



HD & Industrial Product Guide



Let's drive the world forward

Your commercial vehicles do a vital job. We have the industry expertise, experience, products and technology to help you keep everything running smoothly and predictably, whatever your sector.



On-road Transport



Construction & Landfill



Mining & Quarrying



Agriculture

GET COMPLETE PROTECTION

Castrol
VECTON



Castrol
CRB



Castrol
TRANSMAX



Castrol
RADICOL

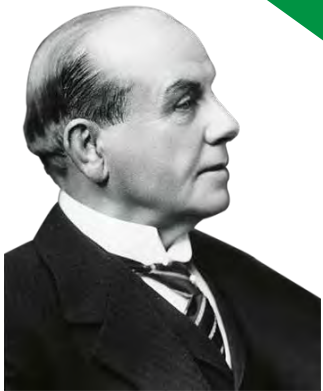


Castrol
HYSPIN



Castrol
SPHEEROL





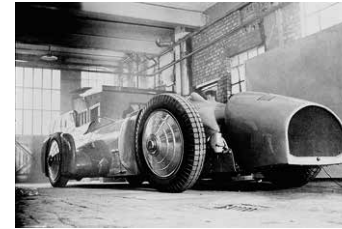
1890

1895

1900

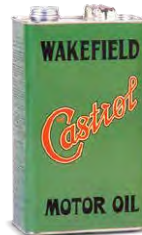
1909

The 'Castrol' brand is registered, its name derived from its castor oil ingredients



CC Wakefield is a pioneer of sponsorship; the World Land Speed Record is broken 23 times, 18 of them using Castrol, including Henry Seagrave and Malcolm Campbell in Bluebird

1899



Charles Wakefield founds CC Wakefield & Co Ltd, and the Castrol story begins



The company pioneers engine oils enhanced with additives, and the first semi-synthetic racing oil is developed

1953

The Castrol brand is so well known that CC Wakefield and Co becomes simply Castrol Ltd.



1922-1939



Queen Elizabeth II, the world's largest ocean going liner, is launched powered by Castrol lubricants

1967

1960

1966

Castrol is acquired by The Burmah Oil Company



Castrol pioneers intelligent molecules with Castrol MAGNATEC

1996

Castrol wins its first World Rally Drivers Championship, (followed by many other World Championship victories)

1978



Castrol EDGE, a new range of synthetic engine oils, is launched

2005

Castrol joins the Bloodhound project providing high performance products for use in the Bloodhound Supersonic car



2014

1985

1980

1975

1970

1968

Castrol GTX becomes Castrol's first global product launch



1997

Castrol and Thrust SSC break the sound barrier on land; and Castrol wins first F1 title with Williams



2000

Burmah Castrol is acquired by BP

2000

1995

2005

2010

2015

2012

Castrol lands on Mars with NASA's Curiosity Rover



2015



Castrol GTX partners with "3 million miles man" Irv Gordon

2016

FORD GT wins Le Mans with Castrol EDGE technology



2017

Castrol returns to Formula 1 with Renault



2018

Castrol GTX 50th Anniversary



Castrol EDGE and Fast & Furious 8 creates its most ambitious Titanium Trial ever: TITANIUM ICE

Around the world

Castrol, one of the world's leading lubricant brands, serves customers and consumers in the automotive, marine, industrial and energy sectors.



Footprint in
160+
countries



5 technology
centres

Pangbourne (UK),
Wayne (USA), Shanghai
(China), Hamburg and
Mönchengladbach (Germany)

Pioneering

We've been pioneering lubricant technology for over 125 years, working with businesses like yours who rely on commercial vehicles.



Expertise

With our expertise and knowledge, we have developed products and solutions to meet the unique challenges of the sector. Helping customers stay ahead of changing environmental and compliance demands.

Whatever commercial vehicles you operate, the Castrol Full Fluid range can help drive your business forward.

The value that your commercial vehicles deliver to your business depends on robust engine oils, fluids and coolants

We deliver:

- A comprehensive full fluids product offer for commercial vehicles, meeting industry specifications
- Castrol brands with leading edge technologies
- Products designed to meet your needs, helping reduce your operational and maintenance costs



WHY CHOOSE CASTROL CRB TURBOMAX

The Problem:

Increased heat in the engine can cause oil to break down and result in an increase of oil thickening and deposit formation; this accumulation of deposits in the oil or on metal surfaces can lead to abrasive or corrosive wear in engine.

The Solution:

New Castrol CRB Turbomax with DuraShield™ Technology helps break the destructive cycle of heat, deposits and wear - giving your engine 3X protection* for long and healthy engine life.

CRB with DuraShield™ Technology delivers improved wear performance for up to 3X longer engine life.*

*3X refers to protection against 3 elements – heat, wear and deposits.

Castrol CRB diesel engine oils provide excellent protection to commercial vehicle engines helping them to operate efficiently and last longer.

**LONGER*
ENGINE LIFE.***



The right
CASTROL CRB
Lubricant for
your vehicle

THE POWER OF 3X-PROTECT

Whatever commercial vehicles you operate, the Castrol Full Fluid range can help drive your business forward.

The value that your commercial vehicles deliver to your business depends on robust engine oils, fluids, coolants and greases.

Every lubricant needs to be capable of helping vehicles and components combat heavy loads and challenging environments.

The Castrol Full Fluid range has been formulated to provide high levels of protection reduce wear and cut downtime.

If you want complete protection, we've got every fluid your vehicles need.

CRB Multi 20W-50 CF-4

API CF-4

CRB Multi 15W-40 CH-4

ACEA E7, API CI-4/SL, JASO DH-1, CAT ECF-2, Cummins CES 20077, CES 20078, DDC Powerguard 93K215, Deutz DQC III-18, DTFR 15B110 (MB 228.3), Mack EO-M Plus, EO-N, MTU Oil Category 2, RVI RLD-2, Volvo VDS-3, Meets requirements of MAN M 3275-1

Turbomax 10W-40 CI-4/SL/E7

CAT ECF-2, Cummins CES 20077, CES 20078, DDC Powerguard 93K215, Deutz DQC III-18, DTFR 15B110 (MB 228.3), Mack EO-M Plus, EO-N, MTU Oil Category 2, RVI RLD-2, Volvo VDS 3, Meets requirements of MAN M 3275-1

Turbomax 10W-40 CK-4/E9

CAT ECF-3, Cummins CES 20086, DDC DFS 93K222, Deutz DQC III-18 LA, DTFR 15C100 (MB 228.31), Mack EOS-4.5, MAN M 3575 M 3575, MTU Oil Category 2.1, RVI RLD-3, Volvo VDS-4.5

* Twice the engine life based on time between camshaft rebuilds in a severe Cummins ISB engine test vs. an equivalent oil without DuraShield™.



WHY CHOOSE CASTROL VECTON

The Problem:

Modern trucks use new technologies to make as much as 30% higher torque, but this also means higher engine temperatures and pressures. This punishes the oil, pushing it closer to breakdown, and reducing its useful life and ability to extend drain intervals.

The Solution:

Castrol VECTON delivers up to *45% extra performance reserve that fights oil breakdown and also adapts to higher temperatures for longer useful oil life, giving you confidence in your maximum drain interval.

*Based on tests conducted on 81% of the whole Castrol VECTON range by volume based on 12 months sales up to March 2017. Actual oil drain depends on engine type, operating conditions, service history, OBD and fuel quality. Always consult your manufacturer's handbook.

Castrol VECTON is formulated with extra performance reserve fights oil breakdown by:

- Combating oxidation and deposits
- Neutralising harmful acids
- Controlling oil aeration
- Also adapting to increased temperatures while resisting viscosity loss through shear.

FOR LONGER USEFUL OIL LIFE



VECTON LONG DRAIN 5W-30 E8/E11

CAT ECF-3, Cummins CES 20086, DDC DFS 93K222, Deutz DQC IV-18 LA, DTFR 15C110 (MB 228.51), Mack EOS-4.5, MAN M 3677 M 3775, MTU Oil Category 3.1, RVI RLD-3, Scania LDF-4, Volvo CNG, VDS-4.5, DTFR 15C120 (MB 228.52), Meets requirements of MAN M 3271-1, M 3477, Meets DAF Extended Drain, For Iveco Trucks requiring ACEA E6, E7, E9

VECTON LONG DRAIN 10W-30 E8/E11

CAT ECF-3, Cummins CES 20086, DAF PSQL 2.4, DDC DFS 93K222, Deutz DOC IV-18 LA, DTFR 15C100, 15C110, 15C120, Mack EOS-4.5, MAN M 3775, MTU Oil Category 3.1, RVI RLD-3, Volvo CNG, VDS-4.5, Warranted by Castrol to be completely suitable for use in vehicles where the following specifications apply: MAN M 3271-1, M 3477, Meets DAF PX Euro VI requirements

VECTON LONG DRAIN 10W-40 E8/E11

CAT ECF-3, Cummins CES 20086, DDC DFS 93K222, Deutz DQC IV-18 LA, DTFR 15C100, DTFR 15C110, DTFR 15C120, Mack EOS-4.5, MAN M 3775, MTU Oil Category 3.1, RVI RLD-3, Volvo CNG, VDS-4.5

VECTON 10W-40 E4/E7

Cummins CES 20077, CES 20078, DDC Powerguard 93K215, Deutz DQC III-10, Mack EO-N, MAN M 3277, MB-Approval 228.5, MTU Oil Category 3, RVI RLD-2, Volvo VDS 3, Meets - Ford WSS-M2C944-A

VECTON 15W-40 CI-4/E7

CAT ECF-2, Cummins CES 20077, CES 20078, DDC Powerguard 93K215, Deutz DQC III-18, DTFR 15B110 (MB 228.3), Mack EO-M Plus, EO-N, MTU Oil Category 2, RVI RLD-2, Volvo VDS-3, Meets requirements of MAN M



Trust TRANSMAX to protect gears and axles and maximise drain intervals

Transmissions have a complex series of components that keep your wheels turning. In many cases, however, they are overlooked because service intervals are quite long.

It is critical to use the right lubricants in your transmission systems to avoid premature transmission failures. Castrol has a wide range of products that will ensure your equipment is performing at their best under the most extreme conditions.



Castrol TRANSMAX MANUAL may be used in applications where API GL-4 performance is required.

- Good thermal stability protects against deposit formation and oil thickening maintaining the life and performance of lubricant and transmission.
- Good antiwear and load carrying characteristics extend the life of components.
- Improved low temperature protection and gear shifts compared to monograde products.



TRANSMAX AXLE EPX 80W-90

API GL-5, MAN 342 M2, ZFTE-ML 05A, 12E, 16B, 17B, 19B, 21A

TRANSMAX AXLE EPX 85W-140

API GL-5, ZFTE-ML 05A, 12E, 16D, 21A

TRANSMAX MANUAL 90 / 140

API GL-4

TRANSMAX MANUAL EP 80W

API GL-4, DTFR 13B100, MB-Approval 235.14, ZFTE-ML 17A

TRANSMAX ATF DEX/MERC MULTIVEHICLE

Meets Dexron®-IIIH, Mercon®, Suitable for use where JASO 1A(03), JASO 1A LV(13) is required including: Toyota T III, T IV, WS, Mitsubishi SP II, IIM, III, IV, PA, J3, Mazda ATF M-III, M-V, FZ, Honda/Acura DW 1/Z 1, Nissan Matic D, J, S, JWS 3314/3317/3309, Suzuki AT Oil 5D06, 2384K, Isuzu, Subaru F6, Red 1, Daihatsu AMMIX ATF D-III Multi, D3-SP, Hyundai/Kia SP III, SP IV, Suitable for use as Power steering fluid, Suitable for use where Allison C4 is required.

TRANSMAX OFFROAD 10W

Approved - ZF - TE-ML 03C, Meets - CAT TO-4, Recommended for use in Komatsu Equipment

TRANSMAX OFFROAD 30

ZFTE-ML 03C, 07F, Meets CAT TO-4, Recommended for use in Komatsu Equipment

TRANSMAX OFFROAD 50

Meets CAT TO-4, Recommended for use in Komatsu Equipment

TRANSMAX CVT

Suitable for use where the following are called for: Toyota CVT Fluid TC, FE, Nissan CVT Fluid NS-1, NS-2, NS-3, MMC DIAQUEEN ATF SP-III, CVT Fluid J1, CVT Fluid J4, CVT Fluid J4+, Mazda CVTF 3320, Subaru i-CVT Fluid, i-CVT FG, Lineartronic II, Lineartronic High Torque Chain CVTF, Daihatsu AMMIX CVT Fluid DC, CVT Fluid DFE, Suzuki CVT Fluid 3320, Green 1, Green 2, CVTF TC, NS-2, Honda HCF-2 *, Hyundai/Kia SP-III, SP-CVT 1, Chrysler NS-2, CVTF+4, Mini Cooper EZL799, Ford CVT23, MB 236.20, VW/Audi TL 52180 (G 052 180), TL 52516 (G 052 516), Dex CVT.

*Transmax CVT is suitable for use in all of Honda CVTs except 2001-2007 Model Honda Fit/Jazz which are equipped with Starting Clutch

TRANSMAX LIMITED SLIP Z 85W-90

API GL-5, ZFTE-ML 05C, 16E, 21C



Outstanding protection against overheating, freezing and corrosion

A ready to use antifreeze and engine coolant for both petrol and diesel engines.

Features & Benefits

Its mixture of monoethylene glycol, distilled water and selected chemical additives to provide excellent corrosion protection and heat transfer characteristics.



ANTI-FREEZE
PROTECTION



CORROSION
PROTECTION



OVERHEATING
PROTECTION



RADICOOOL NF PREMIX

ASTM D3306(III)

ASTM D4985, JASO JIS K 2234:2006, MAN 324 Typ NF, MTU MTL 5048, MB-Approval 326.0, Based on coolant concentrate conforming to: BS 6580:2010

RADICOOOL SF PREMIX

ASTM D3306(III)

ASTM D4985, ASTM D6210, BS 6580:2010, MAN 324 Typ SNF, DTFR 29D110 (MB 326.3), VW TL 774F (G12+), Deutz DQC CB-14, DAF 74002

RADICOOOL SI-OAT PREMIX

ASTM D3306(III)

ASTM D4985, BS 6580:2010, JASO JIS K2234, MAN 324 Type Si-OAT, MB-Approval 326.6, VW-TL 774-G (G12++)





HYDRAULICS

HYSPIN AWH-M RANGE

High quality range of shear stability, high viscosity hydraulic fluids with excellent anti-wear performance.

Suitable for use in a diverse range of hydraulic systems that are subject to wide variations in temperature.

For use in off-highway and marine applications and indoor manufacturing equipment.

FEATURES & BENEFITS

- Can be used over a wide temperature range with good shear stability
- Excellent anti-wear performance provides extended wear protection
- Reduced downtime, prolonged lubricant life.

SPECIFICATIONS/APPROVALS

- DIN 51502 classification – HVLP
- ISO 6743/4 - Hydraulic Oils Type HV
- Parker Hannifin (Denison) HF0, HF1 & HF2
- Eaton E-FDGN-TB002-E

MEETS

- DIN 51524 Part 3
- Cincinnati Lamb (Milacron) P 68-69-70
- US Steel 126 & 127

HYSPIN AWS RANGE

High quality mineral oil based hydraulic fluid containing zinc for industrial equipment including injection moulding plus a wide range of machinery including presses, machine tools (CNC machines), certain gearboxes, bearing lubrication systems and many more applications requiring an oil with good anti-wear and anti-oxidant properties.

Suitable for gear, vane and piston type hydraulic pumps, except those containing silver or cadmium.

FEATURES & BENEFITS

- Optimise machine performance
- Extended life of seals
- Reduced downtime, increased productivity
- Reliability and extended pump life.

SPECIFICATIONS/APPROVALS

- DIN 51502 classification - HLP
- ISO 6743/4 - Hydraulic Oils Type HM
- Parker Hannifin (Denison) HF0, HF1 & HF2
- Eaton E-FDGN-TB002-E

MEETS

- DIN 51524 Part 2
- Fives Cincinnati P68, P69 & P70
- ASTM D6158 HM
- ISO 11158 HM
- US Steel 126
- GB 11118.1 L-HM (General and High Pressure)

HYSPIN HVI RANGE

The Castrol Hyspin™ HVI range of high viscosity index (VI) oils is based on a carefully selected ashless (formulated without zinc) additive system designed to meet and exceed the most exacting performance standards. Hyspin HVI oils are intended for severely stressed hydraulic systems requiring a high level of anti-wear performance and fine filtration. The Castrol Hyspin HVI range is fully compatible with elastomer materials commonly used for static and dynamic seals, such as nitrile, silicone and fluorinated (e.g. Viton) polymers.

APPLICATIONS

- Outdoor equipment which are likely to operate over wide temperature ranges, such as machinery subjected to cold start up conditions and high temperature continuous running. Examples include off-highway and marine applications.
- Indoor manufacturing equipment that incorporates control systems requiring minimal viscosity change with temperature. Examples include precision machine tools.

FEATURES & BENEFITS

- High viscosity index and low pour point enables the product to be used over a wide temperature range. Good shear stability means no excessive loss in viscosity due to mechanical shearing.
- Excellent anti-wear performance provides extended wear protection for hydraulic pumps. Reduced down time due to unscheduled maintenance and savings from replacement part costs.
- Excellent water separation and hydrolytic stability means reduced down time through prolonged lubricant life and increased equipment reliability.
- Excellent thermal and oxidative stability provides reliable performance and extended oil life in

severe applications. Minimal deposit formation gives a cleaner system and reduced frequency of filter changes.

SPECIFICATIONS/APPROVALS

- DIN 51502 classification – HVLP
- ISO 6743/4 - Hydraulic Oils Type HV
- Parker Hannifin (Denison) HF0, HF1 & HF2
- Eaton E-FDGN-TB002-E

MEETS

- DIN 51524 Part 3
- Cincinnati Lamb (Milacron) P 68-69-70
- US Steel 126 & 127



GREASE

MINE GREASE

Castrol Mine Grease is an extreme pressure lithium grease formulated with specially selected base oil combinations that provide optimal pumpability. Castrol Mine Grease also contains 3% molybdenum disulphide, which provides additional wear protection under conditions of vibratory motion.

APPLICATION

Castrol Mine Grease is ideally suited for the lubrication of heavily loaded plain and anti-friction bearings used in construction, earthmoving and mining equipment. Castrol Mine Grease provides protection against wear under heavy and shock loads, high temperature and wet environments.

ADVANTAGES

- Superior EP properties provide protection against extreme shock loading.
- High performance corrosion inhibitors protect equipment and reduce maintenance costs and downtime.
- Excellent pumpability reduces the risk of blocked lubrication lines and lubrication starvation.
- Outstanding structural stability means the lubricant does not slump out of the application.

PRODUCT PERFORMANCE CLAIMS

Komatsu(AH10529a)

Rothe Erde

Liebherr

SPHEEROL EP RANGE

Castrol Spheerol EP is recommended as a general-purpose grease in all heavily loaded or shock-loaded plain and anti-friction bearings or where an extreme pressure additive is required on industrial plant and earthmoving equipment. The product is suitable for operating temperatures between -25 °C to 120 °C.

FEATURES & BENEFITS

- Good mechanical stability, the grease keeps its consistency in service ensuring long lubricant life.
- Good adhesion, continuous lubrication and reduced consumption as film stays between lubricated surfaces.
- Good water resistance, the grease film remains on the surface even in the presence of water.
- Resistant to copper and steel corrosion helps prevent rust and oxidation on metal surfaces.
- Excellent EP and anti-wear properties – protects equipment against extreme loading and helps minimise bearing component wear.

SPECIFICATIONS/APPROVALS

SPHEROL EP 0

- Lithium
- Amber to Brown appearance
- NLGI 00
- Semi fluid

SPHEROL EP 1

- Lithium
- Amber to Brown appearance
- NLGI 1
- Dropping Point, Minimum 190°C

SPHEROL EP 2

- Lithium
- Amber
- NLGI 2
- Dropping Point, 200°C

SPHEEROL™ LMM

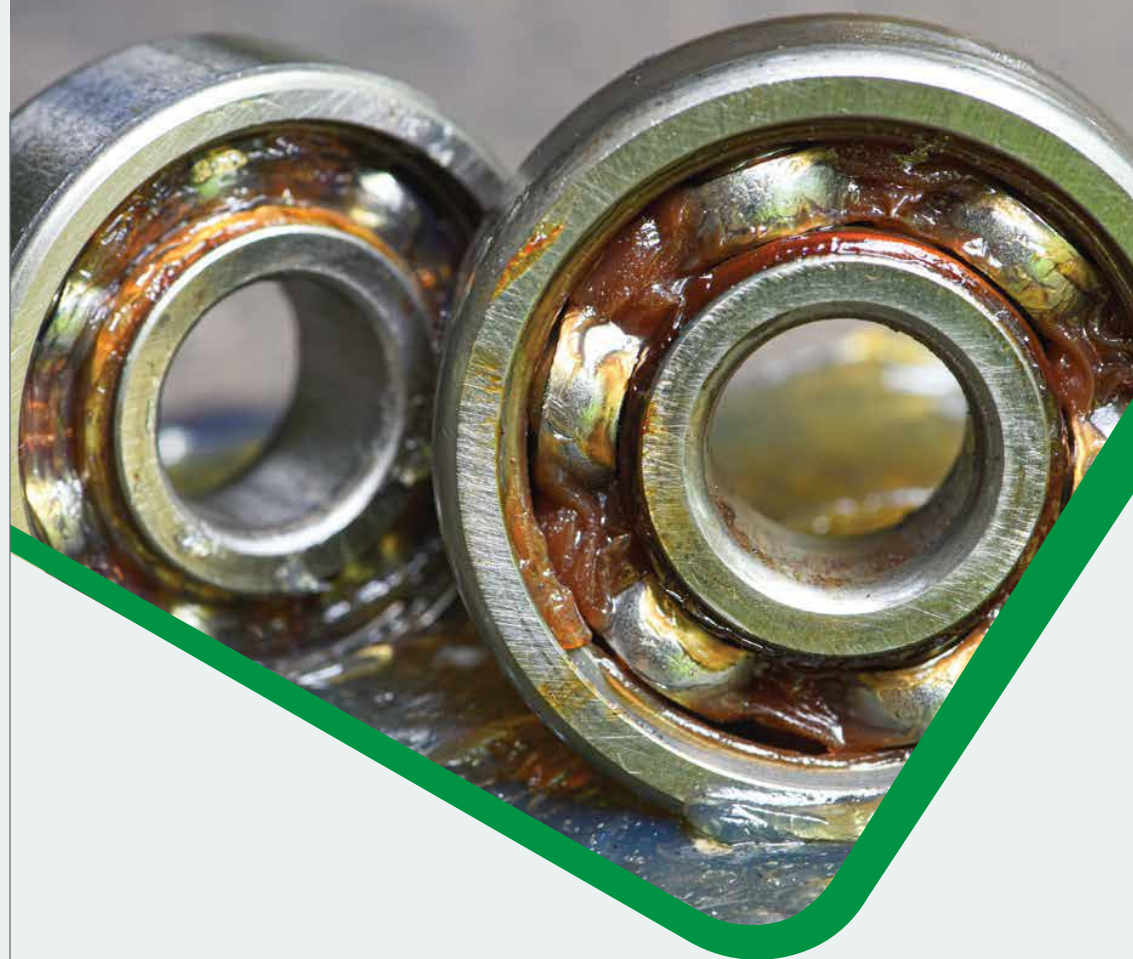
Castrol Spheerol™ LMM is a multi-purpose lithium grease containing molybdenum disulphide solid lubricant to enhance its load carrying properties under conditions of high or shock loading or to prevent scuffing or fretting. It contains oxidation and corrosion inhibitors, anti-wear additives, has good mechanical stability and can be used in the presence of moisture.

