SHIPS & INDUSTRY SERVICE

NS RIF:

SURVEY REPORT

VESSEL:

Survey

Date of Survey

Place of Survey

	NAME	CERT No. / LEVEL	RULE:
Operator :			UNI EN ISO 18436-2
	NAME	SIGNATURE	DATE
Prepared by :			

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INTRODUCTION

Date and Place of Survey

The survey was conducted on board the vessel from

2nd level analyst's with assistance being given by Engineer officers on board.

THE SURVEY

Purpose

The purpose of the survey is to check:

- *Machinery apparatus and electric system by vibration analysis method, with thermographic control and power quality control.*

Reporting

For the machines object of this analysis, the following criteria was applied:

Vibration analysis:

- *ISO 10816-3, ISO 10816-6, ISO 10816-7 & ISO 8528-9;*

Thermographic control:

- *ISO 7726;*

Power quality control:

- *EN 50160;*

REPORT:

Used instruments

Spectrum analyzer and vibrometer model **FLUKE** with the following technical features:

- Frequency range: 20 – 2000 Hz;
- Measuring system: (mm/sec – RMS);
- Number of averages: 5;
- Number of lines: 800;
- Serial number: 3094008.

Sensor Type: accelerator model **FLUKE 3530769** with magnetic base:

- Sensitivity: 100 mV/g (± 5 %, 25 °C);
- Frequency range: Z Da 2 a 7.000 Hz ± 3 dB;

  X, Y Da 2 a 5.000 Hz ± 3 dB;
- Serial number: 6252.

Vibrometer model **Lutron** with the following technical features:

- Frequency range: 10 – 1000 Hz;
- Measuring system: (mm/sec – RMS);
- Number of averages: 4;
- Number of lines: 400;
- Serial number: Q812199.

Infrared Camera **FLIR T660**:

- Thermal Resolution: 307,200 (640 × 480);
- Thermal Sensitivity : <0.02°C @ 30°C;
- Accuracy: +/-1°C (+/-1.8°F) or +/-1% of reading for limited temperature range;

  ±2°C (±3.6°F) or 2%, whichever is greater, at 25°C (77°F) nominal;
- Temperature Range: -40°F to 3,632°F (-40°C to 2,000°C);
- Serial number: **55906789**.

Power quality tester by **FLUKE 435 II**

Ultrasonic Tester **SDT 270**

ANALYSIS RESULTS

COMPONENT	VIBRATION ANALYSIS RESULT	THERMOGRAPHIC ISPECTION RESULT	TOTAL RUNNING HOURS	POWER QUALITY RESULT
AUX GENERATOR No.1	ISO 10816-6 LEVEL A/B	NO FAULTS DETECTED		TEST PASSED
AUX GENERATOR No.2	ISO 10816-6 LEVEL B	NO FAULTS DETECTED		TEST PASSED
AUX GENERATOR No.3	ISO 10816-6 LEVEL A/B	NO FAULTS DETECTED		TEST PASSED
EMERGENCY GENERATOR	ISO 8528-9 LEVEL A	NO FAULTS DETECTED		
MAIN ENGINE	ND	NO FAULTS DETECTED		
M.E. CIRCULATING PUMP No.2	ISO 10816-3	NO FAULTS DETECTED		
ME FO SUPPLY P/P No.1	ISO 10816-3	NO FAULTS DETECTED		
ME FO SUPPLY P/P No.2	ISO 10816-3	NO FAULTS DETECTED		
G.E. MDO FLUSHING P/P No.2	ISO 10816-3	NO FAULTS DETECTED		
STEERING GEAR PUMP No.1	ISO 10816-3	NO FAULTS DETECTED		
STEERING GEAR PUMP No.2	ISO 10816-3	NO FAULTS DETECTED		
MAIN AIR COMPRESSOR No. 1	ISO 10816-3	ND		
MAIN AIR COMPRESSOR No. 2	ISO 10816-3	ND		
WORKING AIR COMPRESSOR	ISO 10816-3	ND		
PROV.COMPRESSOR No.1	ISO 10816-3	NO FAULTS DETECTED		
PROV.COMPRESSOR No.2	ISO 10816-3	ND		
AIR COND. COMPRESSOR No.2	ISO 10816-3	NO FAULTS DETECTED		
AFT HYD. PACK No.1	ISO 10816-3	ND		
AFT HYD. PACK No.2	ISO 10816-3	ND		
FWD HYD. PACK No.1	ISO 10816-3	ND		
FWD HYD. PACK No.2	ISO 10816-3	ND		
HFO PURIFIER No.2	ND	NO FAULTS DETECTED		

COMPONENT	VIBRATION ANALYSIS RESULT	THERMOGRAPHIC ISPECTION RESULT	TOTAL RUNNING HOURS
MAIN LUBE OIL PUMP No.1	ISO 10816-7	NO FAULTS DETECTED	
MAIN LUBE OIL PUMP No.2	ISO 10816-7	NO FAULTS DETECTED	
MAIN SEA COOLING PUMP No.1	ISO 10816-7	NO FAULTS DETECTED	
MAIN SEA COOLING PUMP No.2	ISO 10816-7	NO FAULTS DETECTED	
MAIN SEA COOLING PUMP No.3	ISO 10816-7	NO FAULTS DETECTED	
JACKET WATER PUMP No.1	ISO 10816-7	NO FAULTS DETECTED	
JACKET WATER PUMP No.2	ISO 10816-7	NO FAULTS DETECTED	
CENTRAL C.F.W. PUMP No.1	ISO 10816-7	NO FAULTS DETECTED	
CENTRAL C.F.W. PUMP No.2	ISO 10816-7	ND	
CENTRAL C.F.W. PUMP No.3	ISO 10816-7	NO FAULTS DETECTED	
BALLAST PUMP No.1	ISO 10816-7	NO FAULTS DETECTED	
BALLAST PUMP No.2	ISO 10816-7	NO FAULTS DETECTED	
FIRE & GS PUMP No.1	ISO 10816-7	NO FAULTS DETECTED	
FIRE & BALLAST PUMP No.2	ISO 10816-7	NO FAULTS DETECTED	
EMERGENCY FIRE PUMP	ISO 10816-7	NO FAULTS DETECTED	

