



Railroad Engine Oils (Zinc-free, Chlorine-free)

STARFIRE Railroad Engine Oil 40w and Multigrade SAE 20W-40 are premium locomotive crankcase oils designed to provide optimum engine protection for high horsepower, turbocharged two and four cycle engines normally found in railroads, marine and stationary power generation units where **zinc-free** oils are required. They are formulated to an LMOA Generation 6 quality level and are approved and qualified under EMD's internal listing. **STARFIRE Railroad Engine Oils** meet the requirements and are compatible with earlier generation railroad diesel engine oils.

PERFORMANCE FEATURES AND BENEFITS:

-) Recommended for Electro-Motive Diesel LMOA Generation 5 and General Electric LMOA Generation 4 Long Life applications.
-) Multigrade 20W-40 is formulated to provide year-round engine protection with enhanced cold weather start-up performance.
-) STARFIRE Railroad Engine Oils utilize the latest railroad oil chemistry that is both zinc and chlorine free to protect engines fitted with silver bearings while helping to reduce used oil recycling costs and environmental impact.
-) Excellent detergent, dispersant and anti-wear performance that provides for outstanding engine cleanliness while reducing sludge build-up helping to optimize oil drain intervals and fuel savings.
-) Good retention of Total Base Number (TBN) to protect engine against corrosive combustion by-products while meeting the needs of both new and older locomotive engines.

TYPICAL APPLICATIONS:

-) GE and EMD engines designed for use with low sulfur and ultra low sulfur fuels. Fully compatible with older engines formerly using higher TBN oils and high sulfur fuels.
-) Medium speed two-cycle and four-cycle diesel engines typically employed in railroad diesel engines, switching, short line and regional locomotives, including EMD and General Electric.
-) Most diesel marine applications such as tug boats, work boats and auxiliary engines that require a zinc-free additive system.
-) Stationary engines used in power generation, off-shore drilling and mine-haul applications.

Typical Properties

SAE Grade		40	20W-40
	Test Method		
Viscosity, cSt @ 40°C	ASTM D 445	146	130.0
Viscosity, cSt @ 100°C	ASTM D 445	15.0	15.3
Viscosity Index	ASTM D 2270	104	122
CCS Viscosity, cP @ -15°C	ASTM D 5293	-----	5800
Color	ASTM D 1500	7.5	7.5
Pour Point, °F(°C)	ASTM D 5949	-11 (-24)	-17 (-27)
Flash Point, °F(°C)	ASTM D 92	498 (260)	496 (258)
TBN, (mg KOH/g)	ASTM D 2896	9	9
Sulfated Ash, mass%	ASTM D 874	1.0	1.0
Zinc Content, max.ppm	ICP	< 10	< 10
Specific Gravity, 60°F	ASTM D 4052	0.88	0.88
Density, lbs/gal	Calculated	7.328	7.328