APPLICATION

Spheerol LMM grease is suitable for most types of bearing and a wide range of other industrial applications, which require a molybdenum disulphide grease, including grease lubricated gears. Spheerol LMM may be used in plain and rolling element bearings, including heavily loaded bearings at low and medium speeds, and those subject to shock loading and excessive vibrations. The incorporation of solid lubricant in Spheerol LMM greases makes this grease particularly suited for the lubrication of reciprocating and sliding motion elements, where the prevention of scuffing and fretting is desirable. Typical applications include pivot pins, cams, screws, splined shafts, slides, flexible joints (ball, universal, CV joints etc). It is also useful for the lubrication of chains, swivels and shackles to prevent scuffing.

FEATURES & BENEFITS

- Good load carrying capacity – protects equipment against extreme loading and helps prevent damage caused by shock loading and excessive vibration.
- Resistance to scuffing and fretting – provides protection against fretting that can occur on splined shafts, pivot pins and other parts subject to reciprocating and sliding motion.
- Good water resistance – the grease film remains on the surface even in the presence of water.
- Resistant to copper and steel corrosion – helps prevent rust and oxidation on metal surfaces.
- Good adhesion – continuous lubrication and reduced consumption as film stays between lubricated surfaces.



Commercial Vehicle Product Recommendations

On-Road Truck

Fifth Wheel & King Pin

- Spheerol AP 2
- Spheerol AP 3
- Spheerol EPL 2
- Multipurpose Grease

Engine

- Vecton Long Drain 5W-30 E6/E9
- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 10W40 CI4/SL/E7
- CRB Turbomax 15W-40 CI-4/SL/E7
- CRB Turbomax 15W-40 CH-4
- CRB Turbomax 20W-50 CH-4

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix

Clutch Bearings

- Spheerol AP 3
- Spheerol EPL 2
- Multipurpose Grease

Pins & Bushes

- Spheerol AP 3
- Spheerol EPL 2
- Multipurpose Grease

Transmission Manual & Automatic

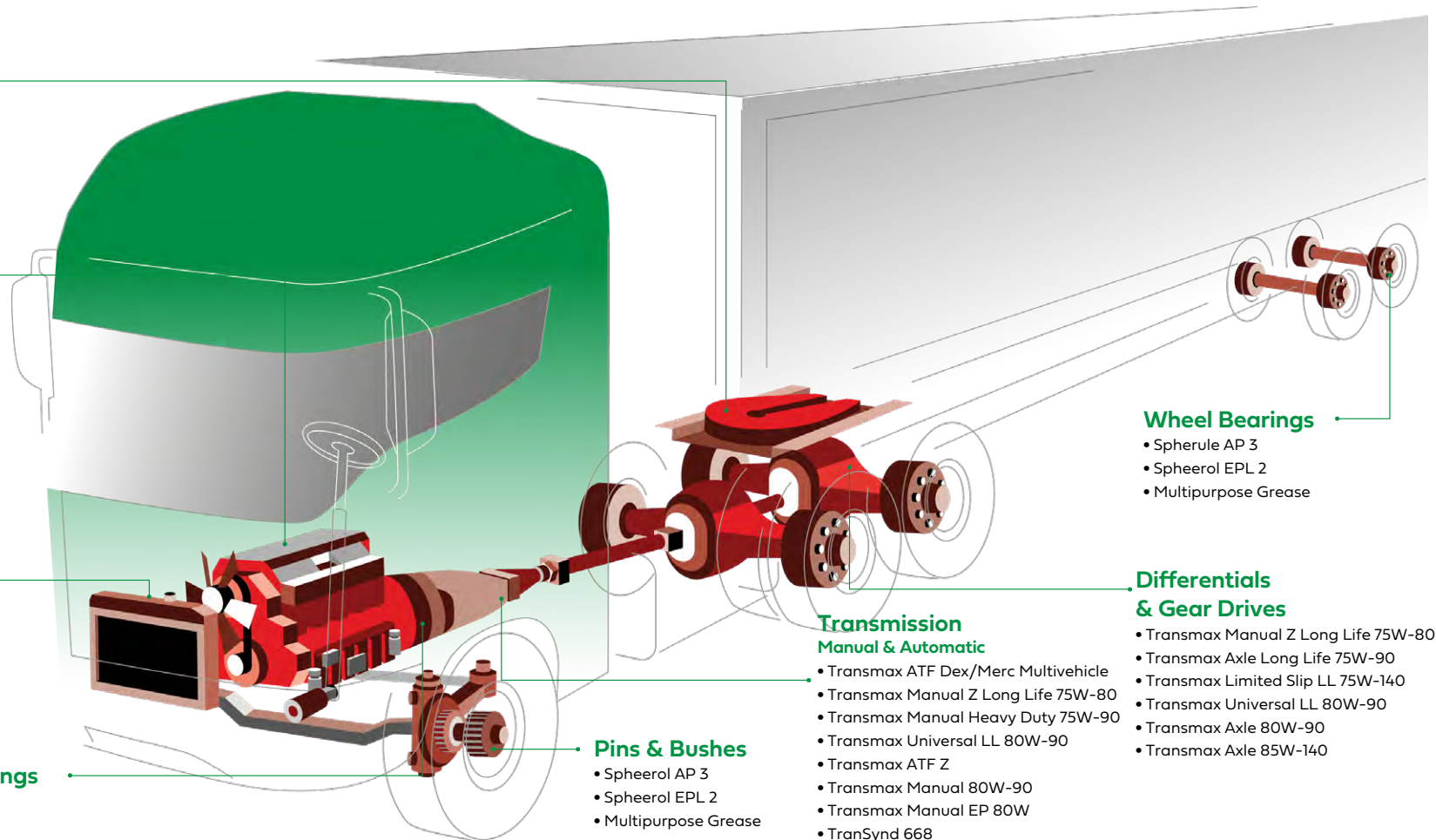
- Transmax ATF Dex/Merc Multivehicle
- Transmax Manual Z Long Life 75W-80
- Transmax Manual Heavy Duty 75W-90
- Transmax Universal LL 80W-90
- Transmax ATF Z
- Transmax Manual 80W-90
- Transmax Manual EP 80W
- TranSynd 668

Wheel Bearings

- Spheerol AP 3
- Spheerol EPL 2
- Multipurpose Grease

Differentials & Gear Drives

- Transmax Manual Z Long Life 75W-80
- Transmax Axle Long Life 75W-90
- Transmax Limited Slip LL 75W-140
- Transmax Universal LL 80W-90
- Transmax Axle 80W-90
- Transmax Axle 85W-140



Commercial Vehicle Product Recommendations

On-Road Rigid Truck

Engine

- Vecton Long Drain 5W-30 E6/E9
- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 10W40 CI4/SL/E7
- CRB Turbomax 15W-40 CI-4/SL/E7
- CRB Turbomax 15W-40 CH-4
- CRB Turbomax 20W-50 CH-4

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix

Clutch Bearings

- Spheerol AP 2
- Spheerol AP 3
- Spheerol SY 1002
- Spheerol EPL 2
- Multipurpose Grease

Grease Points, Rods, Pins & Bearings

- Spheerol AP 2
- Spheerol AP 3
- Spheerol SY 1002
- Spheerol EPL 2
- Multipurpose Grease

Transmission

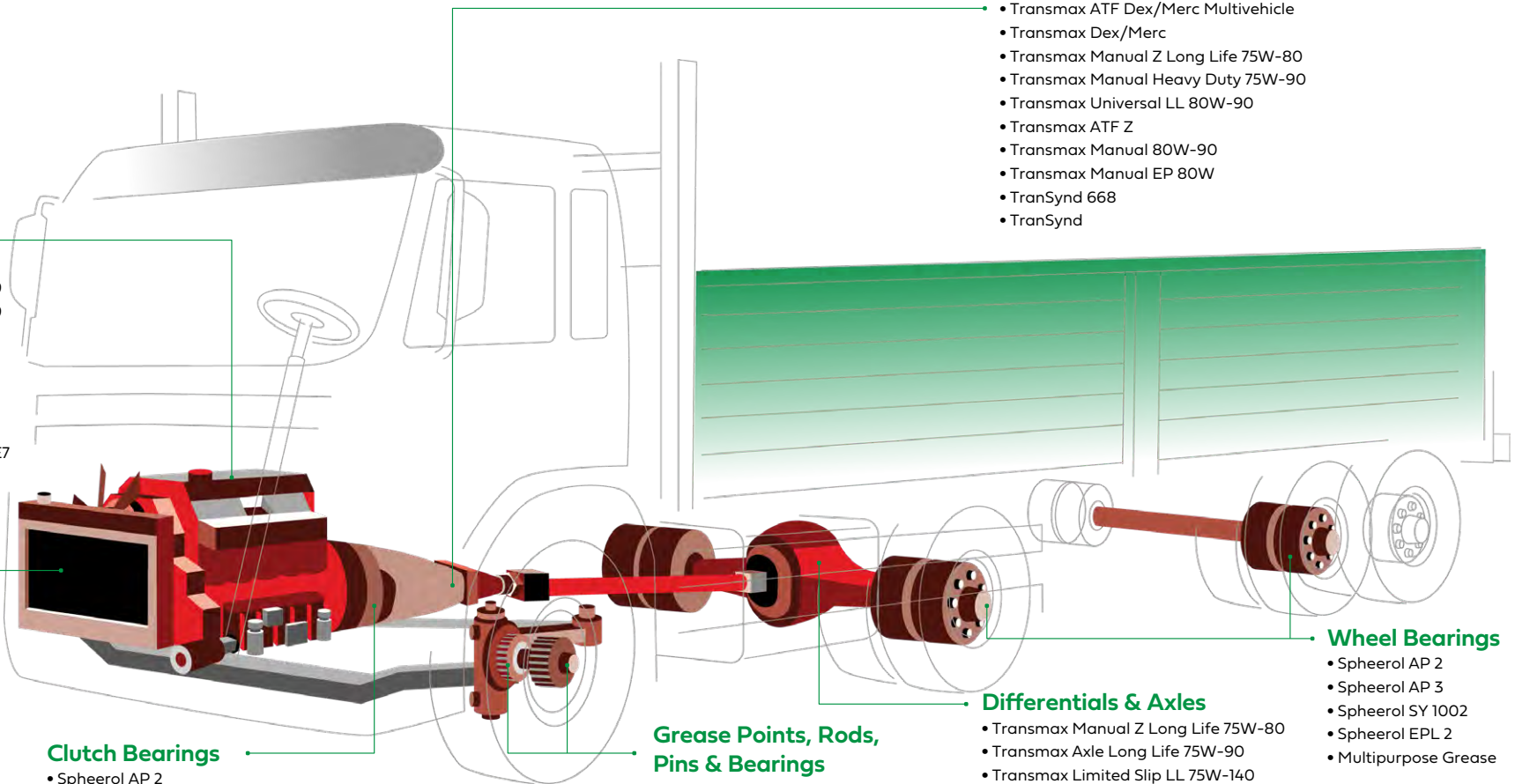
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- Transmax Dex/Merc
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- Transmax Manual Heavy Duty 75W-90
- Transmax Universal LL 80W-90
- Transmax ATF Z
- Transmax Manual 80W-90
- Transmax Manual EP 80W
- TranSynd 668
- TranSynd

Differentials & Axles

- Transmax Manual Z Long Life 75W-80
- Transmax Axle Long Life 75W-90
- Transmax Limited Slip LL 75W-140
- Transmax Universal LL 80W-90
- Transmax Axle 80W-90
- Transmax Axle 85W-140

Wheel Bearings

- Spheerol AP 2
- Spheerol AP 3
- Spheerol SY 1002
- Spheerol EPL 2
- Multipurpose Grease



Commercial Vehicle Product Recommendations

Terminal Tractor

Engine

- Vecton Long Drain 5W-30 E6/E9
- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 10W40 CI4/SL/E7
- CRB Turbomax 15W-40 CI-4/SL/E7
- CRB Turbomax 15W-40 CH-4
- CRB Turbomax 20W-50 CH-4

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix

Clutch Bearings

- Spheerol AP 3
- Spheerol EPL 2
- Multipurpose Grease

Transmission Manual & Automatic

- Transmax ATF Dex/Merc Multivehicle
- Transmax ATF Z
- Transmax Manual Z Long Life 75W-80
- Transmax Manual Heavy Duty 75W-90
- Transmax Universal LL 80W-90
- Transmax Manual 80W-90
- Transmax Manual EP 80W

Grease Points, Rods, Pins & Bearings

- Spheerol AP 3
- Spheerol EPL 2
- Multipurpose Grease

Differentials & Axles

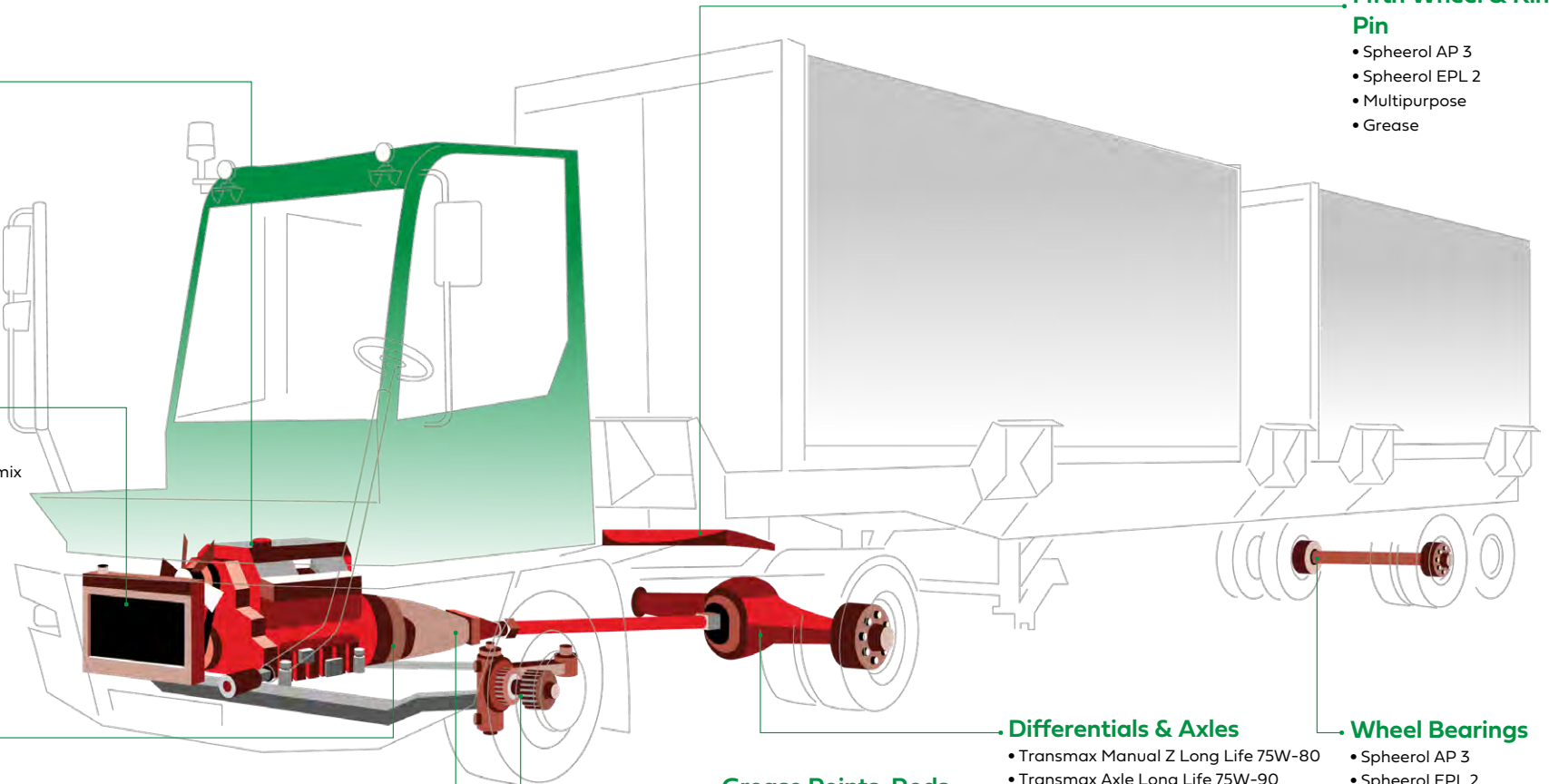
- Transmax Manual Z Long Life 75W-80
- Transmax Axle Long Life 75W-90
- Transmax Limited Slip LL 75W-140
- Transmax Universal LL 80W-90
- Transmax Axle 80W-90
- Transmax Axle 85W-140

Wheel Bearings

- Spheerol AP 3
- Spheerol EPL 2
- Multipurpose Grease

Fifth Wheel & King Pin

- Spheerol AP 3
- Spheerol EPL 2
- Multipurpose
- Grease



Commercial Vehicle Product Recommendations

Bus

Engine

- Vecton Long Drain 5W-30 E6/E9
- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 10W40 CI4/SL/E7
- CRB Turbomax 15W-40 CI-4/SL/E7
- CRB Turbomax 15W-40 CH-4
- CRB Turbomax 20W-50 CH-4

Differentials & Axles

- Transmax Manual Z Long Life 75W-80
- Transmax Axle Long Life 75W-90
- Transmax Limited Slip LL 75W-140
- Transmax Universal LL 80W-90
- Transmax Axle 80W-90
- Transmax Axle 85W-140

Grease Points, Rods, Pins & Bearings

- Spherol EPL 2
- Spherol EPL 3
- Multipurpose Grease

Wheel Bearings

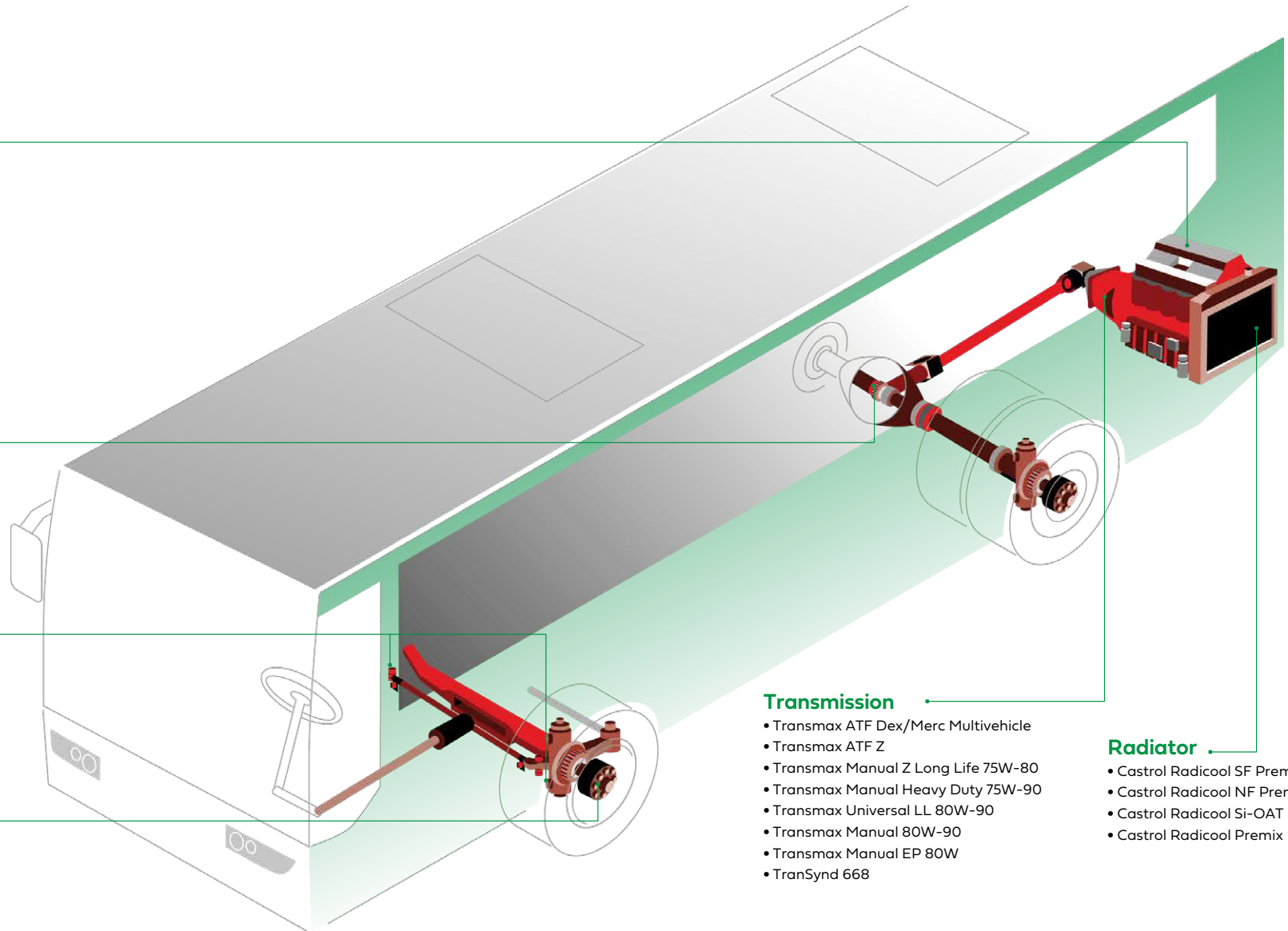
- Spherol EPL 2
- Spherol EPL 3
- Multipurpose Grease

