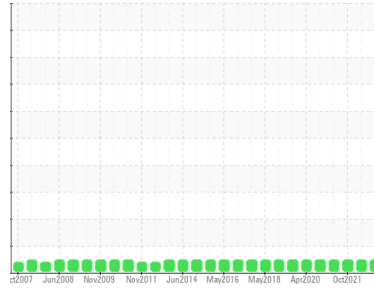




OIL ANALYSIS REPORT

Sample Rating Trend

NORMAL



Area
Ferndale Phase II SP-13598
 Machine Id
T2 (S/N 23965)
 Component
Wind Turbine Gearbox
 Fluid
MOBIL MOBILGEAR SHC XMP 320 (265 LTR)

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

Contamination

The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The water content is negligible. The system and fluid cleanliness is acceptable. NOTE: An increase in the particle count is noted.

Fluid Condition

The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

SAMPLE INFORMATION

| | method | limit/base | current | history1 | history2 |
|---------------|-------------|-------------|--------------------|-------------|-------------|
| Sample Number | Client Info | | WC0863466 | WC0305860 | WC0546227 |
| Sample Date | Client Info | | 01 Dec 2023 | 24 Oct 2022 | 18 Oct 2021 |
| Machine Age | yrs | Client Info | 0 | 0 | 0 |
| Oil Age | yrs | Client Info | 0 | 0 | 0 |
| Oil Changed | Client Info | | N/A | N/A | N/A |
| Sample Status | | | NORMAL | NORMAL | NORMAL |

WEAR METALS

| | method | limit/base | current | history1 | history2 | |
|-----------|-------------|---------------|----------|--------------|----------|----|
| PQ | ASTM D8184* | >50 | 0 | 0 | 0 | |
| Iron | ppm | ASTM D5185(m) | >75 | 14 | 11 | 4 |
| Chromium | ppm | ASTM D5185(m) | >5 | 0 | 0 | 0 |
| Nickel | ppm | ASTM D5185(m) | >10 | <1 | <1 | <1 |
| Titanium | ppm | ASTM D5185(m) | >10 | 0 | 0 | 0 |
| Silver | ppm | ASTM D5185(m) | | 0 | 0 | 0 |
| Aluminum | ppm | ASTM D5185(m) | >10 | <1 | 0 | <1 |
| Lead | ppm | ASTM D5185(m) | >15 | 0 | <1 | 0 |
| Copper | ppm | ASTM D5185(m) | >5 | 2 | <1 | <1 |
| Tin | ppm | ASTM D5185(m) | >10 | 0 | 0 | 0 |
| Antimony | ppm | ASTM D5185(m) | >5 | 0 | 0 | 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) | 0 | <1 | <1 | <1 |
| Barium | ppm | ASTM D5185(m) | | 0 | 0 | 0 |
| Molybdenum | ppm | ASTM D5185(m) | 0 | 0 | 0 | 0 |
| Manganese | ppm | ASTM D5185(m) | | 0 | 0 | 0 |
| Magnesium | ppm | ASTM D5185(m) | | <1 | 0 | 0 |
| Calcium | ppm | ASTM D5185(m) | 0 | <1 | 0 | 0 |
| Phosphorus | ppm | ASTM D5185(m) | 485 | 346 | 396 | 376 |
| Zinc | ppm | ASTM D5185(m) | 0 | 7 | 3 | 1 |
| Sulfur | ppm | ASTM D5185(m) | | 3575 | 3739 | 3772 |
| Lithium | ppm | ASTM D5185(m) | | <1 | <1 | <1 |

CONTAMINANTS

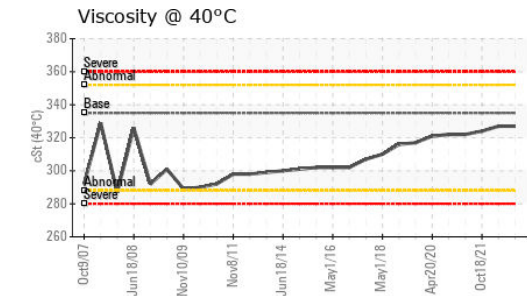
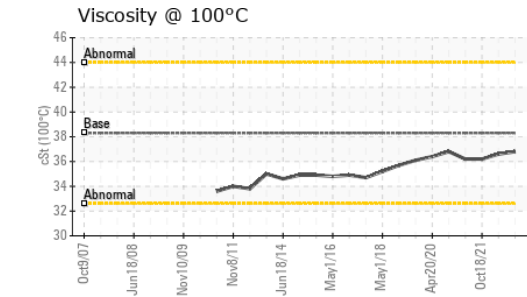
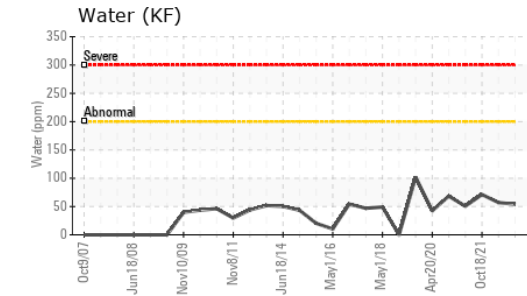
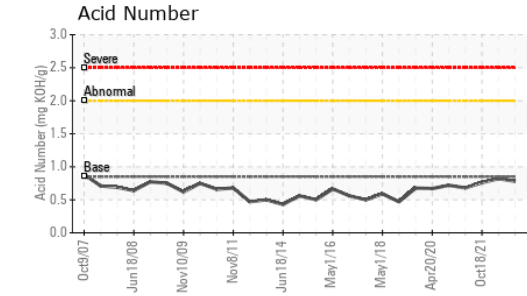
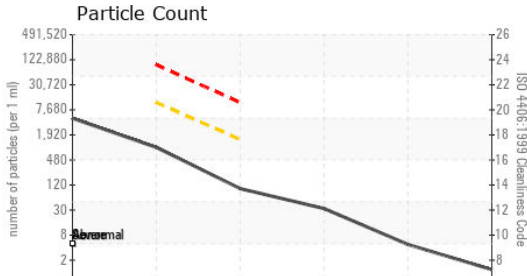
| | method | limit/base | current | history1 | history2 | |
|-----------|--------|---------------|---------|--------------|----------|-------|
| Silicon | ppm | ASTM D5185(m) | >40 | 4 | 6 | 5 |
| Sodium | ppm | ASTM D5185(m) | >10 | <1 | <1 | <1 |
| Potassium | ppm | ASTM D5185(m) | >20 | <1 | <1 | <1 |
| Water | % | ASTM D6304* | >0.02 | 0.005 | 0.005 | 0.007 |
| ppm Water | ppm | ASTM D6304* | >200 | 54 | 57.0 | 71.2 |

