|  |  |  |
| --- | --- | --- |
| Vibration diagnostic report **6442U-2024** | | |
| Project: **Golfstraum**  IMO no: **9390991**  Ordered by: **Utkilen AS** | Date of measurement:   **2024-08-17 - 2024-08-25** | Place of measurement:  **During normal operation** |

Measurement condition

Measurements were taken during normal operating condition.

Results presentation

Overall condition of machinery is presented in 4 states, marked with corresponding colours:

|  |  |
| --- | --- |
|  | Normal – Good condition |
|  | Alert – Remark to machine, but no corrective actions required |
|  | Critical – Action required |
|  | No measurements |

Machinery condition chart provides visual information about number of machines included in each group along with percent value in relation to all machines from report.

Below the chart there is a table with detailed results for each machine, identified by PMS number and name. If applicable, machinery is separated for driver (el. motor, diesel engine, etc.) and driven unit (pump, compressor, etc.).

The left part of the table contains:

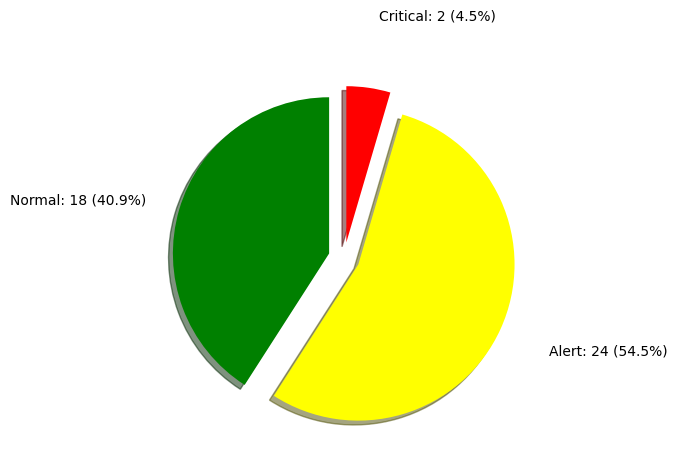
|  |  |
| --- | --- |
| • | dates of last three measurements for machine, presented from oldest to newest. Above date of measurement there is a coloured mark indicating state of machinery: |
| • | trend graph showing measured vibration values (velocity RMS) from last two years. Background is color-coded according to ISO vibration class: |

Right part of the table contains remarks and suggestions based on the analysis of vibration signal. This column can be taken as the final conclusion about machine condition. If this cell states “No remarks”, it means that there is no existing problem or defect shown in vibration signal.

Vibration standards

Following standards may applied for assessment:

|  |  |
| --- | --- |
| **ISO 10816-3** | Mechanical vibration — Evaluation of machine vibration by measurements on non-rotating parts — Part 3: Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 15 000 r/min when measured in situ |
| **ISO 10816-7** | Mechanical vibration — Evaluation of machine vibration by measurements on non-rotating parts — Part 7: Rotodynamic pumps for industrial applications, including measurements on rotating shafts |
| **ISO 20816-1** | Mechanical vibration — Measurement and evaluation of machine vibration — Part 1: General guidelines |
| **ISO 8528-9** | Reciprocating internal combustion engine driven alternating current generating sets — Part 9: Measurement and evaluation of mechanical vibrations |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Batch 1** | | | | | |
| **Cargo Heating pumps** | | | | | |
| **PMS: 365.01** | **Cargo Heating Pump No.1** | | | | |
| 2023-05-10 | 2024-06-03 | 2024-08-21 | High signal only in one point and main signal is related with rotational speed of machine. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **PMS: 365.01.01** | **El.Motor Cargo Heating Pump No.1** | | | | |
| 2023-05-10 | 2024-06-03 | 2024-08-21 | Main signal is related with rotational speed of machine. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **PMS: 365.02** | **Cargo Heating Pump No.2** | | | | |
| 2024-06-03 | 2024-06-30 | 2024-08-21 | High signal only in one point and main signal is related with rotational speed of machine. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **PMS: 365.02.01** | **El.Motor Cargo Heating Pump No.2** | | | | |
| 2024-06-03 | 2024-06-30 | 2024-08-21 | Main signal is related with rotational speed of machine. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **Reduction Gear ME** | | | | | |
| **PMS: 637.01** | **Reduction Gear ME** | | | | |
| 2023-08-26 | 2024-05-26 | 2024-08-18 | High vibration on LO pump and main signal is related with operation of the pump. No signs of deterioration. Next measurement should be done according to regular interval. Please always ensure to include information on suction and delivery pressure of the pump for accurate trend analysis. | | |
|  | | |
| **Emergency generator** | | | | | |
| **PMS: 665.01.01** | **Emergency Generator** | | | | |
| 2023-08-26 | 2024-05-25 | 2024-08-21 | No remark | | |
|  | | |
| **Shaft generator** | | | | | |
| **PMS: 667.01** | **Shaft Generator** | | | | |
| 2023-08-26 | 2024-05-26 | 2024-08-18 | No remark | | |
|  | | |
| **DO transfer pump** | | | | | |
| **PMS: 701.25** | **DO Transfer Pump** | | | | |
| 2023-08-30 | 2024-05-27 | 2024-08-25 | No remark | | |
|  | | |
| **PMS: 701.25.01** | **El.Motor DO Transfer Pump** | | | | |
| 2023-08-30 | 2024-05-27 | 2024-08-25 | No remark | | |
|  | | |
| **FO separator feed pumps** | | | | | |
| **PMS: 702.01.01** | **FO Separator Feed Pump No.1** | | | | |
| 2023-08-28 | 2024-05-24 | 2024-08-17 | No remark | | |
|  | | |
| **PMS: 702.01.01.01** | **El.Motor FO separator feed pump No.1** | | | | |
| 2023-08-28 | 2024-05-24 | 2024-08-17 | No remark | | |
|  | | |
| **DO separator feed pump** | | | | | |
| **PMS: 702.10** | **DO Separator Pump** | | | | |
| 2023-08-30 | 2024-05-25 | 2024-08-17 | No remark | | |
|  | | |
| **PMS: 702.10.01** | **El.Motor DO Separator feed pump** | | | | |
| 2023-08-30 | 2024-05-25 | 2024-08-17 | High signal only in one point and main signal is related with rotational speed of machine. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **ME FO booster pumps** | | | | | |
| **PMS: 703.03.01** | **FO Booster Pump No.1 ME** | | | | |
| 2023-08-31 | 2024-05-24 | 2024-08-18 | No remark | | |
|  | | |
| **PMS: 703.03.01.01** | **El.Motor ME booster pump No.1** | | | | |
| 2023-08-31 | 2024-05-24 | ERROR | Measurement errors occurred. Next measurement should be done at the first possible opportunity. Including pump. | | |
|  | | |
| **PMS: 703.03.02** | **FO Booster Pump No.2 ME** | | | | |
| 2023-08-28 | 2024-05-24 | 2024-08-18 | No remark | | |
|  | | |
| **PMS: 703.03.02.01** | **El.Motor ME booster pump No.2** | | | | |
| 2023-08-28 | 2024-05-24 | 2024-08-18 | Increase in envelope signal. Possible signs of bearings wear in FFT spectra. Next measurement should be done up to week 40 to monitor the condition of the bearings. Including pump. Please provide bearing details for the sake of detailed analysis. | | |
|  | | |
| **ME FO feed pumps** | | | | | |
| **PMS: 703.04.01** | **FO Feed Pump No.1 ME** | | | | |
| 2023-08-31 | 2024-05-24 | 2024-08-18 | No remark | | |
|  | | |
| **PMS: 703.04.01.01** | **El.Motor ME feed pump No.1** | | | | |
| 2023-08-31 | 2024-05-24 | 2024-08-18 | No remark | | |
|  | | |
| **PMS: 703.04.02** | **FO Feed Pump No.2 ME** | | | | |
| 2023-08-28 | 2024-05-24 | 2024-08-18 | Due to some measurement errors occurred the condition of the machine cannot be unequivocally assessed. Next measurement should be repeated at first opportunity. | | |
|  | | |
| **PMS: 703.04.02.01** | **El.Motor ME feed pump No.2** | | | | |
| 2023-08-28 | 2024-05-24 | 2024-08-18 | Main signal is related with environment. No signs of deterioration. Next measurement should be done according to the interval recommended for pump. | | |
|  | | |
| **FO boiler pumps** | | | | | |
| **PMS: 703.61.01** | **FO Pump No.1 Boiler No.1** | | | | |
| 2023-08-31 | 2024-05-24 | 2024-08-17 | No remark | | |
|  | | |
| **PMS: 703.61.01.01** | **El.Motor Boiler FO Pump No.1** | | | | |
| 2023-08-31 | 2024-05-24 | 2024-08-17 | High signal only in one point and main signal is related with operation of the pump. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **PMS: 703.61.03** | **FO Pump No.1 Boiler No.2** | | | | |
| 2023-08-28 | 2024-05-24 | 2024-08-17 | No remark | | |