Transmission

- Transmax ATF Dex/Merc Multivehicle
- Transmax ATF Z
- Transmax Manual Z Long Life 75W-80
- Transmax Manual Heavy Duty 75W-90
- Transmax Universal LL 80W-90
- Transmax Manual 80W-90
- Transmax Manual EP 80W
- TranSynd 668

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix



Commercial Vehicle Product Recommendations

Excavator

Engine

- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 10W40 CI4/SL/E7
- CRB Turbomax 15W-40 CI-4/SL/E7

Transmission

Final Drives, Front and Rear Axle

- Transmax ATF Dex/Merc MV
- Transmax Axle Long Life 75W-90
- Transmax Axle 80W-90
- Transmax Universal LL 80W-90
- Transmax Manual 80W-90
- Transmax Manual 90
- Transmax Manual EP 80W
- Transmax Offroad Series

Differentials & Gear Drives

- Transmax Limited Slip LL 75W-140
- Transmax Universal LL 80W-90
- Transmax Axle 85W-140
- Transmax Manual 140
- Transmax Offroad Series

Radiator

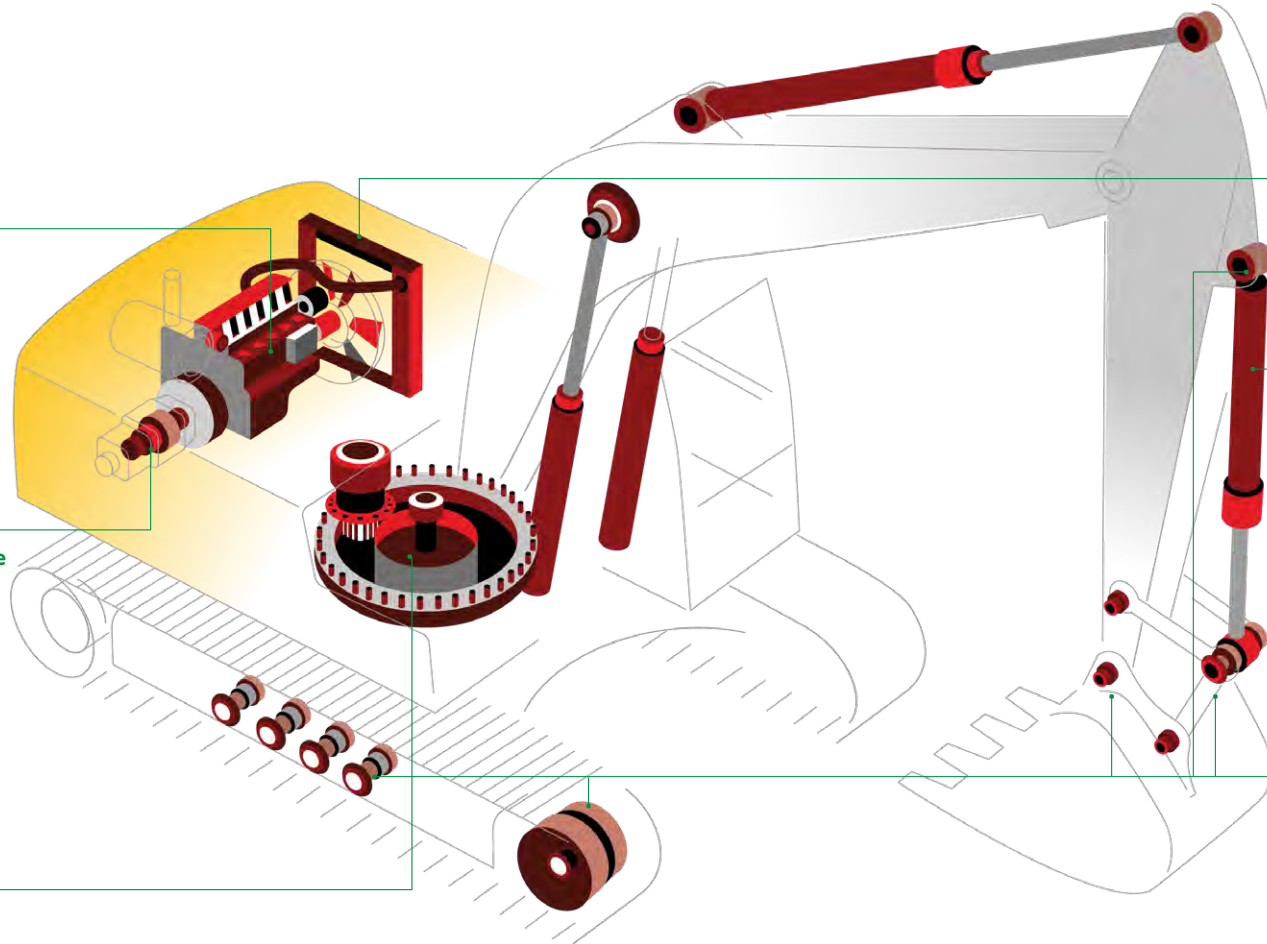
- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix

Hydraulics

- Castrol Hyspin AWS Series
- Castrol Hyspin AWH Series
- Castrol Hyspin HVI Series
- Castrol Offroad Series

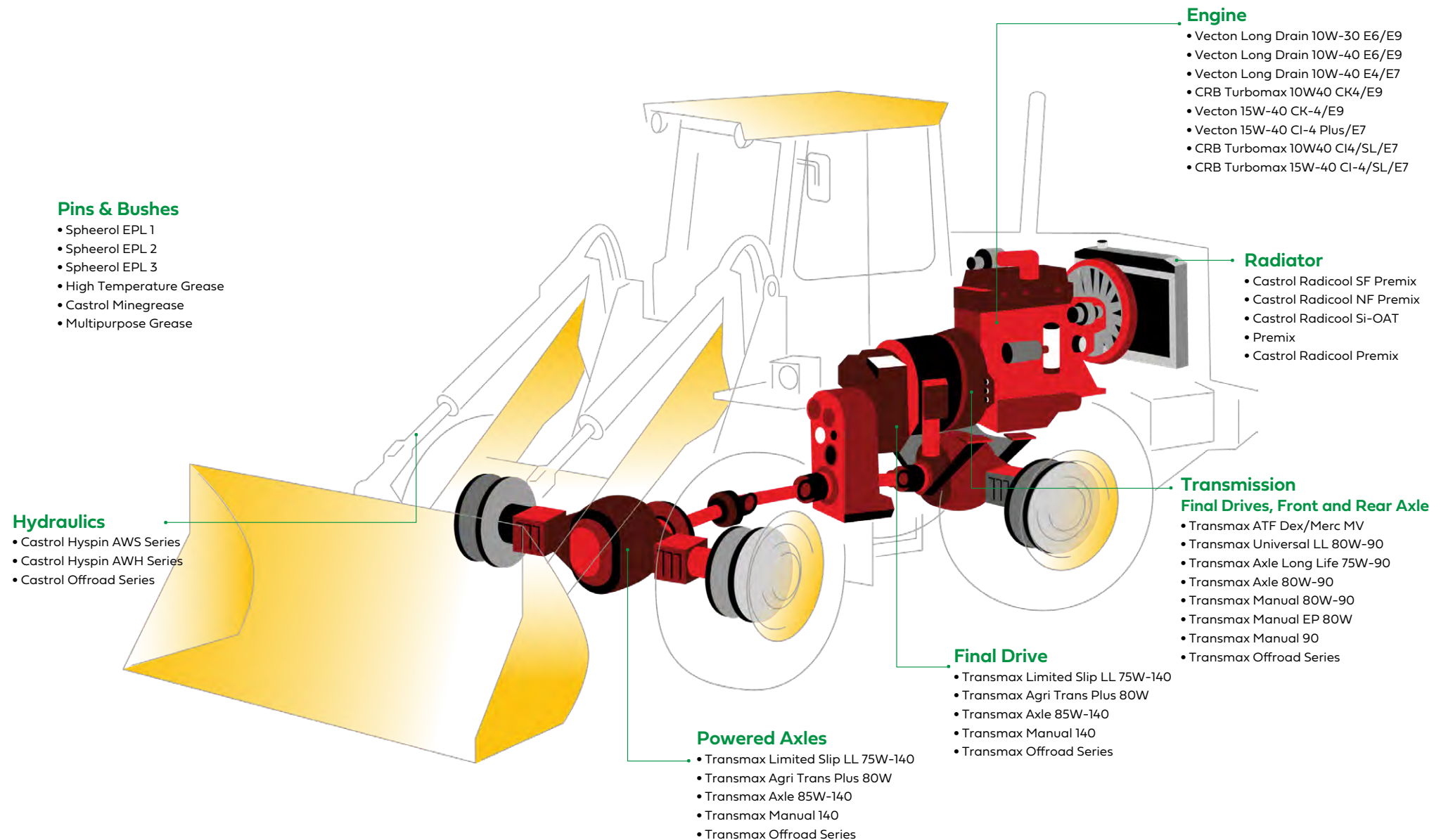
Bearings

- Spheerol EPL 1
- Spheerol EPL 2
- Spheerol EPL 3
- Multipurpose Grease
- Castrol Minegrease
- Spheerol LCX 222 (Japanese Excavators)



Commercial Vehicle Product Recommendations

Wheel Loader



Commercial Vehicle Product Recommendations

Bulldozer

Transmission

Manual & Automatic

- Transmax ATF Dex/Merc MV
- Transmax Universal LL 80W-90
- Transmax Axle Long Life 75W-90
- Transmax Axle 80W-90
- Transmax Manual 80W-90
- Transmax Manual EP 80W
- Transmax Manual 90
- Transmax Offroad Series

Differentials, Axles & Final Drives

- Transmax Limited Slip LL 75W-140
- Transmax Universal LL 80W-90
- Transmax Axle 85W-140
- Transmax Manual 140
- Transmax Offroad Series

Greases

- Spheerol EPL 1
- Spheerol EPL 2
- Spheerol EPL 3
- High Temperature Grease
- Castrol Minegrease
- Multipurpose Grease

Hydraulics

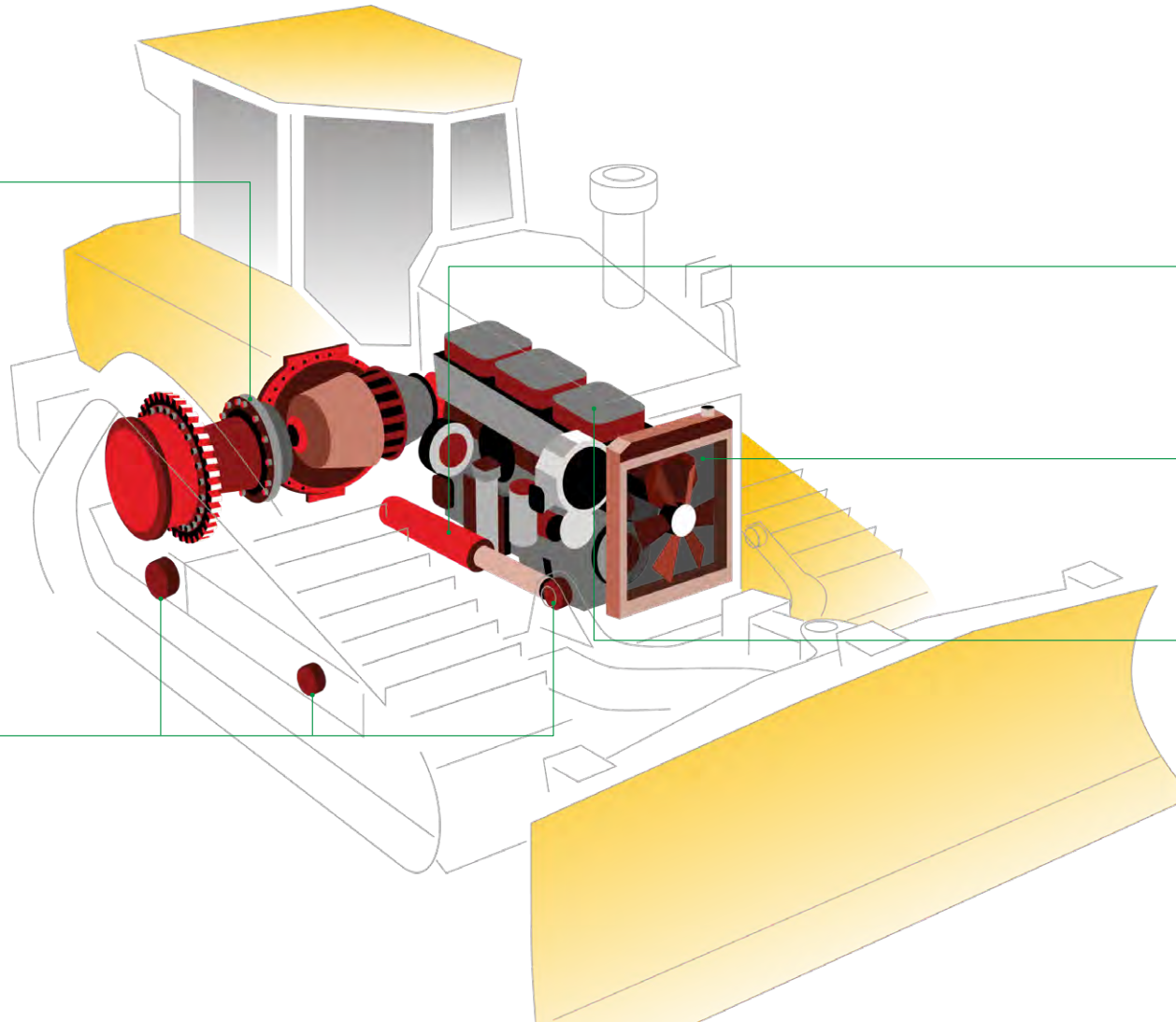
- Castrol Hyspin AWH Series
- Castrol Hyspin AWS Series
- Castrol Offroad Series

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix

Engine

- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 10W40 CI4/SL/E7
- CRB Turbomax 15W-40 CI-4/SL/E7



Commercial Vehicle Product Recommendations

Backhoe Loader

Greases

- Spheral LMM
- Spheral EPL 2
- Spheral EPL 3
- High Temperature Grease
- Castrol Minegrease
- Multipurpose Grease

Transmission

Manual & Automatic

- Transmax ATF Dex/Merc MV
- Transmax Axle 80W-90
- Transmax Manual 80W-90
- Transmax Manual 90
- Transmax Offroad 30

Differentials & Axles

- Transmax Agri Trans Plus 80W
- Transmax Axle 85W-140
- Transmax Manual 140
- Transmax Offroad 50

Hydraulics

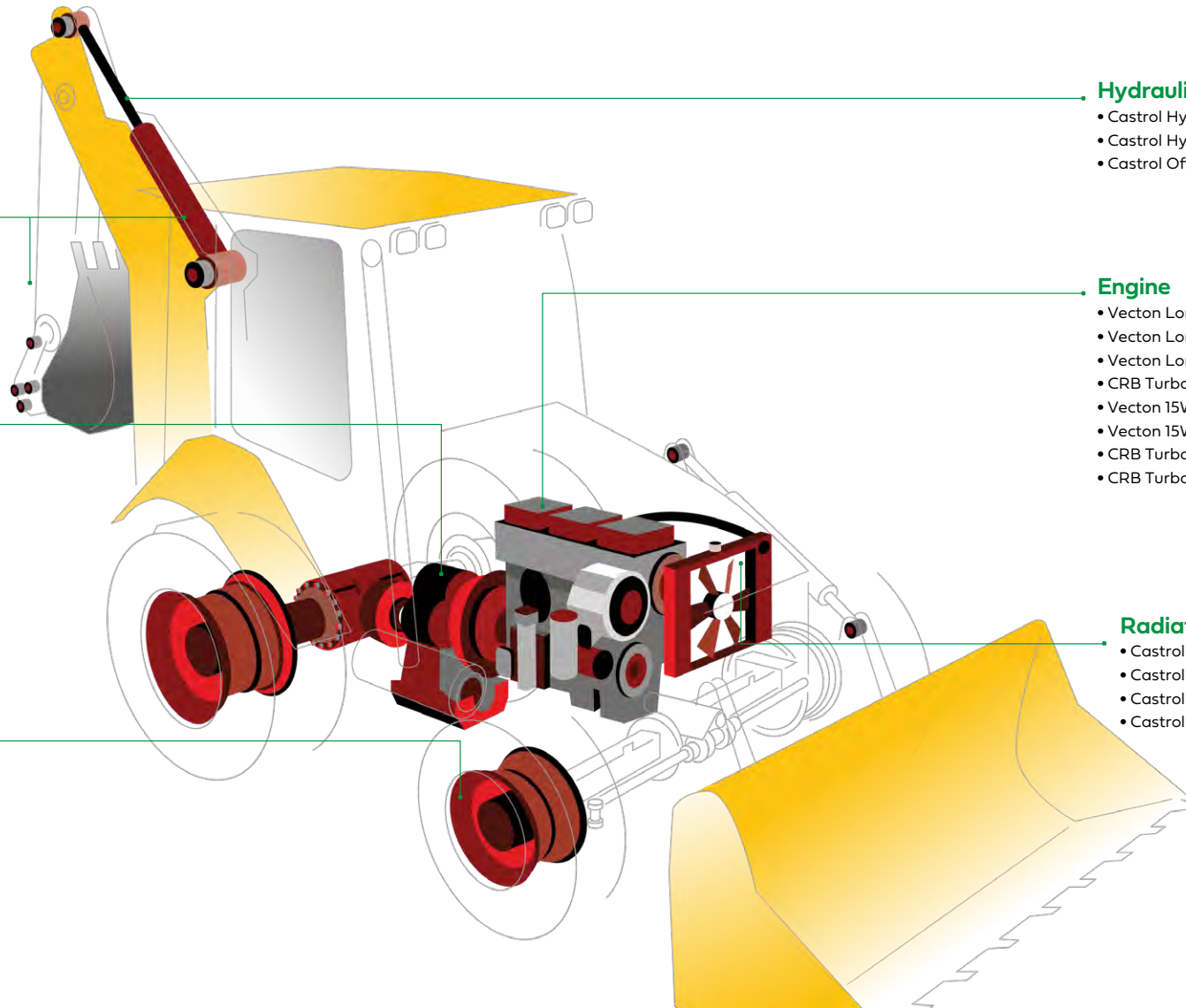
- Castrol Hyspin AWH Series
- Castrol Hyspin AWS Series
- Castrol Offroad Series

Engine

- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 10W40 CI4/SL/E7
- CRB Turbomax 15W-40 CI-4/SL/E7

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix



Commercial Vehicle Product Recommendations

Motor Grader

Engine

- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 10W40 CI4/SL/E7
- CRB Turbomax 15W-40 CI-4/SL/E7