Rating Criteria for Vibration Analysis:

ISO 10816-3 & 10816-7 Vibration Severity Standards

- **GOOD**: The vibration of newly commissioned machines normally falls within this zone.
- **SATISFACTORY**: Machines with vibration within this zone are normally considered acceptable for unrestricted longterm operation.
- **UNSATISFACTORY (ALERT)**: Machines with vibration within this zone are normally considered unsatisfactory for long-term continuous operation. Generally, the machine may be operated for a limited period in this condition until a suitable opportunity arises for remedial saction.
- **UNACCEPTABLE (DANGER)**: Vibration values within this zone are normally considered to be of sufficient severity to cause damage to the machine.

GOOD
SATISFACTORY
UNSATISF.(ALERT)
UNACC. (DANGER)

ISO 10816-6 Vibration Severity Standards

- **LEVEL A/B:** Acceptable for long-term continuous operation.
- **LEVEL C:** Unsatisfactory for long-term continuous operation.
- **OVER LEVEL D:** Sufficient severity to cause damage on the machine

LEVEL A/B - SATISFACTORY
LEVEL C - UNSATISFACTORY (ALERT)
LEVEL D - UNACCEPTABLE (DANGER)

ISO 8528-9 Vibration Severity Standards

- **LEVEL I:** Acceptable for long-term continuous operation.
- **LEVEL II:** Unsatisfactory for long-term continuous operation.
- **OVER LEVEL III:** Sufficient severity to cause damage on the machine

LEVEL I - SATISFACTORY
LEVEL II - UNSATISFACTORY (ALERT)
LEVEL III - UNACCEPTABLE (DANGER)

ISO 7726 Thermography Severity Standards

A means of assessing severity of temperature in evaluating the maintenance scheduling is presented in here follow Tab 3. The degree of temperature rise and criticality of the particular equipment or process involved should determine the final decision as to priorities and order of maintenance.

TEMPERATURE RISE ΔT	REMARKS
1°C ≤ ΔT < 5°C	No corrective measures required
5°C ≤ ΔT ≤ 10°C	Corrective measures required during the next scheduled maintenance period
10°C < ΔT ≤ 20°C	Corrective measures to be scheduled on a priority basis
20°C < ΔT ≤ 30° C	Corrective measures required as soon as possible
Above 30°C	Corrective measures required immediately

RESULTS AS PER:

ISO 10816-6

VIBRATION ANALYSIS

ACCORDING ISO 10816 AS AMENDED

VESSEL NAME		APPARATUS	AUX ENGINE No.1	POWER kW	600
IMO		MAKER	HIMSEN HUNDAY	RPM	900
CLASS		MODEL	H17/28	RUN. HRS	17353
Id. No.		ALTERNATOR	HUNDAY	LOAD	322 kW
OWNER		MODEL	HFC7 504-84K	RPM	900

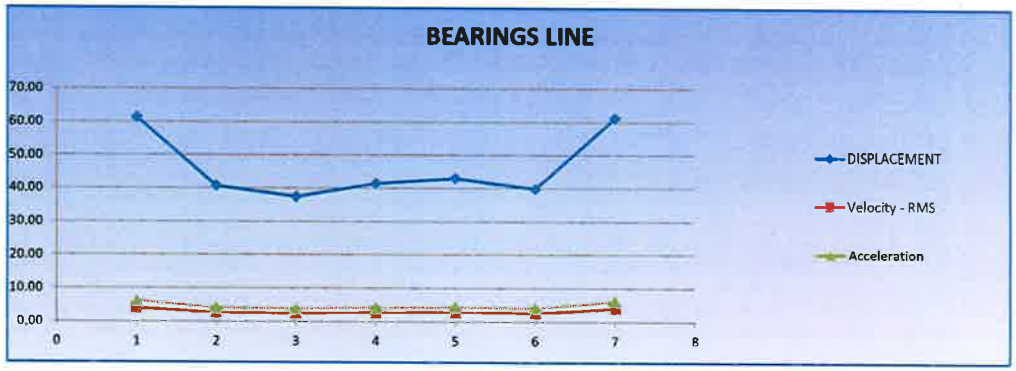
PLACE OF SURVEY		DATE		VESSEL CONDITION	MOORED
		START TIME	08:00	END TIME	08:30

