Developed analogues of oils of Russian origin

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IT'S MORE THAN JUST OIL. IT'S LIQUID ENGINEERING.

Castrol™ Marine

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GLOSSARY & ORGANISATION ABBREVIATIONS

OIL REQUIREMENTS - MARINE DIESEL ENGINE

SLOW SPEED CROSSHEAD

CYLINDER:

- Sulphur acid neutralisation
- Scuffing prevention
- High temp. performance; Good film strength
- Piston, ring and port cleanliness
- Antiwear properties
- Compatible with system oil
- SAE 50

SYSTEM:

- Good film strength
- Lubrication of bearings, crankshaft, chains and running gear
- Ability to separate from water and insoluble matter in the centrifuge
- Good demulsibility
- Rust and oxidation prevention
- SAE 30
- Undercrown cleanliness
- Good anti-foam control
- High FZG-load carrying properties

MEDIUM SPEED CROSSHEAD

CRANKCASE:

- Control piston deposits and prevent ring sticking
- Lubricant consumption control
- Sludge and lacquer control
- Rust control and alkalinity retention
- Neutralise combustion acids
- Protect bearings from corrosion
- Impart EP properties
- SAE 30 & SAE 40
- Undercrown cleanliness
- Anti-foam control

CLASSIFICATION OF MARINE DIESEL ENGINES:

TYPE	SPEED - RPM	BORE - MM
Slow Speed	65-150	260-1080
Medium Speed	230-750	300-650
Medium High Speed	600-1500	200-400
High Speed	600-2250	100-200

CRANKCASE OILS

CASTROL CDX 30 (SAE 30) BN 5

A premium lubricant primarily designed for use in the crankcase systems of modern, highly rated marine crosshead engines, including the latest "Intelligent Cam-less" engines, and is approved by all major engine manufacturers. It can also be used in certain ancillary equipment: turbo-chargers, gear boxes, air compressors, steering gears and oil-filled stern tubes.

CHARACTERISTICS

- Reserve alkalinity to combat acidic corrosive wear
- Excellent water separating properties
- Thermal stability
- Oxidation resistance
- Anti rust properties
- Load carrying properties meet load stage 12 of FZG Gear Test (DIN51354) A/8.3/90
- Detergency

CRANKCASE OIL	KINEMATIC VISCOSITY (cSt) @ 100°C	CLOSED FLASH POINT °C	POUR POINT °C (better than)	BN	SAE NUMBER
CASTROL CDX 30	11.5	>200	-12	5.0	30

CYLINDER OILS

CASTROL CYLTECH 80AW (SAE 50) BN 80

A new generation cylinder lubricant developed for today's and tomorrow's slow speed engines, which has been approved by all principal engine manufacturers and their licensees.

CHARACTERISTICS

- It has the neutralising ability to cater for the demands imposed by highly rated engines with high maximum pressures and correspondingly high acid dew-points, together with a general increase in fuel sulphur content. Special anti-wear agents* resist adhesive wear, which in turn reduces cylinder liner and piston ring wear, extending the period between overhauls, giving an 'added safety factor' in the avoidance of serious cylinder damage.

*patents awarded

CASTROL CYLTECH 70 (SAE 50) BN 70

An alkaline cylinder lubricant designed for use in slow-speed marine diesel engines burning residual fuels. It is approved by all principal engine manufacturers and their licensees.

CHARACTERISTICS

- A blend of acid-neutralising and detergent additives to combat fuel sulphur content.
- An ashless dispersant which helps maintain cleanliness.
- Carefully blended for high temperature performance - as with Cyltech 80AW.

CYLINDER OILS

CASTROL CYLTECH 50S (SAE 50) BN 50

A premium marine diesel engine cylinder lubricant for two-stroke crosshead engines running on lower sulphur fuels.

CHARACTERISTICS

- Carefully levelled (at 50BN) to meet requests for improved flexibility when ships switch from low to moderate sulphur fuels.
- Lower than nominal 70BN oils, it has lower ash and therefore is by default more tolerant in engines on high cylinder oil feed rate.
- Related to the well proven Cyltech technology.

CASTROL CYLTECH 40SX (SAE 50) BN 40

An alkaline cylinder lubricant developed for prolonged operation on low-sulphur fuel (distillate or heavy fuel <1.5% sulphur content).

CHARACTERISTICS

- Superior detergency performance to ensure engine cleanliness.
- Approved by MAN B&W and Sulzer for prolonged operation on low-sulphur fuel.
- Excellent control of cylinder liner and piston ring wear.

CYLINDER OIL	KINEMATIC VISCOSITY (cSt) @ 100°C	CLOSED FLASH POINT °C	POUR POINT °C (better than)	BN	SAE NUMBER
CASTROL CYLTECH 80AW	19	>190	-9	80	50
CASTROL CYLTECH 70	19.5	>190	-9	70	50
CASTROL CYLTECH 50S	19.5	>190	-9	50	50
CASTROL CYLTECH 40SX	19.5	>190	-9	40	50

HEAVY DUTY OILS

CASTROL MLC

CASTROL MLC 30 (SAE 30) BN 12
CASTROL MLC 40 (SAE 40) BN 12

Castrol MLC range is formulated to meet the requirements of traditional trunk-piston marine diesel engines.

CHARACTERISTICS

- Meets the requirements of API-CD.
- load carrying properties meet load stage 11 of FZG A/8.3/90 gear test. Oxidation and corrosion are adequate for traditional and less demanding engines.

