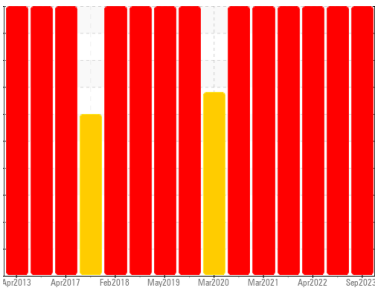
# PROBLEM SUMMARY

Sample Rating Trend

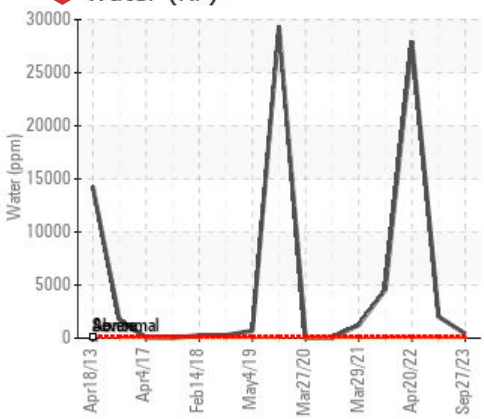


**WEAR**

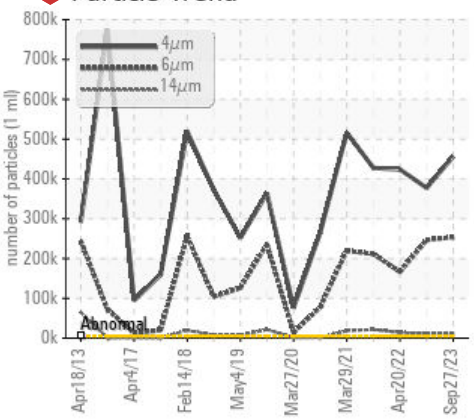
Area
## (ZONE3) BRUCE A/4/34710
Machine Id
## 4-34710-P2-P IB Brg
Component
**Inboard Bearing**
Fluid
**MOBIL DTE 732 (--- GAL)**

## COMPONENT CONDITION SUMMARY

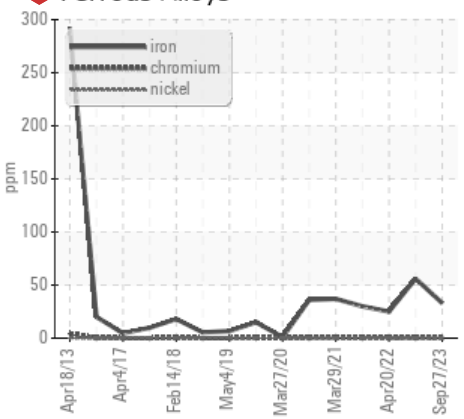
Water (KF)




Particle Trend




Ferrous Alloys




## RECOMMENDATION

Check seals and/or filters for points of contaminant entry. We advise that you check all areas where contaminants can enter the system. We advise that you follow the water drain-off procedure for this component, and use off-line filtration to improve the cleanliness of the system fluid. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We recommend that you change the oil. Resample in 30-45 days to monitor this situation. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.

## PROBLEMATIC TEST RESULTS

| Sample Status | | | | **SEVERE** | SEVERE | SEVERE |
|---|---|---|---|---|---|---|
| Iron | ppm | ASTM D5185(m) | >10 | **33** | 56 | 25 |
| Water | % | ASTM D6304* | >0.005 | **0.041** | 0.202 | 2.791 |
| ppm Water | ppm | ASTM D6304* | >50 | **417.5** | 2021.6 | 27911.8 |
| Particles >4µm | | ASTM D7647 | >5000 | **456036** | 377465 | 423489 |
| Particles >6µm | | ASTM D7647 | >1300 | **253616** | 246293 | 166691 |
| Particles >14µm | | ASTM D7647 | >320 | **11215** | 11845 | 13902 |
| Particles >21µm | | ASTM D7647 | >80 | **797** | 937 | 2192 |
| Oil Cleanliness | | ISO 4406 (c) | >19/17/15 | **26/25/21** | 26/25/21 | 26/25/21 |
| Precipitate | scalar | Visual* | NONE | **LIGHT** | LIGHT | NONE |
| Appearance | scalar | Visual* | NORML | **HAZY** | HAZY | NORML |
| Emulsified Water | scalar | Visual* | >0.005 | **.2%** | 1% | .2% |
| Free Water | scalar | Visual* | | **5%** | 5% | 5% |


