

**Caterpillar C-13  
Engine Oil Test**

**Version** C13 VERSION 20050603 BETA

**Title / Validity Declaration Page  
Form 1**

**Conducted For**

TSTSPON1

TSTSPON2

|          |     |  |
|----------|-----|--|
| LABVALID | V = | Valid; The Reference Oil / Non-Reference Oil was evaluated in accordance with the test procedure.  |
|          | I = | Invalid; The Reference / Non-Reference Oil was not evaluated in accordance with the test procedure.  |
|          | N = | Results cannot be interpreted as representative of oil performance (Non-Reference Oil) and shall not be used in determining average test results using Multiple Test Criteria. |

|        |                             |
|--------|-----------------------------|
| TSTOIL | NR = Non-Reference Oil Test |
|        | RO = Reference Oil Test     |

| Test Number  |                                  |                            |
|--|----------------------------------|----------------------------|
| <b>Stand:</b> STAND                                | <b>Stand Run No.:</b> STRUN      |                            |
| <b>End of Test Date:</b> DTCOMP                    | <b>End of Test Time:</b> EOTTIME |                            |
| <b>Oil Code / CMIR:</b> <sup>A</sup> OILCODE       |                                  |                            |
| <b>Formulation / Stand Code:</b> <sup>B</sup> FORM |                                  |                            |
| <b>Altcode 1:</b> ALTCODE1                         | <b>Altcode 2:</b> ALTCODE2       | <b>Altcode 3:</b> ALTCODE3 |

In my opinion the test OPVALID been conducted in a valid manner in accordance with Test Method D XXXX and the appropriate amendments through the information letter system. The remarks included in this report describe the anomalies associated with this test.

<sup>A</sup> CMIR or Non-Reference Oil Code <sup>B</sup> ACC-Registered Tests Only

Submitted By: SUBLAB  
Testing Laboratory

SUBSIGIM  
Signature

SUBNAME  
Typed Name

SUBTITLE  
Title

**Caterpillar C-13  
Engine Oil Test**

**Form 2  
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**Caterpillar C-13  
Engine Oil Test**

**Form 3  
Summary of Test Method**

The CAT C-13 Engine Oil Test is an engine-dynamometer test which evaluates the ability of an engine oil to protect against ring sticking and oil consumption.

The test engine is a CAT C-13 diesel engine with ACERT technology. It is an in-line six cylinder, four stroke, turbocharged engine with electronically controlled fuel injection.

| <b>C-13 Test Conditions</b>          |              |
|--------------------------------------|--------------|
| <b>Parameter</b>                     | <b>Value</b> |
| Time, h                              | 500          |
| Speed, r/min                         | 1800         |
| Fuel Flow, g/min                     | 1200         |
| Inlet Manifold Temperature, °C       | 40           |
| Coolant Out Temperature, °C          | 88           |
| Fuel In Temperature, °C              | 40           |
| Oil Gallery Temperature, °C          | 98           |
| Intake Air Temperature, ° C          | 25           |
| Tailpipe Exhaust Temperature, °C     | Record       |
| Intake Air Restriction, kPa Absolute | 95           |
| Intake Manifold Pressure, kPa        | 280          |
| Exhaust Back Pressure, kPa           | 6            |
| Humidity, g/kg                       | Record       |
| Coolant System Pressure, kPa         | 99 - 107     |
| Power, kW                            | Record       |
| Torque, Nm                           | Record       |
| Oil Gallery Pressure, kPa            | Record       |

**Caterpillar C-13  
Engine Oil Test**

**Test Results Summary  
Form 4**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

|                                      |                              |                                      |
|--------------------------------------|------------------------------|--------------------------------------|
| <b>Start Date:</b> DTSTRT            | <b>Start Time:</b> STRTTIME  | <b>Test Length:</b> TESTLEN          |
| <b>Laboratory Oil Code:</b> LABOCODE |                              | <b>TMC Oil Code<sup>A</sup>:</b> IND |
| <b>Engine Number:</b> ENGINE         | <b>Engine Hours:</b> ENHOURS | <b>Engine Serial No.:</b> ENSERIAL   |

| Oil Consumption, g/hr |           |          |
|-----------------------|-----------|----------|
| 100 – 150             | 450 – 500 | % Inc.   |
| AOCON1                | AOCON2    | OCONPINC |

| Piston No.     | WD  | TGC  | TLC  | TGF    | IGF  | IGC  | AGF  | Loss of Ring Side Clearance |        |        |
|----------------|-----|------|------|--------|------|------|------|-----------------------------|--------|--------|
|                |     |      |      |        |      |      |      | Top                         | Int.   | Oil    |
| 1              | WD1 | TGC1 | TLC1 | TGF1   | IGF1 | IGC1 | AGF1 | ALSCT1                      | LSCIA1 | LSCOA1 |
| 2              | WD2 | TGC2 | TLC2 | TGF2   | IGF2 | IGC2 | AGF2 | ALSCT2                      | LSCIA2 | LSCOA2 |
| 3              | WD3 | TGC3 | TLC3 | TGF3   | IGF3 | IGC3 | AGF3 | ALSCT3                      | LSCIA3 | LSCOA3 |
| 4              | WD4 | TGC4 | TLC4 | TGF4   | IGF4 | IGC4 | AGF4 | ALSCT4                      | LSCIA4 | LSCOA4 |
| 5              | WD5 | TGC5 | TLC5 | TGF5   | IGF5 | IGC5 | AGF5 | ALSCT5                      | LSCIA5 | LSCOA5 |
| 6              | WD6 | TGC6 | TLC6 | TGF6   | IGF6 | IGC6 | AGF6 | ALSCT6                      | LSCIA6 | LSCOA6 |
| <b>Average</b> | AWD | ATGC | ATLC | TGFAVG | AIGF | AIGC | AAGF | ALSCT                       | ALSCI  | ALSCO  |

| Piston No. |            | Top      | Int.     | Oil      | Crown    | Skirt    | Liner    |
|------------|------------|----------|----------|----------|----------|----------|----------|
| 1          | Stuck Ring | STUCKTP1 | STUCKIN1 | STUCKOL1 |          |          |          |
|            | Scuffed    | SCUFFTP1 | SCUFFIN1 | SCUFFOL1 | SCUFFCR1 | SCUFFPS1 | SCUFFLN1 |
| 2          | Stuck Ring | STUCKTP2 | STUCKIN2 | STUCKOL2 |          |          |          |
|            | Scuffed    | SCUFFTP2 | SCUFFIN2 | SCUFFOL2 | SCUFFCR2 | SCUFFPS2 | SCUFFLN2 |
| 3          | Stuck Ring | STUCKTP3 | STUCKIN3 | STUCKOL3 |          |          |          |
|            | Scuffed    | SCUFFTP3 | SCUFFIN3 | SCUFFOL3 | SCUFFCR3 | SCUFFPS3 | SCUFFLN3 |
| 4          | Stuck Ring | STUCKTP4 | STUCKIN4 | STUCKOL4 |          |          |          |
|            | Scuffed    | SCUFFTP4 | SCUFFIN4 | SCUFFOL4 | SCUFFCR4 | SCUFFPS4 | SCUFFLN4 |
| 5          | Stuck Ring | STUCKTP5 | STUCKIN5 | STUCKOL5 |          |          |          |
|            | Scuffed    | SCUFFTP5 | SCUFFIN5 | SCUFFOL5 | SCUFFCR5 | SCUFFPS5 | SCUFFLN5 |
| 6          | Stuck Ring | STUCKTP6 | STUCKIN6 | STUCKOL6 |          |          |          |
|            | Scuffed    | SCUFFTP6 | SCUFFIN6 | SCUFFOL6 | SCUFFCR6 | SCUFFPS6 | SCUFFLN6 |

<sup>A</sup> Reference Oil Tests Only

**Caterpillar C-13  
Engine Oil Test  
Operational Summary  
Form 5**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| <b>Controlled Parameters</b>     |              |               |                  |                |                |
|----------------------------------|--------------|---------------|------------------|----------------|----------------|
| <b>Parameter</b>                 | <b>Units</b> | <b>Target</b> | <b>Tolerance</b> | <b>Average</b> | <b>Samples</b> |
| Engine Speed                     | r/min        | 1800          | ± 5              | ARPM           | NRPM           |
| Fuel Flow                        | g/min        | 1200          | ± 6              | AFFLO          | NFFLO          |
| <b>Temperature</b>               |              |               |                  |                |                |
| Inlet Air                        | °C           | 25            | ± 2              | AINAIRT        | NINAIRT        |
| Intake Manifold Air              | °C           | 40            | ± 2              | AINMANT        | NINMANT        |
| Fuel Inlet                       | °C           | 40            | ± 1              | AFUELT         | NFUELT         |
| Coolant Outlet                   | °C           | 88            | ± 2              | ACOLOUT        | NCOLOUT        |
| Oil Gallery                      | °C           | 98            | ± 2              | AOILGT         | NOILGT         |
| <b>Pressure</b>                  |              |               |                  |                |                |
| Inlet Air                        | kPa          | 95            | ± 3              | AINAIRP        | NINAIRP        |
| Exhaust Stack                    | kPa          | 6             | ± 1              | AEXHSTP        | NEXHSTP        |
| Intake Manifold                  | kPa          | 280           | ± 5              | AINMANP        | NINMANP        |
| <b>Non-Controlled Parameters</b> |              |               |                  |                |                |
| <b>Parameter</b>                 | <b>Units</b> | <b>Target</b> | <b>Tolerance</b> | <b>Average</b> | <b>Samples</b> |
| Engine Torque                    | Nm           | 1800          | Record           | ALOAD          | NLOAD          |
| Humidity                         | g/kg         | Record        | Record           | AHUMID         | NHUMID         |

**Caterpillar C-13  
Engine Oil Test  
Rod Bearing Weight Loss  
Form 6**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Cylinder No.                          | Location | SOT Weight, g | EOT Weight, g | Weight Change, mg |
|---------------------------------------|----------|---------------|---------------|-------------------|
| 1                                     | Upper    | BWSOTU1       | BWEOTU1       | BWLU1             |
| 2                                     | Upper    | BWSOTU2       | BWEOTU2       | BWLU2             |
| 3                                     | Upper    | BWSOTU3       | BWEOTU3       | BWLU3             |
| 4                                     | Upper    | BWSOTU4       | BWEOTU4       | BWLU4             |
| 5                                     | Upper    | BWSOTU5       | BWEOTU5       | BWLU5             |
| 6                                     | Upper    | BWSOTU6       | BWEOTU6       | BWLU6             |
| Upper Bearing Average Weight Loss, mg |          |               |               | ABWLU             |
| Upper Bearing Minimum Weight Loss, mg |          |               |               | IBWLU             |
| Upper Bearing Maximum Weight Loss, mg |          |               |               | XBWLU             |

| Cylinder No.                          | Location | SOT Weight, g | EOT Weight, g | Weight Change, mg |
|---------------------------------------|----------|---------------|---------------|-------------------|
| 1                                     | Lower    | BWSOTL1       | BWEOTL1       | BWLL1             |
| 2                                     | Lower    | BWSOTL2       | BWEOTL2       | BWLL2             |
| 3                                     | Lower    | BWSOTL3       | BWEOTL3       | BWLL3             |
| 4                                     | Lower    | BWSOTL4       | BWEOTL4       | BWLL4             |
| 5                                     | Lower    | BWSOTL5       | BWEOTL5       | BWLL5             |
| 6                                     | Lower    | BWSOTL6       | BWEOTL6       | BWLL6             |
| Lower Bearing Average Weight Loss, mg |          |               |               | ABWLL             |
| Lower Bearing Minimum Weight Loss, mg |          |               |               | IBWLL             |
| Lower Bearing Maximum Weight Loss, mg |          |               |               | XBWLL             |

