



## Product Data Sheet

# SPARTAN EP

## EXTREME PRESSURE INDUSTRIAL GEAR OILS

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SPARTAN<sup>\*</sup> EP gear oils are Premium Multi-Purpose industrial lubricants that are carefully formulated to work in a wide range of applications in industrial gear types including spur, helical, double helical (herring-bone), spiral bevel and worm gears. They offer the following benefits and features:

- ◆ Spartan EP 68 to 680 meets the performance requirements of AGMA 9005, Cincinnati Machine and USS 224 test specs
- ◆ Excellent demulsibility
- ◆ High temperature oxidation stability, and resistant to sludge formation
- ◆ Spartan EP 68 approved for use in the Sunds defibrator
- ◆ Eleven grades are available, from ISO 32 to ISO 1000 including SPARTAN EP ALL SEASON, which is an ISO 150 grade formulated for outdoor use.

### *Primary Applications*

SPARTAN EP gear oils are suitable for heavily loaded gear sets and gears that are subject to shock loading. All grades meet the European FZG load limit of 13 stages pass and can be safely used in most imported equipment. Check manufacturers' recommendations at all times, and consult Esso Technical Services when in doubt.

Today's SPARTAN EP line possesses outstanding Timken EP values. All grades have a minimum of 60 lb. (27kg) OK limit, thereby meeting AGMA 9005 and US Steel 224 requirements. SPARTAN EP oils are also suitable for use in both plain and anti-friction bearings and in circulating lubrication systems.

SPARTAN EP gear oils are also suitable for spray or mist lubrication systems where lead-compounded lubricants should not be recommended. However, where stray mist must be minimized, special mist oils should be considered such as ENMIST and Mobil Mist oils.

SPARTAN EP ALL SEASON oil is formulated for use indoors or outdoors over a wide range of temperatures. Due to its high viscosity index, it is ideally suited for year-round applications.

### *Performance Features*

#### **Extreme Pressure Properties**

A leading edge technology sulphur/phosphorus additive package provides outstanding protection to gears when shock loading causes the oil film between mating gears to temporarily become

insufficient for full fluid film lubrication. Extreme pressure additives react at high temperatures with the gear tooth surfaces, to form a low shear metal compound, thereby preventing serious damage to the gears such as local "welding" and subsequent surface metal removal.

Note that the extreme pressure additives only do their job under severe conditions such as shock loading, back lashing of gears and temporary overheating of gear drives, leading to a loss in viscosity of the base oil. Normal running gears do not require this protection and high quality turbine type oil or anti-wear hydraulic oil will suffice.

#### **High Temperature Oxidation Stability**

SPARTAN EP oils display a remarkable resistance to sludge formation under high running temperature conditions (up to 95°C). The U.S. Steel 224 test is designed to rate gear oils by heating oil to 121°C for 312 hours with air bubbling through the oil. A viscosity increase of greater than 6% is considered a failure; SPARTAN EP oils exhibit very little viscosity change with corresponding low increases in TAN (total acid number).

What this means is that today's high power density gear drives that generally run at higher bulk oil temperatures than in the past, are better protected against sludge and oxidation build-up which may interfere with proper lubrication on gears as well as the cleanup. It also means an increase in oil life at higher operating temperatures.

Note that bulk oil temperatures should be kept below 95°C for optimum oil life. SPARTAN EP oil is not recommended for worm gears operating above 85°C.

#### **Excellent Demulsibility**

The presence of water in gear drives should be avoided at all times. However cooling leaks do occur, as does condensation. SPARTAN EP oils show very good demulsibility properties. Note that the higher the temperature, the quicker the water separates. In cases where a large quantity of water is to be removed, the higher grades of

SPARTAN EP oils should be heated to 70°C if possible, to speed up the separation process.

#### **Rust Prevention**

Oil wetted surfaces are protected against rusting through the use of an effective surface-active rust prevention additive which forms a barrier against water.

#### **Foam Inhibitor**

Air is a poor lubricant and foam in a gear drive can lead to increased wear. A foam inhibitor guards against foam in the oil. Note that entrained air in an oil is caused generally by the bulk oil temperature being too low, causing the heavy oil to release the air too slowly. Heating the oil or switching to a lower ISO grade may alleviate air entrainment problems.

#### **Precautions**

SPARTAN EP oils are manufactured from high quality petroleum base stocks, carefully blended with selected additives. As with all petroleum products, good personal hygiene and careful handling should always be practiced. Avoid prolonged contact to skin, splashing into the eyes, ingestion or vapour inhalation. Please refer to our ESSO Material Safety Data Sheet for further information.

Note: This product is not controlled under Canadian WHMIS legislation.

### Typical Properties

Grade	32	68	100	All Season	150	220	320	460	680	1000
Colour	2.0	2.0	1.0	4.5	2.5.0	<3.0	<3.0	<4.5	<4.5	7.0
AGMA Grade	--	2 EP	3 EP	4 EP	4 EP	5 EP	6 EP	7 EP	8 EP	--
Density @ 15°C, kg/m <sup>3</sup>	883	875	880	895	884	891	892	895	881	913
Viscosity, Kinematic, cSt @ 40°C @ 100°C	32 5.7	68 9.6	100 11.5	150 16.6	150 14.7	220 18.6	320 24.0	460 30.4	680 43.8	1000 47.5
Viscosity, Brookfield, 16 hour soak, Poise @ -30°C @ -32°C @ -36°C @ -40°C	-- 92 156 341	-- 385 1400 --	-- -- -- --	1200 -- -- --	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --
Viscosity Index	125	120	99	122	96	93	95	100	112	90
Flash Point, COC, °C	166	205	230	178	240	240	240	240	240	246
Pour Point, °C	-51	-36	-27	-42	-27	-15	-15	-15	-9	-9
Timken OK Load, kg (min)	27	27	27	27	27	27	27	27	27	27
Foam Test, Stability Sequence I, II, III	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Demulsibility, After 30 minutes, oil	40	40	40	40	40	40	40	40	40	40
Rust Test,	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Corrosion, Copper Strip, 3 hr @ 100°C	1b	1b	1b	1b	1b	1b	1b	1b	1b	1b
4 Ball Wear Test, 1800 rpm, 20 kg load for 1 hr @ 54°C, Scar Dia., mm	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
FZG Test, Fail Load Stage	>13	>13	>13	>13	>13	>13	>13	>13	>13	>13
Total Acid Number, mg KOH/g	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

*The values shown above are representative of current production. Some are controlled by manufacturing and performance specifications while others are not. All may vary within modest ranges.*