CASTROL MHP

CASTROL MHP 153 (SAE 30) BN 15
CASTROL MHP 154 (SAE 40) BN 15

A range of oils specifically developed to meet the requirements of high performance medium speed engines, including the Caterpillar 3600 series engine.

CHARACTERISTICS

- Meets API-CF specifications, load carrying properties meet load stage 12 of FZG A/8.3/90 test. Full pass on Caterpillar Micro Oxidation Test

HEAVY DUTY OILS

CASTROL TLX PLUS

CASTROL TLX PLUS 203 (SAE 30) BN 20
CASTROL TLX PLUS 204 (SAE 40) BN 20
CASTROL TLX PLUS 303 (SAE 30) BN 30
CASTROL TLX PLUS 304 (SAE 40) BN 30

TLX Plus supersedes the previous TLX range by incorporating a unique formulation of additive technology systems designed to overcome the adverse conditions seen in low oil consumption engines operating with varying heavy fuel qualities.

GENERALLY

- Castrol TLX Plus 200 oils are used where there is a special requirement for a lower BN grade.

CHARACTERISTICS

- Load carrying properties meet load stage 11 of FZG A/8.3/90 test. Resistance to oxidation and corrosion satisfies the I.S.O.T. and I.P. 135 tests respectively.

CASTROL TLX PLUS 404 (SAE 40) BN 40

Upgraded version of Castrol TLX Plus 304 with high levels of alkalinity: they are approved by the principal manufacturers of the latest highly-rated, fuel-efficient marine medium-speed trunk piston engines burning the worst quality fuels. They are also approved by those manufacturers of medium-speed engines preferring a high alkaline cylinder lubricant with lower BN circulating oil.

CASTROL TLX PLUS 504 (SAE 40) BN 50

For use when rapid base number depletion is experienced. This grade will increase the time between drain intervals.

HEAVY DUTY OILS

CASTROL HLX

CASTROL HLX 30 (SAE 30) BN 12
CASTROL HLX 40 (SAE 40) BN 12

These oils have been specifically formulated to meet the latest performance requirements of highly rated medium and high speed diesel engines, such as M.T.U., with its type 2 lubricant specification, allowing extended drain intervals and providing protection against bore polishing. The range is a particular benefit in high speed marine diesel engines where SHPD performance is required.

PERFORMANCE

- The technology exceeds the European Motor Manufacturers Specification ACEA E3, MAN M3275, Mercedes Benz 228.2, API-CF and has an extensive list of other Original Equipment Manufacturers (OEM) approvals.

HEAVY DUTY OILS

TRUNK PISTON OIL	KINEMATIC VISCOSITY (cSt) @ 100°C	CLOSED FLASH POINT °C	POUR POINT °C (better than)	BN	SAE NUMBER
CASTROL MLC 30	11.5	>200	-12	12	30
CASTROL MLC 40	14.0	>200	-12	12	40
CASTROL MHP 153	11.5	>200	-12	15	30
CASTROL MHP 154	13.5	>200	-12	15	40
CASTROL HLX 30	11.5	>200	-12	12	30
CASTROL HLX 40	14.0	>200	-12	12	40
CASTROL TLX PLUS 203	11.5	>200	-12	20	30
CASTROL TLX PLUS 204	14.0	>200	-12	20	40
CASTROL TLX PLUS 303	11.5	>200	-12	30	30
CASTROL TLX PLUS 304	14.0	>200	-12	30	40
CASTROL TLX PLUS 404	14.0	>200	-12	40	40
CASTROL TLX PLUS 504	14.0	>200	-12	50	40

HEAVY DUTY LOW ASH OILS

CASTROL TECTION MONOGRADE DD40 (SAE 40) BN 7

A high performance trunk piston diesel engine lubricants specifically formulated to meet the latest performance requirements for Detroit Diesel 2-stroke engines operating with distillate fuels (sulphur 0.5% max).

PERFORMANCE

- Meets API CF2 performance specification
- Sulphated ash level of 0.77% meets the Detroit Diesel maximum level of 0.8% required for the 149 series engine.

TRUNK PISTON OIL	KINEMATIC VISCOSITY (cSt) @ 100°C	CLOSED FLASH POINT °C	POUR POINT °C (better than)	BN	SAE NUMBER	SULPHATED ASH %
CASTROL TECTION MONOGRADE DD40	15.5	220	-12	7	40	0.77

ZINC FREE ENGINE OIL

CASTROL RLX SUPER 40 (SAE 40) BN 13

Castrol RLX Super 40 is a fifth (LMOA) generation, SAE 40, zinc free engine crankcase lubricant specifically designed to suit all engines where a zinc free lubricant is specified. Castrol RLX Super 40 is formulated to meet the requirements of engines manufactured by General Electric (GE) and General Motors Electromotive Division (GM-EMD).

This grade is suitable for all engines fitted with silver bearings.

TRUNK PISTON OIL	KINEMATIC VISCOSITY (cSt) @ 100°C	CLOSED FLASH POINT °C	POUR POINT °C (better than)	BN	SAE NUMBER
CASTROL RLX SUPER 40	14.5	220	-12	13.5	40

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Marine

TURBINE OILS

CASTROL PERFECTO T

Formulated from highly refined mineral oils with excellent demulsifying and anti-foam properties, blended with oxidation and corrosion inhibitors. (Numbered according to the ISO 3448 viscosity classification).

CASTROL PERFECTO T32

For small industrial gas turbines, turbo-compressors and LNG carriers.

CASTROL PERFECTO T46

For some industrial gas turbines, turbo-compressors and rotary screw air compressors.