Hydraulics

- Castrol Hyspin AWH Series
- Castrol Hyspin AWS Series
- Castrol Offroad Series

Greases

- Castrol Spheerol EPL 2
- Castrol Mine Grease

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix

Differentials & Gear Drives

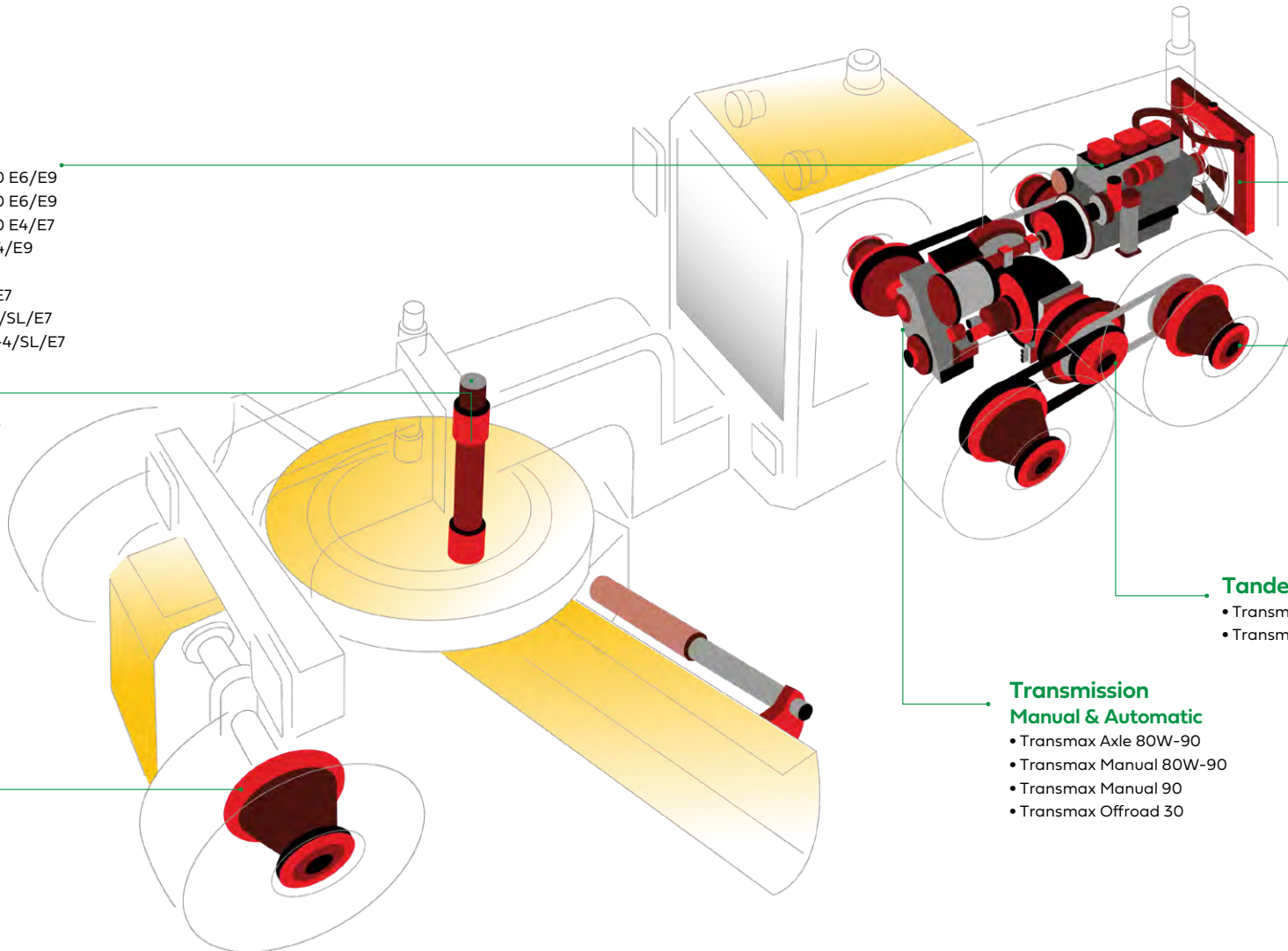
- Transmax Agri Trans Plus 80W
- Transmax Axle 85W-140
- Transmax Manual 140

Tandem Drive

- Transmax Axle 85W-140
- Transmax Manual 140

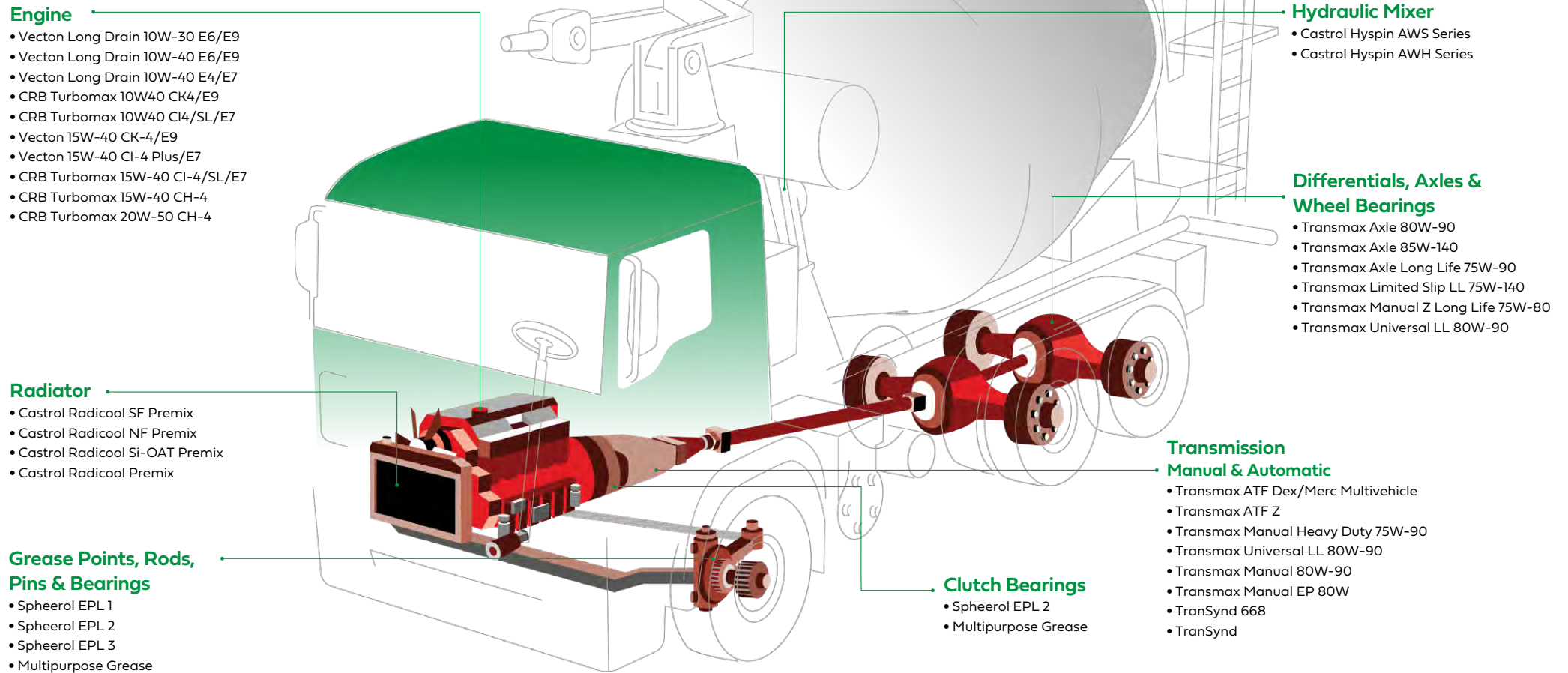
Transmission Manual & Automatic

- Transmax Axle 80W-90
- Transmax Manual 80W-90
- Transmax Manual 90
- Transmax Offroad 30



Commercial Vehicle Product Recommendations

Cement Truck



Commercial Vehicle Product Recommendations

Surface Mining Truck

Hydraulics

- Castrol Hyspin AWS Series
- Castrol Hyspin AWH Series
- Castrol Hyspin HVI Series
- Castrol Offroad Series

Engine

- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 10W40 CI4/SL/E7
- CRB Turbomax 15W-40 CI-4/SL/E7
- CRB Turbomax 15W-40 CH-4
- CRB Turbomax 20W-50 CH-4

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix

Differentials & Gear Drives

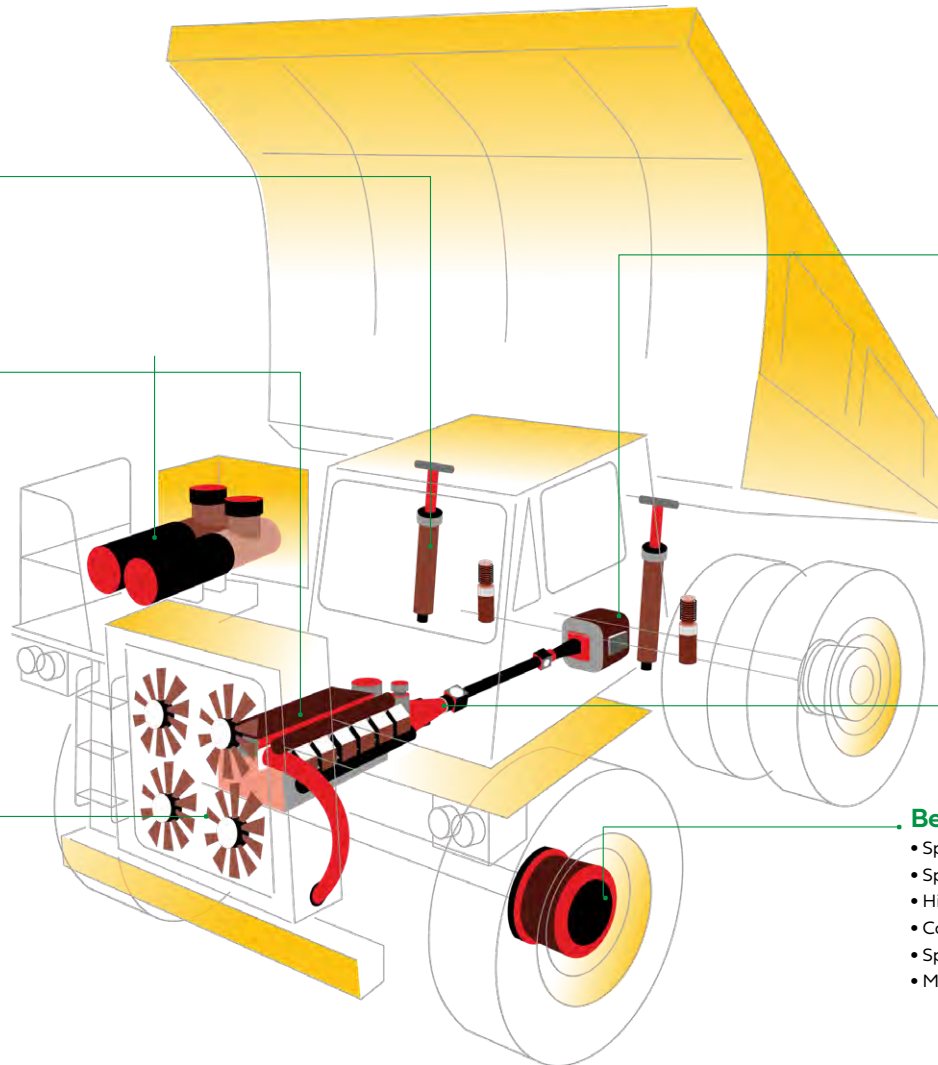
- Transmax Agri Trans Plus 80W
- Castrol Axle EP 80W-90
- Castrol Axle 85W-140
- Transmax Offroad Series

Transmission Final Drives, Front & Rear Axle

- Transmax Offroad 30
- Transmax Offroad 50

Bearings

- Spheerol EPL 2
- Spheerol EPL 3
- High Temperature Grease
- Castrol Minegrease
- Spheerol LCX 222
- Multipurpose Grease



Commercial Vehicle Product Recommendations

Mining Tipper

Engine

- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 10W40 CI4/SL/E7
- CRB Turbomax 15W-40 CI-4/SL/E7
- CRB Turbomax 15W-40 CH-4
- CRB Turbomax 20W-50 CH-4

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix

Transmission

Manual & Automatic

- Transmax ATF Dex/Merc Multivehicle
- Transmax Axle Long Life 75W-90
- Transmax Manual Z Long Life 75W-80
- Transmax Manual Heavy Duty 75W-90
- Transmax Universal LL 80W-90
- Transmax Manual 80W-90
- Transmax Manual EP 80W

Hydraulics

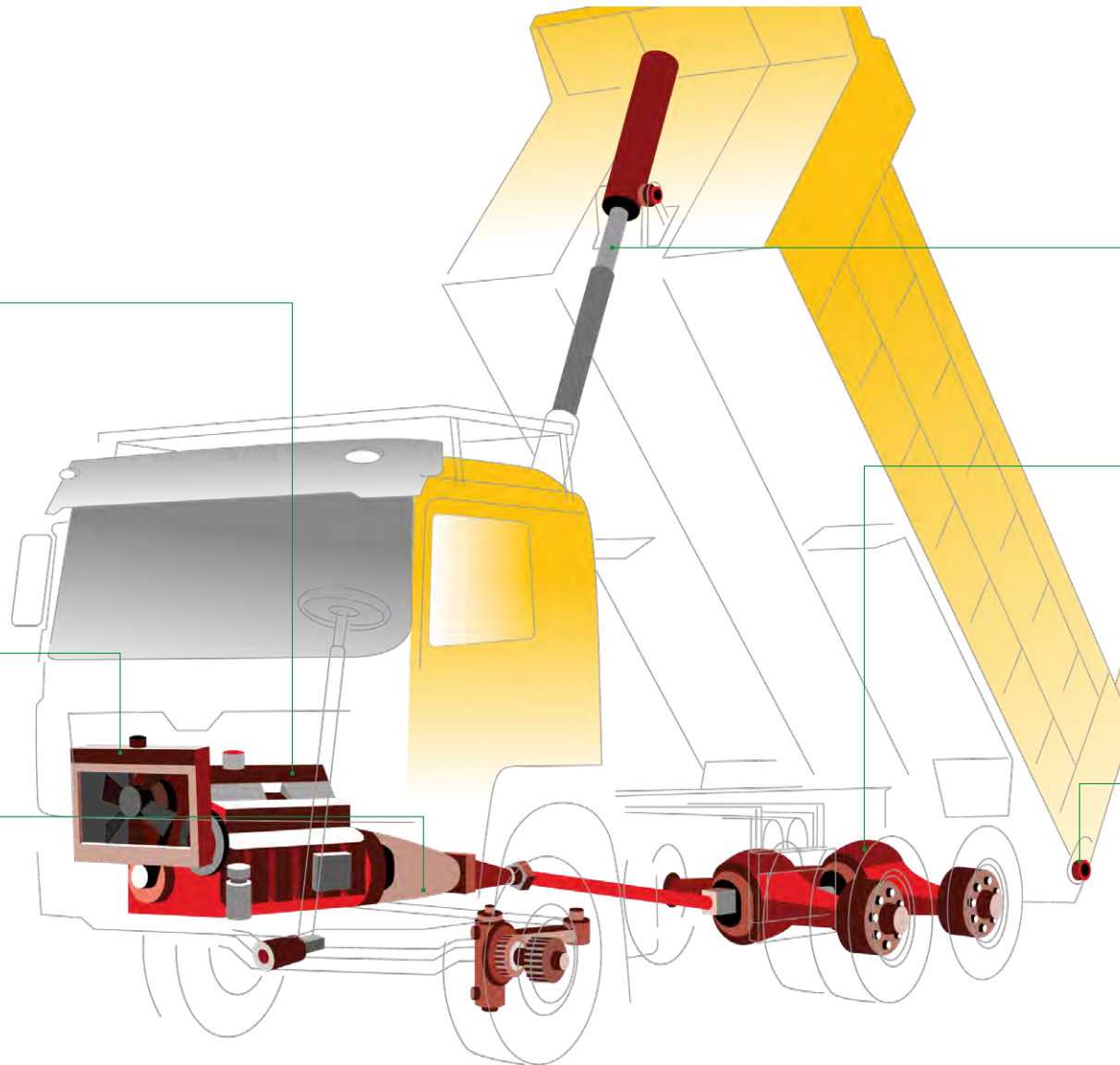
- Castrol Hyspin AWH Series
- Castrol Hyspin AWS Series

Differentials, Axles & Final Drives

- Transmax Axle Long Life 75W-90
- Transmax Limited Slip LL 75W-140
- Transmax Universal LL 80W-90
- Transmax Axle 85W-140
- Transmax Manual 140

Greases

- Spheerol AP 3
- Spheerol EPL 2
- Castrol Minegrease



Commercial Vehicle Product Recommendations

Cone Crusher

Engine

- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CI4/SL/E7
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 15W-40 CI-4/SL/E7
- CRB Turbomax 15W-40 CH-4
- CRB Turbomax 20W-50 CH-4

Hydraulics

- Castrol Hyspin AWS Series
- Castrol Hyspin AWH Series
- Castrol Hyspin HVI Series

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix

Track Gear Box

- Transmax ATF Dex/Merc MV
- Transmax Axle Long Life 75W-90
- Transmax Universal LL 80W-90
- Transmax Axle 80W-90
- Transmax Manual 80W-90
- Transmax Manual EP 80W
- Transmax Manual 90
- Transmax Offroad Series

Cone Spider Bearing

- Castrol Tribol GR 100 PD Range

Feeder Gearbox

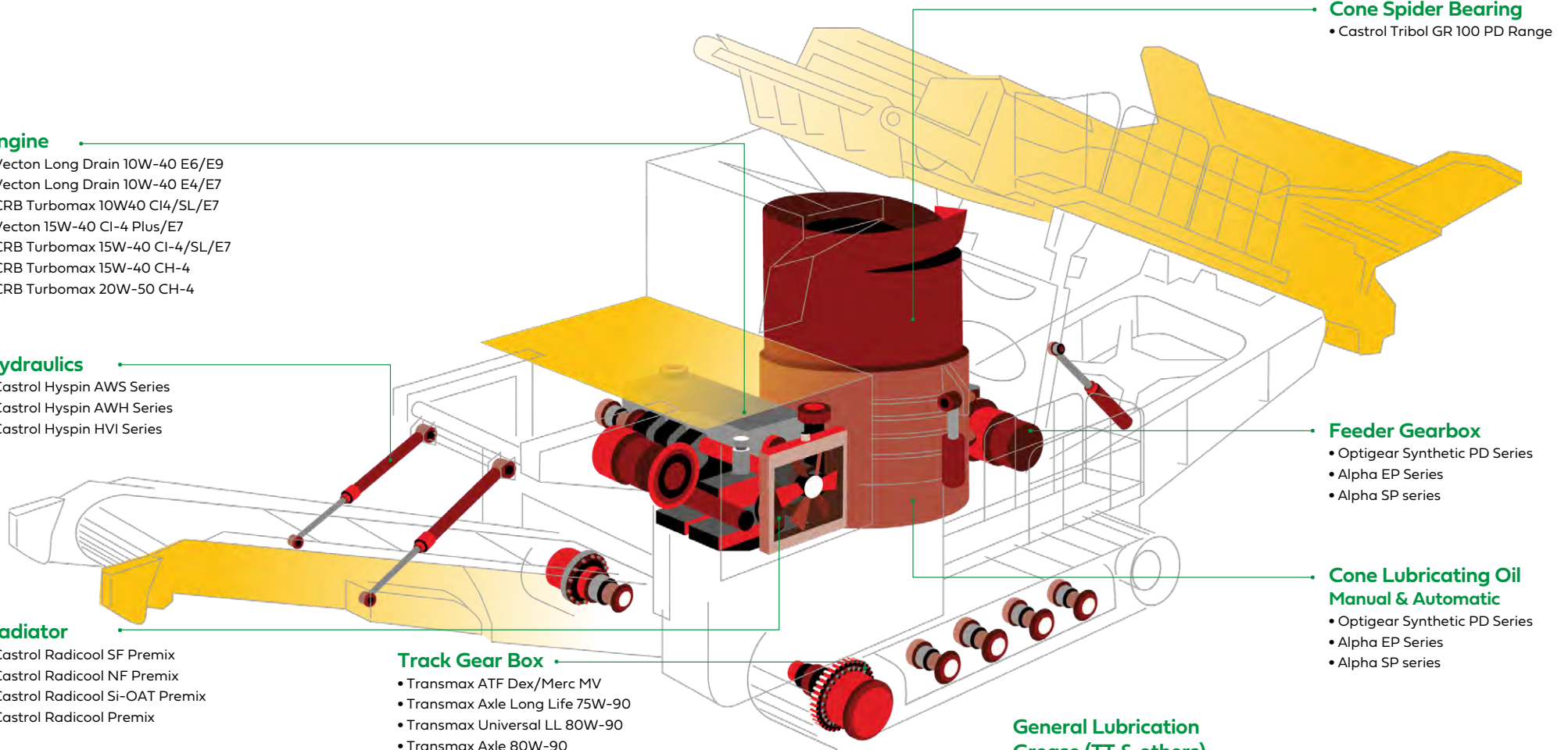
- Optigear Synthetic PD Series
- Alpha EP Series
- Alpha SP series

Cone Lubricating Oil Manual & Automatic

- Optigear Synthetic PD Series
- Alpha EP Series
- Alpha SP series

General Lubrication Grease (TT & others)

- Spheroil LCX 222
- Spheroil EPL 2
- Pyroplex Blue 2



Commercial Vehicle Product Recommendations

WasteTruck

Various Grease Points

- Spheerol EPL 2
- Spheerol EPL 3
- Multipurpose Grease

Engine

- Vecton Long Drain 10W-30 E6/E9
- Vecton Long Drain 10W-40 E6/E9
- Vecton Long Drain 10W-40 E4/E7
- CRB Turbomax 10W40 CK4/E9
- CRB Tmax 10W40 CI4/SL/E7
- Vecton 15W-40 CK-4/E9
- Vecton 15W-40 CI-4 Plus/E7
- CRB Turbomax 15W-40 CI-4/SL/E7
- CRB Turbomax 15W-40 CH-4
- CRB Turbomax 20W-50 CH-4

Radiator

- Castrol Radicool SF Premix
- Castrol Radicool NF Premix
- Castrol Radicool Si-OAT Premix
- Castrol Radicool Premix