**Caterpillar C-13  
Engine Oil Test  
Ring Weight Loss  
Form 7**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Cylinder No. | Top Ring SOT Weight, g             | Top Ring EOT Weight, g | Weight Loss, mg |
|--------------|------------------------------------|------------------------|-----------------|
| 1            | TRWSOT1                            | TRWEOT1                | TRWL1           |
| 2            | TRWSOT2                            | TRWEOT2                | TRWL2           |
| 3            | TRWSOT3                            | TRWEOT3                | TRWL3           |
| 4            | TRWSOT4                            | TRWEOT4                | TRWL4           |
| 5            | TRWSOT5                            | TRWEOT5                | TRWL5           |
| 6            | TRWSOT6                            | TRWEOT6                | TRWL6           |
|              | Top Ring Average Weight Loss, mg   |                        | ATRWL           |
|              | Top Ring Weight Loss Std. Dev., mg |                        | STRWL           |
|              | Top Ring Min. Weight Loss, mg      |                        | ITRWL           |
|              | Top Ring Max. Weight Loss, mg      |                        | XTRWL           |

| Cylinder No. | 2 <sup>nd</sup> Ring SOT Weight, g             | 2 <sup>nd</sup> Ring EOT Weight, g | Weight Loss, mg |
|--------------|--|------------------------------------|-----------------|
| 1            | R2WSOT1  | R2WEOT1                            | R2WL1           |
| 2            | R2WSOT2  | R2WEOT2                            | R2WL2           |
| 3            | R2WSOT3  | R2WEOT3                            | R2WL3           |
| 4            | R2WSOT4  | R2WEOT4                            | R2WL4           |
| 5            | R2WSOT5  | R2WEOT5                            | R2WL5           |
| 6            | R2WSOT6  | R2WEOT6                            | R2WL6           |
|              | 2 <sup>nd</sup> Ring Average Weight Loss, mg   |                                    | AR2WL           |
|              | 2 <sup>nd</sup> Ring Weight Loss Std. Dev., mg |                                    | SR2WL           |
|              | 2 <sup>nd</sup> Ring Min. Weight Loss, mg      |                                    | IR2WL           |
|              | 2 <sup>nd</sup> Ring Max. Weight Loss, mg      |                                    | XR2WL           |

| Cylinder No. | Oil Ring SOT Weight, g             | Oil Ring EOT Weight, g | Weight Loss, mg |
|--------------|------------------------------------|------------------------|-----------------|
| 1            | ORWSOT1                            | ORWEOT1                | ORWL1           |
| 2            | ORWSOT2                            | ORWEOT2                | ORWL2           |
| 3            | ORWSOT3                            | ORWEOT3                | ORWL3           |
| 4            | ORWSOT4                            | ORWEOT4                | ORWL4           |
| 5            | ORWSOT5                            | ORWEOT5                | ORWL5           |
| 6            | ORWSOT6                            | ORWEOT6                | ORWL6           |
|              | Oil Ring Average Weight Loss, mg   |                        | AORWL           |
|              | Oil Ring Weight Loss Std. Dev., mg |                        | SORWL           |
|              | Oil Ring Min. Weight Loss, mg      |                        | IORWL           |
|              | Oil Ring Max. Weight Loss, mg      |                        | XORWL           |

Caterpillar C-13

Engine Oil Test

Ring Side Clearance - Form 8

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Piston No. 1 |           | A        | B        | C        | D        | Avg.     | Max   |
|--------------|-----------|----------|----------|----------|----------|----------|-------|
| <b>Top</b>   | Pre-Test  | SIDETSA1 | SIDETSB1 | SIDETSC1 | SIDETSD1 | ASIDETS1 |       |
|              | Post-Test | SIDETE1A | SIDETE1B | SIDETE1C | SIDETE1D | ASIDE1E  |       |
|              | LSC       | LSCTA1   | LSCTB1   | LSCTC1   | LSCTD1   | ALSCT1   | XLSC1 |
| <b>Int.</b>  | Pre-Test  | SIDEISA1 |          |          |          |          |       |
|              | Post-Test | SIDEIEA1 |          |          |          |          |       |
|              | LSC       | LSCIA1   |          |          |          |          |       |
| <b>Oil</b>   | Pre-Test  | SIDEOSA1 |          |          |          |          |       |
|              | Post-Test | SIDEIEA1 |          |          |          |          |       |
|              | LSC       | LSCOA1   |          |          |          |          |       |

| Piston No. 2 |           | A        | B        | C        | D        | Avg.     | Max   |
|--------------|-----------|----------|----------|----------|----------|----------|-------|
| <b>Top</b>   | Pre-Test  | SIDETSA2 | SIDETSB2 | SIDETSC2 | SIDETSD2 | ASIDETS2 |       |
|              | Post-Test | SIDETE2A | SIDETE2B | SIDETE2C | SIDETE2D | ASIDE2E  |       |
|              | LSC       | LSCTA2   | LSCTB2   | LSCTC2   | LSCTD2   | ALSCT2   | XLSC2 |
| <b>Int.</b>  | Pre-Test  | SIDEISA2 |          |          |          |          |       |
|              | Post-Test | SIDEIEA2 |          |          |          |          |       |
|              | LSC       | LSCIA2   |          |          |          |          |       |
| <b>Oil</b>   | Pre-Test  | SIDEOSA2 |          |          |          |          |       |
|              | Post-Test | SIDEIEA2 |          |          |          |          |       |
|              | LSC       | LSCOA2   |          |          |          |          |       |

| Piston No. 3 |           | A        | B        | C        | D        | Avg.     | Max   |
|--------------|-----------|----------|----------|----------|----------|----------|-------|
| <b>Top</b>   | Pre-Test  | SIDETSA3 | SIDETSB3 | SIDETSC3 | SIDETSD3 | ASIDETS3 |       |
|              | Post-Test | SIDETE3A | SIDETE3B | SIDETE3C | SIDETE3D | ASIDE3E  |       |
|              | LSC       | LSCTA3   | LSCTB3   | LSCTC3   | LSCTD3   | ALSCT3   | XLSC3 |
| <b>Int.</b>  | Pre-Test  | SIDEISA3 |          |          |          |          |       |
|              | Post-Test | SIDEIEA3 |          |          |          |          |       |
|              | LSC       | LSCIA3   |          |          |          |          |       |
| <b>Oil</b>   | Pre-Test  | SIDEOSA3 |          |          |          |          |       |
|              | Post-Test | SIDEIEA3 |          |          |          |          |       |
|              | LSC       | LSCOA3   |          |          |          |          |       |

| Piston No. 4 |           | A        | B        | C        | D        | Avg.     | Max   |
|--------------|-----------|----------|----------|----------|----------|----------|-------|
| <b>Top</b>   | Pre-Test  | SIDETSA4 | SIDETSB4 | SIDETSC4 | SIDETSD4 | ASIDETS4 |       |
|              | Post-Test | SIDETE4A | SIDETE4B | SIDETE4C | SIDETE4D | ASIDE4E  |       |
|              | LSC       | LSCTA4   | LSCTB4   | LSCTC4   | LSCTD4   | ALSCT4   | XLSC4 |
| <b>Int.</b>  | Pre-Test  | SIDEISA4 |          |          |          |          |       |
|              | Post-Test | SIDEIEA4 |          |          |          |          |       |
|              | LSC       | LSCIA4   |          |          |          |          |       |
| <b>Oil</b>   | Pre-Test  | SIDEOSA4 |          |          |          |          |       |
|              | Post-Test | SIDEIEA4 |          |          |          |          |       |
|              | LSC       | LSCOA4   |          |          |          |          |       |

| Piston No. 5 |           | A        | B        | C        | D        | Avg.     | Max   |
|--------------|-----------|----------|----------|----------|----------|----------|-------|
| <b>Top</b>   | Pre-Test  | SIDETSA5 | SIDETSB5 | SIDETSC5 | SIDETSD5 | ASIDETS5 |       |
|              | Post-Test | SIDETE5A | SIDETE5B | SIDETE5C | SIDETE5D | ASIDE5E  |       |
|              | LSC       | LSCTA5   | LSCTB5   | LSCTC5   | LSCTD5   | ALSCT5   | XLSC5 |
| <b>Int.</b>  | Pre-Test  | SIDEISA5 |          |          |          |          |       |
|              | Post-Test | SIDEIEA5 |          |          |          |          |       |
|              | LSC       | LSCIA5   |          |          |          |          |       |
| <b>Oil</b>   | Pre-Test  | SIDEOSA5 |          |          |          |          |       |
|              | Post-Test | SIDEIEA5 |          |          |          |          |       |
|              | LSC       | LSCOA5   |          |          |          |          |       |

| Piston No. 6 |           | A        | B        | C        | D        | Avg.     | Max   |
|--------------|-----------|----------|----------|----------|----------|----------|-------|
| <b>Top</b>   | Pre-Test  | SIDETSA6 | SIDETSB6 | SIDETSC6 | SIDETSD6 | ASIDETS6 |       |
|              | Post-Test | SIDETE6A | SIDETE6B | SIDETE6C | SIDETE6D | ASIDE6E  |       |
|              | LSC       | LSCTA6   | LSCTB6   | LSCTC6   | LSCTD6   | ALSCT6   | XLSC6 |
| <b>Int.</b>  | Pre-Test  | SIDEISA6 |          |          |          |          |       |
|              | Post-Test | SIDEIEA6 |          |          |          |          |       |
|              | LSC       | LSCIA6   |          |          |          |          |       |
| <b>Oil</b>   | Pre-Test  | SIDEOSA6 |          |          |          |          |       |
|              | Post-Test | SIDEIEA6 |          |          |          |          |       |
|              | LSC       | LSCOA6   |          |          |          |          |       |



**Caterpillar C-13**  
**Engine Oil Test Oil Analysis Summary - Form 9**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Hours    | Soot Wt.% TGA | Viscosity @ 100°C cSt,D445 | Viscosity @ 40°C cSt,D445 | TBN D 4739 | Base Number AV D 2896 | TAN D 664 | Integrated IR Oxidation | Fuel Dilution Wt. %, D 3524 |
|----------|---------------|----------------------------|---------------------------|------------|-----------------------|-----------|-------------------------|-----------------------------|
| TST_NEW  | TGA_NEW       | V100NEW                    | V40_NEW                   | TBN_NEW    | AVT_NEW               | TAN_NEW   |                         |                             |
| TST_H004 | TGA_H004      | V100H004                   | V40_H004                  | TBN_H004   | AVT_H004              | TAN_H004  | IRINH004                | FUELH004                    |
| TST_H050 | TGA_H050      | V100H050                   | V40_H050                  | TBN_H050   | AVT_H050              | TAN_H050  | IRINH050                | FUELH050                    |
| TST_H100 | TGA_H100      | V100H100                   | V40_H100                  | TBN_H100   | AVT_H100              | TAN_H100  | IRINH100                | FUELH100                    |
| TST_H150 | TGA_H150      | V100H150                   | V40_H150                  | TBN_H150   | AVT_H150              | TAN_H150  | IRINH150                | FUELH150                    |
| TST_H200 | TGA_H200      | V100H200                   | V40_H200                  | TBN_H200   | AVT_H200              | TAN_H200  | IRINH200                | FUELH200                    |
| TST_H250 | TGA_H250      | V100H250                   | V40_H250                  | TBN_H250   | AVT_H250              | TAN_H250  | IRINH250                | FUELH250                    |
| TST_H300 | TGA_H300      | V100H300                   | V40_H300                  | TBN_H300   | AVT_H300              | TAN_H300  | IRINH300                | FUELH300                    |
| TST_H350 | TGA_H350      | V100H350                   | V40_H350                  | TBN_H350   | AVT_H350              | TAN_H350  | IRINH350                | FUELH350                    |
| TST_H400 | TGA_H400      | V100H400                   | V40_H400                  | TBN_H400   | AVT_H400              | TAN_H400  | IRINH400                | FUELH400                    |
| TST_H450 | TGA_H450      | V100H450                   | V40_H450                  | TBN_H450   | AVT_H450              | TAN_H450  | IRINH450                | FUELH450                    |
| TST_H500 | TGA_H500      | V100H500                   | V40_H500                  | TBN_H500   | AVT_H500              | TAN_H500  | IRINH500                | FUELH500                    |

| Hours    | Metal Elements (ppm) |          |          |          |          |          |          |          |
|----------|----------------------|----------|----------|----------|----------|----------|----------|----------|
|          | Fe                   | Pb       | Cu       | Cr       | Al       | Si       | Sn       | Na       |
| TST_NEW  | FEWMNEW              | PBWMNEW  | CUWMNEW  | CRWMNEW  | ALWMNEW  | SIWMNEW  | SNWMNEW  | NAWMNEW  |
| TST_H004 | FEWMH004             | PBWMH004 | CUWMH004 | CRWMH004 | ALWMH004 | SIWMH004 | SNWMH004 | NAWMH004 |
| TST_H050 | FEWMH050             | PBWMH050 | CUWMH050 | CRWMH050 | ALWMH050 | SIWMH050 | SNWMH050 | NAWMH050 |
| TST_H100 | FEWMH100             | PBWMH100 | CUWMH100 | CRWMH100 | ALWMH100 | SIWMH100 | SNWMH100 | NAWMH100 |
| TST_H150 | FEWMH150             | PBWMH150 | CUWMH150 | CRWMH150 | ALWMH150 | SIWMH150 | SNWMH150 | NAWMH150 |
| TST_H200 | FEWMH200             | PBWMH200 | CUWMH200 | CRWMH200 | ALWMH200 | SIWMH200 | SNWMH200 | NAWMH200 |
| TST_H250 | FEWMH250             | PBWMH250 | CUWMH250 | CRWMH250 | ALWMH250 | SIWMH250 | SNWMH250 | NAWMH250 |
| TST_H300 | FEWMH300             | PBWMH300 | CUWMH300 | CRWMH300 | ALWMH300 | SIWMH300 | SNWMH300 | NAWMH300 |
| TST_H350 | FEWMH350             | PBWMH350 | CUWMH350 | CRWMH350 | ALWMH350 | SIWMH350 | SNWMH350 | NAWMH350 |
| TST_H400 | FEWMH400             | PBWMH400 | CUWMH400 | CRWMH400 | ALWMH400 | SIWMH400 | SNWMH400 | NAWMH400 |
| TST_H450 | FEWMH450             | PBWMH450 | CUWMH450 | CRWMH450 | ALWMH450 | SIWMH450 | SNWMH450 | NAWMH450 |
| TST_H500 | FEWMH500             | PBWMH500 | CUWMH500 | CRWMH500 | ALWMH500 | SIWMH500 | SNWMH500 | NAWMH500 |