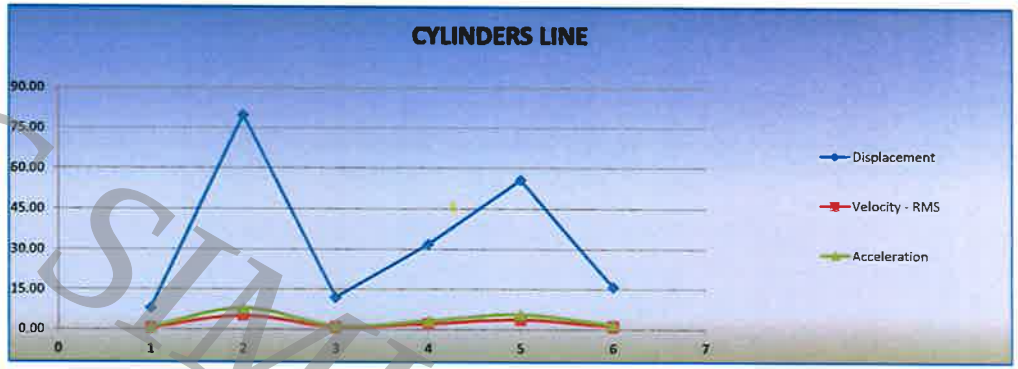
ITEMS	READINGS POSITION	POWER (KW)	FOUND. TYPE	Rpm	FREQ. (Hz)	DISPL. µm	V (mm/s) RMS	a (m/s²)	RESULT
DIESEL ENGINE									
BEARING 1	1	600	RESILIENT	900	15.00	44.52	2.80	4.39	LEVEL A/B
BEARING 1	2	600	RESILIENT	900	15.00	77.90	4.90	7.68	LEVEL A/B
BEARING 2	1	600	RESILIENT	900	15.00	42.93	2.70	4.23	LEVEL A/B
BEARING 2	2	600	RESILIENT	900	15.00	38.16	2.40	3.76	LEVEL A/B
BEARING 3	1	600	RESILIENT	900	15.00	41.34	2.60	4.08	LEVEL A/B
BEARING 3	2	600	RESILIENT	900	15.00	33.39	2.10	3.29	LEVEL A/B
BEARING 4	1	600	RESILIENT	900	15.00	38.16	2.40	3.76	LEVEL A/B
BEARING 4	2	600	RESILIENT	900	15.00	44.52	2.80	4.39	LEVEL A/B
BEARING 5	1	600	RESILIENT	900	15.00	50.87	3.20	5.02	LEVEL A/B
BEARING 5	2	600	RESILIENT	900	15.00	34.98	2.20	3.45	LEVEL A/B
BEARING 6	1	600	RESILIENT	900	15.00	36.57	2.30	3.61	LEVEL A/B
BEARING 6	2	600	RESILIENT	900	15.00	42.93	2.70	4.23	LEVEL A/B
BEARING 7	1	600	RESILIENT	900	15.00	84.26	5.30	8.31	LEVEL A/B
BEARING 7	2	600	RESILIENT	900	15.00	38.16	2.40	3.76	LEVEL A/B
							|ΔV|		
CYL. LINE 1	3	600	RIGID	900	15.00	7.95	0.50	0.78	LEVEL A/B
CYL. LINE 2	3	600	RIGID	900	15.00	79.49	5.00	7.84	LEVEL A/B
CYL. LINE 3	3	600	RIGID	900	15.00	11.92	0.75	1.18	LEVEL A/B
CYL. LINE 4	3	600	RIGID	900	15.00	31.80	2.00	3.13	LEVEL A/B
CYL. LINE 5	3	600	RIGID	900	15.00	55.64	3.50	5.49	LEVEL A/B
CYL. LINE 6	3	600	RIGID	900	15.00	15.90	1.00	1.57	LEVEL A/B
ALTERNATOR									
POSITION RADIAL - 1Y	4	600	RESILIENT	900	15.00	52.46	3.30	5.17	LEVEL A/B
POSITION RADIAL - 2Y	5	600	RESILIENT	900	15.00	63.59	4.00	6.27	LEVEL A/B
POSITION ASSIAL - 3X	6	600	RESILIENT	900	15.00	84.26	5.30	8.31	LEVEL A/B
POSITION RADIAL - 3Y	6	600	RESILIENT	900	15.00	49.28	3.10	4.86	LEVEL A/B
POSITION RADIAL - 3Z	6	600	RESILIENT	900	15.00	44.52	2.80	4.39	LEVEL A/B
POSITION ASSIAL - 4X	7	600	RESILIENT	900	15.00	52.46	3.30	5.17	LEVEL A/B
POSITION RADIAL - 4Y	7	600	RESILIENT	900	15.00	39.75	2.50	3.92	LEVEL A/B
POSITION RADIAL - 4Z	7	600	RESILIENT	900	15.00	28.62	1.80	2.82	LEVEL A/B
TURBOCHARGER									
POSITION RADIAL - 1X	1		RIGID			12.72	0.80	1.25	LEVEL A/B
POSITION RADIAL - 2Y	2		RIGID			11.13	0.70	1.10	LEVEL A/B

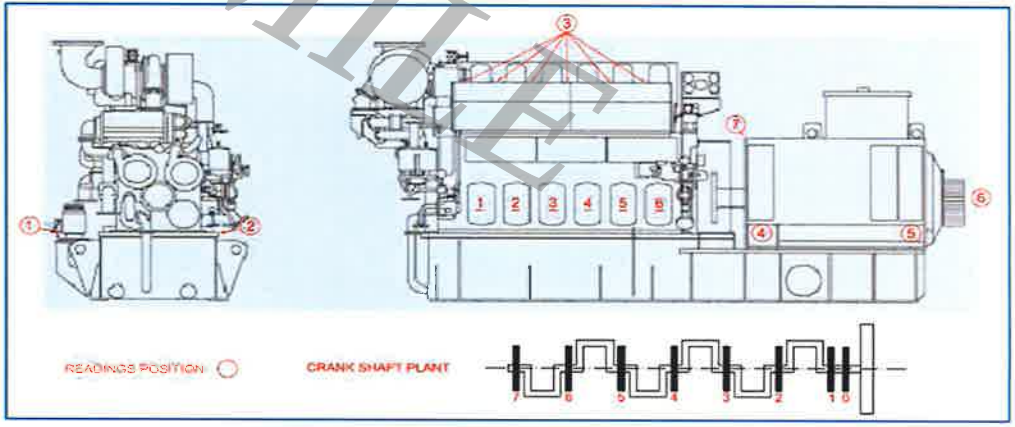
	ENGINE CLASS	5	ALTERNATOR	VIBRATION	DISPLACEMENT	VELOCITY R.M.S.	ACCELERATION
	ISO 10816 -6		ISO 8528 - 9	SEVERITY	µm	(mm/s)	(m/s²)
ENGINE SPEED =>	300≤ RPM ≤ 1000		720 ≤ RPM ≤ 1300	GR.S D.G. =>	84.26	5.30	8.31
RATING	RMS mm/s		RMS mm/s	GR.S ALT. =>	84.26	5.30	8.31
LEVEL A/B	0 < V < 17.8		0<V<20	LEVEL A/B	Acceptable for long-term continuous operation.		
LEVEL C	17.8 <V≤ 28.2		20<V<24	LEVEL C	Unsatisfactory for long-term continuous operation.		
LEVEL D	V>28.2		V > 24	LEVEL D	Sufficient severity to cause damage on the machine		