Clutch Bearings

- Spheerol EPL 2
- Multipurpose Grease

Hydraulics

- Castrol Hyspin AWS Series
- Castrol Hyspin AWH Series

Transmission Manual & Automatic

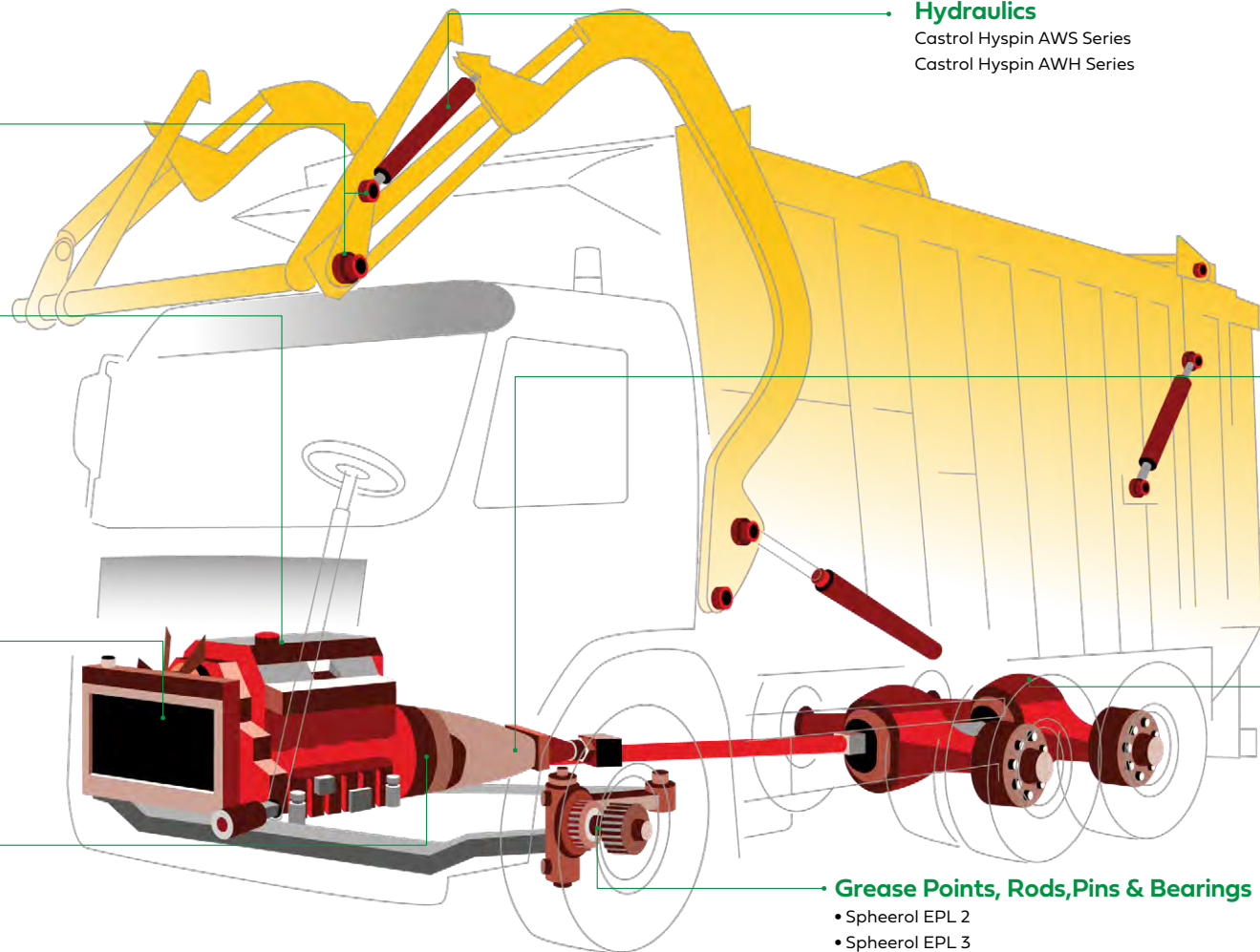
- Transmax ATF Dex/Merc Multivehicle
- Transmax ATF Z
- Transmax Manual Z Long Life 75W-80
- Transmax Manual Heavy Duty 75W-90
- Transmax Universal LL 80W-90
- Transmax Manual 80W-90
- Transmax Manual EP 80W
- TranSynd 668

Differentials & Axles

- Transmax Axle Long Life 75W-90
- Transmax Limited Slip LL 75W-140
- Transmax Universal LL 80W-90
- Transmax Axle 85W-140
- Transmax Manual 140

Grease Points, Rods, Pins & Bearings

- Spheerol EPL 2
- Spheerol EPL 3
- Multipurpose Grease





Industrial lubricants for multiple applications

We can offer a range of products and services to help you drive your business forward.

Castrol, one of the world's leading lubricant brands, has a proud heritage of innovation and fueling the dreams of pioneers. Our passion for performance, combined with a philosophy of working in partnership, has enabled Castrol to develop lubricants, coolants and greases that have been at the heart of numerous technological feats on land, air, sea and in space for over 100 years.

We have the expertise to assist you in selecting the right products and services. Furthermore, we help you improve the productivity and quality of your production while reducing costs at the same time.

Our industrial lubricants and metalworking fluids are based on global experience, an innovative mindset, the most advanced technologies and high-quality products, so you can reap the benefits in your application processes.

Higher productivity.
Longer equipment life.
Lower disposal costs.

Our top priority is to support you in achieving the best possible performance in your industry. We offer you customised solutions and services to suit your individual needs in your production processes.

We support you in every respect. Our sales team helps you select the right products and services for your specific requirements. We are at your side with our comprehensive knowledge and outstanding service to ensure your success.

As our partner, you can depend on Castrol to provide the right products and services for your application.

Industrial lubricants

Castrol offers you a comprehensive range of industrial lubricants for the most diverse areas of application. We have the right products even for the most demanding and cost-intensive applications, which require the latest in lubrication technologies. This allows us to help you optimise your production equipment and protect them from wear.

We can help your equipment work reliably and for longer periods even in difficult and sometimes aggressive environments, therefore increasing the productivity of your machinery.

Gear oils

Our large selection of mineral and synthetic gear oils meet your needs – from standard applications to the most difficult operating conditions such as in wind turbines. These products were developed for a wide range of gear types.

Hydraulic oils

Our superb hydraulic oils fulfil far-reaching requirements such as rapid biodegradability, a high viscosity index, good anti-wear properties along with perfect protection against rust and oxidation.

Machine and slideway oils

Our slideway oils have outstanding lubrication properties, which prevents stick-slip on slideways, and they have a high load-carrying capacity, which significantly reduces wear. These products are suitable to use together with water-soluble cutting fluids thanks to their outstanding demulsifying capacity and their cutting fluids compatibility.

Spindle oils

We offer you high-performance spindle oils to lubricate spindle bearings. These protect your bearings against premature wear and prevent machine downtime.

Spindle oils aim to cool spindles and protect them against corrosion and wear.

Turbine oils

Our Perfecto X and XEP turbine oils are based on the latest additive and base-oil technology. They are used to lubricate and cool steam and gas turbines. They fulfil the requirements of “lubricants and control oils” of DIN 51 515 Part 2 and those of ISO 8068.

Circulating oils

Specifically developed for the critical lubrication demands of larger steel mills, our products are highly suitable for both basic bearings and advanced MORGOIL™ roll neck bearings (which require an outstanding demulsifying property) and for No-Twist™ rollers.



Gas engine oils

The superb gas motor oils of the Castrol Duratec range fulfil the demands of the latest generation of motors. They provide the perfect wear protection, even under high stress.

Medicinal white oils

Our medicinal white oils are specifically designed for lubrication of medical equipment. In addition, they can be used in the food and cosmetic industry where NSF-N1 and FDA approvals are required.

Greases

We offer you a large assortment of outstanding greases – from multi-purpose standard greases and high-performance greases to greases applied in high-temperature environments – from which you can pick the best product for your highly specific application.

Compressor oils

We have high-performance products for screw and piston compressors suitable for small single-stage units to multi-stage designs with very high capacity. Depending on individual application cases, we can offer mineral or synthetic fluids.

Highly fire-resistant hydraulic fluids

Among the highly fire-resistant hydraulic fluids is water glycol. This product has excellent fire resistance, and has proven its excellent anti-wear performance in numerous systems. In addition, we can supply you with Polyolester-based hydraulic fluids with improved anti-wear characteristics.

Heat transfer fluids

Our heat transfer oils are designed for de-pressurised, closed heat transfer systems. They offer excellent heat transfer over a broad temperature range.

Chain lubricants

Our high-performance chain lubricants are suitable for difficult operating conditions such as high temperatures, dusty, wet or corrosive environments as well as electrogalvanisation processes or galvanic metal separation.





HYDRAULICS

HYSPIN AWH-M RANGE

High quality range of shear stability, high viscosity hydraulic fluids with excellent anti-wear performance.

Suitable for use in a diverse range of hydraulic systems that are subject to wide variations in temperature.

For use in off-highway and marine applications and indoor manufacturing equipment.

FEATURES & BENEFITS

- Can be used over a wide temperature range with good shear stability
- Excellent anti-wear performance provides extended wear protection
- Reduced downtime, prolonged lubricant life.

SPECIFICATIONS/APPROVALS

- DIN 51502 classification – HVLP
- ISO 6743/4 - Hydraulic Oils Type HV
- Parker Hannifin (Denison) HF0, HF1 & HF2
- Eaton E-FDGN-TB002-E

MEETS

- DIN 51524 Part 3
- Cincinnati Lamb (Milacron) P 68-69-70
- US Steel 126 & 127

HYSPIN AWS RANGE

High quality mineral oil based hydraulic fluid containing zinc for industrial equipment including injection moulding plus a wide range of machinery including presses, machine tools (CNC machines), certain gearboxes, bearing lubrication systems and many more applications requiring an oil with good anti-wear and anti-oxidant properties.

Suitable for gear, vane and piston type hydraulic pumps, except those containing silver or cadmium.

FEATURES & BENEFITS

- Optimise machine performance
- Extended life of seals
- Reduced downtime, increased productivity
- Reliability and extended pump life.

SPECIFICATIONS/APPROVALS

- DIN 51502 classification - HLP
- ISO 6743/4 - Hydraulic Oils Type HM
- Parker Hannifin (Denison) HF0, HF1 & HF2
- Eaton E-FDGN-TB002-E

MEETS

- DIN 51524 Part 2
- Fives Cincinnati P68, P69 & P70
- ASTM D6158 HM
- ISO 11158 HM
- US Steel 126
- GB 11118.1 L-HM (General and High Pressure)

HYSPIN HVI RANGE

The Castrol Hypsin™ HVI range of high viscosity index (VI) oils is based on a carefully selected ashless (formulated without zinc) additive system designed to meet and exceed the most exacting performance standards. Hypsin HVI oils are intended for severely stressed hydraulic systems requiring a high level of anti-wear performance and fine filtration. The Castrol Hypsin HVI range is fully compatible with elastomer materials commonly used for static and dynamic seals, such as nitrile, silicone and fluorinated (e.g. Viton) polymers.

APPLICATIONS

- Outdoor equipment which are likely to operate over wide temperature ranges, such as machinery subjected to cold start up conditions and high temperature continuous running. Examples include off-highway and marine applications
- Indoor manufacturing equipment that incorporates control systems requiring minimal viscosity change with temperature. Examples include precision machine tools

FEATURES & BENEFITS

- High viscosity index and low pour point enables the product to be used over a wide temperature range. Good shear stability means no excessive loss in viscosity due to mechanical shearing
- Excellent anti-wear performance provides extended wear protection for hydraulic pumps. Reduced down time due to unscheduled maintenance and savings from replacement part costs
- Excellent water separation and hydrolytic stability means reduced down time through prolonged lubricant life and increased equipment reliability
- Excellent thermal and oxidative stability provides reliable performance and extended oil life in severe applications. Minimal deposit formation gives a cleaner system and reduced frequency of filter changes

SPECIFICATIONS/APPROVALS

- DIN 51502 classification – HVLP
- ISO 6743/4 - Hydraulic Oils Type HV
- Parker Hannifin (Denison) HF0, HF1 & HF2
- Eaton E-FDGN-TB002-E

MEETS

- DIN 51524 Part 3
- Cincinnati Lamb (Milacron) P 68-69-70
- US Steel 126 & 127

HYSPIN HLP-Z RANGE

The Castrol Hypsin™ HLP-Z range is based upon highly refined mineral oil enhanced with a stabilised zinc additive system.

APPLICATION

Castrol Hypsin HLP-Z is primarily for use in hydraulic equipment, but is suitable for other duties in which lubricants with good oxidation stability and lubrication performance are required. The quality of its base oils and additives permits the application of Hypsin HLP-Z in lightly loaded gears and for use as circulating oil in applications where a rust and oxidation inhibited oil is required.

The range is fully compatible with elastomer materials commonly used for static and dynamic seals, such as nitrile, silicone and fluorinated (e.g. Viton) polymers.

Hypsin HLP-Z is classified as follows:

- DIN 51502 classification - HLP
- ISO 6743/4 - Hydraulic Oils Type HM

Hypsin HLP-Z meets the requirements (for appropriate viscosity grade) of:

- DIN 51524 part 2
- ASTM D6158 HM
- ISO 11158 HM
- GB 111118.1 L-HM Hydraulic Oil (General)

ADVANTAGES

- Good wear and corrosion protection
- Good thermal and oxidative stability
- High filterability characteristics
- Good water separation



GREASE

MOLUB-ALLOY OG 8031/6000-00

Castrol Molub-Alloy™ OG 8031/6000 is a high viscosity gel formulated lubricant designed to lubricate large heavily loaded open gears. The gel technology adds body to the base fluid to form an ultra-high viscosity lubricant (@ 40°C/ 104°F 10,200 mm²/s approx.) to withstand heavy loads and cushions shock loadings commonly found in open gear applications.

A proprietary blend of Molub-Alloy solids working synergistically with chemical reactive extreme pressure (EP) and antiwear (AW) additives combine to reduce contact temperatures and wear while providing excellent anti-weld protection under extreme pressure and shock loading.

The thixotropic nature of Molub-Alloy OG 8031 allows friction to be reduced to a minimum and aids in its ability to be applied by standard spray systems or used in splash or idler immersion systems. Once applied to the gear surface the Molub-Alloy OG 8031 forms a thick tenacious semi-transparent film on the gear tooth that can be inspected by strobe light during operations.

Molub-Alloy™ OG 8031/6000 has a good pumpability properties at lower temperatures compared to other grades within the range.

APPLICATION

Molub-Alloy OG 8031 is designed to lubricate heavily loaded, low speed open gears, screw type actuators, and low to moderate velocity bushings and bearings operating in the most severely loaded applications equipped with centralised or sump type lubrication systems.

This range is recommended for use in open gear applications in cement, mining and any other industries requiring antiscuff and anti-wear protection, and where no product build up is desired. It is also suited for units containing bushings, bearings and/or gears where straight fluid lubricants can leak out.

ADVANTAGES

- Formulated to minimise distribution line plugging tendency – minimises the potential for eventual plugging of the lubricant distribution lines commonly associated with conventional greases
- Readily pumpable and slumpable for good lubricant distribution – good lubricant distribution in enclosed and semi-enclosed applications, and drainable for ease of removal from surrounding guards
- Specifically formulated to flush contaminants from gear and pinion flanks, and to resist accumulation in the roots of gear teeth
- Highly thixotropic – exhibits a stable form at rest but becomes a fluid when agitated therefore will not run off the gear teeth. However, it will still spread easily and evenly since the gel-like lubricant liquefies when pressure is applied, carrying away both heat and contaminants
- Formulated to address environmental concerns - free of solvents, lead, antimony and barium

MOLUB-ALLOY 6080 RANGE

Castrol Molub-Alloy™ 6080 grease is a High Performance multi-service lubricants designed to give outstanding performance in a wide variety of applications. It may be used in either journal or antifriction bearings in the most demanding industrial applications under extreme environmental conditions.

Molub-Alloy 6080 is manufactured from the highest quality petroleum oil and thickened with a unique calcium complex sulphonate unsurpassed for mechanical shear stability.

Molub-Alloy 6080 grease is compounded with chemical additives for EP characteristics and with select Molub-Alloy lubricating additives for thin-film, high-pressure anti-wear protection. These additives are

dispersed evenly throughout the grease and provide superior protection against component wear, resulting in long service life. It is also inhibited against high temperature oxidation and corrosion, and blended and compounded to withstand the heavy loads and shock loading commonly found in the steel/primary metals, construction, mining, and forest products industries.

The lubricating solids work synergistically with chemical anti-wear and extreme pressure (EP) additives to reduce contact temperatures and wear whilst providing the ultimate in extreme pressure and shock load anti-weld protection.

APPLICATION

Typical applications for Molub-Alloy 6080 grease is bearings that are under heavy water or aggressive process fluid contamination.

ADVANTAGES

- The load carrying and anti-wear capabilities of Molub-Alloy 6080 exceed conventional complex greases.
- Excellent friction reduction characteristics due to Molub-Alloy solid lubricants – easier start-up, reduced heat, and reduced energy leading to longer bearing life.
- Molub-Alloy 6080 multi-service greases offer excellent oxidation resistance and resist washing out, even under adverse water contamination. This product has been designed to work with aggressive process waters.
- Reduced friction due to the effect of the Molub-Alloy additives is most evident under boundary and mixed-film lubrication conditions. This benefit is most pronounced where frequent start up, slow speeds or high and unexpected heavy loads are encountered.
- Overall savings are derived from the above and result from less labor and downtime, smoother, more efficient operation with longer parts life and extended lubrication cycles.

MOLUB-ALLOY 6040 RANGE

Castrol Molub-Alloy™ 6040 greases are extreme pressure (EP) multi-service lubricants designed to give outstanding performance in a wide variety of applications. They may be used in either journal or antifriction bearings in the most demanding industrial applications under extreme environmental conditions.

Castrol Molub-Alloy 6040 is manufactured from the highest quality petroleum oil and thickened with a unique calcium complex sulfonate unsurpassed for mechanical shear stability. Castrol Molub-Alloy 6040 greases are compounded with chemical additives for EP characteristics and with select Castrol Molub-Alloy lubricating additives for thin-film, high-pressure anti-wear protection. They are also inhibited against high temperature oxidation and corrosion.

FEATURES & BENEFITS

- Corrosion and oxidation inhibitors maximise rust protection and grease life.
- Operating temperature range of -40°C to +140°C
- The load carrying and anti-wear capabilities of Castrol Molub-Alloy™ 6040 exceed conventional complex greases
- Castrol Molub-Alloy™ 6040 multi-service greases offer excellent oxidation resistance and resist washing out, even under adverse water contamination. This product has been designed to work with aggressive process waters
- Reduced friction due to the effect of the Castrol Molub-Alloy additives is most evident under boundary and mixed-film lubrication conditions. This benefit is most pronounced where frequent start-up, slow speeds or high and unexpected heavy loads are encountered
- Overall savings are derived from the above and result from less labor and downtime, smoother, more efficient operation with longer parts life and extended lubrication cycles.

TRIBOL GR 100 PD RANGE

Castrol Tribol GR 100 PD is a range of lithium based greases containing highly refined mineral oils, enhanced with the MicroFlux Trans (MFT) additive system. The MFT additive technology provides optimum wear protection and an extremely low coefficient of friction even under extremes of pressure, vibration, shock loads, at high or low speeds or varying micro-smoothing of the friction surfaces.

Typical applications include bearings of spinning and grinding spindles, gear motors exposed to shock loads, screening / wood shaping machines, bearing surfaces of printing plates, spreader rolls, roll neck bearings in steel mills, bearings with changing rotational directions or slewing movements, and are also used in curved teeth couplings and centralised lubricating systems.

FEATURES & BENEFITS

- High load bearing capacity – extends the operating period under high loads leading to optimum wear protection
- Superior lubrication and surface smoothing effects due to MFT can reduce failures, leading to less downtime and repair work. PD technology can prolong the life of damaged components
- Establishment of a protective layer of MFT – this additive system can effectively increase the load bearing area, reducing unit pressures, operating temperatures and wear, increasing service life of both parts and lubricant
- Improved bearing surfaces for longer service life result from the 'running in' effect of MFT
- Extremely low coefficients of friction – generating energy savings and reduced noise levels.

SPHEEROL LCX 222

Castrol Spheerol™ LCX 222 is a premium lithium complex, extreme pressure grease intended for industrial or construction applications. Based on high quality mineral oils, Spheerol LCX grease is formulated to provide excellent high temperature performance with excellent adhesion, structural stability and resistance to water. The grease has a high level of chemical stability and offer excellent protection against rust, corrosion and wear, especially on axles, rings and bearings. The operating temperature range is -20°C to + 140°C

APPLICATION

Spheerol LCX 222 is a NLGI 2 grade heavy duty grease, recommended for industrial bearings in severe applications and provide protection against:

- Shocks and vibrations
- Water washout, water ingress
- Corrosive environment, as in mill applications

ADVANTAGES

Spheerol LCX 222 offers the following benefits:

- Reduced downtime and maintenance costs because of high level of protection against wear, corrosion and oxidation combined with an exceptional degree of rust protection against acidic water.
- High anti-wear and extreme pressure performance to be suitable for a wide range of bearing speeds.
- Extended intervals between re-lubrication due to long product life even under severe operating conditions.
- Excellent resistance to water washout

SPHEEROL EP RANGE

Castrol Spheerol EP is recommended as a general-purpose grease in all heavily loaded or shock-loaded plain and anti-friction bearings or where an extreme pressure additive is required on industrial plant and earthmoving equipment. The product is suitable for operating temperatures between -25 °C to 120 °C.

FEATURES & BENEFITS

- Good mechanical stability, the grease keeps its consistency in service ensuring long lubricant life.
- Good adhesion, continuous lubrication and reduced consumption as film stays between lubricated surfaces.
- Good water resistance, the grease film remains on the surface even in the presence of water.
- Resistant to copper and steel corrosion helps prevent rust and oxidation on metal surfaces.
- Excellent EP and anti-wear properties – protects equipment against extreme loading and helps minimise bearing component wear.