**Caterpillar C-13  
Engine Oil Test  
Liner Wear Summary  
Form 10**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| <b>Position</b>    | <b>Wear Step (µm)</b>  |          |          |          |          |          |                |
|--------------------|------------------------|----------|----------|----------|----------|----------|----------------|
|                    | <b>Cylinder Number</b> |          |          |          |          |          |                |
|                    | <b>1</b>               | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>Average</b> |
| 3:00 (Thrust)      | C1LW3                  | C2LW3    | C3LW3    | C4LW3    | C5LW3    | C6LW3    | ALW3           |
| 6:00 (Rear)        | C1LW6                  | C2LW6    | C3LW6    | C4LW6    | C5LW6    | C6LW6    | ALW6           |
| 9:00 (Anti-Thrust) | C1LW9                  | C2LW9    | C3LW9    | C4LW9    | C5LW9    | C6LW9    | ALW9           |
| 12:00 (Front)      | C1LW12                 | C2LW12   | C3LW12   | C4LW12   | C5LW12   | C6LW12   | ALW12          |
| <b>Average</b>     | C1ALW                  | C2ALW    | C3ALW    | C4ALW    | C5ALW    | C6ALW    | ALW            |

| <b>Summary</b> | <b>As Measured</b> |
|----------------|--------------------|
| Average, µm    | AMACLW             |
| Minimum, µm    | AMICLW             |
| Maximum, µm    | AMXCLW             |

**Caterpillar C-13  
Engine Oil Test  
Unscheduled Downtime & Maintenance Summary  
Form 11**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Number of Downtime Occurrences |          |          | DWNOCR                |
|--------------------------------|----------|----------|-----------------------|
| Test Hours                     | Date     | Downtime | Reasons               |
| DOWNR001                       | DDATR001 | DTIMR001 | DREAR001              |
| DOWNR002                       | DDATR002 | DTIMR002 | DREAR002              |
| DOWNR003                       | DDATR003 | DTIMR003 | DREAR003              |
| DOWNR004                       | DDATR004 | DTIMR004 | DREAR004              |
| DOWNR005                       | DDATR005 | DTIMR005 | DREAR005              |
| DOWNR006                       | DDATR006 | DTIMR006 | DREAR006              |
| DOWNR007                       | DDATR007 | DTIMR007 | DREAR007              |
| DOWNR008                       | DDATR008 | DTIMR008 | DREAR008              |
| DOWNR009                       | DDATR009 | DTIMR009 | DREAR009              |
| DOWNR010                       | DDATR010 | DTIMR010 | DREAR010              |
| DOWNR011                       | DDATR011 | DTIMR011 | DREAR011              |
| DOWNR012                       | DDATR012 | DTIMR012 | DREAR012              |
| DOWNR013                       | DDATR013 | DTIMR013 | DREAR013              |
| DOWNR014                       | DDATR014 | DTIMR014 | DREAR014              |
| DOWNR015                       | DDATR015 | DTIMR015 | DREAR015              |
|                                |          | TOTLDOWN | <b>Total Downtime</b> |

| Other Comments          |        |
|-------------------------|--------|
| Number of Comment Lines | TOTCOM |
| OCOMR001                |        |
| OCOMR002                |        |
| OCOMR003                |        |
| OCOMR004                |        |
| OCOMR005                |        |
| OCOMR006                |        |
| OCOMR007                |        |
| OCOMR008                |        |
| OCOMR009                |        |
| OCOMR010                |        |
| OCOMR011                |        |
| OCOMR012                |        |
| OCOMR013                |        |
| OCOMR014                |        |
| OCOMR015                |        |

**Caterpillar C-13  
Engine Oil Test  
Unscheduled Downtime & Maintenance Summary  
Form 11A**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Number of Downtime Occurrences |          |          | DWNOCR                |  |
|--------------------------------|----------|----------|-----------------------|--|
| Test Hours                     | Date     | Downtime | Reasons               |  |
| DOWNR016                       | DDATR016 | DTIMR016 | DREAR016              |  |
| DOWNR017                       | DDATR017 | DTIMR017 | DREAR017              |  |
| DOWNR018                       | DDATR018 | DTIMR018 | DREAR018              |  |
| DOWNR019                       | DDATR019 | DTIMR019 | DREAR019              |  |
| DOWNR020                       | DDATR020 | DTIMR020 | DREAR020              |  |
| DOWNR021                       | DDATR021 | DTIMR021 | DREAR021              |  |
| DOWNR022                       | DDATR022 | DTIMR022 | DREAR022              |  |
| DOWNR023                       | DDATR023 | DTIMR023 | DREAR023              |  |
| DOWNR024                       | DDATR024 | DTIMR024 | DREAR024              |  |
| DOWNR025                       | DDATR025 | DTIMR025 | DREAR025              |  |
| DOWNR026                       | DDATR026 | DTIMR026 | DREAR026              |  |
| DOWNR027                       | DDATR027 | DTIMR027 | DREAR027              |  |
| DOWNR028                       | DDATR028 | DTIMR028 | DREAR028              |  |
| DOWNR029                       | DDATR029 | DTIMR029 | DREAR029              |  |
| DOWNR030                       | DDATR030 | DTIMR030 | DREAR030              |  |
|                                |          | TOTLDOWN | <b>Total Downtime</b> |  |

| Other Comments          |        |  |
|-------------------------|--------|--|
| Number of Comment Lines | TOTCOM |  |
| OCOMR016                |        |  |
| OCOMR017                |        |  |
| OCOMR018                |        |  |
| OCOMR019                |        |  |
| OCOMR020                |        |  |
| OCOMR021                |        |  |
| OCOMR022                |        |  |
| OCOMR023                |        |  |
| OCOMR024                |        |  |
| OCOMR025                |        |  |
| OCOMR026                |        |  |
| OCOMR027                |        |  |
| OCOMR028                |        |  |
| OCOMR029                |        |  |
| OCOMR030                |        |  |

**Caterpillar C-13  
Engine Oil Test  
Unscheduled Downtime & Maintenance Summary  
Form 11B**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Number of Downtime Occurrences |          |          | DWNOCR                |  |
|--------------------------------|----------|----------|-----------------------|--|
| Test Hours                     | Date     | Downtime | Reasons               |  |
| DOWNR031                       | DDATR031 | DTIMR031 | DREAR031              |  |
| DOWNR032                       | DDATR032 | DTIMR032 | DREAR032              |  |
| DOWNR033                       | DDATR033 | DTIMR033 | DREAR033              |  |
| DOWNR034                       | DDATR034 | DTIMR034 | DREAR034              |  |
| DOWNR035                       | DDATR035 | DTIMR035 | DREAR035              |  |
| DOWNR036                       | DDATR036 | DTIMR036 | DREAR036              |  |
| DOWNR037                       | DDATR037 | DTIMR037 | DREAR037              |  |
| DOWNR038                       | DDATR038 | DTIMR038 | DREAR038              |  |
| DOWNR039                       | DDATR039 | DTIMR039 | DREAR039              |  |
| DOWNR040                       | DDATR040 | DTIMR040 | DREAR040              |  |
| DOWNR041                       | DDATR041 | DTIMR041 | DREAR041              |  |
| DOWNR042                       | DDATR042 | DTIMR042 | DREAR042              |  |
| DOWNR043                       | DDATR043 | DTIMR043 | DREAR043              |  |
| DOWNR044                       | DDATR044 | DTIMR044 | DREAR044              |  |
| DOWNR045                       | DDATR045 | DTIMR045 | DREAR045              |  |
|                                |          | TOTLDOWN | <b>Total Downtime</b> |  |

| Other Comments          |  | TOTCOM |  |
|-------------------------|--|--------|--|
| Number of Comment Lines |  |        |  |
| OCOMR031                |  |        |  |
| OCOMR032                |  |        |  |
| OCOMR033                |  |        |  |
| OCOMR034                |  |        |  |
| OCOMR035                |  |        |  |
| OCOMR036                |  |        |  |
| OCOMR037                |  |        |  |
| OCOMR038                |  |        |  |
| OCOMR039                |  |        |  |
| OCOMR040                |  |        |  |
| OCOMR041                |  |        |  |
| OCOMR042                |  |        |  |
| OCOMR043                |  |        |  |
| OCOMR044                |  |        |  |
| OCOMR045                |  |        |  |

**Caterpillar C-13  
Engine Oil Test  
Test Fuel Analysis (Last Batch)  
Form 12**

|                                       |                         |                                |
|---------------------------------------|-------------------------|--------------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME       |
| <b>Test Number:</b> TESTNUM           |                         |                                |
| <b>Oil Code:</b> OILCODE              |                         |                                |
| <b>Formulation / Stand Code:</b> FORM |                         |                                |
| <b>Fuel Supplier:</b> FUELSUP         |                         | <b>Fuel Batch ID:</b> FUELBTID |

| Measurement                              | Specs.                      | Analysis |          | Test Method                |
|--|-----------------------------|----------|----------|----------------------------|
|  |                             | New      | EOT      |                            |
| <b>Total Sulfur, ppm</b>                 | <b>7 - 15</b>               | FUELSNEW | FUELSEOT | <b>D 5453</b>              |
| <b>Gravity, °API</b>                     | <b>34 - 37</b>              | APIGRNEW | APIGREOT | <b>D 4052</b>              |
| <b>Hydrocarbon Composition</b>           |                             |          |          |                            |
| <b>Aromatics, % Weight</b>               | <b>26 – 31.5</b>            | FUELAROM |          | <b>D 5186</b>              |
| <b>Olefins, % Volume</b>                 | <b>Report</b>               | FUELOLEF |          | <b>D 1319</b>              |
| <b>Cetane Index</b>                      | <b>Report</b>               | CETANEIN |          | <b>D 976</b>               |
| <b>Cetane No.</b>                        | <b>43 – 47</b>              | CETANENO |          | <b>D 613</b>               |
| <b>Copper Strip Corrosion</b>            | <b>1 Maximum</b>            | FUELCU   |          | <b>D 130</b>               |
| <b>Flash Point, °C</b>                   | <b>54 Minimum</b>           | FLASHPT  |          | <b>D 93</b>                |
| <b>Pour Point, °C</b>                    | <b>-18 Maximum</b>          | FUELPOUR |          | <b>D 97</b>                |
| <b>Carbon Residue on 10% Residuum, %</b> | <b>0.35 Maximum</b>         | FUELCRES |          | <b>D 524 (10% Bottoms)</b> |
| <b>Water &amp; Sediment, % Volume</b>    | <b>0.05 Maximum</b>         | FUELH2O  |          | <b>D 2709</b>              |
| <b>Viscosity, cSt @ 40°C</b>             | <b>2.0 – 2.6</b>            | KINVIS   |          | <b>D 445</b>               |
| <b>Total Acid Number</b>                 | <b>0.05 Maximum</b>         | FUELTAN  |          | <b>D 664</b>               |
| <b>Strong Acid Number</b>                | <b>0.00 Maximum</b>         | FUELSAN  |          | <b>D 664</b>               |
| <b>Accelerated Stability</b>             | <b>1.5 max</b>              | FUELACS  |          | <b>D 2274</b>              |
| <b>Ash, % Weight</b>                     | <b>0.005 Maximum</b>        | FUELASH  |          | <b>D 482</b>               |
| <b>SLBOCLE, g</b>                        | <b>3100 min<sup>A</sup></b> | SLBOCLE  |          | <b>D 6078<sup>A</sup></b>  |
| <b>90% Distillation, °C</b>              | <b>282 – 338</b>            | FUEL90   |          | <b>D 86</b>                |

<sup>A</sup> May be altered to be consistent with CARB or ASTM diesel fuel specifications.

