

Caterpillar 1N Alternate Fuel Acceptance Criteria

- Single test stand and associated rebuild hardware
- Intent is to conduct all tests without replacement of major internal or external hardware outside of typical rebuild process between runs
- Conduct 1 calibration test using oil 809-1 or 811-2
 - Test must meet all LTMS calibration acceptance requirements
 - Calculate new Zi value
- Total of 3 tests
- Conduct 2 tests on the alternate fuel using the same oil as above and one test using the other reference oil
 - Calculate Yi and Ei for these three tests. For all Ei values, use the Zi which was calculated immediately following the calibration test on the current fuel
 - Each test must meet the following criteria
 - For each parameter (4 total), $E_i < 1.734$
 - Average exhaust temperatures within +/-7 degrees C of the calibration test
 - Average power within +/- 1 kW of the calibration test
 - Average coolant delta temperature within +/- 0.75 deg C of calibration test
 - It should be noted that this is a ranged parameter with +/-1 deg C tolerance typically
 - Tests must be operationally valid

Note:

In the gasoline sequence test approval criteria, it has been helpful to view these requirements as the “free pass” requirements, rather than “pass/fail” requirements. If these requirements are met, the Mack SP is comfortable that no additional review is necessary to approve the fuel. On the other hand, if these criteria are not met, there may be a very good explanation to the reason, unrelated to the fuel. In these cases, the SP may still determine a path forward to approve the fuel, but the requirements will have to be determined on a case by case basis depending on the data.

Additional questions for consideration:

- 1) Assuming a new fuel is approved, what will the implementation process look like? Will the whole industry choose a single supplier amongst all approved suppliers, or will each lab be able to make its own decision on which approved fuel supplier it wishes to use?
- 2) If switching to a new fuel, previous Zi values and severity adjustments will be based on calibration data from a different fuel.
 - a. Is any additional referencing required?
 - i. If not, can switchover happen in the middle of a calibration period?
 - b. How will we handle severity adjustments?
- 3) For a test stand that runs the procedure described in this document, is the stand still calibrated and able to continue candidate testing?

Engine Parameters (Run Count of "0" is Calibration Test)

