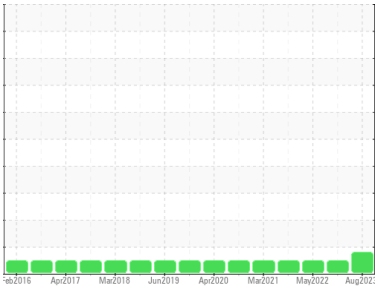
# PROBLEM SUMMARY

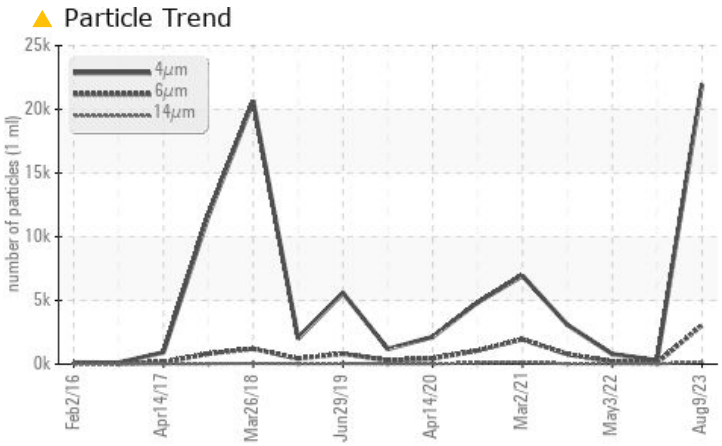
Sample Rating Trend



ISO

Area
**THUNDER SPIRIT [200005313]**
Machine Id
**39WEA84008 (S/N EWP00749)**
Component
**Wind Turbine Gearbox**
Fluid
**CASTROL OPTIGEAR SYNTHETIC X 320 (--- QTS)**

## COMPONENT CONDITION SUMMARY




## RECOMMENDATION

No corrective action is recommended at this time.
Resample at the next service interval to monitor.

## PROBLEMATIC TEST RESULTS

| | | | | | | |
|---|---|---|---|---|---|---|
| Sample Status | | | | **ATTENTION** | NORMAL | NORMAL |
| Particles >6µm | | ASTM D7647 | >2500 | ▲ **3048** | 100 | 206 |
| Oil Cleanliness | | ISO 4406 (c) | >--/18/15 | ▲ **22/19/15** | 15/14/11 | 17/15/12 |

**Customer Id:** NORDEX
**Sample No.:** NX011689
**Lab Number:** 05968988
**Test Package:** IND 2

*To manage this report scan the QR code*

*To discuss the diagnosis or test data:*
Don Baldridge +1
don.b505@comcast.net

*To change component or sample information:*
Customer Service +1 1-800-237-1369
customerservice@wearcheck.com

## RECOMMENDED ACTIONS

*There are no recommended actions for this sample.*

## HISTORICAL DIAGNOSIS

**02 Dec 2022 Diag: Don Baldridge**

NORMAL

Resample at the next service interval to monitor.All component wear rates are normal. There is no indication of any contamination in the component. The amount and size of particulates present in the system is acceptable. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

view report

**03 May 2022 Diag: Jonathan Hester**

NORMAL

Resample at the next service interval to monitor.All component wear rates are normal. There is no indication of any contamination in the oil. The amount and size of particulates present in the system are acceptable. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

view report

**12 Jul 2021 Diag: Don Baldridge**

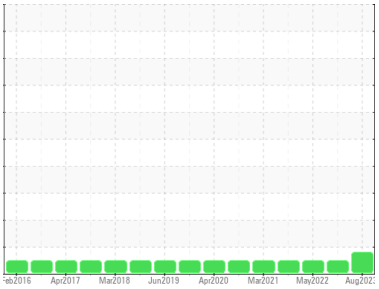
NORMAL

Resample at the next service interval to monitor.All component wear rates are normal. There is no indication of any contamination in the oil. The amount and size of particulates present in the system are acceptable. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

view report

# OIL ANALYSIS REPORT

Sample Rating Trend



ISO

Area
**THUNDER SPIRIT [200005313]**
Machine Id
**39WEA84008 (S/N EWP00749)**
Component
**Wind Turbine Gearbox**
Fluid
**CASTROL OPTIGEAR SYNTHETIC X 320 (--- QTS)**

## DIAGNOSIS

**Recommendation**
No corrective action is recommended at this time. Resample at the next service interval to monitor.

**Wear**
All component wear rates are normal.

**Contamination**
There is a moderate amount of silt (particulates < 14 microns in size) present in the oil.

**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 | | **NX011689** | NX011703 | NX009458 |
| Sample Date | | Client Info | | **09 Aug 2023** | 02 Dec 2022 | 03 May 2022 |
| Machine Age | hrs | Client Info | | **56006** | 51085 | 46746 |
| Oil Age | hrs | Client Info | | **0** | 0 | 0 |
| Oil Changed | | Client Info | | **N/A** | N/A | N/A |
| Sample Status | | | | **ATTENTION** | NORMAL | NORMAL |