**Caterpillar C-13  
Engine Oil Test  
Build-Up and Hardware Information  
Form 13**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| <b>Hardware</b>      |                    |
|----------------------|--------------------|
| <b>Part</b>          | <b>Part Number</b> |
| Intake Valve         | INTAKEPN           |
| Exhaust Valve        | EXHSTPN            |
| Cylinder Head        | CYLHDPN            |
| Head Gasket          | HDGASPN            |
| Pistons              | PISTONPN           |
| Injectors            | INJNOZPN           |
| Rod Bearings         | RODBRGPN           |
| Liners               | LINERPN            |
| Top Ring             | TOPRNGPN           |
| 2 <sup>nd</sup> Ring | SRINGPN            |
| Oil Ring             | OILRNGPN           |

**Caterpillar C-13  
Engine Oil Test  
Piston Deposit Rating Summary  
Form 14**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| <b>Piston Number</b> |          |          |          |          |          |          |                |
|----------------------|----------|----------|----------|----------|----------|----------|----------------|
| <b>Parameter</b>     | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>Average</b> |
| <b>TLHC, %</b>       | TLHC1    | TLHC2    | TLHC3    | TLHC4    | TLHC5    | TLHC6    | ATLHC          |
| <b>TLC, dem.</b>     | TLC1     | TLC2     | TLC3     | TLC4     | TLC5     | TLC6     | ATLC           |
| <b>TGC, dem.</b>     | TGC1     | TGC2     | TGC3     | TGC4     | TGC5     | TGC6     | ATGC           |
| <b>AGF, %</b>        | AGF1     | AGF2     | AGF3     | AGF4     | AGF5     | AGF6     | AAGF           |
| <b>WD, dem.</b>      | WD1      | WD2      | WD3      | WD4      | WD5      | WD6      | AWD            |
| <b>IGC, dem.</b>     | IGC1     | IGC2     | IGC3     | IGC4     | IGC5     | IGC6     | AIGC           |
| <b>2LC, dem.</b>     | SLC1     | SLC2     | SLC3     | SLC4     | SLC5     | SLC6     | ASLC           |





**Caterpillar C-13  
Engine Oil Test  
Rating Summary: Piston No. 2  
Form I6**

|                                       |                              |                          |  |
|---------------------------------------|------------------------------|--------------------------|--|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP      | <b>EOT Time:</b> EOTTIME |  |
| <b>Test Number:</b> TESTNUM           |                              | <b>Oil Code:</b> OILCODE |  |
| <b>Formulation / Stand Code:</b> FORM |                              |                          |  |
| <b>Date Rated:</b> DTRATE             | <b>Rater Initials:</b> RINIT |                          |  |
|                                       | <b>Verified By:</b> VRINIT   |                          |  |

| Total Piston Ratings Summary |                      |                      |                      |                      |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
|------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------------|----------------------|----------------------|----------------|---------------------------------|----------------------|---------------------|-------------|---------------------|--|-------------|--|
| Deposit Factor               | Grooves              |                      |                      |                      | Lands                |                            |                      |                      | Deposit Factor | Lands                           |                      |                     |             | Oil Cooling Gallery |  | Under Crown |  |
|                              | No. 1<br>A,%<br>DEM. | No. 2<br>A,%<br>DEM. | No. 1<br>A,%<br>DEM. | No. 2<br>A,%<br>DEM. | No. 1<br>A,%<br>DEM. | No. 2<br>A,%<br>DEM.       | No. 1<br>A,%<br>DEM. | No. 2<br>A,%<br>DEM. |                | No. 3<br>A,%<br>DEM.            | No. 4<br>A,%<br>DEM. | Oil Cooling Gallery | Under Crown |                     |  |             |  |
| C                            |                      |                      |                      |                      |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| A                            | G1HCA; G1HCD2        | G2HCA; G2HCD2        | L1HCA2; L1HCD2       | L2HCA2; L2HCD2       |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| R                            | G1MCA; G1MCD2        |                      |                      |                      |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| B                            | G1LCA2; G1LCD2       | G2LCA2; G2LCD2       | L1LCA2; L1LCD2       | L2LCA2; L2LCD2       |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| O                            |                      |                      |                      |                      |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| N                            | G1ACT; G1DCTO        | G2ACT; G2DCTO        | L1ACTO; L1DCTO       | L2ACT; L2DCTO        |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| 8 - 9                        | G1V9A2; G1V9D2       | G2V9A2; G2V9D2       | L1V9A2; L1V9D2       | L2V9A2; L2V9D2       |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| 7 - 7.9                      | G1V8A2; G1V8D2       | G2V8A2; G2V8D2       | L1V8A2; L1V8D2       | L2V8A2; L2V8D2       | 7.5                  |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| 6 - 6.9                      | G1V7A2; G1V7D2       | G2V7A2; G2V7D2       | L1V7A2; L1V7D2       | L2V7A2; L2V7D2       |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| 5 - 5.9                      | G1V6A2; G1V6D2       | G2V6A2; G2V6D2       | L1V6A2; L1V6D2       | L2V6A2; L2V6D2       | 4.5                  |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| A                            | G1V5A2; G1V5D2       | G2V5A2; G2V5D2       | L1V5A2; L1V5D2       | L2V5A2; L2V5D2       |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| R                            | G1V4A2; G1V4D2       | G2V4A2; G2V4D2       | L1V4A2; L1V4D2       | L2V4A2; L2V4D2       |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| N                            | G1V3A2; G1V3D2       | G2V3A2; G2V3D2       | L1V3A2; L1V3D2       | L2V3A2; L2V3D2       |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| I                            | G1V2A2; G1V2D2       | G2V2A2; G2V2D2       | L1V2A2; L1V2D2       | L2V2A2; L2V2D2       | 1.5                  |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| S                            | G1V1A2; G1V1D2       | G2V1A2; G2V1D2       | L1V1A2; L1V1D2       | L2V1A2; L2V1D2       |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| H                            | G1VCLN; 0            | G2VCLN; 0            | L1VCLN; 0            | L2VCLN; 0            |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| Total                        | G1AVT; G1DVTOT       | G2AVT; G2DVTOT       | L1AVT; L1DVTOT       | L2AVT; L2DVTOT       |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| Rating                       | G1UWD2               | G2UWD2               | L1UWD2               | L2UWD2               |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| Location Factor              | 2                    | 3                    | 1                    | 3                    |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| Ind. Rating                  | G1WD2                | G2WD2                | L1WD2                | L2WD2                |                      |                            |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| <b>WDP</b>                   | <b>TGC</b>           |                      |                      |                      | <b>TLC</b>           | <b>Unweighted Deposits</b> |                      |                      |                | <b>Top Land Flaked Carbon %</b> |                      |                     |             |                     |  |             |  |
| WD2                          | TGC2                 |                      |                      |                      | TLC2                 | UWD2                       |                      |                      |                | TLFC2                           |                      |                     |             |                     |  |             |  |
| <b>TGF</b>                   | <b>IGF %</b>         |                      |                      |                      | <b>TLHC %</b>        | <b>Acc. Groove Fill %</b>  |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |
| TGF2                         | IGF2                 |                      |                      |                      | TLHC2                | AGF2                       |                      |                      |                |                                 |                      |                     |             |                     |  |             |  |





**Caterpillar C-13  
Engine Oil Test  
Rating Summary: Piston No. 5  
Form 19**

|                                       |                              |                            |  |
|---------------------------------------|------------------------------|----------------------------|--|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP      | <b>EOT Time:</b> EOTTIME   |  |
| <b>Test Number:</b> TESTNUM           | <b>Oil Code:</b> OILCODE     |                            |  |
| <b>Formulation / Stand Code:</b> FORM |                              |                            |  |
| <b>Date Rated:</b> DTRATE             | <b>Rater Initials:</b> RINIT | <b>Verified By:</b> VRINIT |  |

| Total Piston Ratings Summary |                      |                      |                      |                      |                      |                      |                            |                      |                      |                                 |                      |                      |                      |                      |                 |             |                    |
|------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------------|----------------------|----------------------|---------------------------------|----------------------|----------------------|----------------------|----------------------|-----------------|-------------|--------------------|
| Deposit Factor               | Grooves              |                      |                      | Lands                |                      |                      | Deposit Factor             | Groove               |                      |                                 | Lands                |                      |                      | Oil Cooling Gallery  |                 | Under Crown |                    |
|                              | No. 1<br>A,%<br>DEM. | No. 2<br>A,%<br>DEM. | No. 1<br>A,%<br>DEM. | No. 1<br>A,%<br>DEM. | No. 2<br>A,%<br>DEM. | No. 2<br>A,%<br>DEM. |                            | No. 3<br>A,%<br>DEM. | No. 3<br>A,%<br>DEM. | No. 4<br>A,%<br>DEM.            | No. 3<br>A,%<br>DEM. | No. 3<br>A,%<br>DEM. | No. 3<br>A,%<br>DEM. | No. 4<br>A,%<br>DEM. | Cooling Gallery | A,%         | DEM.               |
| C                            | GIHCA                | GIHCD                | GIHCA5               | GIHCD5               | L1HCA5               | L1HCD5               | L2HCA5                     | L2HCD5               | G3HCA5               | G3HCD5                          | L3HCA5               | L3HCD5               | L4HCA5               | L4HCD5               |                 |             |                    |
| A                            | GIMCA                | GIMCD                |                      |                      |                      |                      |                            |                      | G3MCA5               | G3MCD                           |                      |                      |                      |                      |                 |             |                    |
| R                            | GILCA                | GILCD5               | G2LCA5               | G2LCD5               | L1LCA5               | L1LCD5               | L2LCA5                     | L2LCD5               | G3LCA5               | G3LCD5                          | L3LCA5               | L3LCD5               | L4LCA5               | L4LCD5               |                 |             | UCLCA5<br>UCLCD5   |
| B                            |                      |                      |                      |                      |                      |                      |                            |                      |                      |                                 |                      |                      |                      |                      |                 |             |                    |
| O                            |                      |                      |                      |                      |                      |                      |                            |                      |                      |                                 |                      |                      |                      |                      |                 |             |                    |
| N                            | GIACT                | GIDCT                | G2ACTC               | G2DCTO               | L1ACTO               | L1DCTO               | L2ACTO                     | L2DCTO               | G3ACTOT              | G3DCTC                          | L3ACTO               | L3DCTC               | L4ACTC               | L4DCTC               |                 |             | UCACTOT<br>UCDCTOT |
| 8 - 9                        | G1V9A5               | G1V9D5               | G2V9A5               | G2V9D5               | L1V9A5               | L1V9D5               | L2V9A5                     | L2V9D5               |                      |                                 |                      |                      |                      |                      |                 |             |                    |
| 7 - 7.9                      | G1V8A5               | G1V8D5               | G2V8A5               | G2V8D5               | L1V8A5               | L1V8D5               | L2V8A5                     | L2V8D5               | G3V75A5              | G3V75I                          | L3V75A5              | L3V75I               | L4V75A5              | L4V75I               |                 |             | UCV75A5<br>UCV75D5 |
| 6 - 6.9                      | G1V7A5               | G1V7D5               | G2V7A5               | G2V7D5               | L1V7A5               | L1V7D5               | L2V7A5                     | L2V7D5               |                      |                                 |                      |                      |                      |                      |                 |             |                    |
| 5 - 5.9                      | G1V6A5               | G1V6D5               | G2V6A5               | G2V6D5               | L1V6A5               | L1V6D5               | L2V6A5                     | L2V6D5               | G3V45A5              | G3V45I                          | L3V45A5              | L3V45I               | L4V45A5              | L4V45I               |                 |             | UCV45A5<br>UCV45D5 |
| 4 - 4.9                      | G1V5A5               | G1V5D5               | G2V5A5               | G2V5D5               | L1V5A5               | L1V5D5               | L2V5A5                     | L2V5D5               |                      |                                 |                      |                      |                      |                      |                 |             |                    |
| 3 - 3.9                      | G1V4A5               | G1V4D5               | G2V4A5               | G2V4D5               | L1V4A5               | L1V4D5               | L2V4A5                     | L2V4D5               |                      |                                 |                      |                      |                      |                      |                 |             |                    |
| 2 - 2.9                      | G1V3A5               | G1V3D5               | G2V3A5               | G2V3D5               | L1V3A5               | L1V3D5               | L2V3A5                     | L2V3D5               |                      |                                 |                      |                      |                      |                      |                 |             |                    |
| 1 - 1.9                      | G1V2A5               | G1V2D5               | G2V2A5               | G2V2D5               | L1V2A5               | L1V2D5               | L2V2A5                     | L2V2D5               | G3V15A5              | G3V15I                          | L3V15A5              | L3V15I               | L4V15A5              | L4V15I               |                 |             | UCV15A5<br>UCV15D5 |
| >0 - 0.9                     | G1V1A5               | G1V1D5               | G2V1A5               | G2V1D5               | L1V1A5               | L1V1D5               | L2V1A5                     | L2V1D5               |                      |                                 |                      |                      |                      |                      |                 |             |                    |
| H Clean                      | G1VCL5               | 0                    | G2VCLN               | 0                    | L1VCLN               | 0                    | L2VCLN                     | 0                    | G3VCLNA              | 0                               | L3VCLN               | 0                    | L4VCLN               | 0                    |                 |             | UCVCLNA<br>0       |
| Total                        | G1AVT                | G1DVT                | G2AVTC               | G2DVTOT              | L1AVTO               | L1DVTO               | L2AVTO                     | L2DVTOT              | G3AVTO               | G3DVTOT                         | L3AVTC               | L3DVTOT              | L4AVTC               | L4DVTOT              |                 |             | UCAVTO<br>UCDVTOT  |
| Rating                       | G1UWD5               | G2UWD5               | G2UWD5               | G2UWD5               | L1UWD5               | L2UWD5               | L2UWD5                     | L2UWD5               | G3UWD5               | G3UWD5                          | L3UWD5               | L4UWD5               | L4UWD5               | L4UWD5               |                 |             | UCUWD5             |
| Location Factor              | 2                    | 3                    | 3                    | 3                    | 1                    | 1                    | 3                          | 3                    | 20                   | 20                              | 20                   | 60                   | 60                   | 1                    |                 |             | 1                  |
| Ind. Rating                  | G1WD5                | G2WD5                | G2WD5                | G2WD5                | L1WD5                | L2WD5                | L2WD5                      | L2WD5                | G3WD5                | G3WD5                           | L3WD5                | L4WD5                | L4WD5                | L4WD5                |                 |             | UCWD5              |
| <b>WDP</b>                   | <b>TGC</b>           |                      |                      | <b>TLC</b>           |                      |                      | <b>Unweighted Deposits</b> |                      |                      | <b>Top Land Flaked Carbon %</b> |                      |                      |                      |                      |                 |             |                    |
| WD5                          | TGC5                 |                      |                      | TLC5                 |                      |                      | UWD5                       |                      |                      | TLFC5                           |                      |                      |                      |                      |                 |             |                    |
| <b>TGF</b>                   | <b>IGF %</b>         |                      |                      | <b>TLHC %</b>        |                      |                      | <b>Acc. Groove Fill %</b>  |                      |                      |                                 |                      |                      |                      |                      |                 |             |                    |
| TGF5                         | IGF5                 |                      |                      | TLHC5                |                      |                      | AGF5                       |                      |                      |                                 |                      |                      |                      |                      |                 |             |                    |

