-140

These are heavy duty gear oils meant for gears, particularly hypoid gears, in rear axles operating under various combinations of high-speed shock loads and low-speed, high-torque conditions.

Performance Level: API GL-5; IS 1118:1992 (EP Type GL-5); MIL-L-2105D

Application: Recommended for hypoid / bevel gears in rear axles of the vehicles operating under severe service conditions. It can also be used in gear boxes wherever OEMs recommend GL-5 type oils.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|-----------------------|--------------------|-----|---------------------|----------------|
| MAK SPIROL HD 80W | 9.5 | 100 | 196 | -24 |
| MAK SPIROL HD 90 | 14.8 | 98 | 198 | -9 |
| MAK SPIROL HD 140 | 26.6 | 98 | 220 | -6 |
| MAK SPIROL HD 80W-90 | 13.9 | 96 | 198 | -24 |
| MAK SPIROL HD 85W-140 | 26.6 | 96 | 228 | -15 |

MAK SPIROL LL 85W-140

SAE Grade: 85W-140

This is a long life multigrade gear oil developed for lubrication of rear & front axles of commercial vehicles. It has excellent extreme properties required for protection under severe loading, speed & torque conditions. It is based on thermally stable additive technology that provides better oxidation stability and longer drain period.

Performance Level: API GL-5

Application: Recommended for getting double drain period after extensive field trials. It is recommended for use in rear & front axles wherever OEMs recommend GL-5 type of oils and for longer drain period.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|----------------------|--------------------|-----|---------------------|----------------|
| MAK SPIROL LL85W-140 | 27.1 | 115 | 232 | -27 |

MAK SPIROL SYNTH 75W-90

SAE Grade: 75W-90

This oil is formulated using fully synthetic components to provide better low temperature gear shifting, superior thermal & oxidation stability and seal compatibility. It is compatible with brass and molybdenum coated synchrocones in the gear box assembly. The High Viscosity Index provides appropriate film thickness and maintains correct viscosity at wide operating temperature range and thereby provides proper lubrication.

Performance Level: API GL-4

Application: This oil has been approved by TATA Motors for their export vehicles. It is a fully synthetic gear oil developed for export vehicles of TATA Motors with Syncromesh gearbox/transaxle.

| Grade Name | K.V. @ 100° C, cSt | VI | Flash Point COC, ° C | Pour Point, ° C |
|-------------------------|--------------------|-----|----------------------|-----------------|
| MAK SPIROL SYNTH 75W-90 | 14.96 | 177 | 230 | -45 |

MAK SPIROL SYNTH 75W-85

SAE Grade: 75W-85

This semi-synthetic gear box oil provides improved synchronizer durability, better low temperature gear shifting, superior thermal & oxidation stability and seal compatibility. This oil is meant for use in TATA Motors make Syncromesh Gear Box/Transaxle and is compatible with brass, MO coated and carbon lined synchrocones. High Viscosity Index provides appropriate film thickness over wide operating temperature range and thereby provides proper lubrication.

Performance Level: API GL-5

Application: This oil has been approved by TATA Motors for their tipper model LPK 2518 TC BS-III with 9-speed G 1150 gear box.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|-------------------------|--------------------|-----|---------------------|----------------|
| MAK SPIROL SYNTH 75W-85 | 11.80 | 135 | 230 | -42 |

MAK SPIROL LL 80W-90

It is a new generation long life gear oil developed exclusively for synchromesh manual gear box application of commercial vehicles. It is based on special manual transmission fluid technology. It provides complete protection to gears and extended oil drain interval in manual transmission of commercial vehicles. It has excellent low temperature properties.

Performance Level: Proprietary Grade

Application: Recommended for use in synchromesh gear box of commercial vehicles.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|----------------------|--------------------|-----|---------------------|----------------|
| MAK SPIROL LL 80W-90 | 14.1 | 105 | 230 | -27 |

MAK SYNCROL

SAE Grade: 90 & 140

These oils are blended from High Viscosity Index base oils, anti-foam and low temperature flow improvers. These are designed for non-EP gear lubrication.

Performance Level: API GL-1; IS 1277:1987

*

Application: Recommended for use in gear boxes where EP properties are not required.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C |
|-----------------|--------------------|----|---------------------|
| MAK SYNCROL 90 | 17.3 | 95 | 240 |
| MAK SYNCROL 140 | 26.0 | 94 | 242 |

AUTOMATIC TRANSMISSION OILS

MAK ATF-A

This is a premium quality automatic transmission oil having a low co-efficient of friction, fortified with additives to impart excellent thermo-oxidative stability, low temperature flow characteristics, seal compatibility, anti-wear and anti-corrosion properties. This oil ensures smooth operation with a minimum power loss.

Performance Level: Type A Suffix A of DEXRON 1 and IB of General Motors, USA; C-2 Specifications of Detroit Diesel Allison Division of General Motors, USA

Application:

- Recommended for Automatic Transmission and Power Steering Systems of automobiles and earthmoving equipment
- Also recommended for synchromesh manual transmission system of automobiles.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|------------|--------------------|-----|---------------------|----------------|
| MAK ATF- A | 7.5 | 158 | 202 | -42 |

MAK AUTRAN II

Premium quality transmission oil having excellent frictional, anti-oxidation and anti-rust properties. It possesses outstanding low temperature fluidity and seal compatibility.

Performance Level: DEXRON IID of General Motors, USA; MERCON of Ford

Application: Recommended for Automatic Transmissions of latest generation passenger cars and power steering systems of passenger cars & commercial vehicles requiring DEXRON IID fluid.

| Grade Name | K. V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|---------------|--------------------|-----|---------------------|----------------|
| MAK AUTRAN II | 7.1 | 174 | 222 | -42 |

MAK AUTRAN III

Premium quality transmission and power steering oil blended with superior quality base oils & appropriate additives to ensure smooth working of the systems for automatic transmission, power steering & hydraulic of automobiles. It has excellent low temperature and anti-oxidation properties which ensures trouble-free operation with extended oil life. Seal components have extended life due to good seal compatibility.

