

**DESIGNED SPECIFICALLY FOR WIND-TURBINE USE:
CASTROL TRIBOL GR SW 460-1 TOP IN LAB TESTS**

PROPERTY	CASTROL TRIBOL GR SW 460-1	COMPETITOR A	COMPETITOR B	COMPETITOR C	COMPETITOR D	COMPETITOR E
MECHANICAL STABILITY	●	●	●	●	●	●
CORROSION RESISTANCE	●	●	●	●	●	●
LOW TEMPERATURE	●	●	●	●	●	●
FE8-WEAR	●	●	●	●	●	●
FE8-TEMP/TORQUE	●	●	●	●	●	●
FAFNIR-ASTM D4170	●	●	●	●	●	●
SRV-ASTM D7594	●	●	●	●	●	●
SRV-ASTM D7594 at 0 °C	●	●	●	●	●	●

RELATIVE PERFORMANCE RATING		
● GOOD	● MEDIUM	● POOR

**TALK TO YOUR CASTROL LUBRICANT SPECIALIST TO DISCOVER
HOW CASTROL TRIBOL GR SW 460-1 CAN HELP YOU.**



CASTROL TRIBOL GR SW 460-1

**PROTECTING YOUR
WIND TURBINES'
CRITICAL COMPONENTS**

DESIGNED FOR WIND-TURBINE BEARINGS

Castrol Tribol GR SW 460-1 is a lubricant designed to meet the many challenges faced by wind turbines in tough environmental conditions – conditions where temperature and humidity can't be controlled, and where hard-to-reach locations result in long re-lubrication intervals.

Mechanically stable and with excellent low-temperature performance, Castrol Tribol GR SW 460-1 withstands high loads, and resists shearing, wear and water ingress. With good mobility for easy start-up and good protection against fretting, even at 0 °C, Castrol Tribol GR SW 460-1 offers excellent protection and is particularly suited to the harsh conditions of offshore applications.

BENEFITS OF CASTROL TRIBOL GR SW 460-1



Reduced unplanned downtime



Extended lubrication intervals



More efficient energy transfer

ACTIVE PROTECTION WITH MFT-PD TECHNOLOGY

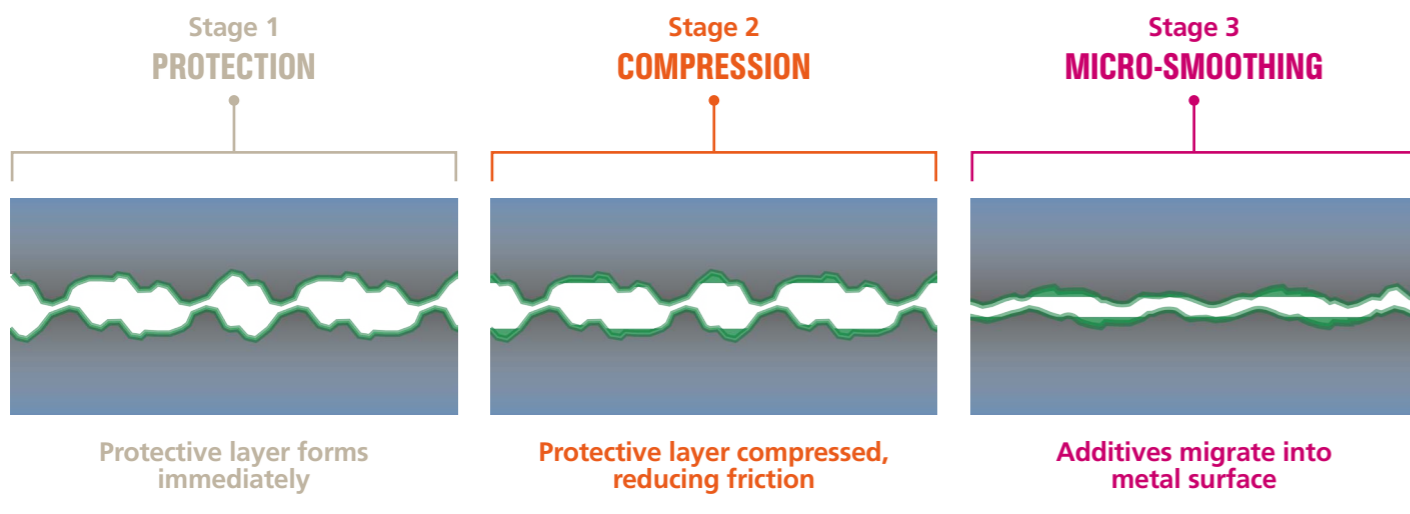
Conventional lubricants use sacrificial additives that get used up and need to be replenished. So even though they protect equipment, there's still wear – and breakdowns still happen.