**Caterpillar C-13  
Engine Oil Test  
Rating Summary: Piston No. 6  
Form 20**

|                                       |                              |                            |
|---------------------------------------|------------------------------|----------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP      | <b>EOT Time:</b> EOTTIME   |
| <b>Test Number:</b> TESTNUM           | <b>Oil Code:</b> OILCODE     |                            |
| <b>Formulation / Stand Code:</b> FORM |                              |                            |
| <b>Date Rated:</b> DTRATE             | <b>Rater Initials:</b> RINIT | <b>Verified By:</b> VRINIT |

| Total Piston Ratings Summary |                   |                   |                   |                   |                   |                   |                            |                   |                   |                                 |                   |                   |                   |                     |                     |             |          |
|------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------------------|-------------------|-------------------|---------------------------------|-------------------|-------------------|-------------------|---------------------|---------------------|-------------|----------|
| Deposit Factor               | Grooves           |                   |                   | Lands             |                   |                   | Deposit Factor             | Groove            |                   |                                 | Lands             |                   |                   | Oil Cooling Gallery |                     | Under Crown |          |
|                              | No. 1<br>A,% DEM. | No. 2<br>A,% DEM. | No. 1<br>A,% DEM. | No. 1<br>A,% DEM. | No. 2<br>A,% DEM. | No. 2<br>A,% DEM. |                            | No. 3<br>A,% DEM. | No. 3<br>A,% DEM. | No. 4<br>A,% DEM.               | No. 3<br>A,% DEM. | No. 3<br>A,% DEM. | No. 3<br>A,% DEM. | No. 4<br>A,% DEM.   | Oil Cooling Gallery | A,%         | DEM.     |
| C                            |                   |                   |                   |                   |                   |                   |                            |                   |                   |                                 |                   |                   |                   |                     |                     |             |          |
| A                            | G1HCA             | G1HCD6            | G2HCA6            | G2HCD6            | L1HCA6            | L1HCD6            | L2HCA6                     | L2HCD6            | G3HCA6            | G3HCD6                          | L3HCA6            | L3HCD6            | L4HCA6            | L4HCD6              |                     |             |          |
| R                            | G1MCA             | G1MCD6            |                   |                   | L1LCA6            | L1LCD6            | L2LCA6                     | L2LCD6            | G3MCA6            | G3MCD6                          |                   |                   |                   |                     |                     |             |          |
| B                            | G1LCA             | G1LCD6            | G2LCA6            | G2LCD6            | L1LCA6            | L1LCD6            | L2LCA6                     | L2LCD6            | G3LCA6            | G3LCD6                          | L3LCA6            | L3LCD6            | L4LCA6            | L4LCD6              | UCLCA               | UCLCD6      |          |
| O                            |                   |                   |                   |                   |                   |                   |                            |                   |                   |                                 |                   |                   |                   |                     |                     |             |          |
| N                            | G1ACT             | G1DCTO            | G2ACT6            | G2DCTO            | L1ACTO            | L1DCTO            | L2ACTO                     | L2DCTO            | G3ACTOT           | G3DCT6                          | L3ACTO            | L3DCT6            | L4ACTC            | L4DCT6              | UCACT               | UCDCT       | UCDCT6   |
| 8 - 9                        | G1V9A             | G1V9D6            | G2V9A6            | G2V9D6            | L1V9A6            | L1V9D6            | L2V9A6                     | L2V9D6            |                   |                                 |                   |                   |                   |                     |                     |             |          |
| 7 - 7.9                      | G1V8A             | G1V8D6            | G2V8A6            | G2V8D6            | L1V8A6            | L1V8D6            | L2V8A6                     | L2V8D6            | G3V75A6           | G3V75D                          | L3V75A6           | L3V75D            | L4V75A            | L4V75D              | UCV75A6             | UCV75D6     |          |
| 6 - 6.9                      | G1V7A             | G1V7D6            | G2V7A6            | G2V7D6            | L1V7A6            | L1V7D6            | L2V7A6                     | L2V7D6            |                   |                                 |                   |                   |                   |                     |                     |             |          |
| 5 - 5.9                      | G1V6A             | G1V6D6            | G2V6A6            | G2V6D6            | L1V6A6            | L1V6D6            | L2V6A6                     | L2V6D6            | G3V45A6           | G3V45D                          | L3V45A6           | L3V45D            | L4V45A            | L4V45D              | UCV45A6             | UCV45D6     |          |
| 4 - 4.9                      | G1V5A             | G1V5D6            | G2V5A6            | G2V5D6            | L1V5A6            | L1V5D6            | L2V5A6                     | L2V5D6            |                   |                                 |                   |                   |                   |                     |                     |             |          |
| 3 - 3.9                      | G1V4A             | G1V4D6            | G2V4A6            | G2V4D6            | L1V4A6            | L1V4D6            | L2V4A6                     | L2V4D6            |                   |                                 |                   |                   |                   |                     |                     |             |          |
| 2 - 2.9                      | G1V3A             | G1V3D6            | G2V3A6            | G2V3D6            | L1V3A6            | L1V3D6            | L2V3A6                     | L2V3D6            |                   |                                 |                   |                   |                   |                     |                     |             |          |
| 1 - 1.9                      | G1V2A             | G1V2D6            | G2V2A6            | G2V2D6            | L1V2A6            | L1V2D6            | L2V2A6                     | L2V2D6            | G3V15A6           | G3V15D                          | L3V15A6           | L3V15D            | L4V15A            | L4V15D              | UCV15A6             | UCV15D6     |          |
| >0 - 0.9                     | G1V1A             | G1V1D6            | G2V1A6            | G2V1D6            | L1V1A6            | L1V1D6            | L2V1A6                     | L2V1D6            |                   |                                 |                   |                   |                   |                     |                     |             |          |
| H Clean                      | G1VCL             | 0                 | G2VCLN            | 0                 | L1VCLN            | 0                 | L2VCLN                     | 0                 | G3VCLNA           | 0                               | L3VCLN            | 0                 | L4VCLN            | 0                   | UCVCLNA             | 0           |          |
| Total                        | L1AVTOT           | L1DVTOT           | L2AVTOT           | L2DVTOT           | L1AVTOT           | L1DVTOT           | L2AVTOT                    | L2DVTOT           | L3AVTOT           | L3DVTOT                         | L3AVTOT           | L3DVTOT           | L4AVTOT           | L4DVTOT             | UCAVTOT             | UCDVTOT     | UCDVTOT6 |
| Rating                       | G1UWD6            | G2UWD6            | G2UWD6            | G2UWD6            | L1UWD6            | L1UWD6            | L2UWD6                     | L2UWD6            | G3UWD6            | G3UWD6                          | L3UWD6            | L3UWD6            | L4UWD6            | L4UWD6              | UCUWD6              | UCUWD6      | UCUWD6   |
| Location Factor              | 2                 | 3                 | 3                 | 3                 | 1                 | 1                 | 3                          | 3                 | 20                | 20                              | 20                | 20                | 60                | 60                  | 1                   | 1           | 1        |
| Ind. Rating                  | G1WD6             | G2WD6             | G2WD6             | G2WD6             | L1WD6             | L1WD6             | L2WD6                      | L2WD6             | G3WD6             | G3WD6                           | L3WD6             | L3WD6             | L4WD6             | L4WD6               | UCWD6               | UCWD6       | UCWD6    |
| <b>WDP</b>                   | <b>TGC</b>        |                   |                   | <b>TLC</b>        |                   |                   | <b>Unweighted Deposits</b> |                   |                   | <b>Top Land Flaked Carbon %</b> |                   |                   |                   |                     |                     |             |          |
| WD6                          | TGC6              |                   |                   | TLC6              |                   |                   | UWD6                       |                   |                   | TLFC6                           |                   |                   |                   |                     |                     |             |          |
| <b>TGF</b>                   | <b>IGF %</b>      |                   |                   | <b>TLHC %</b>     |                   |                   | <b>Acc. Groove Fill %</b>  |                   |                   |                                 |                   |                   |                   |                     |                     |             |          |
| TGF6                         | IGF6              |                   |                   | TLHC6             |                   |                   | AGF6                       |                   |                   |                                 |                   |                   |                   |                     |                     |             |          |

**Caterpillar C-13  
Engine Oil Test  
Supplemental Rating Summary: Piston No. 1  
Form 21**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Carbon                                      |   |    |          | Varnish |          |         |         |         |         |         |         |         |         |         |         |
|---|---|----|----------|---------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Deposit                                     |   | HC | MC       | LC      | 9.0-8    | 7.9-7   | 6.9-6   | 5.9-5   | 4.9-4   | 3.9-3   | 2.9-2   | 1.9-1   | 0.9-0   | Clean   |         |
| Groove<br>Top<br>And<br>Bottom              | 1 | T  | G1THCA1  | G1TMCA  | G1TLCA1  | G1T9A1  | G1T8A1  | G1T7A1  | G1T6A1  | G1T5A1  | G1T4A1  | G1T3A1  | G1T2A1  | G1T1A1  | G1TCLNA |
|   |   | B  | G1BHCA1  | G1BMCA  | G1BLCA1  | G1B9A1  | G1B8A1  | G1B7A1  | G1B6A1  | G1B5A1  | G1B4A1  | G1B3A1  | G1B2A1  | G1B1A1  | G1BCLNA |
|   | 2 | T  | G2THCA1  | G2TMCA  | G2TLCA1  | G2T9A1  | G2T8A1  | G2T7A1  | G2T6A1  | G2T5A1  | G2T4A1  | G2T3A1  | G2T2A1  | G2T1A1  | G2TCLNA |
|   |   | B  | G2BHCA1  | G2BMCA  | G2BLCA1  | G2B9A1  | G2B8A1  | G2B7A1  | G2B6A1  | G2B5A1  | G2B4A1  | G2B3A1  | G2B2A1  | G2B1A1  | G2BCLNA |
|   | 3 | T  | G3THCA1  | G3TMCA  | G3TLCA1  | G3T9A1  | G3T8A1  | G3T7A1  | G3T6A1  | G3T5A1  | G3T4A1  | G3T3A1  | G3T2A1  | G3T1A1  | G3TCLNA |
|   |   | B  | G3BHCA1  | G3BMCA  | G3BLCA1  | G3B9A1  | G3B8A1  | G3B7A1  | G3B6A1  | G3B5A1  | G3B4A1  | G3B3A1  | G3B2A1  | G3B1A1  | G3BCLNA |
| Top<br>Bottom<br>And<br>Back<br>Of<br>Rings | 1 | T  | R1THCA1  | R1TMCA  | R1TLCA1  | R1T9A1  | R1T8A1  | R1T7A1  | R1T6A1  | R1T5A1  | R1T4A1  | R1T3A1  | R1T2A1  | R1T1A1  | R1TCLNA |
|   |   | B  | R1BHCA1  | R1BMCA  | R1BLCA1  | R1B9A1  | R1B8A1  | R1B7A1  | R1B6A1  | R1B5A1  | R1B4A1  | R1B3A1  | R1B2A1  | R1B1A1  | R1BCLNA |
|   |   | BK | R1BKHCA1 | R1BKMCA | R1BKLCA1 | R1BK9A1 | R1BK8A1 | R1BK7A1 | R1BK6A1 | R1BK5A1 | R1BK4A1 | R1BK3A1 | R1BK2A1 | R1BK1A1 | R1BKCLN |
|   | 2 | T  | R2THCA1  | R2TMCA  | R2TLCA1  | R2T9A1  | R2T8A1  | R2T7A1  | R2T6A1  | R2T5A1  | R2T4A1  | R2T3A1  | R2T2A1  | R2T1A1  | R2TCLNA |
|   |   | B  | R2BHCA1  | R2BMCA  | R2BLCA1  | R2B9A1  | R2B8A1  | R2B7A1  | R2B6A1  | R2B5A1  | R2B4A1  | R2B3A1  | R2B2A1  | R2B1A1  | R2BCLNA |
|   |   | BK | R2BKHCA1 | R2BKMCA | R2BKLCA1 | R2BK9A1 | R2BK8A1 | R2BK7A1 | R2BK6A1 | R2BK5A1 | R2BK4A1 | R2BK3A1 | R2BK2A1 | R2BK1A1 | R2BKCLN |
|   | 3 | T  | R3THCA1  | R3TMCA  | R3TLCA1  | R3T9A1  | R3T8A1  | R3T7A1  | R3T6A1  | R3T5A1  | R3T4A1  | R3T3A1  | R3T2A1  | R3T1A1  | R3TCLNA |
|   |   | B  | R3BHCA1  | R3BMCA  | R3BLCA1  | R3B9A1  | R3B8A1  | R3B7A1  | R3B6A1  | R3B5A1  | R3B4A1  | R3B3A1  | R3B2A1  | R3B1A1  | R3BCLNA |
|   |   | BK | R3BKHCA1 | R3BKMCA | R3BKLCA1 | R3BK9A1 | R3BK8A1 | R3BK7A1 | R3BK6A1 | R3BK5A1 | R3BK4A1 | R3BK3A1 | R3BK2A1 | R3BK1A1 | R3BKCLN |
| Top Ring Stuck                              |   |    | STUCKTP1 | TKTPER  | %        |         |         |         |         |         |         |         |         |         |         |
| Top Ring Scuffed                            |   |    | SCUFFTP1 | CFTPER  | %        |         |         |         |         |         |         |         |         |         |         |
| Second Ring Stuck                           |   |    | STUCKIN1 | TK2PER  | %        |         |         |         |         |         |         |         |         |         |         |
| Second Ring Scuffed                         |   |    | SCUFFIN1 | CF2PER  | %        |         |         |         |         |         |         |         |         |         |         |
| Oil Ring Stuck                              |   |    | STUCKOL1 | TKOPER  | %        |         |         |         |         |         |         |         |         |         |         |
| Oil Ring Scuffed                            |   |    | SCUFFOL1 | CFOPER  | %        |         |         |         |         |         |         |         |         |         |         |
| Crown Scuffed                               |   |    | SCUFFCR1 | CFCRWN  | %        |         |         |         |         |         |         |         |         |         |         |
| Skirt Scuffed                               |   |    | SCUFFPS1 | CFSKRT  | %        |         |         |         |         |         |         |         |         |         |         |
| Liner Scuffed                               |   |    | SCUFFLN1 | SCFLNR1 | %        |         |         |         |         |         |         |         |         |         |         |