**Customer Id:** BRUTIV
**Sample No.:** WC0815679
**Lab Number:** 02587176
**Test Package:** IND 2

*To manage this report scan the QR code*

*To discuss the diagnosis or test data:*
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Kevin.Marson@wearcheck.com

*To change component or sample information:*
Gloria Gonzalez +1 (289)291-4643 x4643
gloria.gonzalez@wearcheck.com

## RECOMMENDED ACTIONS

| Action | Status | Date | Done By | Description |
|---|---|---|---|---|
| Change Fluid | --- | --- | ? | We recommend that you change the oil. |
| Water Drain-off | --- | --- | ? | We advise that you follow the water drain-off procedure for this component, and use off-line filtration to improve the cleanliness of the system fluid. |
| Resample | --- | --- | ? | Resample in 30-45 days to monitor this situation. |
| Information Required | --- | --- | ? | NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. |
| Check Breathers | --- | --- | ? | The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. |
| Check Dirt Access | --- | --- | ? | We advise that you check all areas where contaminants can enter the system. |
| Check Seals | --- | --- | ? | Check seals and/or filters for points of contaminant entry. |

## HISTORICAL DIAGNOSIS

**WEAR**

### 23 Mar 2023 Diag: Kevin Marson

Check seals and/or filters for points of contaminant entry. We advise that you check all areas where contaminants can enter the system. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We recommend that you change the oil. Resample in 30-45 days to monitor this situation. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.Iron ppm levels are severe. Wear particle analysis indicates that the ferrous rubbing particles are abnormal. The low ferrous density (PQ) index indicates the wear metal levels are due to corrosion. There is a high amount of particulates (2 to 100 microns in size) present in the oil. There is a high concentration of water present in the oil. Free water present. The system cleanliness code is much higher than the acceptable limit for the target ISO 4406 cleanliness code. The white residue present in the sample is oil additive precipitate. The AN level is acceptable for this fluid. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

**view report**

**WEAR**

### 20 Apr 2022 Diag: Kevin Marson

Check seals and/or filters for points of contaminant entry. We advise that you check all areas where contaminants can enter the system. We advise that you follow the water drain-off procedure for this component, and use off-line filtration to improve the cleanliness of the system fluid. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. Resample in 30-45 days to monitor this situation. No other corrective action is recommended at this time. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.Iron ppm levels are severe. Wear particle analysis indicates that the nonferrous rolling and ferrous rubbing particles are abnormal. Wear particle analysis indicates that the ferrous cutting particles are marginal. The low ferrous density (PQ) index indicates the wear metal levels are due to corrosion. Cutting wear particles are caused by either hard protuberances (mis-aligned components, etc.), or abrasives entering the system and embeding themselves in softer materials (sand, etc.), and gouging out mating surfaces. ppm Water and water contamination levels are severe. Particles >6µm are severely high. Particles >14µm are severely high. Particles >21µm are severely high. Particles >4µm are severely high. There is a high concentration of water present in the oil. Free water present. The system cleanliness code is much higher than the acceptable limit for the target ISO 4406 cleanliness code. The AN level is acceptable for this fluid. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

**view report**

**WEAR**

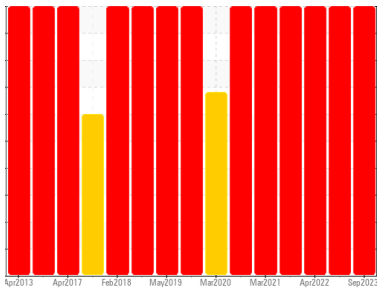
### 29 Sep 2021 Diag: Kevin Marson

Check seals and/or filters for points of contaminant entry. We advise that you check all areas where contaminants can enter the system. We recommend either performing an oil change or oil filtration. We cannot recommend specific action as we have limited information with regards to reservoir capacity and/or lubricant type. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. Resample in 30-45 days to monitor this situation. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.Iron ppm levels are severe. The low ferrous density (PQ) index indicates the wear metal levels are due to corrosion. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. ppm Water and water contamination levels are severe. Particles >38µm are severely high. Particles >6µm are severely high. Particles >14µm are severely high. Particles >21µm are severely high. Particles >4µm are severely high. There is a high concentration of water present in the oil. Free water present. The system cleanliness code is much higher than the acceptable limit for the target ISO 4406 cleanliness code. The AN level is acceptable for this fluid. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