Performance Level: Dexron III of General Motors

Application: Recommended for use in Automatic transmissions, power steering & hydraulic fluid applications in passenger cars and commercial vehicles requiring Dexron III fluid.

| Grade Name | KV@ 100° C | VI | Flash Point |
|----------------|------------|-----|-------------|
| MAK AUTRAN III | 7.61 | 175 | 215 |

AUTOMOTIVE SPECIALITIES: RADIATOR COOLANTS

MAK SUPER KOOL

Premium quality synthetic radiator coolant formulated from environment friendly components. It is free from amines, borates, silicates and phosphates, and possesses outstanding hard water stability.

It is non-corrosive, and gives excellent performance during long running of the engine as engine coolant. It does not boil in summer and does not freeze in winter. It protects non-metallic components like gaskets and hoses.

Performance Level: JIS K-2234-1994, Class II (LLC Type); IS 5759:2006

Application: Suitable for use in mobile and stationary engines having closed loop coolant circulation systems. Recommended for use one part of MAK SUPER KOOL to two parts of water in the radiator (or follow OEM's recommendation).

| Grade Name | Colour | Equilibrium Boiling Point, °C | Freezing Point of water solution, °C |
|----------------|--------|-------------------------------|--------------------------------------|
| MAK SUPER KOOL | Green | 172 | 50% sol. (-) 34.6 |

MAK REDI KOOL

A specially formulated synthetic, environment friendly, premixed ready-to-use radiator coolant. This coolant dissipates heat efficiently, prevents coolant freeze-up and boil over, protects radiator and engine block from rust & corrosion.

Application: Recommended for use without dilution with water in mobile and stationary engines having closed loop coolant circulation systems.

| Grade Name | Colour | Equilibrium Boiling Point, °C | pH | Freezing Point of water solution, °C | Water Content, % |
|-------------|--------|-------------------------------|----|--------------------------------------|------------------|
| MAKREDIKOOL | Green | 107 | 8 | (■) 16-9 | 70.5 |

BRAKE FLUID

MAK BRAKE FLUID

Premium synthetic fluid specially developed and approved for use in hydraulic braking systems of all vehicles. It has a high reflux boiling point and good fluidity & stability even at low temperatures to make braking effective.

Performance Level: FMVSS-116 DOT-3; SAE-J1703; IS 8654:2001

Application: Recommended for use in both disc and drum brake systems for vehicles. It has a high reflux boiling point and good fluidity & stability even at low temperatures to make braking effective.

| Grade Name | K.V. cSt | | Equilibrium Reflux Boiling Point, °C |
|-----------------|----------|-----------|--------------------------------------|
| | 100° C | (-) 40° C | |
| MAK BRAKE FLUID | 2.0 | 1000 | 225 |

MAK BRAKE FLUID XT

It is a premium quality fully synthetic hydraulic brake fluid specially designed to withstand severe heat and moisture condition. It has a very high reflux boiling point, good fluidity & stability, even at low temperature to make braking effective. It is recommended for modern vehicles fitted with disc brakes as they operate under severe conditions leading to generation of higher temperatures especially in city stop-and-go conditions requiring frequent braking.

Performance Level: FMVSS-116 DOT-4; SAE-J-1703; IS 8654:2001

Application: Recommended for use in both disc and drum brake systems of modern vehicles.

| Grade Name | K.V. cSt | | Equilibrium Reflux Boiling Point, °C |
|--------------------|----------|-----------|--------------------------------------|
| | 100° C | (-) 40° C | |
| MAK BRAKE FLUID XT | 2.2 | 1300 | 250 |

SHOCK ABSORBER FLUIDS

MAK FRONT FORK OIL

Blended from selected solvent refined base oils and fortified with additives to provide superior damping effect thereby increasing life of the forks. It also has excellent load carrying ability to ensure smoother ride.

Performance Level: Proprietary Brand

Application: Recommended for use in hydraulic front fork of motorcycles.

| Grade Name | K. V. @40 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|--------------------|-------------------|-----|---------------------|----------------|
| MAK FRONT FORK OIL | 69.4 | 116 | 180 | -27 |

AUTOMOTIVE GREASES

MAK LL GREASE 3

NLGI Grade: 3

MAK LL Grease 3 is a high performance long life lithium-based complex grease, fortified with unique additive combination which provides longer re-lubrication intervals for wheel bearing applications. Formulated with high quality base oil, this grease can take on high temperatures and severe loads that the automotive wheel bearings face in tough Indian road conditions. 50000 km grease changing interval for wheel bearings can be achieved for medium to heavy trucks, if used and handled properly.

Performance Level: Proprietary Grade

Application:

- Recommended for Lubrication of wheel bearings of all types of vehicles including heavy trucks, trailers etc.
- Also suggested for industrial applications operating under severe conditions of load and temperature.

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|-----------------|-----------------|-----------------------------|----------------|
| MAK LL GREASE 3 | LITHIUM COMPLEX | 220-250 | 250 |

MAK MP GREASE 3

NLGI Grade: 3

This is premium quality, lithium-based multipurpose grease manufactured from superior quality base oil and soap. Its excellent structural stability, water resistance property, higher drop point and very good oxidation stability ensures long grease & component life. It has an outstanding rust protection ability.

Performance Level: IS 7623:1993 Regular Type Grade 3

Application: Recommended for wheel bearings and other grease lubricated parts of automotive vehicles.