CASTROL PERFECTO T68

For the lubrication of turbine driven auxiliary equipment including turbo-chargers.

CASTROL PERFECTO T100

Meets the requirements of most manufacturers of marine turbine propulsion machinery, including turbo-chargers.

TURBINE OIL	KINEMATIC VISCOSITY (cSt) @ 40°C	@ 100°C	V.I.	CLOSED FLASH POINT °C	POUR POINT °C	NEUTRALISATION NUMBER MgKOH/g
CASTROL PERFECTO T32	32.0	5.30	96	210	-10	< 0.15
CASTROL PERFECTO T46	46.0	6.70	96	210	-10	< 0.15
CASTROL PERFECTO T68	68.8	8.60	96	225	-10	< 0.15
CASTROL PERFECTO T100	96.0	10.80	96	225	-10	< 0.15

COMPRESSOR OILS

CASTROL AIRCOL

CASTROL AIRCOL PD 32
CASTROL AIRCOL PD 68
CASTROL AIRCOL PD 100
CASTROL AIRCOL PD 150

Compressor lubricants, produced from high quality base oils with anti-oxidants and selected corrosion inhibitors, which have been approved by leading compressor manufacturers. In line with DIN 51506 specification, these grades are recommended for air compressors with air discharge temperatures up to 220°C; they have given excellent results in compressors with much higher discharge temperatures.

CHARACTERISTICS

- Excellent resistance to oxidation.
- Superior protection against rusting and corrosion.
- Low carbonisation characteristics minimising fire and explosion risks.

CASTROL AIRCOL SN 68
CASTROL AIRCOL SN 100

Castrol Aircol SN air compressor lubricants are high quality synthetic diesters designed to cope with the very severe operating conditions experienced in reciprocating, rotary screw and vane compressors. Compared with mineral oils they provide greater stability over an increased temperature range and an extended oil life.

COMPRESSOR OILS

CASTROL AIRCOL SR 46

CASTROL AIRCOL SR 68

Castrol Aircol SR fluids are polyalphaolefin-based synthetic compressor lubricants using an advanced additive system to enhance thermal and oxidation stability and reduce component wear. These products are intended for use in Marine turbo-chargers and rotary compressors, where they will provide significant in-service benefits when compared with mineral oils and other synthetic based lubricants. Castrol Aircol SR 68 is primarily for turbo-chargers and is an approved 5,000 hour Special Low Friction Synthetic Oil by ABB Turbo Systems Ltd and is therefore required in certain ABB VTR.4 series turbo-chargers.

CASTROL AIRCOL PG 185

A high performance synthetic gas compressor oil based on a poly-alkylene glycol which has low solvency properties with hydrocarbon and chemical gases. Castrol Aircol PG 185 can be employed in conjunction with the widest range of LPG, LNG hydrocarbon and chemical gases including Butadiene, Methane, Ethane, Propane, Butane, Ethylene, Propylene, Butylene, Ammonia and Vinyl Chloride, without the need to change to mineral oil lubrication. This simplifies operations and avoids possible operator error.

COMPRESSOR OILS

COMPRESSOR OIL	KINEMATIC VISCOSITY (cSt) @ 40°C	@ 100°C	V.I.	CLOSED FLASH POINT °C	POUR POINT °C	VD-L GRADE NUMBER
CASTROL AIRCOL PD 32	32	5.57	110	215	-25	32
CASTROL AIRCOL PD 68	68	8.57	96	220	-15	68
CASTROL AIRCOL PD 100	100	11.40	100	240	-10	100
CASTROL AIRCOL PD 150	150	15.00	100	246	-12	150
CASTROL AIRCOL SN 68	67	7.60	69	227	-35	
CASTROL AIRCOL SN 100	95	10.10	89	246	-35	
CASTROL AIRCOL SR 46	46	7.75	137	264	-54	
CASTROL AIRCOL SR 68	68	10.50	142	249	-54	
CASTROL AIRCOL PG 185	185	35.00	200	260	-30	

GEAR OILS

Two ranges of high quality gear lubricants are available: Alpha SP range and Alphasyn EP range, numbered according to ISO 3448 classification.

CASTROL ALPHA SP RANGE

The Castrol Alpha SP range is blended with sulphur-phosphorous compounds imparting extreme pressure and anti-wear properties. They also have excellent thermal stability and oxidation resistance, good demulsification characteristics and low foaming tendencies, whilst providing rust and corrosion protection. Load carrying properties exceed load stage 12 of FZG A/8.3/90 test.

CASTROL ALPHASYN EP RANGE

Castrol Alphasyn EP synthetic fluids are polyalphaolefin (PAO) 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. Castrol Alphasyn EP fluids are particularly suitable for applications operating at high temperatures and loadings. They provide superior performance benefits including excellent thermal and oxidation stability, enhanced load carrying properties and outstanding protection against micro-pitting.

GEAR OILS

GEAR OIL	KINEMATIC VISCOSITY (cSt) @ 40°C	@ 100°C	V.I.	CLOSED FLASH POINT °C	POUR POINT °C
CASTROL ALPHA SP 68	68	8.53	95	215	-20
CASTROL ALPHA SP 100	100	11.10	95	224	-20
CASTROL ALPHA SP 150	150	14.50	95	224	-20
CASTROL ALPHA SP 220	220	18.70	95	224	-20
CASTROL ALPHA SP 320	320	24.00	95	230	-20
CASTROL ALPHA SP 460	460	30.50	95	230	-5
CASTROL ALPHA SP 680	680	37.30	90	239	-5
CASTROL ALPHASYN EP 68	68	10.40	140	220	-54
CASTROL ALPHASYN EP 100	100	13.80	140	220	-50
CASTROL ALPHASYN EP 150	150	18.60	140	220	-48
CASTROL ALPHASYN EP 220	220	24.50	140	220	-42
CASTROL ALPHASYN EP 320	320	32.10	140	230	-36

HYDRAULIC OILS

Mineral oil based hydraulic fluids numbered according to ISO 3448 classification.