SPECIFICATIONS/APPROVALS

SPHEROL EP 0

- Lithium
- Amber to Brown appearance
- NLGI 00
- Semi fluid

SPHEROL EP 1

- Lithium
- Amber to Brown appearance
- NLGI 1
- Dropping Point, Minimum 190°C

SPHEROL EP 2

- Lithium
- Amber
- NLGI 2
- Dropping Point, 200°C

SPHEEROL™ LMM

Castrol Spheerol™ LMM is a multi-purpose lithium grease containing molybdenum disulphide solid lubricant to enhance its load carrying properties under conditions of high or shock loading or to prevent scuffing or fretting. It contains oxidation and corrosion inhibitors, anti-wear additives, has good mechanical stability and can be used in the presence of moisture.

APPLICATION

Spheerol LMM grease is suitable for most types of bearing and a wide range of other industrial applications, which require a molybdenum disulphide grease, including grease lubricated gears. Spheerol LMM may be used in plain and rolling element bearings, including heavily loaded bearings at low and medium speeds, and those subject to shock loading and excessive vibrations. The incorporation of solid lubricant in Spheerol LMM greases makes this grease particularly suited for the lubrication of reciprocating and sliding motion elements, where the prevention of scuffing and fretting is desirable. Typical applications include pivot pins, cams, screws, splined shafts, slides, flexible joints (ball, universal, CV joints etc). It is also useful for the lubrication of chains, swivels and shackles to prevent scuffing.

FEATURES & BENEFITS

- Good load carrying capacity – protects equipment against extreme loading and helps prevent damage caused by shock loading and excessive vibration.
- Resistance to scuffing and fretting – provides protection against fretting that can occur on splined shafts, pivot pins and other parts subject to reciprocating and sliding motion.
- Good water resistance – the grease film remains on the surface even in the presence of water.
- Resistant to copper and steel corrosion – helps prevent rust and oxidation on metal surfaces.
- Good adhesion – continuous lubrication and reduced consumption as film stays between lubricated surfaces.

MINE GREASE

Castrol Mine Grease is an extreme pressure lithium grease formulated with specially selected base oil combinations that provide optimal pumpability. Castrol Mine Grease also contains 3% molybdenum disulphide, which provides additional wear protection under conditions of vibratory motion.

APPLICATION

Castrol Mine Grease is ideally suited for the lubrication of heavily loaded plain and anti-friction bearings used in construction, earthmoving and mining equipment. Castrol Mine Grease provides protection against wear under heavy and shock loads, high temperature and wet environments.

ADVANTAGES

- Superior EP properties provide protection against extreme shock loading.
- High performance corrosion inhibitors protect equipment and reduce maintenance costs and downtime.
- Excellent pumpability reduces the risk of blocked lubrication lines and lubrication starvation.
- Outstanding structural stability means the lubricant does not slump out of the application.

PRODUCT PERFORMANCE CLAIMS

Komatsu(AH10529a)

Rothe Erde

Liebherr

PYROPLEX BLUE

Castrol Pyroplex Blue is the ultimate lubricant for challenging on and off highway environments where water is present. Castrol Pyroplex Blue's unique multifunctional solid lubricant additive builds up tack and adhesion when exposed to water and humidity in saturated environments, while resisting softening and washing out. In high temperature environments, film strength is increased between metal surfaces, and the affinity for metal surfaces is enhanced. This produces a slippery physical barrier of protection.

ADVANTAGES

- Multifunctional use for both on and off road.
- Better adhesion with improved mobility.
- Increased tack and adhesion in the presence of water (note water spray-off).
- Enhanced extreme pressure and anti-wear performance (note four ball weld).
- Excellent high temperature performance (note drop point).
- GC-LB approved grease.
- Excellent high temperature performance (note drop point).
- Superior rust and oxidation control.

Castrol Pyroplex Blue's Dependable performance under varying conditions reduces maintenance costs while extending equipment life. Castrol Pyroplex Blue's environmental impact is reduced through the non-utilization of Antimony, Barium, Lead, or Chlorinated Compounds.

Industry Specifications and OEM Approvals by Grade

Exceeds GC-LB (NLGI #1 grade only)



AIR COMPRESSOR OILS

AIRCOL SR RANGE

Range of synthetic based, high performance air compressor oils formulated to provide a significantly longer service life in modern oil flooded rotary screw compressors, especially when compared to conventional mineral oil based products.

Suitable for use in all single and two stage oil flooded rotary screw compressors, both stationary and portable types.

FEATURES & BENEFITS

- Very low deposit forming tendency, extends service life of filters and separators
- Meets the requirements of Atlas Copco 8000 hour oil drain interval
- Outstanding oxidation stability and antiwear performance providing long lubricant and equipment life.

SPECIFICATIONS/APPROVALS

- Viscosity: 46 and 68 available
- DIM 51506 classification VDL
- ISO 6743/3- DAG, DAH and DAJ for rotary air compressors
- Meets requirements of Atlas copco 8000 hour oil drain intervals
- Kaeser

AIRCOL CM RANGE

The Castrol Aircol™ CM compressor oil range of high quality lubricants are based upon highly refined mineral oil, enhanced with additive technology providing excellent thermal and oxidative stability and good load carrying capacity, compared to other products in the same class.

Castrol Aircol CM grades are formulated without zinc additives (ashless oils), recommended for the lubrication of rotary screw and reciprocating compressors.

SPECIFICATIONS/APPROVALS

- Viscosity: 32, 46, 68, 100
- ISO 6743-3 compressor oils
- DAA and DAB for reciprocating (piston) and drip free rotary air compressors
- DAG and DAH for oil-flooded rotary screw air compressors
- Meet the requirements of the DIN 51506 VDL classification for reciprocating compressors having air discharge temperatures up to 220°C.

AIRCOL SN 68 & 100

Aircol SN 68 and 100 are diester based synthetic lubricants with excellent oxidation resistance and low carbon-forming tendency.

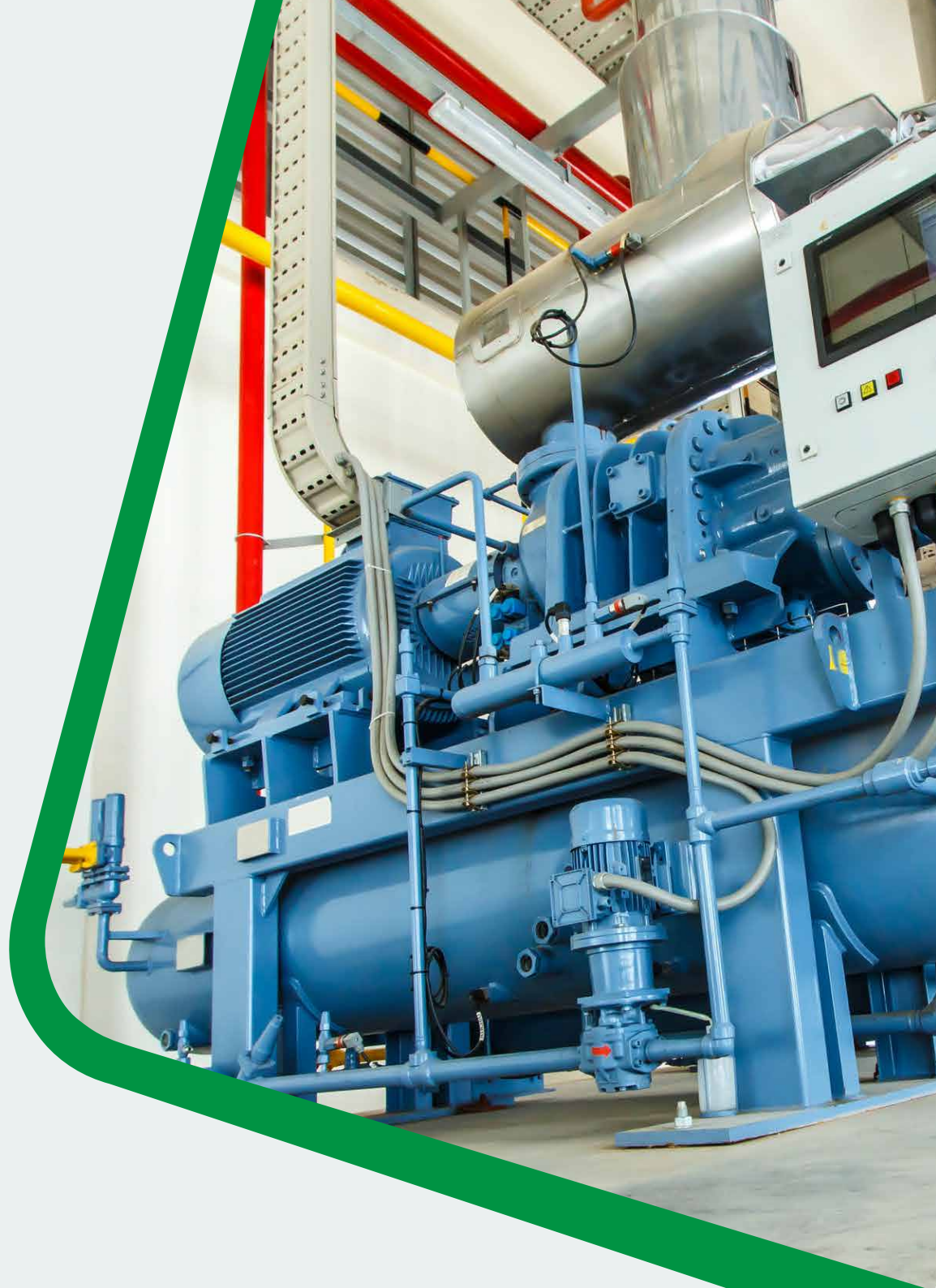
APPLICATION

Aircol SN 68 and 100 were developed to cope with the severe operating conditions experienced in reciprocating air compressors operating at high compression ratios and high discharge temperatures of up to 220 deg C. Under these conditions, Aircol SN 68 and 100 offer a much reduced carbon forming tendency and extended oil life when compared to mineral oil. Whilst Aircol SN 68 was primarily intended for the use in reciprocating air compressors, it may also be used in certain types of turbocharger, where it will provide significant in-service benefits when compared with mineral based lubricants.

FEATURES AND BENEFITS

Castrol Aircol SN combines excellent protection, long life and cleanliness in operation to provide the following key benefits:

- Low carbon forming tendency giving longer valve life, longer intervals between cylinder head overhauls and greater reliability when operating at high discharge temperatures.
- Improved lubricity and film strength minimises cylinder and ring wear and also improves air quality by allowing feed rates to be reduced without detrimental results.
- Reduced compressor down time due to less wear on all moving parts, longer machine life and reduced maintenance.





GAS COMPRESSOR OILS

AIRCOL PG 185

Aircol PG 185 is a high performance synthetic gas compressor oil based on poly-alkylene glycol, for the lubrication of compressors handling hydrocarbon and chemical gases. The lubricant contains oxidation and corrosion inhibitors, providing excellent thermal and oxidation stability, together with the necessary corrosion protection for the compressor.

APPLICATION

Aircol PG 185 has good lubricity characteristics and a very high viscosity index which benefits high temperature operations. It is for use in the working sumps of both rotary and reciprocating compressors where the lubricant is in continuous contact with the gas being compressed. If mineral oils were used in these applications, the gas would dissolve and cause a drastic reduction in oil viscosity, which could in turn lead to compressor failure. Hydrocarbon gases dissolve to a much lesser extent in Aircol PG 185 ensuring longer working life and adequate lubrication performance.

Aircol PG 185 may be used with a wide range of gases, including:

- Liquified natural gases such as methane and ethane.
- Liquified petroleum gases such as propane and butane.
- Hydrocarbon chemical gases such as ethylene, propylene and butylene.
- Chemical gases such as ammonia, vinyl chloride and butadiene.

ADVANTAGES

Aircol PG 185 has low solvency properties with the hydrocarbon and chemical gases, which can enter the crankcases of gas compressors, consequently avoiding a significant fall in viscosity and lubricant performance.

Being totally synthetic, this product does not suffer the tendency

of mineral oils to break down or polymerise to form gums, resins and carbon. It has a high viscosity index which benefits extreme temperature operations. Finally, Aircol PG 185 can be employed in the widest range of LPG, LNG hydrocarbon and chemical gases including butadiene, methane, ethane, propane.

PRODUCT PERFORMANCE CLAIMS

Aircol PG 185 meets the requirements of Sulzer Burckhard A.G. Winterhur for use in K-type gas cargo compressors.



REFRIGERATION COMPRESSOR OILS

AIRCOL 200 RANGE

The Castrol Aircol 200 range of refrigeration lubricants is available as two grades of specially selected mineral oils, highly refined, to provide chemical and thermal stability. Their low wax forming tendencies ensure low pour points.

APPLICATION

The Castrol Aircol 200 range is specifically for use in refrigeration and air conditioning plants using fluorocarbon refrigerants. The exceptional low temperature characteristics of these oils prevent the flocculent precipitation of wax which can otherwise occur in high performance plant using Freon refrigerants.

In most systems using R22, the critical solution temperature characteristics of these oils are adequate to prevent oil/ refrigerant separation problems within the low temperature circuits. Where evaporation temperatures are exceptionally low or in systems not incorporating oil/refrigerant separators, synthetic base refrigerant oils may be preferred.

AIRCOL 228 RANGE

The Castrol Aircol 228 range of refrigeration oils are formulated from selected alkyl-benzene base stocks.

APPLICATION

Suitable for use in R22 refrigeration systems with very low evaporator temperatures where Alkyl-benzene based lubricants are recommended by the manufacturer. These products may not be suitable for use in refrigeration systems employing screw compressors due to the high level of solubility of refrigerant in the lubricant, which may reduce its viscosity to unacceptable levels. However this is largely dependent on operating conditions.

Castrol Aircol 2284 can also be used in ammonia refrigeration compressors where an ISO VG 68 Alkyl-benzene based lubricant is recommended.

FEATURES / BENEFITS

The Castrol Aircol 228 range of refrigeration oils has excellent miscibility and solubility characteristics with R22. The very low floc points enable the Aircol 228 range to be used in systems where evaporator temperatures are extremely low.

AIRCOL SW RANGE

The Castrol Aircol SW range of synthetic refrigeration lubricants are formulated from polyolester base stocks.

APPLICATION

They are specifically designed for use with refrigeration systems using environmentally friendly HFC refrigerants, in particular R134a.

FEATURES AND BENEFITS

The synthetic base stocks used in the Aircol SW range are fully miscible with HFCs, in particular R134a, even at temperatures well below the minimum likely to be encountered in service.

The Aircol SW grades have been formulated to enhance hydrolytic stability, load carrying and inhibition against copper plating. They are wax free and hence have very low pour points. This ensures the evaporator remains clean (consequent efficient heat transfer) and reduces the risk of pipe blockages.

AIRCOL™ LPT RANGE

The Castrol Aircol™ LPT Range (previously called Energol™ LPT) are refrigeration compressor lubricants formulated from highly refined naphthenic base oils for use in both large and industrial and small domestic refrigeration units.

APPLICATION

The Aircol LPT range is formulated to function as lubricants and coolants, as well as sealants in refrigerating compressors.

They maintain good lubrication properties at the high temperatures reached during the compression phase and good fluidity at the low temperatures within the evaporators. Excellent lubrication of the moving parts in the compressor as well as recycling of the oil, entrained into the system by the refrigerant, are therefore ensured.

The chemical stability of the Aircol LPT oils prevents them from reacting with the refrigerants used in refrigeration systems to form potentially disruptive breakdown products. All Aircol LPT grades are suitable for use in systems using Ammonia (NH₃) or halogenated hydrocarbons. They can also be used where good low temperature flow properties are required in the lubricant.

ADVANTAGES

The Aircol LPT Range oils ensure long and trouble-free operation of refrigeration systems through a combination of:

- High thermal and chemical stability.
- Good temperature / viscosity behaviour.
- Good low temperature flow properties

GEAR OILS



ALPHASYN HG RANGE

Alphasyn HG synthetic fluids are polyalphaolefin based, high performance lubricants formulated with specially selected additives to offer a range of fluids for use in both gear and bearing applications.

The range has been designed to offer specific performance benefits over its conventional mineral oil and synthetic fluid counterparts.

APPLICATION

Particularly suitable for applications at high operating temperatures and loadings, Alphasyn HG provides superior performance benefits including excellent thermal and oxidation stability and enhanced load carrying ability as detailed below.

ADVANTAGES

Alphasyn HG offers a wide range of performance benefits over a conventional lubricant when used in gear and bearing applications:

- Substantially extended lubricant life.
- Excellent anti-wear, extreme pressure and load carrying properties.
- Superior performance across a wide temperature range and in particular at high temperatures.
- Excellent thermal and oxidative stability.
- Low pour point and good air and water separation capabilities.

Compatible with standard seal, paint and hose material, and with Ortlinghaus multi-plate clutches.

Alphasyn HG synthetic fluids pass the standard FZG test (A/8.3/90) with a fail load stage of greater than 12 and also the more severe FZG test (A/16.6/140) at a fail load stage of 11.

Alphasyn HG range passes the ASTM D665B corrosion and ASTM D2893 oxidation tests.

PRODUCT PERFORMANCE CLAIMS

Alphasyn HG range meets the requirements of:

- DIN 51517 Part 3 - Industrial gear oil specification.
- DIN 51524 Part 2 - Industrial hydraulic oil specification.

Alphasyn HG oils are approved and recommended by major centrifuge manufacturers for gear case lubrication and meet the requirements of key marine gearbox manufacturers, including the Ortlinghaus clutch test.

ALPHASYN T RANGE

The Castrol Alphasyn T gear oil range of synthetic lubricants are formulated on polyalpha-olefin (PAO) base fluids and phosphorus-based antiwear additive technology providing outstanding thermal stability and good load carrying capacity.

APPLICATION

Alphasyn T grades have been formulated for use in bearings, circulatory systems and moderately-loaded gear systems operating at both high and low temperatures. Alphasyn T should not be used for heavy / shock loaded systems.

Alphasyn T is suitable for various applications where a lubricating oil is used under extremes of temperature or variable temperatures, e.g. from hydraulic systems through to large, slow moving gears.

All products in the Alphasyn T range have very low pour points and excellent viscosity / temperature characteristics, allowing their use in both low and high temperature applications.

The Alphasyn T range is fully compatible with nitrile, silicone and fluopolymer seal materials.

CONDITIONS OF USE

Alphasyn T is classified as follows:

- DIN Classification is CL.

Alphasyn T grades meet the requirements of:

- DIN 51517 Part 2.
- David Brown Type A.

ADVANTAGES

- Good thermal and oxidative stability provides reliable operation and extended operating life when compared to mineral oil based products.
- Inherently high viscosity index (VI) makes the product suitable for operations operating over a wide temperature range.
- Good antiwear and load carrying abilities minimizes gear wear and prolongs gear tooth life.
- Good water separation and demulsification characteristics means reduced down time through prolonged lubricant life and increased equipment reliability.
- PAO based lubricant provides good compatibility with seals

ALPHA SP RANGE

Recommended for the lubrication of industrial gear boxes using forced circulate or splash and oil bath lubrication.

FEATURES & BENEFITS

- Sulphur-phosphorous EP additives provide good load carrying ability, reducing gear tooth wear
- Withstands elevated temperatures for extending service life
- Corrosion inhibitors provide ongoing protection of gear teeth
- Excellent demulsification properties help to maintain full lubricating film with no loss of performance
- Anti-foam additives maintain full lubricating film.

SPECIFICATIONS/APPROVALS

- Viscosity range: 68, 100, 150, 220, 320, 460, 680
- DIN classification - CLP
- DIN 51517 Part 3
- AGMA 9005 - E02
- AIST 224
- David Brown S1.53.101 Type E
- Flender Rev 16 for Helical-, Bevel- and Planetary Gear Units (ISO VG 150 - 460)

ALPHASYN PG RANGE

Synthetic gear oil primarily intended for use in worm reduction gear boxes, where the low coefficient of friction of the polyalkylene glycol (PAG) base fluid improves efficiency and consequently reduces power consumption and operating temperatures.

Meets requirements of most OEM's that allow the use of PAG based gear oils.

FEATURES & BENEFITS

- High VI makes it suitable for operations over a wide temperature range
- Low coefficient of friction reduces energy consumption and lowers operating temperatures, leading to longer oil life
- Good thermal and oxidative stability provides reliable operation and extended operating life when compared to mineral oil based products.

SPECIFICATIONS/APPROVALS

- Viscosity: 150, 220

ALPHASYN EP RANGE

High quality synthetic lubricant based on poly-alphaolefin (PAO) fluids & sulphur/phosphorus.

Extreme pressure additive technology providing good thermal and high load carrying capacity.

FEATURES & BENEFITS

- Excellent equipment protection with minimal wear and tear – provides long term equipment performance and reliability
- Synthetic gear oil that provides excellent high temperature stability to extend machine service life
- EP additives protect gears at high temperatures, reducing bearing and gear tooth wear
- High viscosity index provides high film strength at elevated temperatures.

SPECIFICATIONS/APPROVALS

- Viscosity range: 150, 220, 320, and 460
- DIN Classification CLP-HC
- Meets the requirements of:
 - DIN 51517 Part 3
 - AGMA 9005 - F16
 - AIST 224
 - David Brown S1.53.101 Type E
 - Flender Gear Units Rev 16 for Helical-, Bevel- and Planetary Gear Units ISO VG 150 - 680

OPTIGEAR SYNTHETIC PD...ES RANGE

Castrol Optigear™ Synthetic PD...ES Range is based on synthetic hydrocarbons (PAO) with Castrol's advanced gear oil system which gives special plastic deformation (PD) and surface improvement performance. The additive package, when activated by high specific loads and corresponding temperatures, helps to equalize surface roughness without creating abrasion leading to the surface improvement (plastic deformation).