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|-----------------|--------------|-----------------------------|----------------|
| MAK MP GREASE 3 | LITHIUM | 220-250 | 194 |

MAK UNIVEX A

NLGI Grade: 2

This is a premium quality, lithium-based multifunctional, water resistant grease having a high drop point, good thermal & structural stability and high degree of resistance to oxidation. It also provides protection against rusting and corrosion.

Performance Level: IS 12203:1999 Grade 2

Application: Recommended for use in vehicles for wheel bearings, chassis, and other grease lubricated parts of automotive vehicles.

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|--------------|--------------|-----------------------------|----------------|
| MAK UNIVEX A | LITHIUM | 265-295 | 192 |

MAK UNIVEX CD

NLGI Grade: 1

It is a calcium (lime) based grease, specially designed for chassis lubrication of automotive vehicles. It has an outstanding water resistance and adhesive characteristics.

Performance Level: IS 506:1993 Grade 1

Application: Recommended for chassis lubrication of all types of automotive vehicles including commercial vehicles, tractors and other heavy-duty equipment.

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|---------------|--------------|-----------------------------|----------------|
| MAK UNIVEX CD | CALCIUM | 310-340 | 98 |

MAK MP 3 GREASE Plus

NLGI Grade: 3

This is a premium quality, lithium-based multipurpose grease, manufactured from excellent quality base oil and soap. It has excellent structural stability, water resistance property, higher drop point, outstanding rust protection ability and excellent oxidation stability. It offers premium shear stability under severe operating conditions. Specially selected additives ensure longer grease and component life.

Performance Level: IS 7623:1993 Regular Type Grade 3

Application: Recommended for wheel bearings and other grease lubricated parts of automotive vehicles.

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|----------------------|--------------|-----------------------------|----------------|
| MAK MP 3 GREASE Plus | LITHIUM | 220-250 | 192 |

MAK WB GREASE SPECIAL

NLGI Grade: 2

It is a sodium (Soda) based grease having high dropping point.

Performance Level: IS 10647:1983

Application: Recommended for lubrication of wheel bearing, universal joints and ball & roller bearings of electrical equipment of automotive vehicles.

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|-----------------------|--------------|-----------------------------|----------------|
| MAK WB GREASE SPECIAL | SODIUM | 250-280 | 184 |

AUTOMOTIVE GREASES: OTHER APPLICATIONS

MAK LANTHAX EP GREASE

NLGI Grade: 0, 1 & 2

Premium quality, lithium-based grease containing extreme pressure additives which confer excellent shear stability and high load carrying ability. These are suitable for heavy-duty roller & plain bearings and for situations warranting use of an extreme pressure grease, particularly to those subjected to shock loads at temperatures up to about 130°C.

Performance Level: IS 7623:1993 EP Type; IPSS:1-09-005-99

Application: Recommended for all plain & roller bearings in off-highway, construction and earthmoving equipment operating under severe shock loading conditions.

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|------------------|--------------|-----------------------------|----------------|
| MAK LANTHAX EP 0 | LITHIUM | 355-385 | 160 |
| MAK LANTHAX EP 1 | LITHIUM | 310-340 | 184 |
| MAK LANTHAX EP 2 | LITHIUM | 265-295 | 186 |

MAK LANTHAX BRIGHT EP GREASE

NLGI Grade: 0, 1 & 2

Premium quality, lithium-based grease containing extreme pressure additives which are environment friendly and which confer excellent shear stability and high load carrying ability. Bright yellow in colour and highly homogeneous in texture, these greases are suitable for heavy-duty roller & plain bearings and for situations warranting use of an extreme pressure grease, particularly to those subjected to shock loads at temperatures up to about 130°C.

Performance Level: IS 7623: 1993 EP Type; IPSS: 1-09-005-99

Application: Recommended for all plain & roller bearings of equipments/components operating under severe loading conditions. Good at shock loading conditions also and provides protection at moderate temperatures of 120-140° C.

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|-------------------------|--------------|-----------------------------|----------------|
| MAK LANTHAX BRIGHT EP 0 | LITHIUM | 355-385 | 160 |
| MAK LANTHAX BRIGHT EP 1 | LITHIUM | 310-340 | 184 |
| MAK LANTHAX BRIGHT EP 2 | LITHIUM | 265-295 | 186 |

MAK RR GREASE-3

NLGI Grade: 3

Premium quality, multipurpose lithium soap base grease having excellent thermal and shear stability as well as water resistance properties.

Performance Level: RDSO Specification No. WD.17-MISC-92

Application:

- Specially formulated for cylindrical roller bearings of axles boxes of diesel / electric locomotives & freight stock
- Recommended for use in the wheel bearings of Heavy Duty Vehicles for longer service life.

Approved by RDSO for use in cylindrical roller bearing axle box for all the applications on diesel /electric locomotives.

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|------------------|--------------|-----------------------------|----------------|
| MAK RR GREASE -3 | LITHIUM | 220-250 | 186 |

MAK MOLYGREASE

NLGI Grade: 2

Lithium base, multipurpose grease, fortified with 3% molybdenum disulphide for protection of moving parts under severe shock load conditions, resists water washout and gives long service life.

Performance Level: IS 12203:(Grade 3):IPSS: 1-09-005-99

Application:

- Recommended for lubrication of certain automobile parts where stock loading occurs
- Also recommended for the industrial applicants where lithium base grease is required with 3% molybdenum disulphide

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|---------------|--------------|-----------------------------|----------------|
| MAK MOLYGRESE | LITHIUM | 265-295 | 192 |

MAK MULTIPLEX GREASE

NLGI Grade: 3

Lithium complex soap base multipurpose grease with water resistant, shear stability and high temperature properties.