**view report**

# OIL ANALYSIS REPORT

Sample Rating Trend




WEAR

Area
## (ZONE3) BRUCE A/4/34710
Machine Id
## 4-34710-P2-P IB Brg
Component
**Inboard Bearing**
Fluid
**MOBIL DTE 732 (--- GAL)**

## DIAGNOSIS

**Recommendation**

Check seals and/or filters for points of contaminant entry. We advise that you check all areas where contaminants can enter the system. We advise that you follow the water drain-off procedure for this component, and use off-line filtration to improve the cleanliness of the system fluid. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We recommend that you change the oil. Resample in 30-45 days to monitor this situation. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.

**Wear**

Iron ppm levels are severe. The low ferrous density (PQ) index indicates the wear metal levels are due to corrosion.

**Contaminants**

There is a high amount of particulates (2 to 100 microns in size) present in the oil. There is a high concentration of water present in the oil. Free water present. The system cleanliness code is much higher than the acceptable limit for the target ISO 4406 cleanliness code.

**Oil Condition**

The white residue present in the sample is oil additive precipitate. The AN level is acceptable for this fluid. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

| SAMPLE INFORMATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Sample Number | | Client Info | | **WC0815679** | WC0801512 | WC0660420 |
| Sample Date | | Client Info | | **27 Sep 2023** | 23 Mar 2023 | 20 Apr 2022 |
| Machine Age | hrs | Client Info | | **0** | 0 | 0 |
| Oil Age | hrs | Client Info | | **0** | 0 | 0 |
| Oil Changed | | Client Info | | **N/A** | N/A | N/A |
| Sample Status | | | | **SEVERE** | SEVERE | SEVERE |

| WEAR METALS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| PQ | | ASTM D8184* | | **36** | 45 | 13 |
| Iron | ppm | ASTM D5185(m) | >10 | **33** | 56 | 25 |
| Chromium | ppm | ASTM D5185(m) | >5 | **<1** | <1 | <1 |
| Nickel | ppm | ASTM D5185(m) | >5 | **<1** | <1 | <1 |
| Titanium | ppm | ASTM D5185(m) | >5 | **0** | <1 | 0 |
| Silver | ppm | ASTM D5185(m) | | **<1** | 0 | 0 |
| Aluminum | ppm | ASTM D5185(m) | >5 | **<1** | 1 | <1 |
| Lead | ppm | ASTM D5185(m) | >5 | **<1** | <1 | <1 |
| Copper | ppm | ASTM D5185(m) | >5 | **<1** | 1 | <1 |
| Tin | ppm | ASTM D5185(m) | >5 | **0** | 0 | 0 |
| Antimony | ppm | ASTM D5185(m) | | **0** | <1 | 0 |
| Vanadium | ppm | ASTM D5185(m) | | **0** | 0 | 0 |
| Beryllium | ppm | ASTM D5185(m) | | **0** | 0 | 0 |
| Cadmium | ppm | ASTM D5185(m) | | **0** | 0 | 0 |