CASTROL HYSPIN AWH-M RANGE

A range of mineral oil based hydraulic fluids. The high VI allows a single grade to be used in different climatic zones and ensures they are suitable for use in marine hydraulic systems.

GEAR OIL	KINEMATIC VISCOSITY (cSt) @ 40°C	@ 100°C	V.I.	CLOSED FLASH POINT °C	POUR POINT °C
CASTROL HYSPIN AWH-M15	15	3.80	150	160	-50
CASTROL HYSPIN AWH-M32	32	6.30	150	190	-40
CASTROL HYSPIN AWH-M46	46	8.10	150	190	-35
CASTROL HYSPIN AWH-M68	68	10.90	150	190	-35
CASTROL HYSPIN AWH-M100	100	13.30	130	190	-30
CASTROL HYSPIN AWH-M150	150	15.00	130	194	-30

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Marine

STERN TUBE OIL

CASTROL CORAL 2

A compounded mineral oil which readily emulsifies with water. Coral 2 gives a stable high viscosity emulsion and acceptable rust protection. It has been used in conjunction with Chuetsu-Waukesha and Simplex Compact Seals.

STERN TUBE OIL	KINEMATIC VISCOSITY (cSt) @ 40°C	@ 100°C	CLOSED FLASH POINT °C	POUR POINT °C
CASTROL CORAL 2	222	14	215	-10

REFRIGERATION OILS

CASTROL ICEMATIC

CASTROL ICEMATIC 266/CASTROL ICEMATIC 299

High quality mineral oil based lubricants for use in most of the commonly encountered marine refrigeration applications. Their low wax forming tendencies ensure low pour points and good solubility with fluorocarbon refrigerants. They are approved to Carrier Specification PP33/2 and PP36/2.

CASTROL ICEMATIC 2284/CASTROL ICEMATIC 2285

Synthetic refrigerator compressor oils intended for especially arduous conditions. They have excellent solubility in fluorocarbon refrigerants and can therefore be used in systems where high refrigerant/lubricant miscibility is required.
They are not recommended in systems using some types of screw compressors.

CASTROL ICEMATIC 2294/CASTROL ICEMATIC 2295

A range of refrigeration oils formulated from polyalphaolefin base stocks. They are designed for use in refrigeration systems using screw type compressors combined with very low evaporator temperatures and are also suitable for certain systems using reciprocating compressors with high compression ratios and discharge temperatures. They are virtually immiscible with R22 (and therefore are not suitable in refrigeration systems using flooded evaporators).

CASTROL ICEMATIC SW

A range of refrigeration oils formulated from synthetic ester base stocks. Miscible with CFC R12 and HCFC R22 but particularly suitable for HFC refrigerants such as R404A, R407C, R410A and R134A. They are completely wax free and have very low pour points to prevent blockage and ensure efficient evaporator performance.

REFRIGERATION OILS

REFRIGERATION OIL	KINEMATIC VISCOSITY (cSt) @ 40°C	@ 100°C	CLOSED FLASH POINT °C	POUR POINT °C	FLOC POINT °C NUMBER	ISO VG
CASTROL ICEMATIC 266	29.5	4.1	180	-42	-54	
CASTROL ICEMATIC 299	55.5	5.9	180	-36	-48	
CASTROL ICEMATIC 2284	68.0	6.7	185	-33	< -60	68
CASTROL ICEMATIC 2285	100.0	8.2	195	-30	< -60	100
CASTROL ICEMATIC 2294	68.00	11.0	225	-51	-42	68
CASTROL ICEMATIC 2295	220.0	25.2	235	-39	-29	220
CASTROL ICEMATIC SW 32	32.0	5.4	230	-46		32
CASTROL ICEMATIC SW 46	46.0	6.9	229	-42		46
CASTROL ICEMATIC SW 68	68.0	8.5	220	-39		68
CASTROL ICEMATIC SW 100	100.0	11.3	233	-30		100
CASTROL ICEMATIC SW 150	150	15.1	235	-29		150
CASTROL ICEMATIC SW 220	220	19.3	263	-26		220

ENVIRONMENTALLY FRIENDLY PRODUCTS

CASTROL BIOBAR RANGE

The Castrol BioBar range of high specification hydraulic oils are intended as drop-in replacements for conventional mineral oils in equipment where there is a risk of accidental spillage or leakage and consequent environmental damage. When measured in an OECD 306 (seawater) test Castrol BioBar products are classified as readily biodegradable in the marine environment.

CASTROL BIOTRANS RANGE

Castrol BioTrans synthetic gear oils are formulated from a synthetic ester and are readily biodegradable according to OECD 306 (seawater). Anti-wear and corrosion protection additives improve the natural characteristics of the synthetic base oil.

CASTROL BIOSTAT RANGE

The Castrol BioStat range of high specification stern tube oils are intended as drop-in replacements for conventional mineral oils in equipment where there is a risk of accidental spillage or leakage and consequent environmental damage. In addition to stern tubes, BioStat oils are also suitable for marine enclosed gear applications such as thrusters and other reduction gears. When measured in an OECD 306 (seawater) test Castrol BioStat products are classified as readily biodegradable in the marine environment.