Optigear Synthetic PD...ES is a CLP-HC gear oil (according to DIN 51502) and exceeds the minimum requirements according to DIN 51517, part 3, CLP gear oils and is formulated with detergent type additives.

Optigear Synthetic PD...ES is classified as follows :

- DIN 51517-3 for CLP gear oils
- DIN 51517-4 for C LPX gear oils

Optigear Synthetic PD 150 ES to PD 460 ES gear oils are approved by Flender (Flender gear units - Listing T 7300, Rev. 16, formerly Siemens Mechanical Drives).

APPLICATION

Castrol Optigear Synthetic PD...ES may be used in spur gear, bevel gears or planetary gear units and in heavy loaded gear units. It is also suitable for the lubrication of oil-lubricated rolling bearings. It is especially designed to reduce friction losses and can reduce energy consumption compared to more conventional lubricants. The lower friction observed with Optigear Synthetic PD...ES means less stress in the contact point subsurface area, which means lower risk for pittings and micropittings.

Being synthetic based it will also withstand higher temperatures and provide extended life. Depending on the specific application, Optigear Synthetic PD...ES may be used in an operating temperature

range from -40°C to +100°C, and up to +120°C for short periods. (Note the lower operating temperature is dependent on the pour point).

The beneficial effects of the special PD additives contained in Optigear Synthetic PD...ES will be reduced if mixed with other lubricants. If mixing with other oils cannot be avoided, contact our local technical support team for advice on compatibility (as a guide at least <5% of other oils is preferred). Optigear Synthetic PD...ES is compatible with most commonly used elastomer seal materials.

ADVANTAGES

- High load carrying capacity
- Very low friction coefficient and frictional torque
- Superior micropitting protection
- Surface smoothing effect
- Excellent bearing lubrication suitability
- Good filtration properties
- Long life lubricant



HEAT TRANSFER OILS

PERFECTO HT 5

Castrol Perfecto HT 5 is based on a solvent-refined, high viscosity index mineral oil specially selected for its high thermal and oxidation stability.

FEATURES & BENEFITS

- Tightly controlled specification helps minimise deposits in heat exchangers in order to maintain heat transfer efficiency
- High operating temperature capability in closed systems with temperatures up to 320°C permitted.

SPECIFICATIONS/APPROVALS

- Castrol Perfecto HT 5 is primarily intended for use in closed heat transfer systems with bulk temperatures up to 320°C. It can also be used in open systems at much lower bulk oil temperatures
- Castrol Perfecto HT 5, because of its solvency and high thermal stability serves as excellent Turbine Flushing oil.





**METAL WORKING
FLUIDS**

ILOCUT 510 MP

Castrol Ilocut™ 510 MP is a chlorine and heavy-metal free, multi-purpose neat cutting oil. Formulated from highly refined base oils, it can also be used as a hydraulic oil confirming to ISO 6743/4 Type HM and DIN 51502 Class HLP-D

SPECIFICATION

Castrol Ilocut 510 MP is suitable for large central systems and single sump machines.

APPLICATION

Castrol Ilocut 510 MP is designed for grinding, drilling and general machining of ferrous as well as non-ferrous materials. It does not contain active sulphur and is hence compatible with yellow metals as well.

ADVANTAGES

- Truly multipurpose – spent hydraulic oil can be used as a neat cutting oil thereby reducing overall cost
- Excellent detergency and dispersancy properties preventing residues or deposits on work piece
- Low viscosity and excellent wetting characteristics reduce drag out and result in lower product usage
- Good filtering characteristics and high oxidation stability increases product lifetime
- Our chlorine and heavy-metal free formulation improves the environmental profile and reduces disposal costs

ILOCUT 522 MP

Castrol Ilocut™ 522 MP is a chlorine and heavy-metal free, multi-purpose neat cutting oil. Formulated from highly refined base oils, it can also be used as a hydraulic oil confirming to ISO 6743/4 Type HM and DIN 51502 Class HLP-D specification.

Castrol Ilocut 522 MP is suitable for large central systems and single sump machines.

APPLICATION

Castrol Ilocut 522 MP is designed for grinding, drilling and general machining of ferrous as well as non-ferrous materials. It does not contain active sulphur and is hence compatible with yellow metals as well.

ADVANTAGES

- Truly multipurpose – spent hydraulic oil can be used as a neat cutting oil thereby reducing overall cost
- Excellent detergency and dispersancy properties preventing residues or deposits on work piece
- Low viscosity and excellent wetting characteristics reduce drag out and result in lower product usage
- Good filtering characteristics and high oxidation stability increases product lifetime
- Our chlorine and heavy-metal free formulation improves the environmental profile and reduces disposal costs

ILOCUT 330

Castrol Ilocut™ 330 is a chlorine and heavy-metal free neat cutting oil.

APPLICATION

Ilocut 330 is designed for general machining of high alloyed steel. It is also suitable for broaching and gear cutting of medium alloyed steel.

Ilocut 330 contains active sulphur and is not compatible with yellow metals.

ADVANTAGES

- Advanced additive technology gives high extreme pressure (EP) lubricity properties and lowers production costs through extended tool life
- Improved surface finish and increased cutting speeds leads to improvement of process efficiency
- Our chlorine and heavy-metal free formulation improves the environmental profile and reduces disposal costs

VARIOCUT G 600 HC

Castrol Variocut™ G 600 HC is a chlorine and heavy-metal free neat cutting oil based on the latest generation of Extreme High Viscosity Index (EHVI) hydrocracked base oils.

APPLICATION

Variocut G 600 HC is designed for high speed, creep feed grinding, especially gear grinding of ferrous and yellow metals with CBN and carborundum wheels.

ADVANTAGES

- Low oil mist and foam characteristics, even at high pressures and flow rates, can lead to a reduction in oil consumption and increased production rates
- Superior additive technology helps to improve cutting and grinding efficiencies, increased tool life, surface finish and can lower overall operating costs
- Low viscosity and excellent wetting characteristics can reduce drag out and helps to reduce product usage
- Good filtering characteristics and high oxidation stability can increase product lifetime
- Multi-metal machining using our superior additive technology may provides opportunity for product consolidation
- Our chlorine and heavy-metal free formulation helps to improve the environmental profile and reduces disposal costs
- Low odour, light colour and low mist qualities result in high operator acceptability

HYSOL SL 20 XBB

Castrol Hysol™ SL 20 XBB is a high performance semi synthetic metalworking fluid which is formulated without formaldehyde releasing agent and boron. It contains an additive package that works in synergy to help enhancing machining performance and surface finish, provide excellent product stability and lower the overall operations costs.

Hysol SL 20 XBB is suitable for large central systems and single sump machines.

APPLICATION

Hysol SL 20 XBB is especially designed for machining of cast iron and low-medium alloyed steel.

ADVANTAGES

- Extended fluid life can help to reduce maintenance and downtime
- Low foam in recommended water conditions (see details below)
- Good anti-corrosion properties help to protect machine tools and parts
- Good wetting properties can help to reduce coolant drag out and help deliver cleaner machine tools and components
- Formulated without formaldehyde releasing agent and boron which help you to fulfil aspects of legislative requirements and waste treatment requirements that specify that these chemicals are excluded

HYSOL MB 50

Castrol Hysol™ MB 50 is a high performance soluble metalworking fluid formulated without formaldehyde releasing agents. It contains an additive package that may help to enhance machining performance and surface finish. It also provides excellent product stability which helps to lower the overall operational costs.

Hysol MB 50 is suitable for large central systems and single sump machines.

APPLICATION

Hysol MB 50 is especially designed for machining of ferrous and aluminium alloys

ADVANTAGES

- Extended fluid life can help to reduce maintenance and downtime
- Low foam in recommended water conditions (see details below)
- Lubrication package designed to try to help enhance tool life and improve surface finish on aluminium, titanium and ferrous machining
- Good wetting properties can help to reduce coolant drag out and help deliver cleaner machine tools and components
- Suitable for a wide range of materials and applications provides opportunity for product consolidation
- Formulated without formaldehyde releasing agents which help you to fulfil aspects of legislative requirements and waste treatment requirements that specify that these chemicals are excluded

ALUSOL™ SL 61 XBB

Castrol Alusol™ SL 61 XBB is a high performance semi-synthetic metalworking fluid formulated without boron and formaldehyde releasing agents. It contains an additive package that may help to enhance machining performance and surface finish. It also provides excellent product stability which helps to lower the overall operational costs.

Alusol SL 61 XBB is suitable for large central systems and single sump machines.

APPLICATION

Alusol SL 61 XBB is especially designed for the machining of aluminium alloys. The product can also be used for the machining of ferrous alloys.

ADVANTAGES

- Extended fluid life can help to reduce maintenance and downtime
- Low foam in recommended water conditions (see details below)
- Lubrication package designed to try to help enhance tool life and improve surface finish on aluminium machining
- Good wetting properties can help to reduce coolant drag out and help deliver cleaner machine tools and components
- Formulated without formaldehyde releasing agent and boron which help you to fulfil aspects of legislative requirements and waste treatment requirements that specify that these chemicals are excluded





SPECIALTY GRADES

RUSTILO™ 66 VCI

Castrol Rustilo™ 66 VCI is an oil type protective containing a vapour-phase corrosion inhibitor (VCI).

APPLICATION

Rustilo 66 VCI has been specifically designed for simultaneously cleaning and protecting ball and roller bearings. It is also suitable for the protection of all types of delicate or highly finished engineering products, particularly those, which contain moving parts and cannot be protected with greasy film coatings.

Rustilo 66 VCI can be applied by immersion in a suitably designed treatment tank, which should be covered when not in use. It can also be applied by spray.

ADVANTAGES

- Free from hydrocarbon solvents, supports compliance with EC Solvent Directive (1999/13/EC).
- Heavy metals free (for example Barium), which may help to fulfil aspects of legislative requirements and waste
- treatment requirements that specify that these chemicals are excluded.
- Additional rust prevention through Vapour Corrosion Inhibitor. The maximum protection is achieved in hermetically sealed packs (safe pack).
- Contains no additives which inhibit the even distribution of oil and grease (e.g. silicone).
- Very good age resistance enables long service life and ensures best cleanability even after temperature exposure.
- Compatible with most mineral oil and greases.
- Shows very good filtering properties.
- If required protective films of Rustilo 66 VCI can be removed by using a petroleum solvent or alkaline process cleaner, all available from Castrol.





TECH TALKS

ACEA E Class - Heavy duty diesel engine oil

What is ACEA?

ACEA is the European Automobile Constructors' Association that represents Europe's 14 major car, van, truck and bus manufacturers. They are the European equivalent of the American Petroleum Institute (API).

The ACEA oil sequences define the minimum quality level for service fill engine oil.

What is new for ACEA E Class?

ACEA E sequences were updated in 2022 and are now mandatory, replacing 2016 sequences. And for the first time in well over a decade, the ACEA have introduced two new ACEA categories - E8 and E11.

ACEA E8 replaces ACEA E6.

ACEA E11 replaces ACEA E9.

ACEA E4 and ACEA E7 have updated requirements.

ACEA E1, E2, E3, E5, E6, E9 categories are all withdrawn (2022).

New Categories

E8 & E11 have revised requirements for use with biofuel, improved piston cleanliness, oxidation and aeration control. E8 has improved cylinder liner and top ring wear. E11 has enhanced soot related wear control.

Updated Categories

E4 & E7 have revised requirements for piston cleanliness. ACEA E7 describes the minimum performance requirement for heavy duty diesel engine oil.

These new and updated categories enhance engine oil performance and engine protection. They better serve changing engine technologies and regulatory requirements for reduced emissions and renewable fuels. They also better align with industry standards, reducing complexity.

Figure 1: ACEA categories

Can align with API CK-4	{	Low SAPS
		ACEA E8*
		ACEA E11
Can align with API CI-4	{	Mid / high SAPS
		ACEA E4*
		ACEA E7

How are ACEA categories different?

ACEA categories are governed by a set of parameters. Key parameters are SAPS and TBN. Low SAPS (E8, E11) provide longer life for after treatment devices. This is particularly important for engine technologies in markets with strict emissions standards e.g Euro VI. Higher TBN (E4, E7) provide better protection against acidic corrosion. This is particularly important for markets with high sulphur fuel (≥ 50 ppm). Table 1 provides an overview of applications that each category targets. Always follow the manufacturer's recommendations when selecting an engine oil.

SAPS – Sulphated Ash Phosphorus and Sulfur.

TBN – Total Base Number

Table 1: (Source: ACEA)

Engine Oil Sequence	Euro VI Stage IIIB, IV, V	Euro I, II, III, IV, V Stage I, II, IIa	EGR engine compatibility	Exhaust treatment (DPF, SCR & Catalyst)	Fuel compatibility		How to read the table
					High Sulfur*	Biodiesel**	
E4	X			X	✓		✓ recommended
E7	X		✓	X	✓		for some applications
E8	✓	✓	✓	✓		✓	X not recommended
E11	✓	✓	✓	✓	✓	✓	

* >50 ppm Sulfur

** Recommendations may differ between engine manufacturers, especially with >67 biodiesel blends; please consult driver manuals and/or dealers if in doubt.

Combined performance claims

Multiple ACEA categories can be claimed for the same lubricant formulation where all the associated requirements are met. For example, ACEA E4 and E7 are typically formulated to be medium and high SAPS lubricants, they have a S.A. limit $\leq 2.0\%$ m/m. However, there is no minimum SAPS requirement for these categories so low SAPS formulations can also meet these categories if all other requirements are met.).

Future ACEA Class

The proposed **ACEA F** class is expected to support improved fuel economy. Fuel economy improvements are possible by reducing the HTHS viscosity from the current high 3.5cP @ 150C to a low 2.9cP @ 150C. This will align with the HTHS requirement for API FA-4 currently available.

Manufacturer requirements

ACEA categories are often used as baseline performance for OEM approvals. OEM specific requirements are included to build lubricant standards best suited to specific engine groups. For example, DTFR 115C110 (MB-Approval 228.51) will often be combined with ACEA E8, Volvo VDS 3 with ACEA E7.

If a manufacturer mandates an ACEA or OEM specification, using lubricants without the required specification may provide inadequate engine protection, shorten the life of after treatment devices and void the manufacturer's warranty.

ATIEL & ACEA oil sequences and claims

Who is ATIEL?

ATIEL is the Technical Association of the European Lubricants Industry. It is a not-for-profit association under Belgian Law. ATIEL has functioned as the voice of the lubricant industry with its' members collective expertise pushing boundaries of engine oil innovation, benefiting vehicle manufacturers, consumers, and the environment. It has been working in action over the last 25 years.

ATIEL collaborate closely with ACEA (European Automobile Manufacturer's Association), additive suppliers and testing bodies ensuring lubricant standards meet the latest engine technologies and regulations.

ACEA sets the technical and quality standards called Oil Sequences for lubricants suitable for engines and vehicles. ATIEL developed the European Engine Lubricant Quality Management System (EELQMS) to provide a comprehensive framework for lubricant marketers to design, develop, manufacture and market lubricants according to ACEA standards. It provides consumers with confidence in the quality of their lubricants.

How does ACEA oil sequence performance works with ATIEL?

Lubricant marketers making claims against ACEA oil sequences are required by ACEA to sign a "Letter of Conformance" or LoC. It is administered by SAIL (Services to Associations and Industry in the Lubricants Sector). LoC confirms compliance with EELQMS and submits to ATIEL who administer the system.

Can there be combined claims for the same lubricant such as C2/C3?

The answer is Yes. Combined claims for the same lubricant against 2 or more Categories within the ACEA oil Sequences are possible.

The advantages are making products as widely applicable as possible and reducing portfolio complexity. It is only possible if "ALL" the associated chemical limits and physical test requirements are met.

Check out the Valid Compatible Change table. —————>

Incompatible claims are when it is technically impossible due to conflicting demands of two or more categories. Or where it is highly unlikely due to minimal overlap in the physical and chemical properties required for that combination of Categories.

When is the ACEA oil sequence claim invalid, partial or incomplete?

ACEA Sequences states that ALL test must be passed to make a performance claim. For example, a claim such as C2 (without fuel economy) is not a valid claim against ACEA C2 category. Or a claim such as C2 (without fuel economy)/C3 is not a valid combined claim.

A market survey activity conducted by ATIEL has identified several issues relating to invalid claims in the market such as technically impossible, highly improbable, incorrectly described, or misrepresented claims.

One reason may be due to lack of technical knowledge or misunderstanding of the ACEA

Sequences. Othe reasons may be due to some confusion over requirements of different releases of ACEA Sequences i.e., 2012/2016/2023 and expiry dates.

The current issues of the Oil Sequences are ACEA 2022 for HD (Heavy Duty) and ACEA 2023 for LD (Light Duty).

ACEA performance claims are self-certifying so using ACEA "approved," "certified" or "recommended" are not valid ways of making an ACEA Claim. Also, combined claims should be separated. For example, A3/B3/B4 is not a valid claim but A3/B3, A3/B4 is a valid claim.

ACEA states the year is not to be included for example claim ACEA A3/B4 and NOT ACEA A3/B4-16 as the year and number is not intended for use on marketing information such as product data sheets and product labels.

Is there a claim validity period?

Yes, there is a validity period that applies to each of the ACEA sequences. ACEA has a published list of sequence expiry dates for ACEA 2023 LD and ACEA 2022 HD.

A formulation must meet the requirements of a valid ACEA sequence to maintain a current claim.

Since 1st May 2023, any NEW products for Heavy Duty must meet ACEA 2022. Until 1st May 2024 claims against ACEA 2016 were possible. After 1st May 2024, any NEW products for Light Duty must meet ACEA 2023. Until 1st August 2025 claims against ACEA 2021 are possible.

TARGETED SEQUENCE													
	A3/B4	A5/B5	A7/B7	C2	C3	C4	C5	C6	C7	E4	E6	E7	E11
A3/B4		HTHS TBN SA	HTHS TBN	SA P S	SA P S	SA P S	HTHS SA P S	HTHS SA P S	HTHS SA P S	TBN	SA P S		SA P S
A5/B5	HTHS TBN SA		TBN	SA P S	HTHS SA P S	HTHS Noack SA P S	HTHS	HTHS	HTHS	HTHS TBN	SA P S	HTHS TBN	HTHS SA P S
A7/B7	HTHS TBN SA	TBN		TBN SA P S	HTHS TBN SA P S	HTHS TBN Noack SA P S	HTHS	HTHS	HTHS	HTHS TBN	HTHS SA P S	HTHS TBN	HTHS TBN SA P S
C2	SA	HTHS TBN	HTHS TBN		HTHS TBN	HTHS TBN Noack S SA	HTHS	HTHS	HTHS	HTHS TBN	HTHS TBN P	HTHS TBN	HTHS TBN
C3	SA	HTHS TBN	HTHS TBN			Noack SA S	HTHS	HTHS	HTHS	TBN	TBN P	TBN	TBN
C4	SA	HTHS TBN	HTHS TBN	P	P		HTHS	HTHS	HTHS	TBN	TBN P	TBN	TBN
C5	HTHS SA	HTHS	HTHS	HTHS	HTHS	HTHS		TBN	HTHS	HTHS	HTHS	HTHS	HTHS
C6	HTHS SA	HTHS	HTHS	HTHS	HTHS	HTHS	TBN		HTHS	HTHS	HTHS	HTHS	HTHS
C7	HTHS AS	HTHS	HTHS	HTHS	HTHS	HTHS	HTHS	HTHS		HTHS	HTHS	HTHS	HTHS
E4	SA	HTHS SA	HTHS TBN SA	SA P S	SA P S	Noack SA P S	HTHS	HTHS	HTHS		SA P S		SA P S
E6	SA TBN	HTHS TBN	HTHS TBN	SA P	SA P	Noack SA S	HTHS	HTHS	HTHS	TBN		TBN	
E7	SA TBN	HTHS SA	HTHS TBN SA	SA P S	SA P S	Noack SA P S	HTHS	HTHS	HTHS	TBN	SA P S		SA P S
E11	SA TBN	HTHS TBN	HTHS TBN	SA P S	SA P S	Noack SA P S	HTHS	HTHS	HTHS	TBN	P S	TBN	

NOT COMPATIBLE

POSSIBLE COMBINATIONS

POSSIBLE BUT NEEDS CARE DUE TO PHYSICAL AND CHEMICAL REQUIREMENTS

HTHS = HIGH TEMPERATURE HIGH SHEAR VISCOSITY

SA = SULPHATED ASH

TBN = TOTAL BASE NUMBER

Noack = Noack VOLATILITY

S = SULPHUR

P = PHOSPHORUS

Source: ATIEL, ACEA Oil Sequences Chart 2024 – Valid Compatible Claims

Understanding and selection of driveline fluid.

Driveline fluid selection

Driveline fluids, like engine oils, are approved to industry standards such as API, SAE J2360 and MT-1 performance levels. These leading industry bodies and certifications determine the minimum requirements for fluids used in the majority of vehicles.

API Service Designations in Current Use

API GL-4: Lubricants intended for axles with spiral bevel gears operating under moderate to severe conditions of speed and load, or axles with hypoid gears operating under moderate conditions of speed and load.

API GL-5: Lubricants intended for gears, particularly hypoid gears, in axles operating under various combinations of high-speed/shock load and low-speed/high-torque conditions.

API MT-1: Lubricants intended for non-synchronised manual transmissions used in buses and heavy-duty trucks.

SAE J2360: Lubricants satisfy and exceed the requirements of API GL-5 and contains performance requirements that exceed those of API Category GL-5. For example, SAE J2360 has a requirement for elastomer compatibility and gear cleanliness after oxidation, that are not contained in API GL-5.

Why do oem defines their own standards?