Vibration Analyst Name & Certificate Number

ENGINE LEVEL	LEVEL A/B	ALTERNATOR	LEVEL A/B
		TURBOCHARGER	LEVEL A/B







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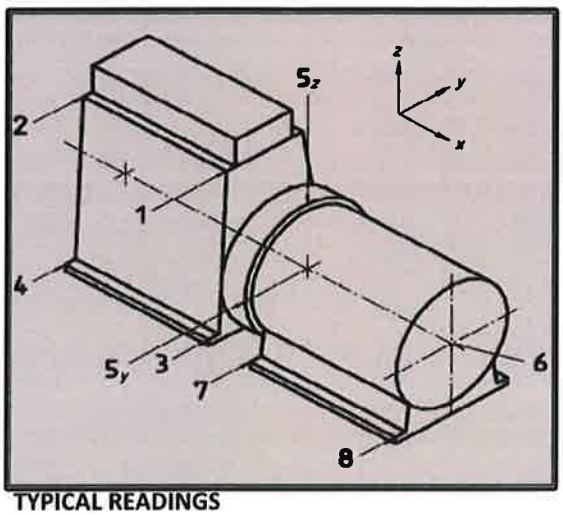
VIBRATION ANALYSIS

ACCORDING ISO 8528-9 AS AMENDED

APPARATUS	POSITION	POWER (KW)	FOUND. TYPE	Rpm	FREQ. (Hz)	DISPL.	V (mm/s) RMS	a (mm/s^2)	RESULT
EMERGENCY GEN.									
R.I.C.	1	120	RIGID	1800	30.00	0.09	5.60	3.52	LEVEL I
DOOSAN	2	120	RIGID	1800	30.00	0.09	5.90	3.71	LEVEL I
MOD: AD136TI	3	120	RIGID	1800	30.00	0.11	6.80	4.27	LEVEL I
kW 120 RPM 1800	4	120	RIGID	1800	30.00	0.11	7.20	4.52	LEVEL I
ALTERNATOR	5y	120	RIGID	1800	30.00	0.08	5.10	3.20	LEVEL I
LEROY SOMER	5z	120	RIGID	1800	30.00	0.11	6.80	4.27	LEVEL I
M44.2 M95 C6/4	6	120	RIGID	1800	30.00	0.11	6.80	4.27	LEVEL I
KW 120	7	120	RIGID	1800	30.00	0.11	6.90	4.33	LEVEL I
RPM 1800	8	120	RIGID	1800	30.00	0.10	6.50	4.08	LEVEL I

ISO 8528-9 SPEED ENGINE	R.I.C. (DIES. MOT.)	ALTERN. 100< KW ≤200	ALTERN. > 200 kW
1300 ≤ RPM <2000	RMS mm/s	RMS mm/s	RMS mm/s
LEVEL I	< 45	0<V<25	0<V<20
LEVEL II	≤ 45	25<V<30	20<V<28
OVER LEVEL	> 45	V > 30	V > 28

LEVEL I	Acceptable for long-term continuous operation.
LEVEL II	Unsatisfactory for long-term continuous operation.
OVER LEVEL	Sufficient severity to cause damage on the machine



TYPICAL READINGS

NOTE

Vibration Analyst Name & Certificate Number

Place:

Date:

RESULTS AS PER:

ISO 10816-3

SHIPS & INDUSTRY SERVICE

VIBRATION ANALYSIS

ACCORDING ISO 10816 AS AMENDED

APPARATUS	POSITION	POWER (KW)	FOUND. TYPE	Rpm	FREQ. (Hz)	V (mm/s) RMS	RESULT
ME FO SUPPLY P/P No.1					0.00		
EL. MOTOR	Motor drive end AXIAL X	1.5	RIGID	1135	18.92	0.80	
1.5 kW	Motor drive end RADIAL Y	1.5	RIGID	1135	18.92	0.80	
MOD: ABB	Motor drive end RADIAL Z	1.5	RIGID	1135	18.92	0.90	
					0.00		
PUMP	Pump drive end AXIAL X	1.5	RIGID	1135	18.92	0.72	
1135 RPM	Pump drive end RADIAL Y	1.5	RIGID	1135	18.92	0.80	
60Hz	Pump drive end RADIAL Z	1.5	RIGID	1135	18.92	0.80	
					0.00		
ME FO SUPPLY P/P No.2					0.00		
EL. MOTOR	Motor drive end AXIAL X	1.5	RIGID	1135	18.92	0.90	
1.5 kW	Motor drive end RADIAL Y	1.5	RIGID	1135	18.92	0.80	
MOD: ABB	Motor drive end RADIAL Z	1.5	RIGID	1135	18.92	1.30	
					0.00		
PUMP	Pump drive end AXIAL X	1.5	RIGID	1135	18.92	1.70	
1135 RPM	Pump drive end RADIAL Y	1.5	RIGID	1135	18.92	1.60	
60Hz	Pump drive end RADIAL Z	1.5	RIGID	1135	18.92	1.40	
					0.00		

