

43. D7528 ROBO Test LTMS Requirements

The following are the specific D7528 ROBO Test calibration requirements.

A. Reference Oils and Critical Parameters

1. The critical pass/fail parameter is MRV Apparent Viscosity of the aged oil in transformed units. The reference oils, performance targets and acceptance criteria required for the test stand calibration with the TMC are listed in Table 1 and have been approved by the ASTM D02.B0.07 ROBO Surveillance Panel.

Table 1
MRV VISCOSITY
Unit of Measure: LN(MRV)

| D7528 (ROBO) Aged Oil MRV Acceptance Bands, mPa·s and ln(mPa·s) | | | | | | | | |
|---|----|---|------------------------------|-----------|--------------------------------------|--------------------------------------|----------------------|----------------------|
| Oil | n | Natural Log Transformed Mean (ln) | Mean in Original Units | s.d. (ln) | 95% | 95% | 95% | 95% |
| | | | | | band in mPa·s Min ¹ | band in mPa·s Max ¹ | Bands Min (ln) | Bands Max (ln) |
| 434-1 | 13 | 10.6599 | 42,612 | 0.1672 | 30,706 | 59,136 | 10.3322 | 10.9876 |
| 434-2 | 36 | ² 10.9284 | ² 55,737 | 0.1551 | ² 41,126 | ² 76,008 | ² 10.6244 | ² 11.2386 |
| 434-3 | 22 | ² 10.8172 | ² 49,871 | 0.1389 | ² 37,987 | ² 65,473 | ² 10.5450 | ² 11.0894 |
| 435 | 15 | 11.4895 | 97,685 | 0.2932 | ³ 60,000 | 173,546 | ³ 11.0021 | 12.0642 |
| 435-1 | 22 | 11.0416 | 62,420 | 0.20295 | ⁴ 44570 | 92910 | ⁴ 10.7048 | 11.4394 |
| 438 | 14 | 10.2676 | 28,785 | 0.2037 | 19,308 | 42,912 | 9.8683 | 10.6669 |
| 438-2 | 19 | ² 10.5404 | ² 37813 | 0.2596 | ² 22,734 | ² 62,894 | ² 10.0316 | ² 11.0492 |

¹ 95% bands in mPa·s are listed for information purposes only, the transformed values will be used to judge acceptance in all cases.

² A bias adjustment has been applied to the mean of reference oils 434-2, 434-3 and 438-2 to account for biases observed in the TMC reference data during the periods that each oil target dataset was generated. The 95% confidence range reflects the inclusion of the bias adjustments.

³ The minimum value for Reference oil 435 is fixed at 60,000 (11.0021 in transformed units) and not a true 95% minimum as calculated from the statistics.

⁴ The minimum value for reference oil 435-1 is based on -1.66 standard deviations from the target mean (to match the range previously approved for oil 435 min), so is not actually a 95% confidence range. A 95% confidence range would use 1.96 standard deviations from target mean.

2. EOT MRV (MRVEOT) viscosity values >400,000 mPa·s shall be reported as >400000.
3. EOT volatiles (VOLEOT) for the reference oils, in a properly run test, should never reach or exceed 60%. Tests with EOT volatility >= 60% will be declared operationally invalid.
4. Tests with EOT yield stress (MRVYSEOT) measured or reported at anything other than <35 will be declared operationally invalid. An exception is allowed for reference oil 434-3 only, where any yield stress measured at >35 Pa does not invalidate the test.

B. Acceptance Criteria

1. New Laboratory/New Test Stand(s)