CASTROL BIOTAC EP2

BioTac EP2 is an environmentally friendly, multi-purpose grease. This lithium/calcium based grease utilises a combination of readily biodegradable base fluids and additives to enhance corrosion and oxidation resistance and to provide good load carrying properties.

ENVIRONMENTALLY FRIENDLY PRODUCTS

ENVIRONMENTALLY FRIENDLY HYDRAULIC OILS	KINEMATIC VISCOSITY (cSt) @ 40°C	@ 100°C	V. I.	CLOSED FLASH POINT °C	POUR POINT °C
CASTROL BIOBAR 32	32	6.4	145	232	-45
CASTROL BIOBAR 46	46	8.2	146	232	-45
CASTROL BIOBAR 68	68	11	150	230	-30
CASTROL BIOBAR 100	100	14.1	150	>230	-30

ENVIRONMENTALLY FRIENDLY GEAR OILS	KINEMATIC VISCOSITY (cSt) @ 40°C	@ 100°C	V. I.	CLOSED FLASH POINT °C	POUR POINT °C
CASTROL BIOTRANS 150	150	21.6	170	>230	-27
CASTROL BIOTRANS 220	220	29.3	170	>230	-24

ENVIRONMENTALLY FRIENDLY PRODUCTS

ENVIRONMENTALLY FRIENDLY STERN TUBE OILS	KINEMATIC VISCOSITY (cSt) @ 40°C	@ 100°C	CLOSED FLASH POINT °C	POUR POINT °C
CASTROL BIOSTAT 68	70	13.3	>200	-39
CASTROL BIOSTAT 100	103	16.9	>200	-27
CASTROL BIOSTAT 220	207.8	28.4	>200	-27

ENVIRONMENTALLY FRIENDLY MULTI-PURPOSE GREASE	WORKED PENETRATION	MINERAL OIL VISCOSITY @ 40 °C (cSt)	DROP POINT °C	RECOMMENDED OPERATING TEMPERATURES MIN/MAX °C	N. L. G. I NUMBER	BASE
CASTROL BIOTAC EP2	265-295	105	>170	-30/120	2	Lithium/Calcium

GREASES

CASTROL LITHIUM BASE GREASES

CASTROL SPHEEROL LMM

An NLGI No. 2 lithium base grease containing molybdenum disulphide giving exceptional anti-seize properties for particularly severe applications.

CASTROL SPHEEROL EPL

Grease contains EP additives in addition to corrosion and oxidation inhibitors. Used in bearings operating under unusually heavy shock load conditions.

CASTROL SPHEEROL AP 3

An NLGI No.3 multi-purpose grease containing oxidation and corrosion inhibitors. Approved by most bearing manufacturers.

CASTROL LMX

Grease has an NLGI No. 2 consistency and is particularly suitable for high temperature applications in the marine and offshore industries.

CASTROL SPHEEROL SYNTHERM

Castrol Spheerol Syntherm is a true multi-service high performance synthetic grease designed and proven to extend the service life of bearings in heavy duty applications and at elevated temperatures in all shipboard applications. It is formulated from a blend of high quality synthetic base oils, a lithium complex thickener and a synthetic friction modifier/anti-wear system. In addition this product contains corrosion inhibitors and anti-oxidants for long service life.

GREASES

CASTROL CALCIUM SULPHONATE COMPLEX BASE GREASE

CASTROL SPHEEROL SX2

Multi-purpose grease designed specifically for wire rope lubrication, open gears and low to medium speed highly loaded bearings and has a high resistance to the effects of water.

CASTROL BENTONE BASE GREASE

CASTROL SPHEEROL BN

An NLGI No.3 consistency grease for high temperature applications manufactured from treated bentonite clays.

GREASES	WORKED PENETRATION	MINERAL OIL VISCOSITY @ 40 °C (cSt)	DROP POINT °C	RECOMMENDED OPERATING TEMPERATURES MIN/MAX °C	N. L. G. I NUMBER	BASE
CASTROL SPHEEROL LMM	280	150	180	-18/95	2	Lithium
CASTROL SPHEEROL EPL 00	410	475	Semi-fluid	-10/120	00	Lithium
CASTROL SPHEEROL EPL 0	370	200	170	-18/105	0	Lithium
CASTROL SPHEEROL EPL 1	330	200	170	-18/105	1	Lithium
CASTROL SPHEEROL AP 3	235	120	174	-30/120	3	Lithium
CASTROL SPHEEROL LMX	273	180	250	-30/170	2	Lithium complex
CASTROL SPHEEROL SX 2	285	180	>300	-20/150	2	Calcium Sulphonate complex
CASTROL SPHEEROL SYNTHERM	27	220	>250	-40/160	2	Pao + Ester
CASTROL SPHEEROL BN	245	460	indefinite	-7/260	3	Bentonite

HEAT TRANSFER OIL

CASTROL PERFECTO HT5

A solvent refined mineral oil with high thermal and oxidation stability, designed for use in modern closed heat transfer systems which operate under turbulent flow conditions thereby necessitating the use of a low viscosity fluid. The maximum recommended bulk-oil temperature in closed systems under controlled conditions is 320°C.