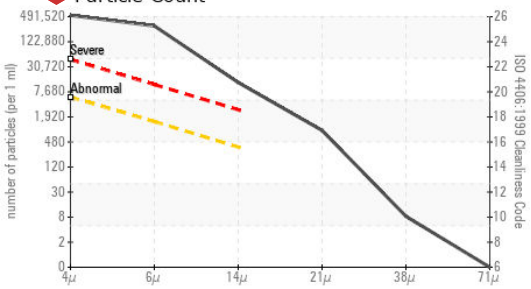
| ADDITIVES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Boron | ppm | ASTM D5185(m) | | **<1** | <1 | <1 |
| Barium | ppm | ASTM D5185(m) | | **<1** | 0 | 0 |
| Molybdenum | ppm | ASTM D5185(m) | | **0** | 0 | 0 |
| Manganese | ppm | ASTM D5185(m) | | **0** | <1 | 0 |
| Magnesium | ppm | ASTM D5185(m) | | **<1** | <1 | 0 |
| Calcium | ppm | ASTM D5185(m) | | **<1** | 0 | <1 |
| Phosphorus | ppm | ASTM D5185(m) | | **0** | 0 | <1 |
| Zinc | ppm | ASTM D5185(m) | | **<1** | <1 | 1 |
| Sulfur | ppm | ASTM D5185(m) | | **11** | 14 | 25 |
| Lithium | ppm | ASTM D5185(m) | | **<1** | <1 | <1 |

| CONTAMINANTS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Silicon | ppm | ASTM D5185(m) | >5 | **1** | 2 | 1 |
| Sodium | ppm | ASTM D5185(m) | >5 | **<1** | <1 | 0 |
| Potassium | ppm | ASTM D5185(m) | >20 | **0** | <1 | <1 |
| Water | % | ASTM D6304* | >0.005 | **0.041** | 0.202 | 2.791 |
| ppm Water | ppm | ASTM D6304* | >50 | **417.5** | 2021.6 | 27911.8 |

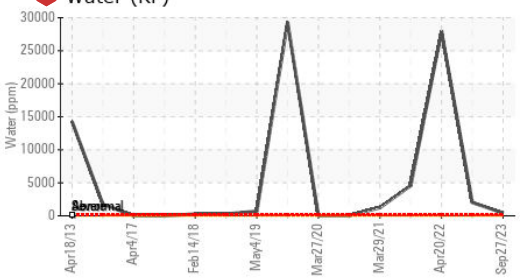
| FLUID CLEANLINESS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Particles >4µm | | ASTM D7647 | >5000 | **456036** | 377465 | 423489 |
| Particles >6µm | | ASTM D7647 | >1300 | **253616** | 246293 | 166691 |
| Particles >14µm | | ASTM D7647 | >320 | **11215** | 11845 | 13902 |
| Particles >21µm | | ASTM D7647 | >80 | **797** | 937 | 2192 |
| Particles >38µm | | ASTM D7647 | >20 | **7** | 14 | 26 |
| Particles >71µm | | ASTM D7647 | >4 | **0** | 1 | 0 |
| Oil Cleanliness | | ISO 4406 (c) | >19/17/15 | **26/25/21** | 26/25/21 | 26/25/21 |

# OIL ANALYSIS REPORT

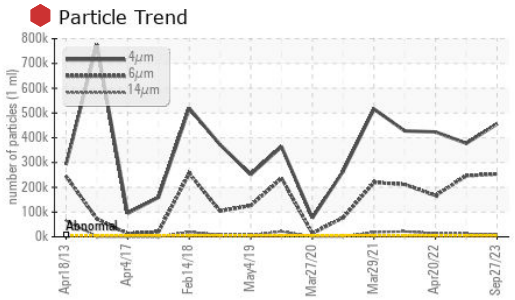
Particle Count



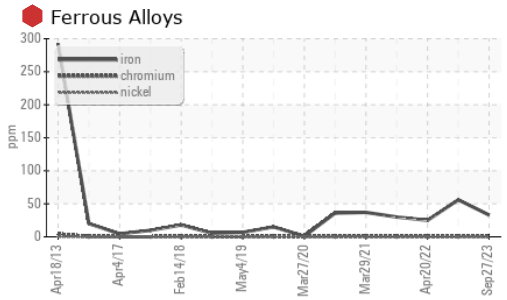

Water (KF)



