DATA BULLETIN

HP Marine® Synthetic 2-Stroke Oil

High-Performance Marine 2-Stroke Oil

High-quality motor oil is critical for maximum performance in modern two-stroke marine motors. Direct fuel injection (DFI) improves combustion efficiency, delivering the extra power boaters want, while leaner gas-to-oil ratios provide the reduced exhaust emissions the government mandates. The leaner ratio leaves less oil to lubricate and protect these hotter, more powerful motors, which invites deposits and wear that threaten engine performance and life. HP Marine is proven to excel in these harsh conditions. It controls performance-robbing friction, heat and wear, yet produces low smoke and has low aquatic toxicity properties. It's an oil as advanced as the engines it protects.

Outstanding Wear Protection

The elevated heat and friction of modern two-stroke marine motors can exceed the film strength of inferior oils, increasing the likelihood of scuffing and wear. HP Marine's exclusive synthetic formulation provides increased lubricity for reduced wear during normal and lean-mix operation (see field study results). In 534 hours of field testing, HP Marine completely prevented piston skirt and cylinder bore scuffing, demonstrating its superior lubricity and ability to reduce friction between moving parts. It maintains a strong lubricating film even in lean-mix, severe-service conditions, helping marine engines achieve maximum life.

Excellent Deposit Control

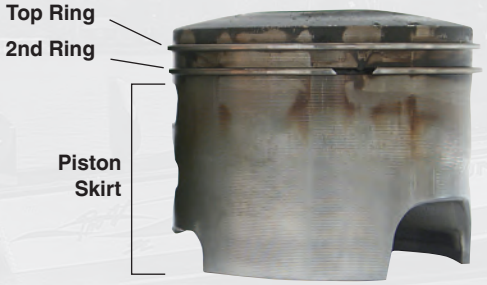
HP Marine is formulated with MAXDOSE™, a system of advanced additives for "super-clean" operation. It helps prevent deposits that lead to poor performance. In field testing, HP Marine inhibited ring deposits that can cause ring sticking and ring jacking (carbon buildup behind the ring, forcing it outward), a phenomenon that occurs in modern DFI outboard motors. It also virtually eliminated exhaust port deposits for reliable, efficient operation.

- **Excellent** for Evinrude* E-TEC* factory-lean setting
- **Helps prevent** deposits
- **Protects** against wear
- **Low** smoke
- **Protects** against rust
- **Low** aquatic toxicity
- **Superior performance** as an injection oil or at 50:1 pre-mix

Proven in Marine E-TEC Field Study

HP Marine was installed in a 250-hp Evinrude E-TEC engine powering a heavy-duty marine rescue vessel. Following a 28-hour break-in period at the normal oil setting, the engine was programmed to its factory-lean setting and operated for 506 hours prior to disassembly. An ASTM calibrated rater examined and awarded each component either a merit rating on a scale of 0 to 10 (with 10 representing no distress) or a percentage rating (with 0 percent representing no distress). Results prove HP Marine provided exceptional wear protection and deposit control. For complete study results, visit amsoil.com/proof.

Marine E-TEC Field Study Results



The piston rings earned a perfect merit rating of 10, demonstrating no-stick performance. The piston skirts demonstrated 0.00% scuffing, proving HP Marine's superior lubricity and friction-reduction capabilities.

TYPICAL TECHNICAL PROPERTIES

HP Marine® Synthetic 2-Stroke Oil (HPM)

Kinematic Viscosity @ 100°C, cSt (ASTM D445)	8.5
Kinematic Viscosity @ 40°C, cSt (ASTM D445)	46.8
Viscosity Index (ASTM D2270)	160
Pour Point °C (°F) (ASTM D97)	-46 (-51)
Flash Point °C (°F) (ASTM D92)	86 (187)
Fire Point °C (°F) (ASTM D92)	86 (187)
Brookfield Viscosity @ -40°C, cP (ASTM D2983)	14,025
NMMA TC-W3® Rust Test	Pass
Jaso M 342-92 Smoke Test (FD)	Pass
TC-W3 Lubricity Test (ASTM D4863)	Pass
OECD – Guideline 203, Fish Acute Toxicity Test	100% Survival Rate
OECD – Guideline 202, Daphnia Acute Immobilization Test	100% Survival Rate

APPLICATIONS

Use in two-stroke marine applications that specify TC-W3, including those made by: Johnson/Evinrude*, FICHT*, E-TEC*, Mercury* EFI & Optimax*, Yamaha*, Nissan*, Tohatsu* TLDI*, Suzuki*, Mariner*, Force*. Use as injection oil or 50:1 premix (2.6 oz. per U.S. gallon of gas).

COMPATIBILITY

Compatible with mineral and synthetic TC-W3-type two-stroke oils; however, mixing two-stroke oils should be minimized.

WARRANTY SECURE®

HP Marine Synthetic 2-Stroke Oil is Warranty Secure, keeping your factory warranty intact. HP Marine is a high-performance replacement for vehicle manufacturer-branded products and is also backed by the AMSOIL Limited Warranty (G1363). For details, visit www.amsoil.com/warrantysecure.

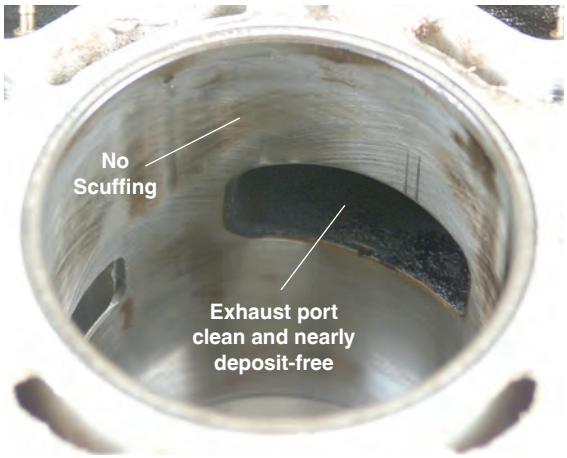
HEALTH AND SAFETY

This product is not expected to cause health concerns when used for the intended applications and according to the recommendations in the Safety Data Sheet (SDS). An SDS is available online at www.amsoil.com or upon request at (715) 392-7101. **Keep Out of Reach of Children.** Recycle used oil and bottle.

HP Marine E-TEC Field Study Results

For complete study results, visit amsoil.com/proof.

Cylinder Bore & Exhaust Port



Following 534 hours in service, the cylinder bores demonstrated 0.00% scuffing and the cross-hatch pattern is 100% intact. The exhaust ports are nearly deposit-free. Results prove the superior protection and clean-burning properties of HP Marine.

Main Bearings

The main bearings showed only trace to light wear despite 534 hours of rigorous use, most at the Evinrude E-TEC engine's factory-lean oil setting. They earned a nearly perfect 9.95 merit rating for deposits.

AMSOIL products and Dealership information are available from your local full-service AMSOIL Dealer.

https://www.TwoStrokeOils.com

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