HEAT TRANSFER OIL	KINEMATIC VISCOSITY (cSt) @ 40°C	@ 100°C	CLOSED FLASH POINT °C	POUR POINT °C
CASTROL PERFECTO HT5	30.5	5.28	210	-10

SUNDRY PRODUCTS

MARINE DFM

Marine DFM is a diesel fuel treatment which is mixed directly into the fuel to enhance combustion and assist in the removal of combustion space deposits in highly rated four stroke engines burning low sulphur marine gas oil.

CASTROL MOLUB-ALLOY 936 SF HEAVY A

A uniquely compounded solvent-free open gear lubricant developed specifically for use on heavy duty equipment. Contains a proprietary blend of Molub-Alloy lubricating solids to promote anti-wear and load carrying properties beyond those of conventional lubricants. The compounding technology resists 'squeeze-out' and clings tenaciously even to gear teeth in vertical orientation.

CASTROL TRIBOL® 3020/1000-1

Tribol®3020/1000-1 grease is formulated with an advanced TGOA® additive system designed specifically for very heavy duty service in adverse environments. The additive package out-performs all other EP and anti-wear agents because of its unique action on frictional surfaces. This lubricating grease can therefore withstand the shock and heavy loading found in marine applications.

CASTROL OPTITEMP OG 0 PLUS

Optitemp OG 0 Plus is a sprayable high performance grease containing colloidal graphite for the lubrication of open gears. The grease is bitumen and solvent free yet provides excellent adhesion and so is highly resistant in unfavourable ambient conditions. Optitemp OG 0 Plus is preferably applied automatically via a grease spraying device but can be applied manually by brush.

SUNDRY PRODUCTS

SUNDRY PRODUCTS	WORKED PENETRATION	MINERAL OIL VISCOSITY @ 40 °C (cSt)	DROP POINT °C	RECOMMENDED OPERATING TEMPERATURES MIN/MAX °C	N. L. G. I NUMBER	BASE
CASTROL MOLUB-ALLOY 936 SF HEAVY A	345	1,890	Semi-fluid	-30/120	0-1	Lithium
CASTROL TRIBOL 3020/1000-1	325	1,000	>180	-30/120	1	Lithium
CASTROL OPTITEMP OG 0 PLUS	370	740	140	-20/120	0	Aluminium complex

GLOSSARY

ACID Any substance capable of producing hydrogen ions in solution. An acid will be neutralised by a base.

ACIDITY In lubricants, acidity denotes the presence of acidic constituents whose concentration is usually defined in terms of an acid number.

ADDITIVES A chemical compound or compounds added to a lubricating oil for the purpose of imparting new properties or enhancing those properties which the lubricant already has.

ANTIFOAM AGENT An additive used to suppress the foaming tendency of petroleum products in service. May be a silicone oil to break up surface bubbles or a polymer to decrease the number of small entrained bubbles.

ANTIWEAR AGENT Additives or their reaction products which form thin, tenacious films on highly loaded parts to prevent metal-to-metal contact.

ASH Some additives, particularly metallic based detergent additives, leave behind a powdery residue after combustion. This residue is known as ash and it can cause engine malfunction if allowed to build up in the combustion chamber.

ASH (SULPHATED) The ash content of an oil, determined by charring the oil and breaking the residue with sulphuric acid and evaporating to dryness. Expressed as % by mass.

BACTERICIDE A chemical material added to a fluid to prevent the growth of bacteria.

BASE NUMBER (BN) A measure of the amount of acid-neutralising additive present in a lube.

BASE STOCK (BASE OIL) Refined petroleum oil used in the production of lubricants and other products. The base stock may be used alone or blended with other base stocks and/or additives, to manufacture a finished lubricant.

GLOSSARY

BLACK OILS Asphaltic materials are added to lubricants used for open gears and steel cables to impart extra adhesiveness, giving them the characteristic black colour.

BLOW-BY Passage of combustion gases past the piston rings of internal combustion engines, resulting in contamination of the crankcase oil.

BOUNDARY LUBRICATION Lubrication between two rubbing surfaces without the development of a full fluid lubricating film. It occurs under high loads and requires the use of antiwear or EP additives to prevent metal-to-metal contact.

CAMS Eccentric shafts used in most internal combustion engines to open and close valves.

CARBON RESIDUE Coked material remaining after an oil has been exposed to high temperatures under controlled conditions.

CENTISTOKE (cSt) The normal measurement of kinematic viscosity.

CIF Price includes cost of cargo, insurance and freight (cargo, insurance plus freight).

CLOUD POINT The temperature at which a cloud or haze begins to appear when an oil, which has been previously dried, is cooled under prescribed conditions. Such cloud or haze is usually due to the separation of wax.

COPPER STRIP CORROSION A qualitative measure of the tendency of a petroleum product to corrode pure copper.

CORROSION INHIBITOR A substance added to a lubricant to protect against metal corrosion.

CROSSHEAD DIESEL ENGINE Slow-speed marine diesel engine with separated lubrication systems for cylinders and crankcase. Invariably operating on the 2-stroke cycle these engines derive their name from the crosshead bearing which couples the piston rod and the connecting rod.

GLOSSARY

CROWN The upper surface of the piston of an internal combustion engine, above the top ring exposed to direct flame impingement.

CYLINDER OIL Lubricating oil specifically designed for the total loss lubrication of the cylinders of crosshead marine diesel engines and some types of trunk piston engines.

DEMULSIBILITY The property of a lubricant to resist forming an emulsion with water. This property is measured by a test which times the separation of a well-mixed sample of oil and water and gives a 'Demulsification Number'.

DENSITY Mass per unit volume. Standard units are kg/m^3 or g/cm^3.