ISO 10816-3 RATING CRITERIA	LARGE MACHINE POWER 300 kW to 50 MW		MEDIUM SIZED MACHINE POWER 15 kW to 300 kW		SMALL SIZED MACHINE POWER LESS 15 kW	
RATING	RMS mm/s	SUPPORT	RMS mm/s	SUPPORT	RMS mm/s	SUPPORT
GOOD	0<V≤2.3	RIGID	0<V≤1.4	RIGID	0<V≤0.71	RIGID
SATISFACTORY	2.3<V≤4.5	RIGID	1.4<V≤2.8	RIGID	0.71<V≤1.8	RIGID
UNSATISF.(ALERT)	4.5<V≤7.1	RIGID	2.8<V≤4.5	RIGID	1.8<V≤4.5	RIGID
UNACC. (DANGER)	V>7.1	RIGID	V>4.5	RIGID	V>4.5	RIGID
GOOD	0<V≤3.5	SOFT	0<V≤2.3	SOFT		
SATISFACTORY	3.5<V≤7.1	SOFT	2.3<V≤4.5	SOFT		
UNSATISF.(ALERT)	7.1<V≤11	SOFT	4.5<V≤7.1	SOFT		
UNACC. (DANGER)	V>11	SOFT	V>7.1	SOFT		

NOTE

Vibration analysis performed during normal operating condition

Vibration Analyst Name & Certificate Number

SHIPS & INDUSTRY SERVICE

THERMOGRAPHIC ANALISYS REPORT		Ns.RIF:
		Vs. RIF:
COSTUMER:	PLACE:	DATE:
		SHEET:
OBJECT:		
INFRARED THERMOGRAPHIC CONTROL ON AUXILIARY GENERATOR No. 2		

EQUIPMENT:	POSITION:	APPARATUS:
FLIR T660 - S.N. 55906789	ENGINE ROOM	AUXILIARY GENERATOR No. 2

GENERAL INFO ONLY FOR BEARING INSPECTION

Starting time	14:50 LT
Completion time	15:15 LT
NOTE:	Engine stopped on 26/06/2016 at 14:28 LT

INSPECTED PARTS:

ITEM:	COMMENT:
CRANKCASE	Inspected external crankcase and found all in order. No traces of possible overheating, temperature found in the normal range of 85/88 °C
MAIN BEARINGS	All found in order no overheating parts found, average temperature around 85/88 °C sea picture details.
CONNECTING ROD BEARINGS	All found in order no overheating parts found, average temperature around 85/88 °C sea picture details.
CYLINDER HEAD	After checking all temperatures found in normal operative range.
TURBO CHARGER	All found in order at the time of inspection the air flow was good no any obstruction noted see picture details.
CIRCULATING SYSTEM	Found operative and in order.
ALTERNATOR	All found in order no overheating parts found, average temperature around 42 - 44°C see picture details.
FREE END BEARING	Average temperature around 48 - 50°C see picture details.
DISTRIBUTION PANNEL	All phases found in order and balanced no traces of overheating

RESULTS:

REFERENCE	ITEM	AVERAGE TEMP. °C	OPERATIVE ΔT	CRITICAL T ALARM	RESULT
LINE 1	MAIN BEARING No. 7	85.7	N.A.	100°C	GOOD
LINE 1	MAIN BEARING No. 6	84.7	N.A.	100°C	GOOD
LINE 1	CONNECTING ROD BEARING	84.1	N.A.	100°C	GOOD

REFERENCE	ITEM	AVERAGE TEMP. °C	OPERATIVE ΔT	CRITICAL T ALARM	RESULT
LINE 2	MAIN BEARING No. 6	85.1	N.A.	100°C	GOOD
LINE 2	MAIN BEARING No. 5	84.9	N.A.	100°C	GOOD
LINE 2	CONNECTING ROD BEARING	83.3	N.A.	100°C	GOOD

REFERENCE	ITEM	AVERAGE TEMP. °C	OPERATIVE ΔT	CRITICAL T ALARM	RESULT
LINE 3	MAIN BEARING No. 5	83.8	N.A.	100°C	GOOD
LINE 3	MAIN BEARING No. 4	84.6	N.A.	100°C	GOOD
LINE 3	CONNECTING ROD BEARING	83.6	N.A.	100°C	GOOD

REFERENCE	ITEM	AVERAGE TEMP. °C	OPERATIVE ΔT	CRITICAL T ALARM	RESULT
LINE 4	MAIN BEARING No. 4	85.0	N.A.	100°C	GOOD
LINE 4	MAIN BEARING No. 3	84.2	N.A.	100°C	GOOD
LINE 4	CONNECTING ROD BEARING	84.0	N.A.	100°C	GOOD

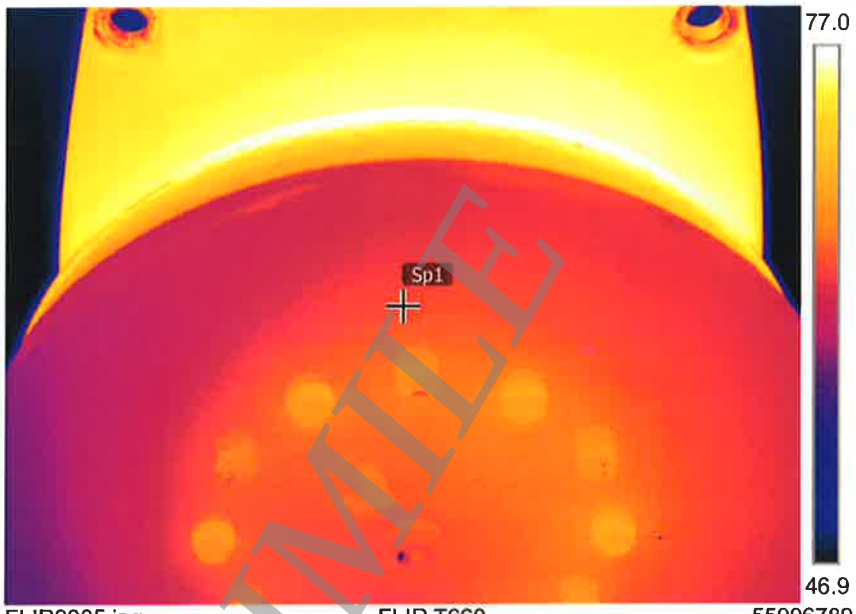
REFERENCE	ITEM	AVERAGE TEMP. °C	OPERATIVE ΔT	CRITICAL T ALARM	RESULT
LINE 5	MAIN BEARING No. 3	84.8	N.A.	100°C	GOOD
LINE 5	MAIN BEARING No. 2	85.2	N.A.	100°C	GOOD
LINE 5	CONNECTING ROD BEARING	84.4	N.A.	100°C	GOOD