Castrol's new wind-turbine grease, Castrol Tribol GR SW 460-1, takes a completely different approach: it uses MicrofluxTrans Plastic Deformation technology (MFT PD). This actively smoothens the surface, without depositing or removing material.

That means less pressure, less friction and less wear. Because MFT PD is non-sacrificial and needs replacing less frequently, re-lubrication intervals can be longer. The result is not only increased protection and lower maintenance, but lower energy and lubricant costs, too.

SURFACE ENGINEERING

Castrol Tribol GR SW 460-1 with MFT PD technology creates a protective layer on metal surfaces to reduce micro pitting and wear, and potentially prolong bearing life.

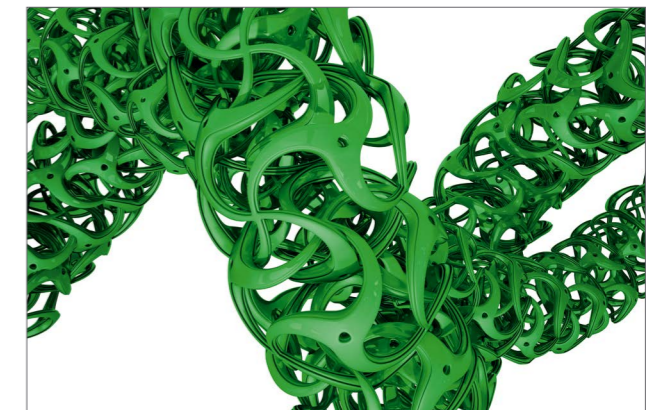


CASTROL TRIBOL GR SW 460-1 PERFORMANCE PROFILE

- Withstands high/shock loads
- Resists shearing and wear (fretting, rolling, sliding)
- Resists water ingress and corrosion
- Has good mobility at low temperatures for easy start-up
- Saves energy and prolongs component life due to reduced friction
- Controlled bleed rate and oil separation



Adaptive protection for equipment reliability



DESIGNED SPECIFICALLY FOR WIND-TURBINE USE: CASTROL TRIBOL GR SW 460-1 TOP IN LAB TESTS

PROPERTY	TEST DESCRIPTION	METHOD	PARAMETER	CASTROL TRIBOL GR SW 460-1	GOOD	MEDIUM	POOR
MECHANICAL STABILITY	Roll Stability Test (50 h, 80 °C)	ASTM D1831 mod	PW 60 unit change	≤ 10 %	≤ 15 %	15 – 20 %	> 20 %
CORROSION RESISTANCE	Emcor Test 1 % NaCl	DIN 51802		≤ 0 / 1	≤ 0 / 1	1 / 1 – 1 / 2	> 2 / 1
LOW TEMPERATURE	Flow Pressure at -40 °C	DIN 51805		525 hPa	≤ 800 hPa	825 – 1400 hPa	> 1400 hPa
	Low Temp Torque at -40 °C	ASTM D1478	Start Torque (ST) / Running Torque (RT)	0.3 Nm / 0.07 Nm	< 0.5 Nm / < 0.1 Nm	0.5-1.0 Nm / 0.1-0.5 Nm	> 1.0 Nm / > 0.5 Nm
FE8 – WEAR	FE8 C/75/50	DIN 51819-2	Wear MW50	1.5 mg	< 10 mg	10 - 50 mg	> 50 mg
FE8 – TEMP / TORQUE	FE8 C/75/50	DIN 51819-2	Temperature max ST / RT	≤ 50 °C 12 Nm / 5.5 Nm	< 60 °C < 15 Nm / < 8 Nm	60 - 90 °C 15 – 30 Nm / 8 – 15 Nm	> 90 °C > 30 Nm / > 15 Nm
FAFNIR – ASTM D4170		ASTM D4170	Wear loss	≤ 10 mg	< 10 mg	10 – 20 mg	> 20 mg
SRV – ASTM D7594		ASTM D7594	CoF Friction curve	Low, stable / Smooth, no fretting	Low, stable / Smooth, no fretting	Medium, stable / Smooth, no fretting	High, unstable / Rocky, fretting
SRV – ASTM D7594 at 0 °C		ASTM D7594	CoF Friction curve	Stable, no fretting	Stable, no fretting		Rocky, fretting