DETERGENT A substance added to a lubricant to keep engine parts clean. In engine oil formulations, the detergents most commonly used are metallic soaps with a reserve of basicity to neutralise acids formed during combustion.

DEW POINT The temperature at which water vapour starts to condense.

DISPERSANT An additive designed to disperse oil insoluble sludge in suspension, thus preventing harmful deposition in oilways.

DISTILLATE Any product obtained by condensing the vapours distilled from a refining process.

DROP POINT The temperature at which a grease passes from a semi-solid to a liquid under specified test conditions.

EMULSIBILITY The ability of a non-water soluble fluid to form an emulsion with water.

EMULSIFIER A type of surfactant effective at producing stable emulsions.

GLOSSARY

ENGINE DEPOSITS Accumulations of sludge, varnish and carbonaceous residues due to blow-by of unburned and partially burned fuel, or from partial breakdown of the crank-case lubricant. Water from condensation of combustion products, carbon, residues from fuel or lubricating oil additives, dust and metal particles also contribute.

ENGINE TEST Use of an internal combustion engine to evaluate lubricants. Parameters such as piston varnish, component wear, oil viscosity etc. are measured.

EXTREME PRESSURE (EP) LUBRICANTS EP oils and greases contain additives (usually based on sulphur, phosphorus or chlorine) which, under the effects of high temperature and pressure, form a protective film on metallic surfaces, preventing metal-to-metal contact if the normal hydrodynamic film breaks down under high pressure.

FAS Free alongside. The price includes the cost of delivery to the quayside.

FLASH POINT The temperature to which a combustible liquid must be heated to give off sufficient vapour to form a momentarily flammable mixture with air when ignited under specified conditions.

FOB Free on board. The price includes the cost of delivery on board the vessel.

FOT Free on truck. The price includes the cost of loading a truck.

FOUR BALL EP TEST Method for determining extreme pressure (EP) properties of fluids. One steel ball under load rotates against three stationary balls in the form of a cradle. Heated test fluid is subjected to a series of timed tests at increasing load until welding occurs. Wear is described by scar diameter plus load to weld in kg.

GLOSSARY

FRICTION The resisting force encountered at the common boundary between two bodies when, under the action of an external force, one body moves or tends to move relative to the other.

FZG GEAR TEST RIG A method for determining the load carrying ability of lubricants. Calibrated spur gears are operated at fixed speed and controlled initial oil temperatures for 15 minute stages. The load on the gear teeth is increased at each stage. Performance is judged by the number of stages run up to a defined weight loss of the test gears or visual assessment of damage to the tooth flanks. Maximum number of stages is 12.

GREASE A lubricant composed of an oil, or oils, thickened with a soap or other thickener, to a semi-solid or to a solid consistency.

HYDROCARBONS Chemical compounds which consist entirely of carbon and hydrogen. They form the basic components of all fuels and lubricants derived from petroleum.

IMMISCIBLE Incapable of being mixed to form a homogeneous fluid (or mixture) eg oil plus water.

INHIBITOR A substance which is added in a small proportion to a lubricant to prevent or retard undesirable changes in the quality of the lubricant, or in the condition of the equipment in which the lubricant is used.

INSOLUBLES Contaminants found in used oils due to dust, dirt, wear particles and/or oxidation products often measured as pentane or benzene insolubles to distinguish different types of insoluble matter.

KINEMATIC VISCOSITY Measure of a fluid's resistance to flow under gravity at a specific temperature (usually 40°C or 100°C), normally measured in centistokes (cSt).

GLOSSARY

LUBRICANT	Any substance interposed between rubbing surfaces for the purpose of reducing friction between them.
MIL-	US military specifications.
MINERAL OIL	Oil derived from fractionation and purification of crude oil.
MISCIBLE	Descriptive of substances, usually liquids, which mix together to form a homogeneous fluid.
MULTIGRADE	'Multigrade' is a term used to describe an oil for which the viscosity/temperature characteristics are such that its low temperature and high temperature viscosities fall within the limits of two different SAE grades.
NAPHTHENIC BASE STOCK	A type of base stock prepared from Naphthenic crudes (crudes containing a high percentage of ring type aliphatic hydrocarbons). They are characterised by high specific gravity plus low viscosity index.
NEUTRALISATION NUMBER	A measure of the acidity or alkalinity of an oil. The number is the mass, in milligrams, of acid (HCl) or base (KOH) required to neutralise one gram of oil.
NITRATION	The process whereby nitrogen oxides attack petroleum fluids at high temperature, often resulting in viscosity increases and deposit formation.
NLGI NUMBER	A numerical scale for classifying the consistency or stiffness range of lubricating greases.
OXIDATION	A process whereby oxygen attacks petroleum fluids at high temperature, often resulting in viscosity increases and deposit formation.
OXIDATION INHIBITOR	An additive which slows down the rate of oxidation of an oil.
OXIDATION STABILITY	An arbitrary measure of resistance of a product to deterioration through oxidation.

GLOSSARY

PARAFFINIC BASE STOCK A type of base stock prepared from Paraffinic crudes (crudes containing a high percentage of open-chain aliphatic hydrocarbons). They are characterised by low specific gravity and high viscosity index.

PENETRATION Measure of consistency (hardness) of a grease. All penetration measurements are in inverse scale of consistency - that is, the softer the consistency, the higher the penetration number.

PETTER W1 Single cylinder gasoline engine. Evaluates oil oxidation by viscosity increases and copper/lead bearing weight loss. Duration is 36 hours at 1500 rpm with sump oil temperature at 137°C.