Performance Level: MAK MULTIPLEX L GREASE 3 meets IS 14847:2000

Application:

- Recommended for use in steel plants, mining and engineering industries
- Recommended for use in wheel bearings of Heavy Duty Vehicles for longer service life

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|--------------------------|-----------------|-----------------------------|----------------|
| MAK MULTIPLEX L GREASE 3 | LITHIUM COMPLEX | 235 | 264 |

MAK WHITE GREASE

NLGI Grade: 3

This is premium quality, lithium-based multipurpose grease. The grease is manufactured from superior quality base oil and is fortified with Jasmine perfume. Its excellent structural stability, water resistance property, higher drop point and very good oxidation stability ensures long grease & component life. It has an outstanding rust protection ability.

“An easy to carry and easy to use product”

Performance Level: Proprietary

Application: For use in all kinds of applications ranging from household appliances, agricultural equipment, bearing lubrication of cycles, tractors, cars, two/three wheelers to providing lubrication to rollers in shutters and gates.

| Grade Name | Type of Soap | Worked Penetration at 25° C | Drop Point, °C |
|------------------|--------------|-----------------------------|----------------|
| MAK WHITE GREASE | LITHIUM | 220-250 | 194 |

AGRICULTURAL EQUIPMENT LUBRICANTS: PUMP SET OILS

MAK PUMP

SAE Grade: 40

Specially developed to meet the engine oil requirements of agricultural pump sets. This oil is formulated with carefully selected performance additives which provide good thermo-oxidative stability, high detergency, anti-wear and anti-corrosive properties.

Performance Level: API CC; IS 13656:2002 EDL1; MIL-L-2104B

Application: Recommended for agricultural pump sets, threshers, sugarcane harvesters/crushers etc.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|-------------|--------------------|-----|---------------------|---------------|
| MAK PUMP 40 | 14.0 | 103 | 220 | -9 |

MAK PUMP HARIT 40

SAE Grade: 40

Diesel Engine Oil specially developed to meet the engine oil requirements of agricultural pump sets. Provides good protection against wear of moving engine parts at all operating conditions.

Performance Level: API CC

Application: Recommended for Agricultural pump sets, threshers, sugarcane harvesters/crushers etc.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|-------------------|--------------------|-----|---------------------|---------------|
| MAK PUMP HARIT 40 | 14.0 | 100 | 238 | -21 |

MAK KHUSHAAL

SAE Grade: 20W-40

This is specially formulated to meet the severe lubrication requirements of tractors working in dusty environments for extended hours under varying load conditions. It is recommended for lubrication of slow / medium & high speed stationary diesel engines equipped on agricultural pump sets operating on diesel or LDO.

Performance Level: API CF, IS 13656 : 2002 Type EDL 2

Application: This oil is recommended for use in naturally aspirated, supercharged and turbo-charged diesel engines fitted on various makes and models of tractors, agricultural pump sets, threshers, sugarcane harvesters/crushers etc.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|-------------------|--------------------|-----|---------------------|---------------|
| MAK PUMP HARIT 40 | 15.7 | 100 | 210 | -21 |

AGRICULTURAL EQUIPMENT LUBRICANTS: TRACTOR OILS

MAK TRAC

SAE Grade: 40 & 20W-40

Premium quality diesel engine oil specially formulated to meet the severe service lubrication requirement of tractors. This oil is blended from superior high quality viscosity index base oils and selected additives which provide excellent detergency, dispersancy, oxidation stability, anti-wear and anti-corrosion properties.

Performance Level: API CF/CD; IS 13656:2002 EDL2; MIL-L-45199B; UK DEF 2101D; Caterpillar series 3

Application: Recommended for various makes and models of tractors.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|-----------------|--------------------|-----|---------------------|---------------|
| MAK TRAC 20W-40 | 13.8 | 103 | 224 | -21 |
| MAK TRAC 40 | 14.0 | 103 | 240 | -9 |

MAK SPIROL BHT

SAE Grade: 10W-30

This is a premium quality, multifunctional lubricating oil, formulated from superior quality base oils together with specially selected performance additive components. This oil has superior oxidation stability, and provides outstanding rust & corrosion protection besides excellent wet brake, anti-squeak and low temperature properties.

Performance Level: John Deere JD 20C; Ford ESN-M2C-134D; Volvo WB 101

Application: Recommended for farm tractors, agriculture machinery and construction equipment requiring a common oil to meet lubrication requirements of transmissions, hydraulic circuits, in-board wet brake and axles.

| Grade Name | k.v. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point, °C |
|------------------------|-------------------|-----|---------------------|----------------|
| MAK SPIROL BHT 10W -30 | 10.2 | 156 | 204 | -30 |

MULTI FUNCTIONAL TRACTOR LUBRICANT

MAK TRAC MAGIC +

This universal tractor transmission oil is exclusively designed for use in agricultural tractors' transmission, differential & final drive, wet-multiple disc brake and hydraulic systems. Its innovative formula is based on the well balanced additive technology and superior quality base oils, which ensures better performance of driveline, wet-brake and hydraulic systems in agricultural tractors.

Benefits:

- Superior anti-wear characteristic of this oil provides better protection to driveline systems i.e. it increases the life of gears used in transmission, differential, final drive systems and hydraulic aggregates
- Ensures excellent braking efficiency of wet-brakes due to its highly optimised frictional performance of additive system used and it eliminates brake chattering noise (squawk). This enhances the life of wet-multiple disc brakes thus reduced maintenance costs
- Provides good protection against rust & corrosion to driveline gears and hydraulic system components
- Better anti-foam characteristics ensure effective lubrication of all gears and efficient functioning of hydraulic systems under all operating conditions
- Possesses good oxidative and thermal stability essential for the wet-brake / clutches operation
- Excellent elastomer compatibility with the seals of hydraulic systems
- The viscometric of this oil enables smooth operation of tractor driveline and hydraulic systems in all seasons

Performance Level: Proprietary

Application: Recommended for use in transmission, differential & final drive gears and hydraulic system of agricultural tractors with wet-brake as well as conventional dry disc brake systems such as Mahindra & Mahindra, Sonalika and Swaraj tractors.