| WEAR METALS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| PQ | | ASTM D8184 | >80 | **12** | 7 | 18 |
| Iron | ppm | ASTM D5185m | >150 | **2** | 2 | 1 |
| Chromium | ppm | ASTM D5185m | >5 | **<1** | <1 | 0 |
| Nickel | ppm | ASTM D5185m | >10 | **0** | 0 | 0 |
| Titanium | ppm | ASTM D5185m | >10 | **<1** | 0 | 0 |
| Silver | ppm | ASTM D5185m | | **0** | <1 | <1 |
| Aluminum | ppm | ASTM D5185m | >10 | **0** | <1 | <1 |
| Lead | ppm | ASTM D5185m | >20 | **<1** | <1 | <1 |
| Copper | ppm | ASTM D5185m | >50 | **2** | <1 | <1 |
| Tin | ppm | ASTM D5185m | >10 | **<1** | <1 | <1 |
| Antimony | ppm | ASTM D5185m | >5 | **---** | --- | --- |
| Vanadium | ppm | ASTM D5185m | | **<1** | <1 | <1 |
| Cadmium | ppm | ASTM D5185m | | **<1** | 0 | 0 |

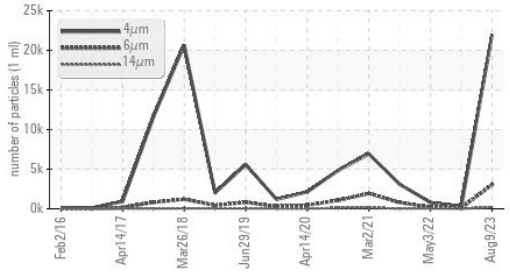
| ADDITIVES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Boron | ppm | ASTM D5185m | | **0** | 0 | 17 |
| Barium | ppm | ASTM D5185m | | **0** | 3 | 0 |
| Molybdenum | ppm | ASTM D5185m | 1150 | **738** | 728 | 714 |
| Manganese | ppm | ASTM D5185m | | **<1** | <1 | 0 |
| Magnesium | ppm | ASTM D5185m | | **5** | 8 | 6 |
| Calcium | ppm | ASTM D5185m | 2000 | **1299** | 1254 | 1325 |
| Phosphorus | ppm | ASTM D5185m | 400 | **328** | 354 | 332 |
| Zinc | ppm | ASTM D5185m | 0 | **0** | 0 | 0 |
| Sulfur | ppm | ASTM D5185m | 1850 | **1754** | 1834 | 1511 |

| CONTAMINANTS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Silicon | ppm | ASTM D5185m | >50 | **8** | 10 | 6 |
| Sodium | ppm | ASTM D5185m | >20 | **4** | 5 | 3 |
| Potassium | ppm | ASTM D5185m | >20 | **1** | 0 | <1 |
| Water | % | ASTM D6304 | >0.05 | **0.022** | 0.005 | 0.011 |
| ppm Water | ppm | ASTM D6304 | >500 | **228.3** | 53.0 | 115.8 |

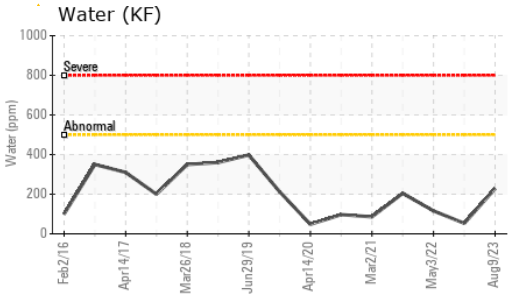
| FLUID CLEANLINESS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Particles >4µm | | ASTM D7647 | | **21967** | 298 | 793 |
| Particles >6µm | | ASTM D7647 | >2500 | **3048** | 100 | 206 |
| Particles >14µm | | ASTM D7647 | >320 | **178** | 13 | 27 |
| Particles >21µm | | ASTM D7647 | >80 | **36** | 3 | 11 |
| Particles >38µm | | ASTM D7647 | >20 | **2** | 0 | 0 |
| Particles >71µm | | ASTM D7647 | >4 | **2** | 0 | 0 |
| Oil Cleanliness | | ISO 4406 (c) | >--/18/15 | **22/19/15** | 15/14/11 | 17/15/12 |

# OIL ANALYSIS REPORT

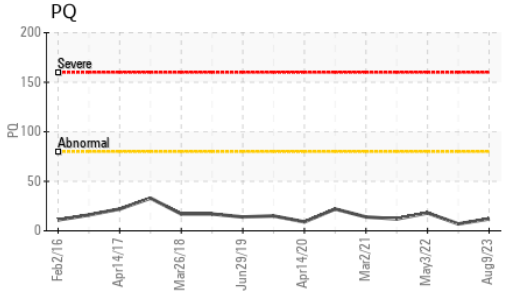
Particle Trend



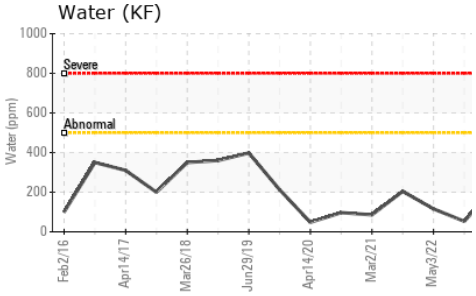

Water (KF)