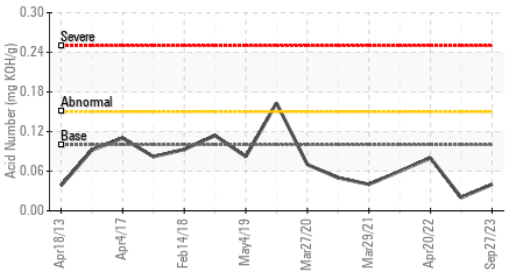

Particle Trend




Ferrous Alloys




Acid Number




| FLUID DEGRADATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Acid Number (AN) | mg KOH/g | ASTM D974* | 0.10 | **0.04** | 0.02 | 0.08 |

| VISUAL | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| White Metal | scalar | Visual* | NONE | **NONE** | NONE | NONE |
| Yellow Metal | scalar | Visual* | NONE | **NONE** | NONE | NONE |
| Precipitate | scalar | Visual* | NONE | ▲ **LIGHT** | ▲ LIGHT | NONE |
| Silt | scalar | Visual* | NONE | **NONE** | NONE | NONE |
| Debris | scalar | Visual* | NONE | **NONE** | NONE | VLITE |
| Sand/Dirt | scalar | Visual* | NONE | **LIGHT** | LIGHT | NONE |
| Appearance | scalar | Visual* | NORML | ▲ **HAZY** | ▲ HAZY | NORML |
| Odor | scalar | Visual* | NORML | **NORML** | NORML | NORML |
| Emulsified Water | scalar | Visual* | >0.005 | ▲ **.2%** | ▲ 1% | ▲ .2% |
| Free Water | scalar | Visual* | | ▲ **5%** | ▲ 5% | ▲ 5% |

| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Visc @ 40°C | cSt | ASTM D7279(m) | 30.0 | **32.4** | 32.2 | 32.2 |

| SAMPLE IMAGES | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|
| Color | | |  | | |
| Bottom | | |  | | |
| PrtFilter | | | *no image* | *no image* | *no image* |

ISO 17025:2017 Accredited Laboratory

**Laboratory** : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
**Sample No.** : WC0815679
**Lab Number** : 02587176
**Unique Number** : 5656242
**Test Package** : IND 2 ( Additional Tests: A-FERR, Bottom, BottomAnalysis, DR-FERR, FILTERPATCH, PQ, TAN Man )

**Received** : 05 Oct 2023
**Diagnosed** : 10 Oct 2023
**Diagnostician** : Kevin Marson

*To discuss this sample report, contact Customer Service at 1-800-268-2131.*
*Test denoted (*) outside scope of accreditation, (m) method modified, (e) tested at external lab.*
*Validity of results and interpretation are based on the sample and information as supplied.*

**Bruce Power - Bruce A PdM**
P.O.Box 1540, 177 Tie Road,, RM-222 U2 Column 2N11 615`
Tiverton, ON
CA N0G 2T0
Contact: Pierre Adouki
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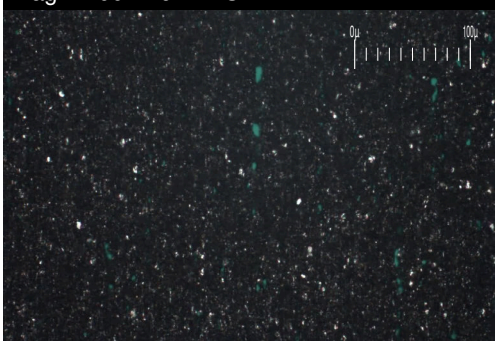
T: (519)361-2673
F:

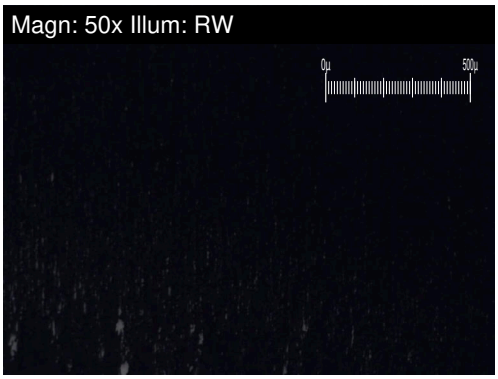
# FERROGRAPHY REPORT

Area
## (ZONE3) BRUCE A/4/34710
Machine Id
## 4-34710-P2-P IB Brg
Component
**Inboard Bearing**
Fluid
**MOBIL DTE 732 (--- GAL)**