**Caterpillar C-13  
Engine Oil Test  
Supplemental Rating Summary: Piston No. 2  
Form 22**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Carbon                                      |   |    |          | Varnish |          |         |         |         |         |         |         |         |         |         |         |
|---|---|----|----------|---------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Deposit                                     |   | HC | MC       | LC      | 9.0-8    | 7.9-7   | 6.9-6   | 5.9-5   | 4.9-4   | 3.9-3   | 2.9-2   | 1.9-1   | 0.9-0   | Clean   |         |
| Groove<br>Top<br>And<br>Bottom              | 1 | T  | G1THCA2  | G1TMCA2 | G1TLCA2  | G1T9A2  | G1T8A2  | G1T7A2  | G1T6A2  | G1T5A2  | G1T4A2  | G1T3A2  | G1T2A2  | G1T1A2  | G1TCLNA |
|   |   | B  | G1BHCA2  | G1BMCA2 | G1BLCA2  | G1B9A2  | G1B8A2  | G1B7A2  | G1B6A2  | G1B5A2  | G1B4A2  | G1B3A2  | G1B2A2  | G1B1A2  | G1BCLNA |
|   | 2 | T  | G2THCA2  | G2TMCA2 | G2TLCA2  | G2T9A2  | G2T8A2  | G2T7A2  | G2T6A2  | G2T5A2  | G2T4A2  | G2T3A2  | G2T2A2  | G2T1A2  | G2TCLNA |
|   |   | B  | G2BHCA2  | G2BMCA2 | G2BLCA2  | G2B9A2  | G2B8A2  | G2B7A2  | G2B6A2  | G2B5A2  | G2B4A2  | G2B3A2  | G2B2A2  | G2B1A2  | G2BCLNA |
|   | 3 | T  | G3THCA2  | G3TMCA2 | G3TLCA2  | G3T9A2  | G3T8A2  | G3T7A2  | G3T6A2  | G3T5A2  | G3T4A2  | G3T3A2  | G3T2A2  | G3T1A2  | G3TCLNA |
|   |   | B  | G3BHCA2  | G3BMCA2 | G3BLCA2  | G3B9A2  | G3B8A2  | G3B7A2  | G3B6A2  | G3B5A2  | G3B4A2  | G3B3A2  | G3B2A2  | G3B1A2  | G3BCLNA |
| Top<br>Bottom<br>And<br>Back<br>Of<br>Rings | 1 | T  | R1THCA2  | R1TMCA2 | R1TLCA2  | R1T9A2  | R1T8A2  | R1T7A2  | R1T6A2  | R1T5A2  | R1T4A2  | R1T3A2  | R1T2A2  | R1T1A2  | R1TCLNA |
|   |   | B  | R1BHCA2  | R1BMCA2 | R1BLCA2  | R1B9A2  | R1B8A2  | R1B7A2  | R1B6A2  | R1B5A2  | R1B4A2  | R1B3A2  | R1B2A2  | R1B1A2  | R1BCLNA |
|   |   | BK | R1BKHCA2 | R1BKMC  | R1BKLCA2 | R1BK9A2 | R1BK8A2 | R1BK7A2 | R1BK6A2 | R1BK5A2 | R1BK4A2 | R1BK3A2 | R1BK2A2 | R1BK1A2 | R1BKCLN |
|   | 2 | T  | R2THCA2  | R2TMCA2 | R2TLCA2  | R2T9A2  | R2T8A2  | R2T7A2  | R2T6A2  | R2T5A2  | R2T4A2  | R2T3A2  | R2T2A2  | R2T1A2  | R2TCLNA |
|   |   | B  | R2BHCA2  | R2BMCA2 | R2BLCA2  | R2B9A2  | R2B8A2  | R2B7A2  | R2B6A2  | R2B5A2  | R2B4A2  | R2B3A2  | R2B2A2  | R2B1A2  | R2BCLNA |
|   |   | BK | R2BKHCA2 | R2BKMC  | R2BKLCA2 | R2BK9A2 | R2BK8A2 | R2BK7A2 | R2BK6A2 | R2BK5A2 | R2BK4A2 | R2BK3A2 | R2BK2A2 | R2BK1A2 | R2BKCLN |
|   | 3 | T  | R3THCA2  | R3TMCA2 | R3TLCA2  | R3T9A2  | R3T8A2  | R3T7A2  | R3T6A2  | R3T5A2  | R3T4A2  | R3T3A2  | R3T2A2  | R3T1A2  | R3TCLNA |
|   |   | B  | R3BHCA2  | R3BMCA2 | R3BLCA2  | R3B9A2  | R3B8A2  | R3B7A2  | R3B6A2  | R3B5A2  | R3B4A2  | R3B3A2  | R3B2A2  | R3B1A2  | R3BCLNA |
|   |   | BK | R3BKHCA2 | R3BKMC  | R3BKLCA2 | R3BK9A2 | R3BK8A2 | R3BK7A2 | R3BK6A2 | R3BK5A2 | R3BK4A2 | R3BK3A2 | R3BK2A2 | R3BK1A2 | R3BKCLN |
| Top Ring Stuck                              |   |    | STUCKTP2 | TKTPER  | %        |         |         |         |         |         |         |         |         |         |         |
| Top Ring Scuffed                            |   |    | SCUFFTP2 | CFTPER  | %        |         |         |         |         |         |         |         |         |         |         |
| Second Ring Stuck                           |   |    | STUCKIN2 | TK2PER  | %        |         |         |         |         |         |         |         |         |         |         |
| Second Ring Scuffed                         |   |    | SCUFFIN2 | CF2PER  | %        |         |         |         |         |         |         |         |         |         |         |
| Oil Ring Stuck                              |   |    | STUCKOL2 | TKOPER  | %        |         |         |         |         |         |         |         |         |         |         |
| Oil Ring Scuffed                            |   |    | SCUFFOL2 | CFOPER  | %        |         |         |         |         |         |         |         |         |         |         |
| Crown Scuffed                               |   |    | SCUFFCR2 | CFCRWN  | %        |         |         |         |         |         |         |         |         |         |         |
| Skirt Scuffed                               |   |    | SCUFFPS2 | CFSKRT  | %        |         |         |         |         |         |         |         |         |         |         |
| Liner Scuffed                               |   |    | SCUFFLN2 | SCFLNR2 | %        |         |         |         |         |         |         |         |         |         |         |



**Caterpillar C-13  
Engine Oil Test  
Supplemental Rating Summary: Piston No. 3  
Form 23**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Carbon                                      |   |    |          | Varnish |        |        |        |        |        |        |        |        |        |        |        |
|---|---|----|----------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Deposit                                     |   | HC | MC       | LC      | 9.0-8  | 7.9-7  | 6.9-6  | 5.9-5  | 4.9-4  | 3.9-3  | 2.9-2  | 1.9-1  | 0.9-0  | Clean  |        |
| Groove<br>Top<br>And<br>Bottom              | 1 | T  | G1THCA   | G1TMCA  | G1TLCA | G1T9A3 | G1T8A3 | G1T7A3 | G1T6A3 | G1T5A3 | G1T4A3 | G1T3A3 | G1T2A3 | G1T1A3 | G1TCLN |
|   |   | B  | G1BHCA   | G1BMCA  | G1BLCA | G1B9A3 | G1B8A3 | G1B7A3 | G1B6A3 | G1B5A3 | G1B4A3 | G1B3A3 | G1B2A3 | G1B1A3 | G1BCLN |
|   | 2 | T  | G2THCA   | G2TMCA  | G2TLCA | G2T9A3 | G2T8A3 | G2T7A3 | G2T6A3 | G2T5A3 | G2T4A3 | G2T3A3 | G2T2A3 | G2T1A3 | G2TCLN |
|   |   | B  | G2BHCA   | G2BMCA  | G2BLCA | G2B9A3 | G2B8A3 | G2B7A3 | G2B6A3 | G2B5A3 | G2B4A3 | G2B3A3 | G2B2A3 | G2B1A3 | G2BCLN |
|   | 3 | T  | G3THCA   | G3TMCA  | G3TLCA | G3T9A3 | G3T8A3 | G3T7A3 | G3T6A3 | G3T5A3 | G3T4A3 | G3T3A3 | G3T2A3 | G3T1A3 | G3TCLN |
|   |   | B  | G3BHCA   | G3BMCA  | G3BLCA | G3B9A3 | G3B8A3 | G3B7A3 | G3B6A3 | G3B5A3 | G3B4A3 | G3B3A3 | G3B2A3 | G3B1A3 | G3BCLN |
| Top<br>Bottom<br>And<br>Back<br>Of<br>Rings | 1 | T  | R1THCA   | R1TMCA  | R1TLCA | R1T9A3 | R1T8A3 | R1T7A3 | R1T6A3 | R1T5A3 | R1T4A3 | R1T3A3 | R1T2A3 | R1T1A3 | R1TCLN |
|   |   | B  | R1BHCA   | R1BMCA  | R1BLCA | R1B9A3 | R1B8A3 | R1B7A3 | R1B6A3 | R1B5A3 | R1B4A3 | R1B3A3 | R1B2A3 | R1B1A3 | R1BCLN |
|   |   | BK | R1BKHC   | R1BKMC  | R1BKLC | R1BK9A | R1BK8A | R1BK7A | R1BK6A | R1BK5A | R1BK4A | R1BK3A | R1BK2A | R1BK1A | R1BKCL |
|   | 2 | T  | R2THCA   | R2TMCA  | R2TLCA | R2T9A3 | R2T8A3 | R2T7A3 | R2T6A3 | R2T5A3 | R2T4A3 | R2T3A3 | R2T2A3 | R2T1A3 | R2TCLN |
|   |   | B  | R2BHCA   | R2BMCA  | R2BLCA | R2B9A3 | R2B8A3 | R2B7A3 | R2B6A3 | R2B5A3 | R2B4A3 | R2B3A3 | R2B2A3 | R2B1A3 | R2BCLN |
|   |   | BK | R2BKHC   | R2BKMC  | R2BKLC | R2BK9A | R2BK8A | R2BK7A | R2BK6A | R2BK5A | R2BK4A | R2BK3A | R2BK2A | R2BK1A | R2BKCL |
|   | 3 | T  | R3THCA   | R3TMCA  | R3TLCA | R3T9A3 | R3T8A3 | R3T7A3 | R3T6A3 | R3T5A3 | R3T4A3 | R3T3A3 | R3T2A3 | R3T1A3 | R3TCLN |
|   |   | B  | R3BHCA   | R3BMCA  | R3BLCA | R3B9A3 | R3B8A3 | R3B7A3 | R3B6A3 | R3B5A3 | R3B4A3 | R3B3A3 | R3B2A3 | R3B1A3 | R3BCLN |
|   |   | BK | R3BKHC   | R3BKMC  | R3BKLC | R3BK9A | R3BK8A | R3BK7A | R3BK6A | R3BK5A | R3BK4A | R3BK3A | R3BK2A | R3BK1A | R3BKCL |
| Top Ring Stuck                              |   |    | STUCKTP3 | STKTPE  | %      |        |        |        |        |        |        |        |        |        |        |
| Top Ring Scuffed                            |   |    | SCUFFTP3 | SCFTPE  | %      |        |        |        |        |        |        |        |        |        |        |
| Second Ring Stuck                           |   |    | STUCKIN3 | STK2PE  | %      |        |        |        |        |        |        |        |        |        |        |
| Second Ring Scuffed                         |   |    | SCUFFIN3 | SCF2PE  | %      |        |        |        |        |        |        |        |        |        |        |
| Oil Ring Stuck                              |   |    | STUCKOL3 | STKOPE  | %      |        |        |        |        |        |        |        |        |        |        |
| Oil Ring Scuffed                            |   |    | SCUFFOL3 | SCFOPE  | %      |        |        |        |        |        |        |        |        |        |        |
| Crown Scuffed                               |   |    | SCUFFCR3 | SCFCRV  | %      |        |        |        |        |        |        |        |        |        |        |
| Skirt Scuffed                               |   |    | SCUFFPS3 | SCFSKR  | %      |        |        |        |        |        |        |        |        |        |        |
| Liner Scuffed                               |   |    | SCUFFLN3 | SCFLNR  | %      |        |        |        |        |        |        |        |        |        |        |