OEMs are increasingly working with lubricant companies to define their own standards for lubricant performance. These fluids are tailored specifically for the components they manufacture. These standards ensure the lubricant delivers superior performance as they are developed for the engine or component manufactured by the OEM. Castrol has partnerships with major OEMs. This provides Castrol with an opportunity to begin developing lubricants years in advance of the release of a component when it exists only as a drawing.

This approach gives Castrol's Lubrication Engineers a unique insight into the tribology and specific requirements of the components so they can deliver a product that maximises performance and extends component life. This is Castrol Co-Engineering! To secure lubricant approvals often requires lengthy field trials that can last for up to five years.

Why its important to select right fluid?

With the continuous evolution of cars' technology over the past years transmissions have become more complex, demanding more technologically advanced fluids to ensure vehicle reliability. Getting the right oil for your vehicle is key to ensuring drivelines operate as they are designed to and get the maximum protection under demanding conditions. Using the right oil Castrol, with over 100 years of experience in developing transmission and axle fluids and being the choice of many leading car and transmissions manufacturers for factory-fill products, offers a complete range of products which can meet your car's requirements.



Automatic transmission reveal.
Components such as these can be protected using an OEM approved driveline lubricant.

Fill for life fluids

OEMs are working to improve fuel efficiency and provide quality drivability. This has led to the development of OEM service fill specifications for driveline products. As competition for car sales increases, "filled for life" becomes a strategy to reduce the cost of ownership of a vehicle and improve its environmental impact by removing the need to change the oil, filters and screens in manual and automatic transmissions and in differentials and cooling systems. Typically, these filled for life fluids are extremely high quality synthetic oils or long life coolants with the relevant OEM approval.

Castrol Transmax, Smooth Drive Technology

Whether a car is automatic or manual, Castrol TRANSMAX range has the right transmission fluid for the vehicle, providing enhanced protection to all moving parts which enables longer transmission life.

The advanced Castrol TRANSMAX range features Smooth Drive Technology™ with active control molecules that automatically adjust their friction level with changing pressures and speed. This ensures the transmission is constantly served the right level of friction at any given moment – protecting the parts and delivering a smoother drive for longer. you are providing the correct recommendation.



**Smooth Drive
Technology™**

Understanding Coolant technologies.

What is Coolant?

The primary job of an engine coolant is to provide cooling by absorbing generated heat in engine components.

Coolants are composed of ethylene glycol (sometimes propylene glycol), purified water, performance additives and coloring dyes. Works of an engine can generate extreme heat which can catastrophic failure if it isn't equipped with an efficient heat transfer mechanism. Heat transfer is achieved by an advanced cooling system continuously circulating coolant around the engine's hot zones, absorbing heat and discharging it to the atmosphere via the radiator.

Coolants encounter very high surface temperatures are circulated at high velocity and are exposed to a variety of different types of metal and non-metal components. Hence there is great potential for chemical reactions and physical damage.

The second critical function of a coolant is to protect hot metal surfaces and other components from corrosion and degradation. In order to prevent engine damage and enable swift start-up, coolant must resist freezing in sub-zero temperatures, and boiling in summer heat. Two types of glycols are usually applied for engine coolants where both share similar cooling properties. Propylene glycol is categorized to be less toxic compare with ethylene glycol. While the later has better heat transfer due to its lower specific heat.

Concentrate or premix?

Coolants are sold in premixed, ready-to-use form or concentrate.

Concentrated coolants should never be used undiluted as heat transfer since it will be severely compromised. Water quality is very important for corrosion protection. Only de-ionized or soft tap water should be mixed with a coolant concentrate.

Color is not an indicator of coolant performance

Early antifreeze products were often dyed green to aid leak detection.

Other colors now differentiate new technology coolant from the "conventional green" antifreeze. The color may be representative of an approved or OEM genuine product or simply a coolant manufacturer's choice. There is no standardized color system for coolants. Never select a coolant based on its color alone.

Types of Coolant

Coolants are generally categorized by their additive technology and level of approval to OEM and other performance specifications.

There are three broad classes of engine coolant technology:

1. Conventional/Traditional - based on older technology and less expensive inorganic additives. Relatively short life due to depletion of the additives and limited stability and protection at high temperature e.g. Castrol PREMIUM COOL PLUS.

2. OAT - based on fully organic additives with very low depletion rate and deliver long service life. Very stable and offers superior corrosion protection at high temperatures and compatibility with all cooling system materials e.g. Castrol RADICOOOL SF.
3. Hybrid OAT - combination of OAT type and selected inorganic additives that provide additional protection for certain component metallurgies under severe conditions. Several OEM approvals are restricted to hybrid-OAT-type technology e.g. Castrol RADICOOOL NF and Castrol RADICOOOL Si-OAT.

The risk of getting it wrong

Cooling system problems are one of the leading contributors of engine failure, a victim of a "set and forget" perception. Proper coolant selection and maintenance are critical to troublefree vehicle operation. A faulty cooling system may prevent effective warm-up of the engine, leading to poor lubrication and poor combustion control.



Minor cooling system corrosion generally becomes a major problem if left untreated. Problems can sometimes arise when different coolants are mixed-together. This is due to certain mineral-type additives being incompatible with each other if concentrations become unbalanced, extreme cases causing formation of solid deposits and cooling system blockage. Modern OAT type coolants tend to be much more tolerant of mixing with each other, nevertheless it is safe practice to avoid mixing different coolants together, and when replacing coolant to always fully drain and flush out the cooling system first.

Latest approved Coolant Technology

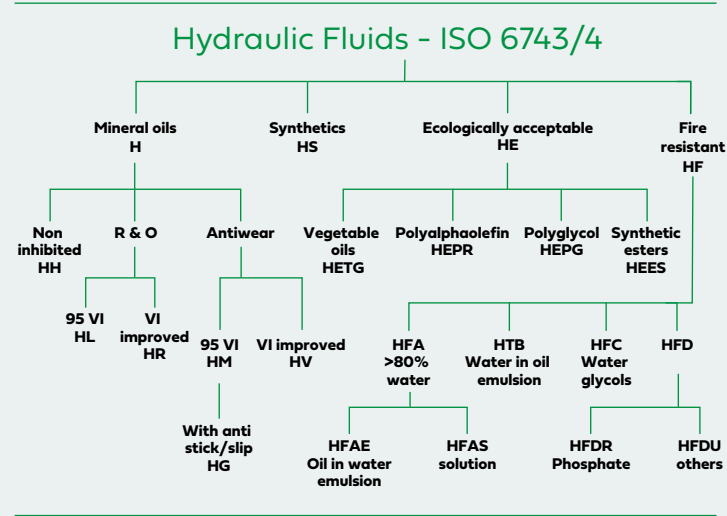
Industry standards define basic coolant performance. Most vehicle manufacturers add additional set of requirements onto the industry standards to define the higher performing coolants tailored to their engines and to enable extended warranty protection. To qualify a coolant for an approval, manufacturers must submit a sample for rigorous lab, engine and fleet tests designed by the OEM. This can take years to complete and is done at the coolant manufacturer's expense. If it runs successfully, the product then determined to fulfil all the performance and warranty requirements of the manufacturer and earns a formal OEM approval. Only advanced coolants will pass these tests. Castrol Radicool Si-OAT is one such example, carrying formal approval from MAN, Mercedes Benz, Renault and Volvo. Coolants which only claim to "meet the requirements" of an OEM standard have not passed this comprehensive testing and qualification program. This is a much weaker indicator of performance, based on the marketer's own judgement.

Understanding hydraulic oil specification

Nowadays, hydraulic fluids face challenging requirements and standards through equipment manufacturers and customers applications. Several applications will need specific characteristic to meet the standard of the industry, OEM, and regulatory requirements

There are several classifications which defines hydraulic fluid for hydrostatic applications:

- ISO 6743/4 or DIN 51524/3 – applied to mineral based fluid, biodegradable fluid, and fire-resistant hydraulic fluid
- ISO 12922 – specifically applied to fire-resistant hydraulic fluid
- ISO 15380 – specification for environmentally friendly hydraulic fluids
- OEM requirements



- ISO-L-HH: Mineral lubricants without corrosion inhibitors
- ISO-L-HL: HH lubricants with anti-rust and oxidation additive

- ISO-L-HM: HL lubricants with anti-wear additive
- ISO-L-HR: HL lubricants with a high VI ISO-L-HV HM lubricants with a high VI
- ISO-L-HG: HM lubricants with shock resistant features
- ISO-L-HS: Synthetic liquids

German OEMs usually also mention DIN 51524/3 standard which has slightly different specification from ISO 6743/4.

- DIN HL: Mineral oil with anti-rust and oxidation additive
- DIN HLP: HL oils with improved anti-wear properties
- DIN HVLP: HLP oils with improved temperature-viscosity behavior
- DIN HLPD: HLP oils with additives to improve detergency and dispersion capacity.

- DIN HETG: triglycerides (vegetable not soluble in water)

- DIN HEES: synthetic ester non-water soluble
- DIN HEPG: polyglycols types soluble in water
- DIN HEPR: polyalphaolefins and related hydrocarbon products.

- ISO HFAE: oil in water emulsions, mineral or synthetic ester (> 80% water content)

- ISO HFAS: mineral oil free, aqueous synthetic chemical solution (> 80% solution)
- ISO HFB: water in oil emulsions, mineral content >40%
- ISO HFC: water glycol solution, water content >35%
- ISO HFDR: water-free synthetic fluids consist of phosphate esters (not soluble in water)
- ISO HFDS: chlorinated hydrocarbons
- ISO HFDT: mixture HFDU / HFDT
- ISO HFDU: water-free synthetic fluids other than phosphate esters

Several leading OEM components manufacturers such as Denison, Bosch and Vickers also issued their own standards usually related to thermal/oxidation stability, mechanical/ dynamic behavior, and filterability. They also have their own in-house tests

Understanding and selection of right grease.

What is grease and the difference compared to oil?

Grease is formed by emulsifying liquid lubricant in a thickening agent like soap. The liquid lubricant in the grease generally is mineral oil or synthetic oil.

The key difference between oil and grease is the addition of thickening agent, typically a soap in grease. Generally, in room temperature and pressure, oil is in liquid form while grease would be in solid or semi-solid form.

Grease exhibits shear-thinning or pseudo-plastic fluid characteristic, which means that the viscosity of the fluid is reduced under shear. Once adequate force applied to shear the grease is achieved, the viscosity drops and approaches that of the base lubricant use in the formation of the grease.

Soap is the most common thickener or emulsifying agent for grease. The choice of the soap plays important roles in the performance of the grease like the operating temperature, water resistance, and chemical stability. Similarly, like liquid lubricants, grease is added with specific additives to improve the performance.

How to select a suitable grease

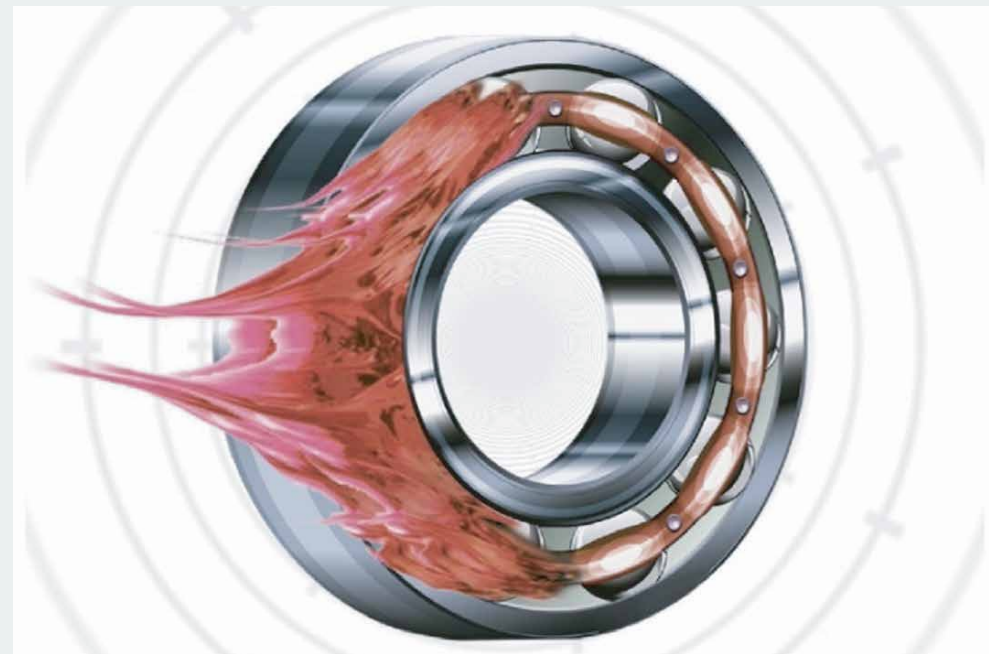
Like liquid lubricants, greases also are available in various grades and forms. In grease, the most important criterion for selection is the NLGI grade.

NLGI grade is the measure of the consistency or relative hardness of a grease used for lubrication, as specified by the standard classification of lubricating grease established by the National Lubricating Grease Institute (NLGI). The below table shows the NLGI number and compares each grade with everyday products of similar consistency.

NLGI Number	Appearance	Consistency Food Analog
000	Fluid	Cooking oil
00	Semi-fluid	Apple sauce
0	Very soft	Brown mustard
1	soft	Tomato paste
2	"Normal" grease	Peanut butter
3	Firm	Vegetable shortening
4	Very firm	Frozen yoghurt
5	Hard	Smooth paté

The most common grease grade in automotive and industrial application is NLGI 2. This is followed by NLGI 1 and NLGI 3 grade grease. Other NLGI grades grease are usually required in other special application.

After selecting the right NLGI grade, the next evaluation is viscosity of the base oil in the grease. The base oil viscosity is measured in centistokes (cSt) at 40°C. Following rule of thumb, the higher the bearing/ component speed, the lower the base oil viscosity required. Thicker base oils are used in slower moving, heavily loaded applications.



Greases are usually formulated using mineral grade base oil. For grease formulated with synthetic base oil, it would enable the grease to reach higher or lower operating temperatures as well as wider operating temperature range compared to mineral base grease. In addition, synthetic base oil grease is used in application where extended relubrication intervals are required.

To improve performance, greases are improved by using additives. Example of additives are oxidation and rust inhibitors, extreme pressure additives, antiwear and friction-reducing additives.

The most widely used soap are lithium and calcium. Grease with lithium is preferred in general application as it has high dropping point and stable when carrying high load. Calcium grease is preferred for marine application due to its excellent water resistivity.

Castrol's specially formulated range of high-performance greases provide outstanding protection in all operating conditions and applications. We have developed some of the most advanced and high performing greases in the world, including for the International Space Station and the Mars curiosity rover.

The Technical team at Castrol have the experience and knowledge to help you make the most optimum choice on grease selection.

Heat transfer fluid and its applications.

Heat transfer system

A typical heat transfer system has 4 main components as below figure.

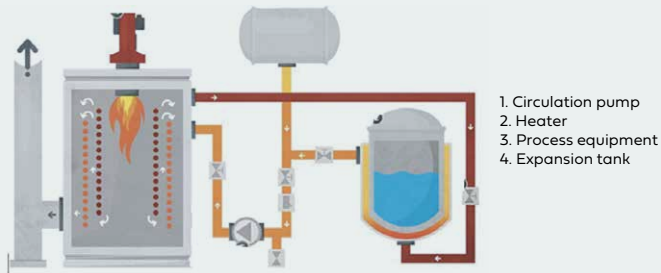


Figure 1: A typical design of heat transfer system

The circulation pump (1) pushes the heat transfer oil through an insulated piping to the heater (2) and to the process equipment (3). The expansion tank (4) on the system allows for the expansion and contraction of the hot oil as it heats up and cools down. Most heat transfer oil expand by up to 25% when heated to the maximum recommended bulk temperature. The tank will be $\frac{1}{4}$ full at ambient temperature and $\frac{3}{4}$ full at system's normal operating temperature. The expansion tank should be installed at the highest point in the system and connected to the suction side of the pump.

Heat transfer fluid application



Requirement of heat transfer fluid

The temperature of the heat transfer oil is raised in the heater by (gas, oil, coal, firewood, etc). Therefore, heat transfer oil must have properties as follows to adapt the hot working conditions, carry the heat, & protect the systems – the pumps, valves, pipe, equipment, etc.

1. High thermal stability
2. High heat capacity & transfer properties
3. High thermal conductivity
4. Low viscosity at operating temperature & pressure
5. Low corrosivity towards system materials
6. Low volatility

7. Low toxicity
8. Available economically.

Deterioration of heat transfer oil

The service life and heat transfer efficiency of an oil are significantly affected by thermal cracking, oxidation, and contamination.

Therefore, to minimise the influence of the above processes on the heat transfer fluid, please note as following.

- Make sure that the oil passes through the heat exchanger at the correct design speed, arrange the location of the heater appropriately, etc. to avoid local overheating.
- Heat the fluid slowly, do not increase oil temperature too quickly.
- Do not turn off the system suddenly.
- Keep the oil temperature on the expansion tank no more than 60°C. Minimize the direct contact of hot oil with the air.
- Keep fluid clean by minimizing contamination into the system. For new system, clean the heat transfer system, remove contamination such as debris, dirt, welding slag... Do not test system pressure by water.

Important notes while using heat transfer fluid

Before filling process

- Check the oil pipeline system, fix the leak points in the system.
- Check the expansion tank: The expansion tank volume must be large enough to hold the oil when the system is working, the expansion tank must be set high enough.
- Pump and heat transfer oil supply system must be suitable, ensure the flow rate, avoid causing local overheating.
- Arrange a backup electric power (generator) and backup pump in case the mains electric power failure causes the pump to stop working suddenly.



During filling process

- Check the positions of vents, exhaust, connections, electrical cables, connection bolts...
- Open the vent valves.
- Fill in the oil into the tank through the oil pump system at the lowest point to minimize gas entering the system. Stop filling when expansion tank is about 25% full.

Monitoring heat transfer fluid condition

The fluid should be tested according to 5 below parameters, at least twice per year.

1. Kinematic viscosity
2. Flash point
3. Total acid number
4. Carbon residue
5. Water by Karl Fischer.

Troubleshooting of water-soluble cutting fluids.

Water-soluble cutting fluids

Water-soluble cutting fluid are used by diluting the concentrate with water to a proper concentration.

Therefore, the diluent solution of water-soluble cutting fluid (hereinafter referred to as "coolant") has almost no risk of fire compared to water-insoluble cutting fluid and is often used in production sites.

On the other hand, compared to neat cutting oil that can be used almost on top-up, water-soluble cutting fluids change their concentration over time, so it is necessary to monitor the coolant condition and top-up the new coolant. If this coolant management is not properly implemented, the coolant will be prone to degradation, which will have a negative impact on productivity.

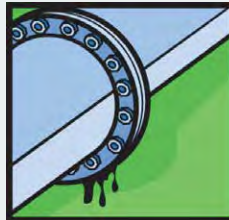
Therefore, here we will explain troubleshooting for water-soluble cutting fluids whose coolant condition tends to change over time.

Contamination

Since cutting fluids are used in open systems, they are mixed with various substances as follows.

These contaminants often lead to coolant troubles, it may be possible to prevent problems by knowing in advance what substances will be mixed into the coolant.

- Tramp oils: slideway oils, hydraulic fluids, front-end oils (cutting fluid, rust preventive, cleaner, forging oils, etc.)
- Leaching from chips (magnesium, zinc, copper, iron, etc.)
- Powders: barrel abrasive (calcium, etc.), shot blasting (zinc, etc.), surface treatment (bonderite treatment)
- Dirt: washing water used for floor cleaning, etc.



Color is not an indicator of performance

Coolant-related troubles include those listed below.

Other colors now differentiate new technology coolant from the "conventional green" antifreeze. The color may be representative of an approved or OEM genuine product or simply a coolant manufacturer's choice. There is no standardised color system for coolants. Never select a coolant based on its color alone.

Types of problems

Coolants are generally categorized by their additive technology and level of approval to OEM and other performance specifications.

If these troubles occur immediately after the start of coolant use, we believe that it is necessary to review the oil agent.

- Foaming
- Rust
- Scum (floating substances)
- Coolant discoloration

- Deposits in workpieces and machines, stickiness
- Workpiece discoloration (aluminum discoloration, oil stains on steel)
- Clogging of filters and piping
- Emulsion separation and gelation
- Damage to rubber and plastic
- Mist and oil smoke
- Odor (putrid odor, component odor)
- Increased wastewater treatment load
- Rough hands, dermatitis
- Increase in oil usage.

What information needs to be collected

If coolant-related trouble occurs at your customer site, the following information will lead to the resolution of the problem promptly.

In other words, if you always grasp the following information, it will lead to trouble prevention and better product selection.

In addition, if there is coolant that is not causing problems on similar processing machines, it will help to investigate the cause of the problem by comparing it with the coolant of the trouble machine.

- Coolant condition: concentration, pH, bacteria, etc.
- Process type: drilling, tapping, etc.
- Workpiece: cylinder block, cylinder head, etc.
- Workpiece material: aluminum, steel, cast iron (the distinction between FC or FCD is important), etc.
- Previous process: water soluble or neat oil, anti-rust, barrel polishing, etc.
- Diluted water quality (hardness, chlorine ions, etc.)
- Others: new machine (with anti-rust oil and grease),
- Lube oil leaks.

Tank-side additives

The use of tank-side additives is an effective way to solve coolant troubles, but there are a few things to be aware of.

For one thing, the concentration of ingredients is high, so it is necessary to pay particular attention to the human body when handling. On the other hand, if you make a mistake in selection or the amount of addition, the trouble may not be solved or another trouble may occur.

Summary

Summarising the troubleshooting of water-soluble cutting fluids:

- Find out when trouble occurs and whether the coolant condition changes, have the customer monitor the coolant.
- Collect information related to coolant and production processes, to grasp the cause of the problem, and
- Take corrective action.

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