INFRA-RED

| | method | limit/base | current | history1 | history2 | |
|-----------|----------|-------------|---------|-------------|----------|------|
| Soot % | % | ASTM D7844* | | 0 | 0 | 0 |
| Nitration | Abs/cm | ASTM D7624* | | 2.1 | 2.3 | 2.1 |
| Sulfation | Abs/.1mm | ASTM D7415* | | 49.1 | 26.3 | 48.1 |



OIL ANALYSIS REPORT

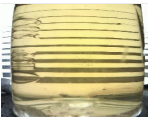







| FLUID CLEANLINESS | method | limit/base | current | history1 | history2 |
|-------------------|--------------|------------|-----------------|----------|----------|
| Particles >4µm | ASTM D7647 | | 4213 | 2131 | 3590 |
| Particles >6µm | ASTM D7647 | >10000 | 844 | 517 | 697 |
| Particles >14µm | ASTM D7647 | >1300 | 87 | 44 | 50 |
| Particles >21µm | ASTM D7647 | >320 | 29 | 12 | 13 |
| Particles >38µm | ASTM D7647 | >80 | 4 | 2 | 2 |
| Particles >71µm | ASTM D7647 | >20 | 1 | 1 | 0 |
| Oil Cleanliness | ISO 4406 (c) | >--/20/17 | 19/17/14 | 18/16/13 | 19/17/13 |

| FLUID DEGRADATION | method | limit/base | current | history1 | history2 |
|-------------------|----------|-------------|-------------|----------|----------|
| Oxidation | Abs./1mm | ASTM D7414* | 56.0 | 23.4 | 54.5 |
| Acid Number (AN) | mg KOH/g | ASTM D974* | 0.78 | 0.82 | 0.76 |

| VISUAL | method | limit/base | current | history1 | history2 |
|------------------|--------|------------|--------------|----------|----------|
| White Metal | scalar | Visual* | NONE | NONE | NONE |
| Yellow Metal | scalar | Visual* | NONE | NONE | NONE |
| Precipitate | scalar | Visual* | NONE | NONE | NONE |
| Silt | scalar | Visual* | NONE | NONE | NONE |
| Debris | scalar | Visual* | VLITE | NONE | VLITE |
| Sand/Dirt | scalar | Visual* | NONE | NONE | NONE |
| Appearance | scalar | Visual* | NORML | NORML | NORML |
| Odor | scalar | Visual* | NORML | NORML | NORML |
| Emulsified Water | scalar | Visual* | NEG | NEG | NEG |
| Free Water | scalar | Visual* | NEG | NEG | NEG |

| FLUID PROPERTIES | method | limit/base | current | history1 | history2 |
|----------------------|--------|---------------|-------------|----------|----------|
| Visc @ 40°C | cSt | ASTM D7279(m) | 327 | 327 | 324 |
| Visc @ 100°C | cSt | ASTM D7279(m) | 36.8 | 36.6 | 36.2 |
| Viscosity Index (VI) | Scale | ASTM D2270* | 160 | 159 | 158 |

| SAMPLE IMAGES | method | limit/base | current | history1 | history2 |
|---------------|--------|------------|---|---|---|
| Color | | |  |  |  |
| Bottom | | |  |  |  |



Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 Vestas American Wind Technology Inc.
Sample No. : WC0863466 **Received** : 12 Jan 2024
Lab Number : **02608639** **Diagnosed** : 16 Jan 2024
Unique Number : 5709725 **Diagnostician** : Kevin Marson
Test Package : IND 2 (Additional Tests: FT-IR, KF, KV100, PQ, TAN Man, VI)

1417 NW Everett Street
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 US 97209
 Contact: Nicole Philippi
 NiPhi@vestas.com
 T: (503)327-7683
 F: (503)327-0247

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.