REFERENCE	ITEM	AVERAGE TEMP. °C	OPERATIVE ΔT	CRITICAL T ALARM	RESULT
LINE 6	MAIN BEARING No. 2	85.2	N.A.	100°C	GOOD
LINE 6	MAIN BEARING No. 1	85.2	N.A.	100°C	GOOD
LINE 6	CONNECTING ROD BEARING	83.0	N.A.	100°C	GOOD

Measurements	°C
Sp1	65.1

Parameters	
Emissivity	0.64
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation	
Compass	279° W



FLIR3005.jpg FLIR T660 55906789

FLIR3005.jpg FLIR T660 55906789

Measurements °C

Li1	Max	85.6
	Min	78.2
	Average	83.5
Li2	Max	85.9
	Min	84.4
	Average	85.2

Parameters

Emissivity	0.68
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

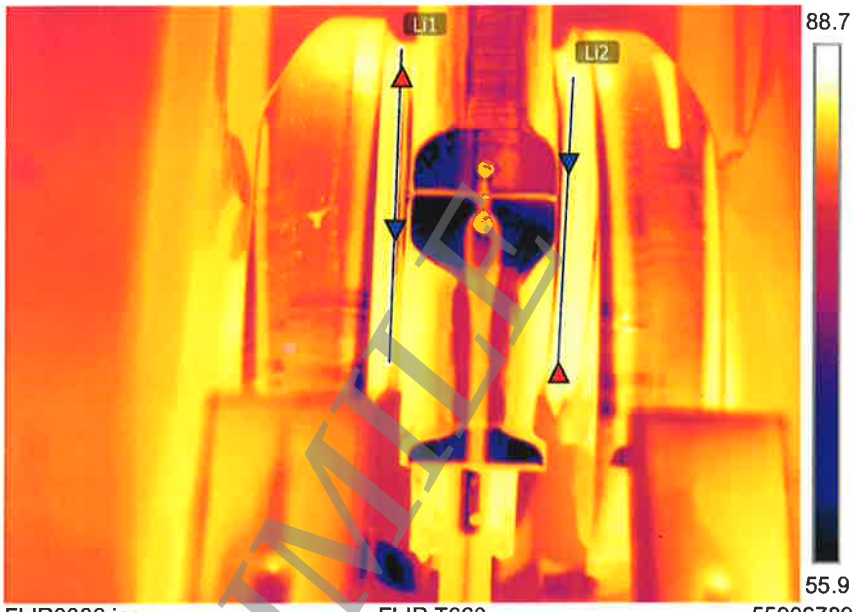
Geolocation

Compass	277° W

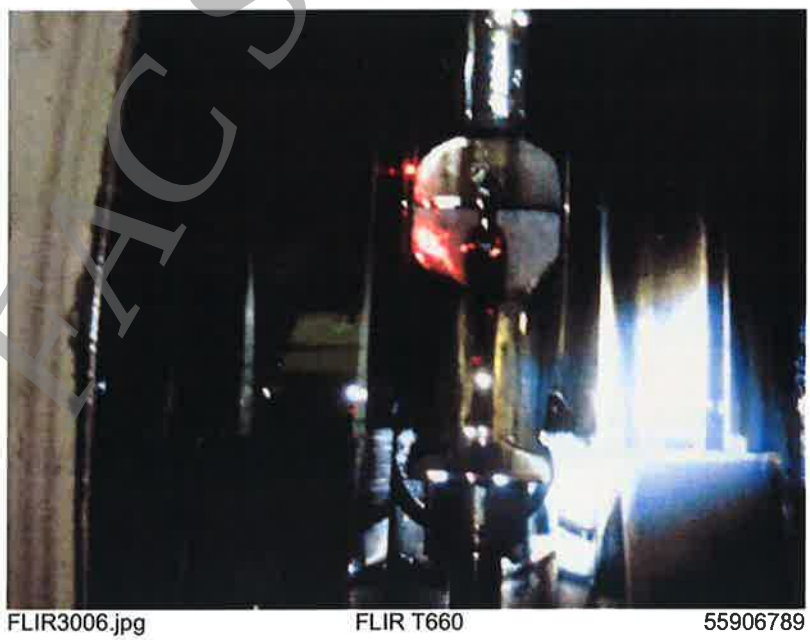
Note

LINE No.1

°C



FLIR3006.jpg FLIR T660 55906789



FLIR3006.jpg FLIR T660 55906789

Measurements °C

Sp1		81.8
Li1	Max	86.2
	Min	84.0
	Average	85.7
Li2	Max	85.6
	Min	82.4
	Average	84.3