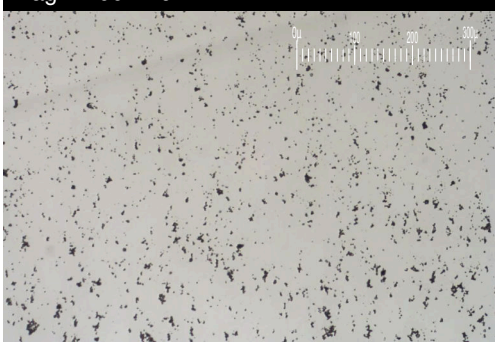
Magn: 200x Illum: BC



Magn: 50x Illum: RW



Magn: 100x Illum: RW

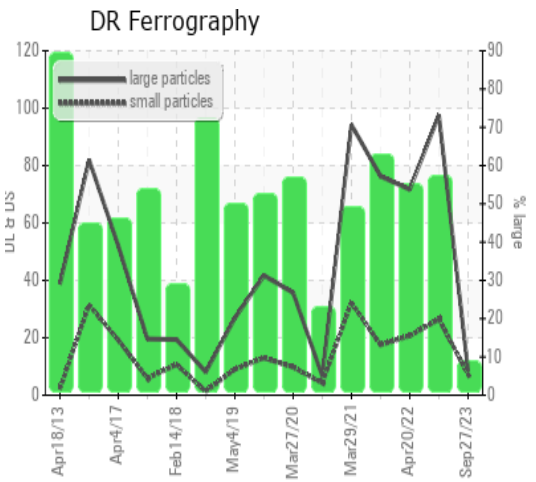


| DR-FERROGRAPHY | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Large Particles | | DR-Ferr* | | **8.7** | 97.6 | 71.7 |
| Small Particles | | DR-Ferr* | | **7.3** | 26.5 | 20.7 |
| Total Particles | | DR-Ferr* | >--- | **16** | 124.1 | 92.4 |
| Large Particles Percentage | % | DR-Ferr* | | **8.7** | 57.3 | 55.2 |
| Severity Index | | DR-Ferr* | | **12** | 6939 | 3657 |

| FERROGRAPHY | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Ferrous Rubbing | Scale 0-10 | ASTM D7684* | | | 8 | 7 |
| Ferrous Sliding | Scale 0-10 | ASTM D7684* | | | | |
| Ferrous Cutting | Scale 0-10 | ASTM D7684* | | | | 1 |
| Ferrous Rolling | Scale 0-10 | ASTM D7684* | | | 3 | 2 |
| Ferrous Break-in | Scale 0-10 | ASTM D7684* | | | | |
| Ferrous Spheres | Scale 0-10 | ASTM D7684* | | | | |
| Ferrous Black Oxides | Scale 0-10 | ASTM D7684* | | | | |
| Ferrous Red Oxides | Scale 0-10 | ASTM D7684* | | | | |
| Ferrous Corrosive | Scale 0-10 | ASTM D7684* | | | 2 | 3 |
| Ferrous Other | Scale 0-10 | ASTM D7684* | | | | |
| Nonferrous Rubbing | Scale 0-10 | ASTM D7684* | | | | |
| Nonferrous Sliding | Scale 0-10 | ASTM D7684* | | | | |
| Nonferrous Cutting | Scale 0-10 | ASTM D7684* | | | | |
| Nonferrous Rolling | Scale 0-10 | ASTM D7684* | | | | 2 |
| Nonferrous Other | Scale 0-10 | ASTM D7684* | | | | |
| Carbonaceous Material | Scale 0-10 | ASTM D7684* | | | | |
| Lubricant Degradation | Scale 0-10 | ASTM D7684* | | | 4 | 6 |
| Sand/Dirt | Scale 0-10 | ASTM D7684* | | | 1 | 2 |
| Fibres | Scale 0-10 | ASTM D7684* | | | | |
| Spheres | Scale 0-10 | ASTM D7684* | | | | |
| Other | Scale 0-10 | ASTM D7684* | | | 2 | |

### WEAR

Iron ppm levels are severe. The low ferrous density (PQ) index indicates the wear metal levels are due to corrosion.



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