OFF-HIGHWAY EQUIPMENT / DG SET ENGINE OILS

MAKCD

SAE Grade: 10W, 30, 40 & 20W-40

These oils are formulated with high quality detergents that minimize engine deposits due to excellent sludge and varnish control. They have good oxidation and thermal stability. They are also designed for the efficient power transmission in earthmoving machinery and off-highway construction equipment operating under severe conditions such as heavy loads, dusty atmosphere and extreme ambient temperatures.

The multigrade version is suitable for all seasons and helps in reducing oil consumption.

Performance Level: API CF; IS 13656:2002 Type EDL2; MIL-L-45199B; UK DEF2101D; Caterpillar series 3

Application:

Recommended for use in naturally aspirated supercharged and turbo-charged diesel engines operating round the clock and under heavy loads in the following application:

- Stationary DG sets
- Off-highway equipment
- Construction & Earthmoving equipment
- These oils are also recommended for use in the hydraulic transmission fitted in the earthmoving & off-highway equipments. SAE 10W & 30 grade is also recommended for use in certain earthmoving equipment as transmission oil.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|---------------|--------------------|-----|---------------------|---------------|
| MAKCD 10W | 5.7 | 105 | 210 | -30 |
| MAK CD 30 | 11.1 | 102 | 238 | -9 |
| MAK CD 40 | 14.3 | 98 | 242 | -9 |
| MAK CD 20W-40 | 14.0 | 116 | 228 | -21 |

MAK ULTRA SUPREME

SAE Grade: 15W-40

This oil is specially formulated for heavy duty diesel engines. It imparts excellent piston cleanliness. It has better TBN retention power which assists in protecting engine parts from corrosion attributed to sulphur in fuels. It is suitable for all seasons and helps in reducing oil consumption.

Performance Level: API CF-4; MIL-L-2104E; IS 13656:2002 Type EDL4

Application: Recommended for highly rated, turbo-charged diesel engines used in earthmoving equipment and stationary DG sets.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|--------------------------|--------------------|-----|---------------------|---------------|
| MAK ULTRA SUPREME 15W-40 | 14.20 | 139 | 226 | -24 |

MAK T

SAE Grade: 30, 40, 50 & 20W-40

These oils are formulated from highly refined base oils and carefully selected detergent-dispersant inhibitors & anti-wear additives.

Performance Level: API CF/CD; Mack T-7/T-BA Test; IS 13656:2002 Type EDL3; MIL-L-2104C

Application: Recommended for all types of naturally aspirated, supercharged & turbo-charged diesel engines used in stationary DG sets and off-highway/earthmoving equipment.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|--------------|--------------------|-----|---------------------|---------------|
| MAK T 30 | 11.4 | 96 | 230 | -9 |
| MAK T 40 | 14.4 | 95 | 236 | -9 |
| MAK T 50 | 18.8 | 95 | 242 | -9 |
| MAK T 20W-40 | 14.5 | 115 | 220 | -21 |

MAK TURBO SHPD

SAE Grade: 30, 40, 15W-40, 20W-40

Premium quality super high performance diesel engine oils blended from highly refined base oils and state-of-the-art performance additive system. They ensure excellent engine cleanliness, reduced oil thickening tendency and provide outstanding protection against value wear and bore polish. Owing to their superior capability to combat oil thickening and wear protection, they have good potential to increase drain periods and engine life. The multigrade versions are suitable for all seasons and help in reducing oil consumption.

Performance Level: API CH4, MB 228.2 (Only SAE Grades 30 & 40); MB 228.3 (Only SAE Grades 15W-40 & 20W-40); ACEA E3-96; IS 13656:2002 Type EDL6

Application: Recommended for high-powered turbo-charged and naturally aspirated diesel engines in on-highway and off-highway application requiring long drain engine oils.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|-----------------------|--------------------|-----|---------------------|---------------|
| MAK TURBO SHPD 30 | 11.47 | 98 | 226 | -9 |
| MAK TURBO SHPD 40 | 15.20 | 97 | 240 | -9 |
| MAK TURBO SHPD 15W-40 | 14.20 | 134 | 226 | -27 |
| MAK TURBO SHPD 20W-40 | 14.40 | 115 | 232 | -24 |

MAK D-GEN

SAE Grade: 15W-40

Exclusively formulated multigrade diesel engine oil for modern, highly rated, turbo-charged DG sets that power mobile towers. It is manufactured using superior quality base oils and advanced additive chemistry. Recommended for 400 hrs under normal operating conditions. This oil provides round-the-clock protection to DG set engines operating under severe conditions.

Benefits:

- Superior protection against wear, especially engine scuffing & bore polishing, of engine components at all operating temperatures
- Enhanced thermo-oxidative stability ensures reduced engine deposits thereby keeping the engine clean
- Ensures easy engine start even at low ambient temperatures
- Longer oil and engine life

Performance Level: API CF-4/SG; MB 228.1

Application: Recommended for use in all models of naturally aspirated and turbo-charged DG sets.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|-----------------------|--------------------|-----|---------------------|---------------|
| MAK D-GEN (SAE 15W40) | 14.3 | 135 | 224 | -24 |

HYDRAULIC TRANSMISSION OILS

MAK HYDRAULIC TRANSMISSION FLUID C-4

SAE Grade: 10W&30

It is a premium quality, heavy duty automatic transmission oil, developed to meet the requirements of on-highway and off-highway Allison Transmissions of General Motors, USA. It has excellent oxidation stability, wear protection, frictional properties and elastomer seal compatibility.