**Caterpillar C-13  
Engine Oil Test  
Supplemental Rating Summary: Piston No. 4  
Form 24**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Deposit                                     |   | Carbon |          |         | Varnish |         |         |         |         |         |         |         |         |         |         |
|---|---|--------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|   |   | HC     | MC       | LC      | 9.0-8   | 7.9-7   | 6.9-6   | 5.9-5   | 4.9-4   | 3.9-3   | 2.9-2   | 1.9-1   | 0.9-0   | Clean   |         |
| Groove<br>Top<br>And<br>Bottom              | 1 | T      | G1THCA4  | G1TMCA4 | G1TLCA4 | G1T9A4  | G1T8A4  | G1T7A4  | G1T6A4  | G1T5A4  | G1T4A4  | G1T3A4  | G1T2A4  | G1T1A4  | G1TCLNA |
|   |   | B      | G1BHCA4  | G1BMCA4 | G1BLCA4 | G1B9A4  | G1B8A4  | G1B7A4  | G1B6A4  | G1B5A4  | G1B4A4  | G1B3A4  | G1B2A4  | G1B1A4  | G1BCLNA |
|   | 2 | T      | G2THCA4  | G2TMCA4 | G2TLCA4 | G2T9A4  | G2T8A4  | G2T7A4  | G2T6A4  | G2T5A4  | G2T4A4  | G2T3A4  | G2T2A4  | G2T1A4  | G2TCLNA |
|   |   | B      | G2BHCA4  | G2BMCA4 | G2BLCA4 | G2B9A4  | G2B8A4  | G2B7A4  | G2B6A4  | G2B5A4  | G2B4A4  | G2B3A4  | G2B2A4  | G2B1A4  | G2BCLNA |
|   | 3 | T      | G3THCA4  | G3TMCA4 | G3TLCA4 | G3T9A4  | G3T8A4  | G3T7A4  | G3T6A4  | G3T5A4  | G3T4A4  | G3T3A4  | G3T2A4  | G3T1A4  | G3TCLNA |
|   |   | B      | G3BHCA4  | G3BMCA4 | G3BLCA4 | G3B9A4  | G3B8A4  | G3B7A4  | G3B6A4  | G3B5A4  | G3B4A4  | G3B3A4  | G3B2A4  | G3B1A4  | G3BCLNA |
| Top<br>Bottom<br>And<br>Back<br>Of<br>Rings | 1 | T      | R1THCA4  | R1TMCA4 | R1TLCA4 | R1T9A4  | R1T8A4  | R1T7A4  | R1T6A4  | R1T5A4  | R1T4A4  | R1T3A4  | R1T2A4  | R1T1A4  | R1TCLNA |
|   |   | B      | R1BHCA4  | R1BMCA4 | R1BLCA4 | R1B9A4  | R1B8A4  | R1B7A4  | R1B6A4  | R1B5A4  | R1B4A4  | R1B3A4  | R1B2A4  | R1B1A4  | R1BCLNA |
|   |   | BK     | R1BKHA4  | R1BKMA4 | R1BKLA4 | R1BK9A4 | R1BK8A4 | R1BK7A4 | R1BK6A4 | R1BK5A4 | R1BK4A4 | R1BK3A4 | R1BK2A4 | R1BK1A4 | R1BKCLN |
|   | 2 | T      | R2THCA4  | R2TMCA4 | R2TLCA4 | R2T9A4  | R2T8A4  | R2T7A4  | R2T6A4  | R2T5A4  | R2T4A4  | R2T3A4  | R2T2A4  | R2T1A4  | R2TCLNA |
|   |   | B      | R2BHCA4  | R2BMCA4 | R2BLCA4 | R2B9A4  | R2B8A4  | R2B7A4  | R2B6A4  | R2B5A4  | R2B4A4  | R2B3A4  | R2B2A4  | R2B1A4  | R2BCLNA |
|   |   | BK     | R2BKHA4  | R2BKMA4 | R2BKLA4 | R2BK9A4 | R2BK8A4 | R2BK7A4 | R2BK6A4 | R2BK5A4 | R2BK4A4 | R2BK3A4 | R2BK2A4 | R2BK1A4 | R2BKCLN |
|   | 3 | T      | R3THCA4  | R3TMCA4 | R3TLCA4 | R3T9A4  | R3T8A4  | R3T7A4  | R3T6A4  | R3T5A4  | R3T4A4  | R3T3A4  | R3T2A4  | R3T1A4  | R3TCLNA |
|   |   | B      | R3BHCA4  | R3BMCA4 | R3BLCA4 | R3B9A4  | R3B8A4  | R3B7A4  | R3B6A4  | R3B5A4  | R3B4A4  | R3B3A4  | R3B2A4  | R3B1A4  | R3BCLNA |
|   |   | BK     | R3BKHA4  | R3BKMA4 | R3BKLA4 | R3BK9A4 | R3BK8A4 | R3BK7A4 | R3BK6A4 | R3BK5A4 | R3BK4A4 | R3BK3A4 | R3BK2A4 | R3BK1A4 | R3BKCLN |
| Top Ring Stuck                              |   |        | STUCKTP4 | TKTPER  | %       |         |         |         |         |         |         |         |         |         |         |
| Top Ring Scuffed                            |   |        | SCUFFTP4 | CFTPER  | %       |         |         |         |         |         |         |         |         |         |         |
| Second Ring Stuck                           |   |        | STUCKIN4 | TK2PER  | %       |         |         |         |         |         |         |         |         |         |         |
| Second Ring Scuffed                         |   |        | SCUFFIN4 | CF2PER  | %       |         |         |         |         |         |         |         |         |         |         |
| Oil Ring Stuck                              |   |        | STUCKOL4 | TKOPER  | %       |         |         |         |         |         |         |         |         |         |         |
| Oil Ring Scuffed                            |   |        | SCUFFOL4 | CFOPER  | %       |         |         |         |         |         |         |         |         |         |         |
| Crown Scuffed                               |   |        | SCUFFCR4 | CFCRWN  | %       |         |         |         |         |         |         |         |         |         |         |
| Skirt Scuffed                               |   |        | SCUFFPS4 | CFSKRT  | %       |         |         |         |         |         |         |         |         |         |         |
| Liner Scuffed                               |   |        | SCUFFLN4 | SCFLNR  | %       |         |         |         |         |         |         |         |         |         |         |

**Caterpillar C-13  
Engine Oil Test  
Supplemental Rating Summary: Piston No. 5  
Form 25**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Carbon                                      |   |    |          | Varnish |         |         |         |         |         |         |         |         |         |         |         |
|---|---|----|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Deposit                                     |   | HC | MC       | LC      | 9.0-8   | 7.9-7   | 6.9-6   | 5.9-5   | 4.9-4   | 3.9-3   | 2.9-2   | 1.9-1   | 0.9-0   | Clean   |         |
| Groove<br>Top<br>And<br>Bottom              | 1 | T  | G1THCA5  | G1TMCA5 | G1TLCA5 | G1T9A5  | G1T8A5  | G1T7A5  | G1T6A5  | G1T5A5  | G1T4A5  | G1T3A5  | G1T2A5  | G1T1A5  | G1TCLNA |
|   |   | B  | G1BHCA5  | G1BMCA5 | G1BLCA5 | G1B9A5  | G1B8A5  | G1B7A5  | G1B6A5  | G1B5A5  | G1B4A5  | G1B3A5  | G1B2A5  | G1B1A5  | G1BCLNA |
|   | 2 | T  | G2THCA5  | G2TMCA5 | G2TLCA5 | G2T9A5  | G2T8A5  | G2T7A5  | G2T6A5  | G2T5A5  | G2T4A5  | G2T3A5  | G2T2A5  | G2T1A5  | G2TCLNA |
|   |   | B  | G2BHCA5  | G2BMCA5 | G2BLCA5 | G2B9A5  | G2B8A5  | G2B7A5  | G2B6A5  | G2B5A5  | G2B4A5  | G2B3A5  | G2B2A5  | G2B1A5  | G2BCLNA |
|   | 3 | T  | G3THCA5  | G3TMCA5 | G3TLCA5 | G3T9A5  | G3T8A5  | G3T7A5  | G3T6A5  | G3T5A5  | G3T4A5  | G3T3A5  | G3T2A5  | G3T1A5  | G3TCLNA |
|   |   | B  | G3BHCA5  | G3BMCA5 | G3BLCA5 | G3B9A5  | G3B8A5  | G3B7A5  | G3B6A5  | G3B5A5  | G3B4A5  | G3B3A5  | G3B2A5  | G3B1A5  | G3BCLNA |
| Top<br>Bottom<br>And<br>Back<br>Of<br>Rings | 1 | T  | R1THCA5  | R1TMCA5 | R1TLCA5 | R1T9A5  | R1T8A5  | R1T7A5  | R1T6A5  | R1T5A5  | R1T4A5  | R1T3A5  | R1T2A5  | R1T1A5  | R1TCLNA |
|   |   | B  | R1BHCA5  | R1BMCA5 | R1BLCA5 | R1B9A5  | R1B8A5  | R1B7A5  | R1B6A5  | R1B5A5  | R1B4A5  | R1B3A5  | R1B2A5  | R1B1A5  | R1BCLNA |
|   |   | BK | R1BKHA5  | R1BKMA5 | R1BKLA5 | R1BK9A5 | R1BK8A5 | R1BK7A5 | R1BK6A5 | R1BK5A5 | R1BK4A5 | R1BK3A5 | R1BK2A5 | R1BK1A5 | R1BKCLN |
|   | 2 | T  | R2THCA5  | R2TMCA5 | R2TLCA5 | R2T9A5  | R2T8A5  | R2T7A5  | R2T6A5  | R2T5A5  | R2T4A5  | R2T3A5  | R2T2A5  | R2T1A5  | R2TCLNA |
|   |   | B  | R2BHCA5  | R2BMCA5 | R2BLCA5 | R2B9A5  | R2B8A5  | R2B7A5  | R2B6A5  | R2B5A5  | R2B4A5  | R2B3A5  | R2B2A5  | R2B1A5  | R2BCLNA |
|   |   | BK | R2BKHA5  | R2BKMA5 | R2BKLA5 | R2BK9A5 | R2BK8A5 | R2BK7A5 | R2BK6A5 | R2BK5A5 | R2BK4A5 | R2BK3A5 | R2BK2A5 | R2BK1A5 | R2BKCLN |
|   | 3 | T  | R3THCA5  | R3TMCA5 | R3TLCA5 | R3T9A5  | R3T8A5  | R3T7A5  | R3T6A5  | R3T5A5  | R3T4A5  | R3T3A5  | R3T2A5  | R3T1A5  | R3TCLNA |
|   |   | B  | R3BHCA5  | R3BMCA5 | R3BLCA5 | R3B9A5  | R3B8A5  | R3B7A5  | R3B6A5  | R3B5A5  | R3B4A5  | R3B3A5  | R3B2A5  | R3B1A5  | R3BCLNA |
|   |   | BK | R3BKHA5  | R3BKMA5 | R3BKLA5 | R3BK9A5 | R3BK8A5 | R3BK7A5 | R3BK6A5 | R3BK5A5 | R3BK4A5 | R3BK3A5 | R3BK2A5 | R3BK1A5 | R3BKCLN |
| Top Ring Stuck                              |   |    | STUCKTP5 | TKTPER  | %       |         |         |         |         |         |         |         |         |         |         |
| Top Ring Scuffed                            |   |    | SCUFFTP5 | CFTPER  | %       |         |         |         |         |         |         |         |         |         |         |
| Second Ring Stuck                           |   |    | STUCKIN5 | TK2PER  | %       |         |         |         |         |         |         |         |         |         |         |
| Second Ring Scuffed                         |   |    | SCUFFIN5 | CF2PER  | %       |         |         |         |         |         |         |         |         |         |         |
| Oil Ring Stuck                              |   |    | STUCKOL5 | TKOPER  | %       |         |         |         |         |         |         |         |         |         |         |
| Oil Ring Scuffed                            |   |    | SCUFFOL5 | CFOPER  | %       |         |         |         |         |         |         |         |         |         |         |
| Crown Scuffed                               |   |    | SCUFFCR5 | CFCRWN  | %       |         |         |         |         |         |         |         |         |         |         |
| Skirt Scuffed                               |   |    | SCUFFPS5 | CFSKRT  | %       |         |         |         |         |         |         |         |         |         |         |
| Liner Scuffed                               |   |    | SCUFFLN5 | SCFLNR5 | %       |         |         |         |         |         |         |         |         |         |         |