Parameters

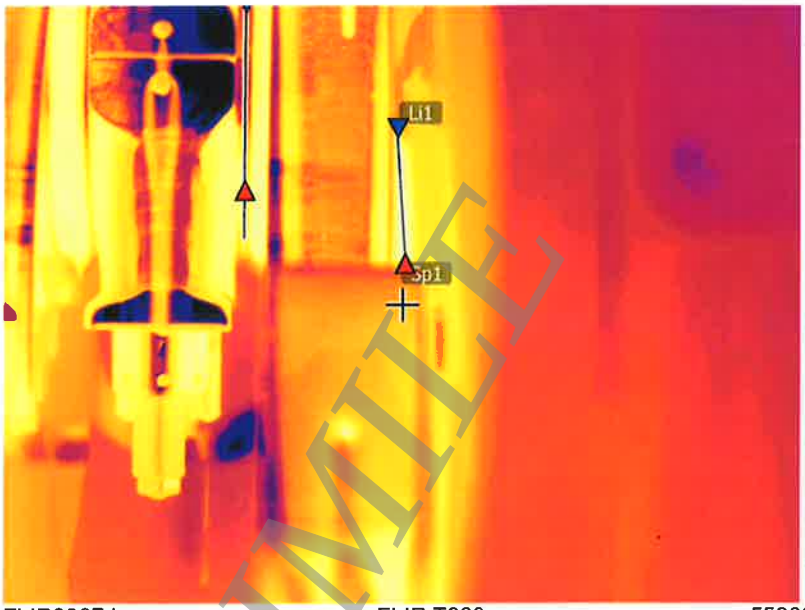
Emissivity	0.68
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

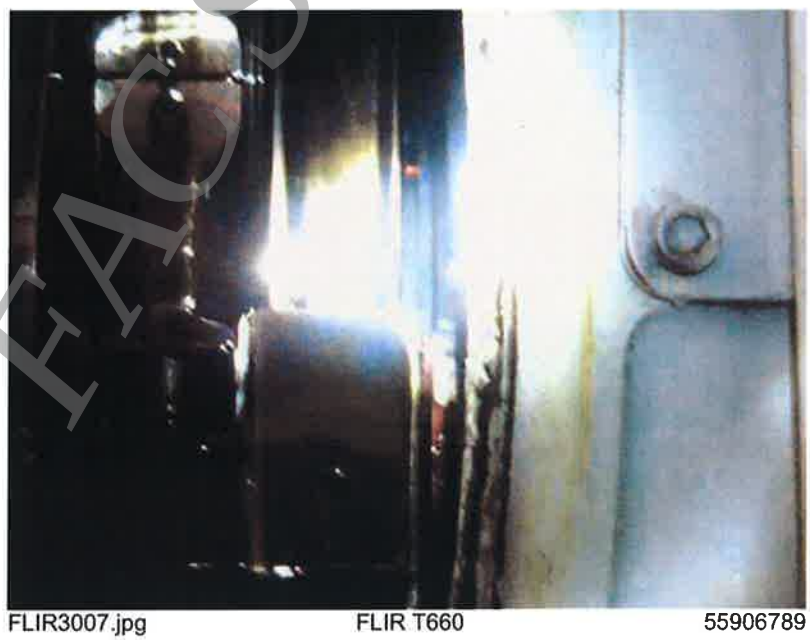
Compass	273° W

Note

LINE No.1



FLIR3007.jpg FLIR T660 55906789



FLIR3007.jpg FLIR T660 55906789

Text annotations

Li1	MAIN BEARING No.7

Measurements °C

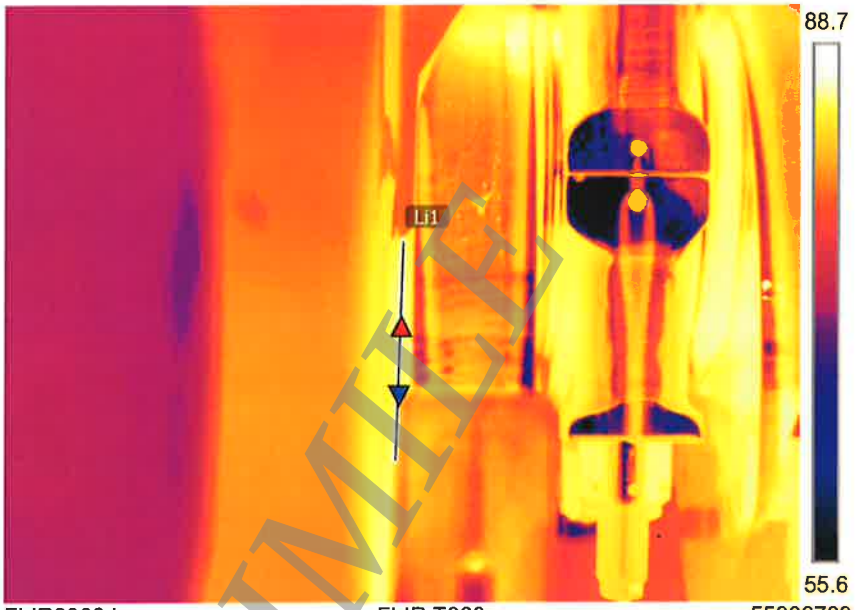
Li1	Max	85.5
	Min	83.0
	Average	84.7

Parameters

Emissivity	0.68
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	277° W



FLIR3008.jpg FLIR T660 55906789

FLIR3008.jpg FLIR T660 55906789

Text annotations

Li1	MAIN BEARING No.6

SHIPS & INDUSTRY SERVICE

THERMOGRAPHIC ANALYSIS REPORT		Ns.RIF:
		Vs. RIF:
COSTUMER:	PLACE:	DATE:
		SHEET:
OBJECT:		
INFRARED THERMOGRAPHIC CONTROL ON F.O. SUPPLY PUMP No.2		

EQUIPMENT:	POSITION:	APPARATUS:
FLIR T660 - S.N. 55906789	ENGINE ROOM	F.O. SUPPLY PUMP No.2

GENERAL INFO:

Starting time	09:04 LT
Completion time	09:06 LT
NOTE:	

INSPECTED PARTS:

ITEM:	COMMENT:
ELECTRIC MOTOR	Distribution of temperature found uniform no evidence of overheathing parts.
PUMP	Range of temperature normal, no evidence of leaking.