Performance Level: Type C-4 of Allison Transmission Division of General Motors, USA; Caterpillar TO-2

Application: Heavy duty automatic and powershift transmissions of both on-highway and off-highway equipment and earthmoving machinery.

Approved by M/s. Allison Transmission Division of General Motors, USA.

| Grade Name | K.V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|--|-------------------|-----|---------------------|---------------|
| MAK HYDRAULIC TRANSMISSION FLUID C-4 SAE 10W | 6.2 | 115 | 234 | -27 |
| MAK HYDRAULIC TRANSMISSION FLUID C-4 SAE 30 | 11.9 | 99 | 232 | -24 |

MAK TRANSFLUID F

This is a premium quality transmission fluid blended with superior quality base oils and performance additives. It has excellent frictional properties, outstanding low temperature fluidity and seal compatibility.

Performance Level: Ford ESW-M2C-33F

Application: Recommended for use in transmission systems requiring specific clutch and band frictional characteristic meeting Ford ESW-M2C-33F specifications and power steering.

| Grade Name | K.V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|------------------|-------------------|-----|---------------------|---------------|
| MAK TRANSFLUID F | 7.3 | 178 | 210 | -42 |

MAK DH-1

SAE Grade: 15W-40

This oil is designed for engine lubrication of modern construction & earthmoving equipment which operate under arduous conditions. It is formulated using superior quality base oils and unique additive chemistry.

Benefits:

- The unique detergents and dispersants in this oil ensure high level of engine cleanliness
- Enhanced oxidation stability reduces sludge formation and extends oil service life
- Ensures excellent protection against oxidation, rust and corrosion
- This oil is suitable for use in all seasons and helps in reducing oil consumption

Performance Level: JASO DH-1 & KES requirements

Application: It is recommended for lubrication of engines of L&T Komatsu range of excavators.

| Grade Name | K.V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|----------------|-------------------|-----|---------------------|---------------|
| MAK DH-1 15W40 | 14.78 | 137 | 232 | -27 |

MAK HYDROL P

ISO VG: 46, 68, 100

These are blended from high quality solvent refined mineral oils fortified with extremely shear stable VI Improver which helps in maintaining the viscosity for longer periods under severe operating conditions. These oils have very good thermal stability, oxidation resistance, seal compatibility, corrosion resistance and anti-wear properties. Exceptionally High Viscosity Index of these oils ensures smoother operation of hydraulic transmission systems even under extreme ambient temperature conditions. These oils perform extremely well even in cold climatic conditions owing to their very low pour point.

**Performance Level: Hydrol P 46: Proprietary Brand, Hydrol P 68: L & T-(R-201 -032-11) Index A Specification
Hydrol P 100: L & T- (Z-00-032-42) Index G Specification**

Application: MAK Hydrol P 46 is approved by M/s. TATA Motors for use in Tata Hitachi Excavators. Hydrol P 68 is recommended for use in small L&T- Komatsu Excavators. MAK Hydrol P 100 is recommended for use in large L&T Poclain Excavators. MAK Hydrol P 100 is approved by M/s. Hyderabad Industries Ltd. for use in Demag Excavators.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|------------------|--------------------|-----|---------------------|---------------|
| MAK HYDROL P46 | 46.2 | 154 | 210 | -39 |
| MAK HYDROL P68 | 68.5 | 141 | 226 | -36 |
| MAK HYDROL PI 00 | 100.4 | 130 | 240 | -30 |

MAK HYDROL CE 68

MAK HYDROL CE 68 is high performance hydraulic oil blended from highly refined high viscosity index mineral oil and zinc free ash-less type of additives.

Performance Level: DIN 51524 Part II, HLP type; Denison HF-0 & HF-2; Vickers 1-286-S.

Application: These are recommended for high pressure hydraulic systems and also for power transmission in systems operating at high speeds, loads and temperatures. These are also suitable for lubrication of pumps and industrial hydraulic machinery operating under heavy loads. These are specially recommended for sophisticated high performance Electrohydraulic or Numerically Controlled systems. These applications are generally found in concrete mixture unit (mobile & stationary) used for construction application.

Approved by M/s Putzmeister Concrete Machines Pvt. Ltd., Goa, for factory & service fill

| Grade Name | K.V. @100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|------------------|-------------------|-----|---------------------|---------------|
| MAK HYDROL CE 68 | 68.91 | 108 | 244 | -18 |

MAK SPIROL LS 80W-90

SAE Grade: 80W-90

This is a multipurpose, heavy duty extreme pressure gear oil meant for limited-slip rear drive differentials. It contains a special additive required for limited-slip differential application. Limited-slip differentials allow normal differential action when going around turns. When a wheel slips, they allow more torque to be transferred to the non-slipping wheel.

MAK SPIROL LS 80W-90 is specially formulated for final drives differential which utilize limited-slip clutches and friction discs. These oils contain special friction modifiers and additives to eliminate “chatter” and offer smooth performance throughout a variety of difficult traction situations.

Performance Level: API GL-5; MIL-L-2105D; limited-slip requirements.

Application: The most common limited-slip differentials (mainly used in earthmoving machinery) are of cone or clutch type; MAK SPIROL LS 80W-90 is recommended for these types of differentials to prevent the clutches or cones from chattering. Using regular gear oil can cause noise and rough operation that can damage parts.