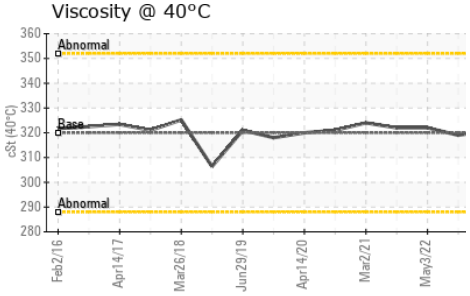

PQ




Water (KF)




Viscosity @ 40°C

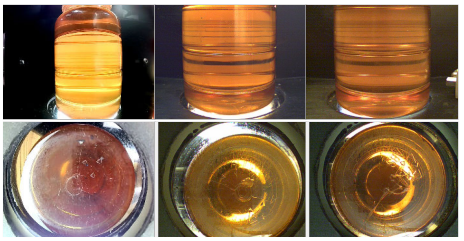



| FLUID DEGRADATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Acid Number (AN) | mg KOH/g | ASTM D8045 | 1.6 | **0.77** | 0.66 | 0.80 |

| 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 | **NONE** | NONE | NONE |
| Silt | scalar | *Visual | NONE | **LIGHT** | NONE | NONE |
| Debris | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| Sand/Dirt | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| Appearance | scalar | *Visual | NORML | **NORML** | NORML | NORML |
| Odor | scalar | *Visual | NORML | **NORML** | NORML | NORML |
| Emulsified Water | scalar | *Visual | >0.05 | **NEG** | NEG | NEG |
| Free Water | scalar | *Visual | | **NEG** | NEG | NEG |

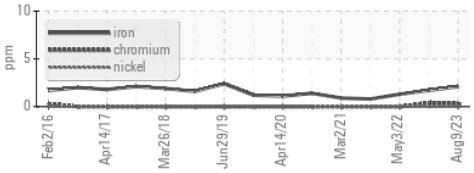
| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Visc @ 40°C | cSt | ASTM D445 | 320 | **321** | 319 | 322 |

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

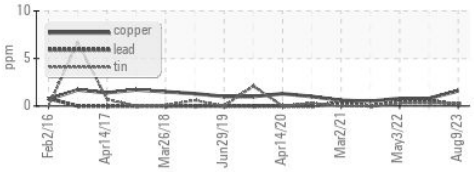


## GRAPHS

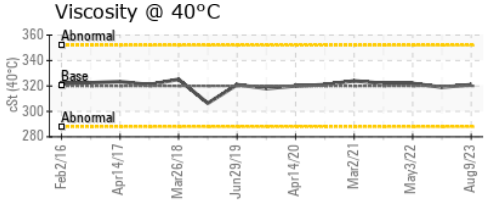
Ferrous Alloys



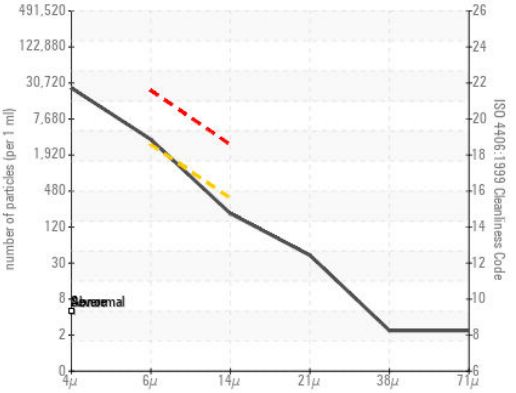

Non-ferrous Metals



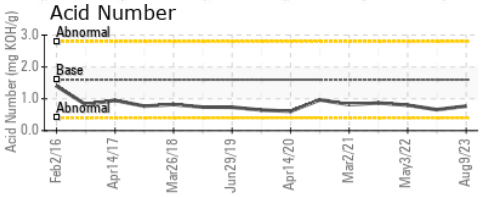

Viscosity @ 40°C




Particle Count




Acid Number




Certificate L2367

**Laboratory** : WearCheck USA - 501 Madison Ave., Cary, NC 27513
**Sample No.** : NX011689 **Received** : 04 Oct 2023
**Lab Number** : 05968988 **Diagnosed** : 06 Oct 2023
**Unique Number** : 10675539 **Diagnostician** : Don Baldridge
**Test Package** : IND 2 ( Additional Tests: KF, PQ, PrtCount )

*To discuss this sample report, contact Customer Service at 1-800-237-1369.*
** - Denotes test methods that are outside of the ISO 17025 scope of accreditation.*
*Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)*


**NORDEX USA - Chicago**
300 SOUTH WACKER DRIVE, SUITE 1500
CHICAGO, IL
US 60606
Contact: DEVIN LINEHAN
DLinehan@nordex-online.com
T: (312)386-4124
F: (312)386-7102