Southwest Research Institute®

Fuels and Lubricants Research Division

NMMA 115 HP General Performance Engine Test (GPET)

Specifications

- NMMA FC-W®
- NMMA FC-W Catalyst Compatible®

Objective

- Evaluate the general performance of a lubricant designed for use in fourstroke cycle outboard engines where an increased propensity for corrosion and fuel dilution has been identified as a field concern.

Field Service Simulated

- High-speed, high-load, water-cooled marine engine duty cycles with exposure to high humidity levels and greater than 7% fuel dilution.

Test Fixture

- A Yamaha 115 hp, four-cylinder, four-stroke cycle, water-cooled, spark ignition outboard engine is mounted in a 10,000-gallon outboard test tank.
- A closed coolant system maintains engine temperature and a trimmed propeller provides the load to obtain a specified engine speed at wide-open throttle (WOT).

Test Parameters

- The 110-hour test consists of three primary segments including 10 hours of cyclic break-in, 90 hours of cyclic endurance testing, and 10 hours of steady-state 6000 rpm WOT operation.
- Engine speed is controlled at each test condition.
- Combustion air temperature is maintained at 21°C ± 5°C with relative humidity at 75% ± 5%.
- The following parameters are monitored and must remain within prescribed limits which vary at each test condition:
  - Fuel flow
  - Coolant-in temperature
  - Coolant-out temperature
  - Oil sump temperature
  - Oil pressure

Test Parts Evaluation

The engine is disassembled and the following components are cleaned and inspected:

- Cam lobes
- Cam caps
- Cam journals
- Cam bearings
- Piston rings
- Pistons
- Con rod bearings
- Cylinder bores
- Main bearings
- Crank journals
- Fuel pump lobe (reference only)

Used Lubricant Analysis

- Lubricant samples are taken at the end of break-in, and at test hours 25, 50, 75, 90 and at the end of the test.
- The level of fuel dilution, measured using ASTM D3525M-FDG, must reach a minimum of 7% by the 50th test hour, and remain at or above 7% until the 90th test hour.

Pass/Fail Criteria

- The components must have no excessive wear or damage such as scuffing, spalling, scoring, or ring wiping, and in general, must be comparable to or better than the results of the most recent reference test.

We welcome your inquiries. For additional information, please contact:

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