PISTON RINGS The circular metallic components that ride in the grooves of a piston and provide compression sealing during combustion. Also used to control lubricating oil on the cylinder liner surface.

POISE (P) The unit of dynamic viscosity, which is related to its kinematic viscosity by a factor equal to its density at the temperature of measurement.

POLISHING (BORE) Excessive smoothing out of the surface finish of the cylinder bore or cylinder liner in an engine to a mirror-like appearance, resulting in poor ring sealing leading to high oil consumption.

POLYALPHAOLEFIN A synthetic lubricant produced by polymerisation of unsaturated hydrocarbons.

POUR POINT The lowest temperature at which a lubricant will pour or flow under specified conditions. A useful guide to minimum storage or handling temperature.

POUR POINT DEPRESSANT An additive used in a small proportion to lower the pour point of a lubricant.

PUMPABILITY The characteristic of an oil that ensures satisfactory flow to and from the engine oil pump and subsequent lubrication of moving components.

GLOSSARY

REFINING Series of processes for converting crude oil to finished petroleum products, including thermal cracking, catalytic cracking, polymerisation, alkylation, reforming hydrocracking, hydroforming, hydrogenation, hydrogen treating, solvent extraction, dewaxing, deoiling, acid treating, clay filtration and deasphalting.

RESIDUAL FUEL OIL Very heavy fuel oils produced from the residue of the fractional distillation process rather than from the distilled fractions.

RING STICKING The situation when the piston grooves become sufficiently full of deposits to prevent the piston rings from moving freely.

RUST PREVENTATIVE Compound for coating metal surfaces to protect against rust. Commonly used for the preservation of equipment in storage.

SCUFFING Abnormal wear occurring in engines due to localised welding and fracture. It can be prevented through the use of antiwear, extreme pressure, and friction modifier additives.

SHEAR STABILITY The property to resist viscosity loss under high rates of shear. Normally applied to products containing Viscosity Index Improver, where the VI improver molecules may be broken down into small molecules.

S.I.P.W.A Sulzer Integrated Piston Wear Arrangement equipment, used for in-service wear monitoring of cross head engine piston rings.

SLUDGE Oil insoluble products formed in internal combustion engines, and deposited on engine parts other than those in contact with the combustion space, can be derived from the lubricant, fuel or other contaminants in the engine.

GLOSSARY

SOLVENT EXTRACTION Refining process used to separate reactive components (unsaturated hydrocarbons) from lube distillates in order to improve the oxidation stability, viscosity index and response to additives.

SURFACTANT A compound able to reduce surface tension and commonly used to achieve emulsification, wetting or detergency.

STOKE (ST) Kinematic measurement of a fluid's resistance to flow defined by the ratio of the fluid's dynamic viscosity to its density.

TIMKEN OK LOAD Measure of the EP properties of a lubricant. Lubricated by the product under investigation, a standard steel roller rotates against a block. Timken OK load is the heaviest load that can be carried without scoring.

TRIBOLOGY The science and technology of interacting surfaces in relative motion and its related subjects and practices, eg. the science of lubrication.

TRUNK PISTON DIESEL ENGINE Medium-speed diesel engine generally using the same oil for both cylinder and crankcase lubrication.

TURBINE A piece of equipment in which a bladed rotor is rotated by a current of steam, air, water, or other fluid.

TURBO-CHARGER Compressor driven by exhaust turbine supplying air at higher pressure to the engine to increase power.

VISCOSITY That property of a liquid which quantifies its resistance to motion or flow at a stated temperature. It is commonly regarded as the "thickness" of the liquid. Viscosity decreases with increasing temperature.

GLOSSARY

VISCOSITY INDEX (VI)	An arbitrary scale used to measure a fluid's change of viscosity with temperature, normally based on kinematic viscosity measured at 40°C and 100°C.
VISCOSITY INDEX IMPROVER (VII)	An additive employed to raise the VI of an oil.
ZINC (ZDDP)	Commonly used name for zinc dithiophosphate, an antiwear/oxidation inhibitor chemical.

ORGANISATION ABBREVIATIONS

ACEA	Association des Constructeurs Européens d'Automobiles
ANSI	American National Standard Institute
APE	Association of Petroleum Engineers (USA)
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATC	Technical Committee of Petroleum Additive Manufacturers in Europe
ATIEL	Association Technique de l'Industries Européenne des Lubrifiants
BTC	British Technical Council of the Motor & Petroleum Industries (member CEC)
CCMC	Comitè des Constructeurs d'Automobiles du Marche Commun (Replaced by ACEA)
CEC	Conseil Européen de Co-ordination pour les Developments des Essais de Performance des Lubrifiants et des Combustibles pour Moteurs (Coordinating European Council)
CIMAC	Conseil International des Machines a Combustion
DIN	Deutches Institut für Normung
EFTC	Engine Fuels Technical Committee (of CEC)
ELTC	Engine Lubricants Technical Committee (of CEC)
FZG	Forschungstelle für Zahnrader und Getriebau
IP	Institute of Petroleum (UK)
ISO	International Organisation for Standardisation
NLGI	National Lubricating Grease Institute (USA)
OECD	Organisation for Economic Co-operation & Development
SAE	Society of Automotive Engineers
STLE	Society of Tribologists and Lubrication Engineers

Castrol Marine
Building D
Chertsey Road
Sunbury on Thames
Middlesex
TW16 7LN
United Kingdom

Telephone: +44 (0) 1932 774493
Fax: +44 (0) 1932 764062
www.castrolmarine.com

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