**Caterpillar C-13  
Engine Oil Test  
Supplemental Rating Summary: Piston No. 6  
Form 26**

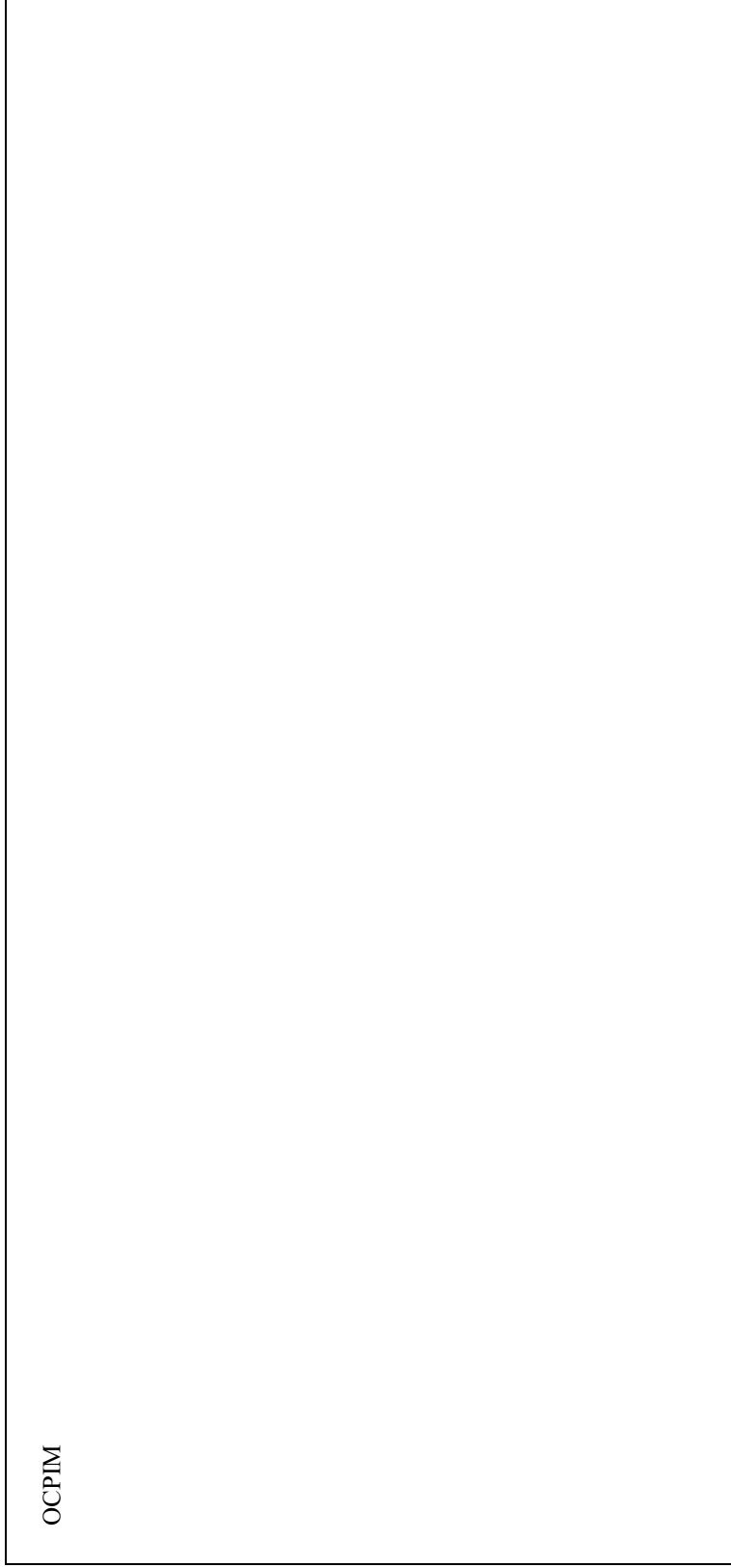
|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Carbon                                      |   |    |          | Varnish |          |         |         |         |         |         |         |         |         |         |           |
|---|---|----|----------|---------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------|
| Deposit                                     |   | HC | MC       | LC      | 9.0-8    | 7.9-7   | 6.9-6   | 5.9-5   | 4.9-4   | 3.9-3   | 2.9-2   | 1.9-1   | 0.9-0   | Clean   |           |
| Groove<br>Top<br>And<br>Bottom              | 1 | T  | G1THCA6  | G1TMCA6 | G1TLCA6  | G1T9A6  | G1T8A6  | G1T7A6  | G1T6A6  | G1T5A6  | G1T4A6  | G1T3A6  | G1T2A6  | G1T1A6  | G1TCLNA6  |
|   |   | B  | G1BHCA6  | G1BMCA6 | G1BLCA6  | G1B9A6  | G1B8A6  | G1B7A6  | G1B6A6  | G1B5A6  | G1B4A6  | G1B3A6  | G1B2A6  | G1B1A6  | G1BCLNA6  |
|   | 2 | T  | G2THCA6  | G2TMCA6 | G2TLCA6  | G2T9A6  | G2T8A6  | G2T7A6  | G2T6A6  | G2T5A6  | G2T4A6  | G2T3A6  | G2T2A6  | G2T1A6  | G2TCLNA6  |
|   |   | B  | G2BHCA6  | G2BMCA6 | G2BLCA6  | G2B9A6  | G2B8A6  | G2B7A6  | G2B6A6  | G2B5A6  | G2B4A6  | G2B3A6  | G2B2A6  | G2B1A6  | G2BCLNA6  |
|   | 3 | T  | G3THCA6  | G3TMCA6 | G3TLCA6  | G3T9A6  | G3T8A6  | G3T7A6  | G3T6A6  | G3T5A6  | G3T4A6  | G3T3A6  | G3T2A6  | G3T1A6  | G3TCLNA6  |
|   |   | B  | G3BHCA6  | G3BMCA6 | G3BLCA6  | G3B9A6  | G3B8A6  | G3B7A6  | G3B6A6  | G3B5A6  | G3B4A6  | G3B3A6  | G3B2A6  | G3B1A6  | G3BCLNA6  |
| Top<br>Bottom<br>And<br>Back<br>Of<br>Rings | 1 | T  | R1THCA6  | R1TMCA6 | R1TLCA6  | R1T9A6  | R1T8A6  | R1T7A6  | R1T6A6  | R1T5A6  | R1T4A6  | R1T3A6  | R1T2A6  | R1T1A6  | R1TCLNA6  |
|   |   | B  | R1BHCA6  | R1BMCA6 | R1BLCA6  | R1B9A6  | R1B8A6  | R1B7A6  | R1B6A6  | R1B5A6  | R1B4A6  | R1B3A6  | R1B2A6  | R1B1A6  | R1BCLNA6  |
|   |   | BK | R1BKHCA6 | R1BKMC6 | R1BKLCA6 | R1BK9A6 | R1BK8A6 | R1BK7A6 | R1BK6A6 | R1BK5A6 | R1BK4A6 | R1BK3A6 | R1BK2A6 | R1BK1A6 | R1BKCLNA6 |
|   | 2 | T  | R2THCA6  | R2TMCA6 | R2TLCA6  | R2T9A6  | R2T8A6  | R2T7A6  | R2T6A6  | R2T5A6  | R2T4A6  | R2T3A6  | R2T2A6  | R2T1A6  | R2TCLNA6  |
|   |   | B  | R2BHCA6  | R2BMCA6 | R2BLCA6  | R2B9A6  | R2B8A6  | R2B7A6  | R2B6A6  | R2B5A6  | R2B4A6  | R2B3A6  | R2B2A6  | R2B1A6  | R2BCLNA6  |
|   |   | BK | R2BKHCA6 | R2BKMC6 | R2BKLCA6 | R2BK9A6 | R2BK8A6 | R2BK7A6 | R2BK6A6 | R2BK5A6 | R2BK4A6 | R2BK3A6 | R2BK2A6 | R2BK1A6 | R2BKCLNA6 |
|   | 3 | T  | R3THCA6  | R3TMCA6 | R3TLCA6  | R3T9A6  | R3T8A6  | R3T7A6  | R3T6A6  | R3T5A6  | R3T4A6  | R3T3A6  | R3T2A6  | R3T1A6  | R3TCLNA6  |
|   |   | B  | R3BHCA6  | R3BMCA6 | R3BLCA6  | R3B9A6  | R3B8A6  | R3B7A6  | R3B6A6  | R3B5A6  | R3B4A6  | R3B3A6  | R3B2A6  | R3B1A6  | R3BCLNA6  |
|   |   | BK | R3BKHCA6 | R3BKMC6 | R3BKLCA6 | R3BK9A6 | R3BK8A6 | R3BK7A6 | R3BK6A6 | R3BK5A6 | R3BK4A6 | R3BK3A6 | R3BK2A6 | R3BK1A6 | R3BKCLNA6 |
| Top Ring Stuck                              |   |    | STUCKTP6 | TKTPER  | %        |         |         |         |         |         |         |         |         |         |           |
| Top Ring Scuffed                            |   |    | SCUFFTP6 | CFTPER  | %        |         |         |         |         |         |         |         |         |         |           |
| Second Ring Stuck                           |   |    | STUCKIN6 | TK2PER  | %        |         |         |         |         |         |         |         |         |         |           |
| Second Ring Scuffed                         |   |    | SCUFFIN6 | CF2PER  | %        |         |         |         |         |         |         |         |         |         |           |
| Oil Ring Stuck                              |   |    | STUCKOL6 | TKOPER  | %        |         |         |         |         |         |         |         |         |         |           |
| Oil Ring Scuffed                            |   |    | SCUFFOL6 | CFOPER  | %        |         |         |         |         |         |         |         |         |         |           |
| Crown Scuffed                               |   |    | SCUFFCR6 | CFCRWN  | %        |         |         |         |         |         |         |         |         |         |           |
| Skirt Scuffed                               |   |    | SCUFFPS6 | CFSKRT  | %        |         |         |         |         |         |         |         |         |         |           |
| Liner Scuffed                               |   |    | SCUFFLN6 | SCFLNR6 | %        |         |         |         |         |         |         |         |         |         |           |

**Caterpillar C-13  
Engine Oil Test  
Oil Consumption Plot  
Form 27**

|                                       |                         |                          |
|---------------------------------------|-------------------------|--------------------------|
| <b>Laboratory:</b> LAB                | <b>EOT Date:</b> DTCOMP | <b>EOT Time:</b> EOTTIME |
| <b>Test Number:</b> TESTNUM           |                         |                          |
| <b>Oil Code:</b> OILCODE              |                         |                          |
| <b>Formulation / Stand Code:</b> FORM |                         |                          |

| Test Hours                  | 50       | 100      | 150      | 200      | 250      | 300      | 350      | 400      | 450      | 500      |
|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Oil Consumption, g/h</b> | OCONH050 | OCONH100 | OCONH150 | OCONH200 | OCONH250 | OCONH300 | OCONH350 | OCONH400 | OCONH450 | OCONH500 |
| <b>R<sup>2</sup></b>        | OCRRH050 | OCRRH100 | OCRRH150 | OCRRH200 | OCRRH250 | OCRRH300 | OCRRH350 | OCRRH400 | OCRRH450 | OCRRH500 |



**100 – 150 h  
Oil**

**Consumption:**

AOCON1

**450 – 500 h  
Oil**

**Consumption:**

AOCON2

**% Increase:**

OCONPINC

Test Hours