




# Test Monitoring Center

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MEMORANDUM: 23-041  
DATE: December 29, 2023  
TO: HTCBT Surveillance Panel  
FROM: John Loop   
SUBJECT: Reference Oil 44-5 Revised Test Targets

On November 3, 2023, the Corrosion Bench Test (HTCBT) surveillance panel met and reviewed test data that had been generated on batch 5 of reference oil 44 (RO 44-5). A motion was made to revise the reference oil 44-5 test targets based upon 49 total valid HTCBT results generated with RO 44-5. The 49 data points represent the initial 16 data points used to create the beginning test targets, plus another 33 data points that had been generated over the past 6 months after RO 44-5 was accepted into use and initial targets set in March 2023. After a discussion during the meeting and a vote by email, these revised RO 44-5 Acceptance Ranges were accepted by the surveillance panel.

Initial and Revised targets are shown in Table 1 below:

| <b>Table 1: Initial and Revised Reference Oil 44-5 Test Targets (N=49)</b> |                     |                           |                              |
|--|---------------------|---------------------------|------------------------------|
| <b>Initial (N = 16)</b>  |                     |                           |                              |
| <b>Parameter</b>   | <b>Mean, ppm</b>    | <b>Standard Deviation</b> | <b>Acceptance Range, ppm</b> |
| Copper Concentration   | 114.96 <sup>A</sup> |                           | 77 to 172 <sup>B</sup>       |
| In transformed   | 4.7446              | 0.2071                    |                              |
| Lead Concentration   | 33                  | 6.3666                    | 20 to 45                     |
| <b>Revised (N = 49)</b>  |                     |                           |                              |
| <b>Parameter</b>   | <b>Mean, ppm</b>    | <b>Standard Deviation</b> | <b>Acceptance Range, ppm</b> |
| Copper Concentration   | 124.81 <sup>A</sup> |                           | 62 to 253 <sup>B</sup>       |
| In transformed   | 4.8268              | 0.3608                    |                              |
| Lead Concentration   | 32.67               | 7.652                     | 18 to 47                     |

<sup>A</sup> Untransformed value from average of natural log transformed Change in Copper Results  
<sup>B</sup> Acceptance Range calculated from natural log transformed Mean and Standard Deviation Values

Individual HTCBT results used to generate test targets are shown in Table 2.

The revised 44-5 reference oil targets are effective as of November 14, 2023.

c: J. A, Clark, TMC  
S. A. Moyer, TMC  
B07 Surveillance Panel Mailing Lists

<https://astmtmc.org/ftp/docs/bench/htcvt/memos/mem23-041.pdf>

Distribution: email

**Table 2. Individual HTCBT Results for Reference Oil 44-5**

| COUNT (N) | Reference Oil 44-5 TESTKEY | Change in Lead, ppm | Change In Copper, ppm | Change In Copper (Ln Transformed) |
|-----------|----------------------------|---------------------|-----------------------|-----------------------------------|
| 1         | 175323-HTCBT               | 35                  | 80                    | 4.3820                            |
| 2         | 175324-HTCBT               | 33                  | 98                    | 4.5850                            |
| 3         | 175325-HTCBT               | 33                  | 84                    | 4.4308                            |
| 4         | 175314-HTCBT               | 38                  | 129                   | 4.8598                            |
| 5         | 175316-HTCBT               | 39                  | 107                   | 4.6728                            |
| 6         | 175315-HTCBT               | 40                  | 124                   | 4.8203                            |
| 7         | 175312-HTCBT               | 20                  | 123                   | 4.8122                            |
| 8         | 175311-HTCBT               | 30                  | 98                    | 4.5850                            |
| 9         | 175313-HTCBT               | 23                  | 121                   | 4.7958                            |
| 10        | 175786-HTCBT               | 35                  | 117                   | 4.7622                            |
| 11        | 175787-HTCBT               | 32                  | 94                    | 4.5433                            |
| 12        | 175320-HTCBT               | 32                  | 178                   | 5.1818                            |
| 13        | 175788-HTCBT               | 31                  | 133                   | 4.8903                            |
| 14        | 175317-HTCBT               | 46                  | 119                   | 4.7791                            |
| 15        | 175321-HTCBT               | 34                  | 151                   | 5.0173                            |
| 16        | 175322-HTCBT               | 27                  | 121                   | 4.7958                            |
| 17        | 175319-HTCBT               | 37                  | 151                   | 5.0173                            |
| 18        | 179739-HTCBT               | 25                  | 163                   | 5.0938                            |
| 19        | 178946-HTCBT               | 36                  | 164                   | 5.0999                            |
| 20        | 178947-HTCBT               | 34                  | 141                   | 4.9488                            |
| 21        | 178954-HTCBT               | 33                  | 160                   | 5.0752                            |
| 22        | 178955-HTCBT               | 34                  | 145                   | 4.9767                            |
| 23        | 179737-HTCBT               | 26                  | 153                   | 5.0304                            |
| 24        | 178948-HTCBT               | 37                  | 164                   | 5.0999                            |
| 25        | 178949-HTCBT               | 33                  | 160                   | 5.0752                            |
| 26        | 180949-HTCBT               | 22                  | 106                   | 4.6634                            |
| 27        | 181493-HTCBT               | 42                  | 148                   | 4.9972                            |
| 28        | 178950-HTCBT               | 32                  | 149                   | 5.0039                            |
| 29        | 178953-HTCBT               | 36                  | 150                   | 5.0106                            |
| 30        | 180950-HTCBT               | 20                  | 104                   | 4.6444                            |
| 31        | 179738-HTCBT               | 33                  | 162                   | 5.0876                            |
| 32        | 182102-HTCBT               | 35                  | 131                   | 4.8752                            |
| 33        | 179898-HTCBT               | 29                  | 44                    | 3.7842                            |
| 34        | 182103-HTCBT               | 39                  | 164                   | 5.0999                            |
| 35        | 182104-HTCBT               | 34                  | 151                   | 5.0173                            |
| 36        | 182105-HTCBT               | 30                  | 173                   | 5.1533                            |
| 37        | 179899-HTCBT               | 16                  | 140                   | 4.9416                            |
| 38        | 180951-HTCBT               | 20                  | 99                    | 4.5951                            |
| 39        | 182129-HTCBT               | 46                  | 167                   | 5.1180                            |
| 40        | 178951-HTCBT               | 21                  | 181                   | 5.1985                            |
| 41        | 182132-HTCBT               | 42                  | 166                   | 5.1120                            |
| 42        | 182107-HTCBT               | 28                  | 151                   | 5.0173                            |
| 43        | 183524-HTCBT               | 43                  | 28                    | 3.3322                            |
| 44        | 182130-HTCBT               | 38                  | 97                    | 4.5747                            |
| 45        | 183523-HTCBT               | 52                  | 57                    | 4.0431                            |
| 46        | 178952-HTCBT               | 20                  | 188                   | 5.2364                            |
| 47        | 181494-HTCBT               | 27                  | 137                   | 4.9200                            |
| 48        | 182914-HTCBT               | 34                  | 124                   | 4.8203                            |
| 49        | 183156-HTCBT               | 39                  | 139                   | 4.9345                            |