Approval: MAK SPIROL LS 80W-90 grade is approved by M/s BEML for use in Axles of their wheel loader & wheel dozer models BL30, BL06, BL1420/ 14TH, BD 14W, BL54, BL40, BL3035, BD30W-1, BL03, BL8H and BL9H.

| Grade Name | K.V. @ 100 °C, cSt | VI | Flash Point COC, °C | Pour Point °C |
|----------------------|--------------------|-----|---------------------|---------------|
| MAK SPIROL LS 80W-90 | 15.4 | 115 | 222 | -27 |

RAIL ROAD ENGINE OILS

MAK RR 940

SAE Grade : 40

MAK RR 940 is now de-commercialized and replaced with MAK RR 513M for ALCO locomotives.

MAK RR 513 M

SAE Grade : 20W-40

A premium quality, zinc free multigrade rail road engine oil meeting Generation '5' requirements of Locomotive Maintenance Officers' Association (LMOA), USA. This oil is formulated with state-of-the-art additive technology which has been tried and approved by both EMD & GE for their latest generation engines in U.S. The advanced detergents and dispersants used in this engine oil have been found to help in reducing piston deposits, keeping the engines clean and extending oil / filter life. The use of this oil is expected to reduce wear of engine components thereby increasing the engine life and extending the period of maintenance schedule.

Performance Level:

- Generation 5 of LMOA, USA
- API CF

Application:

MAK RR 513 M is recommended for use in ALCO locomotives of Indian Railways and shunting locomotives in steel, cement plants etc. Field evaluation in EMD locomotives is under progress.

MAK RR 513 M has been extensively field tested in locomotives of Indian Railways where it has demonstrated benefits in terms of lower lube oil and fuel consumption besides reducing wear of engine components compared to monograde rail road engine oil.

| Grade Name | K.V., cSt 100°C | VI | Flash Point COC, °C | Pour Point °C | TBN mg. KOH/gm |
|--------------|-----------------|-----|---------------------|---------------|----------------|
| MAK RR 513 M | 16.0 | 120 | 226 | -21 | 13 |

MAK RR 517 M

SAE Grade : 20W-40

This is a premium quality, zinc free multigrade rail road engine oil meeting Generation '5' requirements of Locomotive Maintenance Officers' Association (LMOA), USA. This oil is based on premium additive technology which has been tried and approved by both EMD & GE for their latest generation engines in U.S. The advanced detergents & dispersants used in this technology has been found to help in reducing piston deposits, keeping the engines clean and extending oil life. The use of this oil is expected to reduce wear of engine components thereby increasing the engine life and extending the period of maintenance schedule.

Performance Level:

- Generation 5 of LMOA, USA
- API CF

Application:

MAK RR 517 M is recommended for use in latest GM EMD locomotives of Indian Railways.

MAK RR 517 M has been approved by RDSO for use in GM EMD locomotives based on the extensive field trials conducted for more than two years in the latest GT 46 MAC locomotives of Indian Railways. Compatibility & miscibility on this oil with other EMD crankcase oil has been recently established in the field trial.

| Grade Name | K.V., cSt 100°C | VI | Flash Point COC, °C | Pour Point °C | TBN mg. KOH/gm |
|--------------|-----------------|-----|---------------------|---------------|----------------|
| MAK RR 517 M | 16.0 | 111 | 232 | -21 | 17 |

MAK RR 509 M

SAE Grade : 20W-40

A premium quality, zinc free multigrade rail road engine oil meeting Generation '5' requirements of locomotive Maintenance Officers' Association (LMOA), USA. This oil is formulated with state-of-the-art additive technology which has been tried and approved by both EMD & GE for their latest generation engines in U.S. Advance detergents and dispersants, used in this crankcase oil, help in reducing piston deposits and keep, the engines clean. This is suitable for modern low emission engines using low sulfur fuel.

Performance Level:

- Generation 5 of LMOA, USA
- API CF

Application:

MAK RR 509 M is recommended for use in ALCO and EMD locomotives of Indian Railways and shunting locomotives in steel, cement plants etc. Field evaluation in EMD locomotives will be initiated soon.

| Grade Name | K.V., cSt 100°C | VI | Flash Point COC, °C | Pour Point °C | TBN mg. KOH/gm |
|--------------|-----------------|-----|---------------------|---------------|----------------|
| MAK RR 509 M | 16.0 | 120 | 226 | -21 | 8.3 |

PERFORMANCE SPECIFICATION FOR AUTOMOTIVE OILS

SAE J300 April 2013 - ENGINE OILS VISCOSITY CLASSIFICATION

| SAE Viscosity Grade | Low temperature (°C) cranking Viscosity ⁽²⁾ , cP Max | Low temperature (°C) pumping Viscosity ⁽³⁾ , cP Max with No Yield Stress ⁽⁴⁾ | Low-shear-rate Kinematic Viscosity ⁽⁵⁾ , (cSt) at 100°C Min | Low-shear-rate Kinematic Viscosity ⁽⁵⁾ , (cSt) at 100°C Max | High-shear-rate Viscosity ⁽⁴⁾ (cP) at 150°C Min |
|---------------------|---|--|--|--|--|
| 0W | 6200 at-35 | 60000 at-40 | 3.8 | . | . |
| 5W | 6600 at-30 | 60000 at-35 | 3.8 | . | . |
| 10W | 7000 at-25 | 60000 at-30 | 4.1 | . | . |
| 15W | 7000 at-20 | 60000 at-25 | 5.8 | . | . |
| 20W | 9500 at-15 | 60000 at-20 | 6.6 | . | . |
| 25W | 13000 at-10 | 60000 at-15 | 9.3 | . | . |
| 16 | | | 6.1 | < 8.2 | 2.3 |
| 20 | | | 5.6 | < 9.3 | 2.6 |
| 30 | | | 9.3 | < 12.5 | 2.9 |
| 40 | | | 12.5 | < 16.3 | 2.9 (DE-40,5W-40,10W-40 grades) |
| 40 | | | 12.5 | < 16.3 | 3.7 (15W-40,20W-40,25W-40,40 grades) |
| 50 | | | 16.3 | < 21.9 | 3.7 |
| 60 | | | 21.9 | < 26.1 | 3.7 |

Notes: 1cP = 1mPa.s; 1cSt=1 mm²/s

1) All values are critical specifications as defined by ASTM D 3244.