|  | | |
| **PMS: 703.61.03.01** | **El.Motor FO Pump No.1 Boiler No.2** | | | | |
| 2023-08-28 | 2024-05-24 | 2024-08-17 | Main signal is related with operation of the pump. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **Exhaust water pumps** | | | | | |
| **PMS: 756.06.01** | **Exhaust Gas Boiler Circulating Pump No.1** | | | | |
| 2023-08-31 | 2024-05-24 | 2024-08-17 | No remark | | |
|  | | |
| **PMS: 756.06.01.01** | **El.Motor Exhaust Gas Boiler Circulating Pump No.1** | | | | |
| 2023-08-31 | 2024-05-24 | 2024-08-17 | Main signal is related with rotational speed of machine. and environment. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **PMS: 756.06.02** | **Exhaust Gas Boiler Circulating Pump No.2** | | | | |
| 2023-08-28 | 2024-05-24 | 2024-08-17 | No remark | | |
|  | | |
| **PMS: 756.06.02.01** | **El.Motor Exhaust Gas Boiler Circulating Pump No.2** | | | | |
| 2023-08-28 | 2024-05-24 | 2024-08-17 | Main signal is related with rotational speed of machine. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **Fire & GS pumps** | | | | | |
| **PMS: 813.01** | **Fire/Genaral Service Pump** | | | | |
| 2023-09-01 | 2024-05-27 | 2024-08-25 | No remark | | |
|  | | |
| **PMS: 813.01.01** | **El.Motor Fire/Genaral Service Pump** | | | | |
| 2023-09-01 | 2024-05-27 | 2024-08-25 | High signal indicates a cavitation problem. Next measurement should be taken by week 42. Including pump. Please provide pump operating parameters. | | |
|  | | |
| **PMS: 813.02** | **Fire/Deck Wash/Foam Pump** | | | | |
| 2023-09-01 | 2024-05-27 | 2024-08-25 | Main signal is related with rotational speed of machine. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **PMS: 813.02.01** | **El.Motor Fire/Deck Wash/Foam Pump** | | | | |
| 2023-09-01 | 2024-05-27 | 2024-08-25 | Main signal is related with rotational speed of machine. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **Emergency fire pump** | | | | | |
| **PMS: 813.31** | **Emergency Fire Pump** | | | | |
| 2023-08-26 | 2024-05-25 | 2024-08-25 | Vibration reduced from last reading. Please advise if work recommended in report 6294-2024 was performed: 1. All bolts responsible for stiffness of structure should be checked/retightened. 2. Next measurement should be done after performing work (please send with feedback). | | |
|  | | |
| **PMS: 813.31.01** | **Hydraulic Motor Emergency Fire Pump** | | | | |
| 2023-08-26 | 2024-05-25 | 2024-08-25 | Vibration reduced from last reading. Please advise if work recommended in report 6294-2024 was performed: 1. All bolts responsible for stiffness of structure should be checked/retightened. 2. Next measurement should be done after performing work (please send with feedback). | | |
|  | | |
| **HPP for EM Fire Pump** | | | | | |
| **PMS: 813.31.02.01** | **El.Motor Power pack emergency fire pump** | | | | |
| 2023-08-26 | 2024-05-25 | 2024-08-25 | Main signal is related with flow pulsation. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **Framo pumps** | | | | | |
| **PMS: 831.03.01** | **Hydr. Power Pack No.1** | | | | |
| 2023-08-31 | 2024-05-28 | ERROR | Measurement errors occurred. Next measurement should be repeated at first opportunity. Including el. motor. | | |
|  | | |
| **PMS: 831.03.01.01** | **El.Motor Hydr. Power Pack No.1** | | | | |
| 2023-08-31 | 2024-05-28 | 2024-08-18 | No remark | | |
|  | | |
| **PMS: 831.03.02** | **Hydr. Power Pack No.2** | | | | |
| 2023-08-31 | 2024-05-28 | ERROR | Measurement errors occurred. Next measurement should be repeated at first opportunity. | | |
|  | | |
| **PMS: 831.03.02.01** | **El.Motor Hydr. Power Pack No.2** | | | | |
| 2023-08-31 | 2024-05-28 | ERROR | Measurement errors occurred. Next measurement should be repeated at first opportunity. | | |
|  | | |
| **PMS: 831.03.03** | **Hydr. Power Pack No.3** | | | | |
| 2023-08-31 | 2024-05-28 | 2024-08-18 | Main signal comes from flow pulsation. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **PMS: 831.03.03.01** | **El.Motor Hydr. Power Pack No.3** | | | | |
| 2023-08-31 | 2024-05-28 | 2024-08-18 | Main signal comes from flow pulsation. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **PMS: 831.03.04** | **Hydr. Power Pack No.4** | | | | |
| 2023-08-31 | 2024-05-28 | 2024-08-18 | Main signal comes from flow pulsation. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |
| **PMS: 831.03.04.01** | **El.Motor Hydr. Power Pack No.4** | | | | |
| 2023-08-31 | 2024-05-28 | 2024-08-18 | Main signal is related with rotational speed of machine. No signs of deterioration. Next measurement should be done according to regular interval. | | |
|  | | |

**Measurement equipment:**

|  |  |
| --- | --- |
| Technical data | |
| Maker: | Info Marine |
| Type: | MarVib DC750 |
| Serial number: | 7503954 |
| Measuring range: | 2Hz-30kHz / RPM = 60-20000 |
| Indication error: | ± 0,5% |

Equipment is calibrated, certificate for verification - if required.

|  |  |
| --- | --- |
| **Ship type:**  Tanker | **Main dimensions:**  Length(b.p).......................................129,00 m  Breadth(B.)........................................19,20 m |
| **Sea depth:**  Least twice times greater than Vessel draught |  |
| **Measurement method:**  According to standard ISO 10816 : - procedure No. 2 Measurement report | |

Summary  
Next measurements should be done in three month period to obtain trend value for each equipment, in some cases even one month period is preferable.  
  
This report is prepared in good faith based on measurement diagnostic done on available running rotary machine and documentation submitted.

|  |  |
| --- | --- |
| **Prepared by:** | **Approved by:** |
| Service Engineer | Tomasz Chuchra |
| Nagoor Basha Kalluri | mob: 0048 600052257 |