2) ASTM D 5293.

3) ASTM D 4684. Note that the presence of any yield stress detectable by this method constitutes a failure regardless of viscosity.

4) ASTM D 445.

5) ASTM D 4683, CEC-36-A-90 (ASTM D 4741), or ASTM D 5481.

6) 0W-40, 5W-40 and 10W-40 grades.

7) 15W-40, 20W-40, 25W-40, 40 grades.

SAE J306 2005

AXLE AND MANUAL TRANSMISSION OILS VISCOSITY CLASSIFICATION

Viscosity grades shown in this table classify axle and transmission lubricants in terms of viscosity only. This classification is based on the lubricant viscosity measured at both higher temperature (according to ASTM D 445) and low temperature (according to ASTM D 2983, using the Brookfield Viscometer).

| SAE Viscosity Grade | Temperature for Viscosity of 150,000 mPa.s, ocww | Viscosity at 100°C (mm ² /s) ⁽²⁾ | | Viscosity at 100°C after KRL shear stability (mm ² /s) ⁽⁴⁾ |
|---------------------|--|--|------|--|
| | | Min | Max | Minimum |
| | Maximum | | | |
| 70W | -55(5) | 4.1 | | 4.1 |
| 75W | -40 | 4.1 | | 4.1 |
| 80W | -26 | 7.0 | | 7.0 |
| 85W | -12 | 11.0 | | 11.0 |
| 80 | | 7.0 | 11.0 | 7.0 |
| 85 | | 11.0 | 13.5 | 11.0 |
| 90 | | 13.5 | 18.5 | 13.5 |
| 110 | | 18.5 | 24.0 | 18.5 |
| 140 | | 24.0 | 32.5 | 24.0 |
| 190 | | 32.5 | 41.0 | 32.5 |
| 250 | | 41.0 | | 41.0 |

Notes: 1cP = 1mPa.s; 1cSt=1 mm²/s

1) Using ASTM D 2983.

2) Additional low-temperature viscosity requirements may be appropriate for fluids intended for use in light duty synchronized manual transmission.

3) Using ASTM D 445,

4) using CEC L-45-T-93, method C (20 h)

5) The precision of ASTM method D 2983 has not been established for determination, made at temperatures below 40°C. This fact should not be taken into consideration in any producer - consumer relationship.

Viscosity Conversion Table
ISO Viscosity Grades to SUS at 37.8°C and 98.9°C

| ISO Grade | Viscosity Range cSt at 40°C | Approximate Viscosity Range SUS at 37.8°C | Approximate Viscosity Range SUS at 98.9°C | | |
|-----------|-----------------------------|---|---|-----------|-----------|
| | | | 95 VI | 65VI | 35 VI |
| 2 | 1.98-2.42 | 32.8-34.4 | - | - | - |
| 3 | 2.88-3.52 | 36.0-38.2 | - | - | - |
| 5 | 4.14-5.06 | 40.4-43.5 | - | - | - |
| 7 | 6.12-7.48 | 47.2-52.0 | - | - | - |
| 10 | 9.00-11.00 | 57.6-65.4 | 34.6-35.7 | 34.2-35.3 | 33.8-34.9 |
| 15 | 13.5-16.5 | 75.8-89.1 | 37.0-38.3 | 36.4-37.8 | 36.0-37.3 |
| 22 | 19.8-24.2 | 105-126 | 39.7-41.4 | 39.1-40.6 | 38.5-40.0 |
| 32 | 28.8-35.2 | 149-182 | 42.9-45.0 | 42.0-43.8 | 41.4-42.9 |
| 46 | 41.4-50.6 | 214-262 | 47.1-49.9 | 45.4-47.8 | 44.2-46.2 |
| 68 | 61.2-74.8 | 317-389 | 53.0-56.9 | 50.3-53.4 | 48.6-51.1 |
| 100 | 90.0-110 | 469-575 | 61.4-66.9 | 56.8-61.0 | 54.0-57.7 |
| 150 | 135-165 | 708-869 | 74.0-81.9 | 66.6-72.7 | 62.1-67.2 |
| 220 | 198-242 | 1046-1283 | 90.3-101 | 79.3-87.6 | 72.6-79.5 |
| 320 | 288-352 | 1531-1878 | 112-126 | 95.7-106 | 86.3-95.3 |
| 460 | 414-506 | 2216-2717 | 139-158 | 116-130 | 104-115 |
| 680 | 612-748 | 3298-4046 | 178-202 | 145-162 | 127-142 |
| 1000 | 900-1100 | 4885-5994 | 227-257 | 181-204 | 156-175 |
| 1500 | 1350-1650 | 7385-9063 | 293-331 | 229-256 | 204-219 |

*Conversion based on 95VI.

| NLGI No. | ASTM Penetration at 25°C | NLGI No. | ASTM Penetration at 25°C |
|----------|--------------------------|----------|--------------------------|
| 000 | 445-475 | 3 | 220-250 |
| 00 | 400-430 | 4 | 175-205 |
| 0 | 355-385 | 5 | 130-160 |
| 1 | 310-340 | 6 | 85-115 |
| 2 | 265-295 | | |

*After working 60 strokes (ASTM D217)