RESULTS:

All parts inspected found in order.

Measurements °C

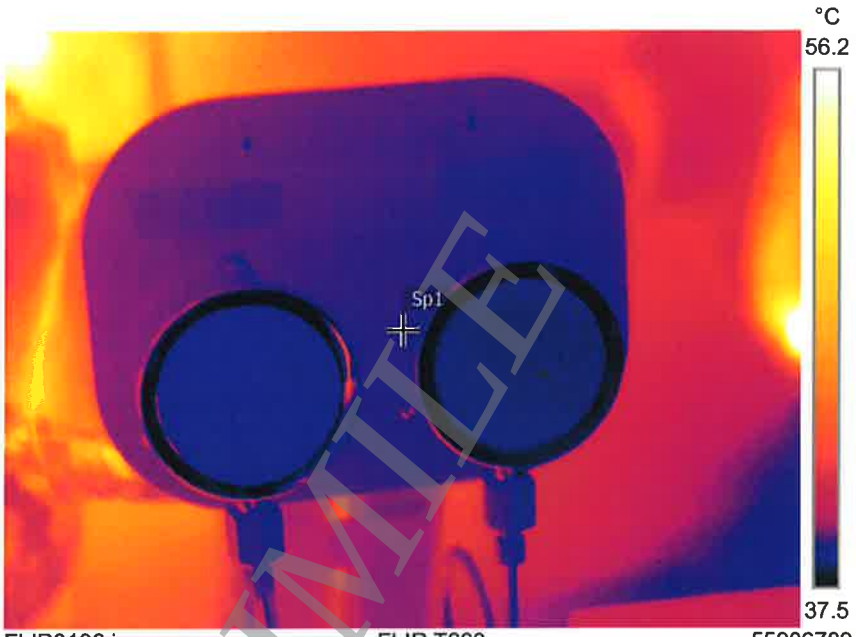
Sp1	39.2

Parameters

Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	303° NW



FLIR3106.jpg FLIR T660 55906789

FLIR3106.jpg FLIR T660 55906789

Measurements °C

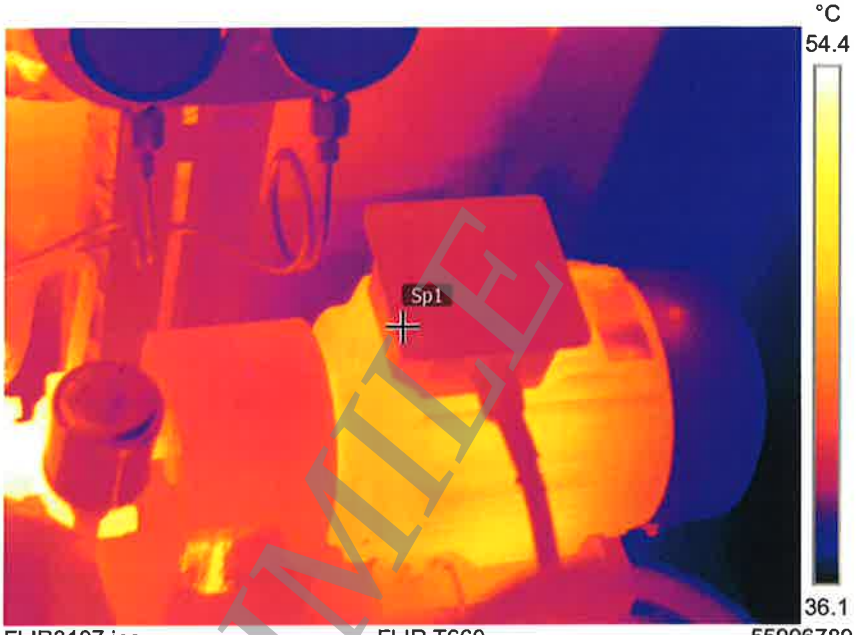
Sp1	40.8

Parameters

Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	290° W



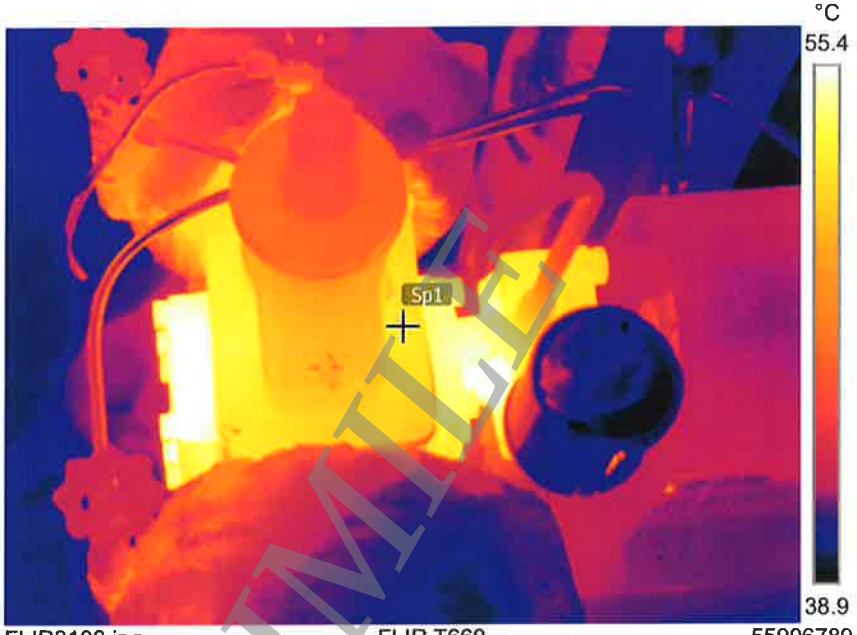
FLIR3107.jpg FLIR T660 55906789

FLIR3107.jpg FLIR T660 55906789

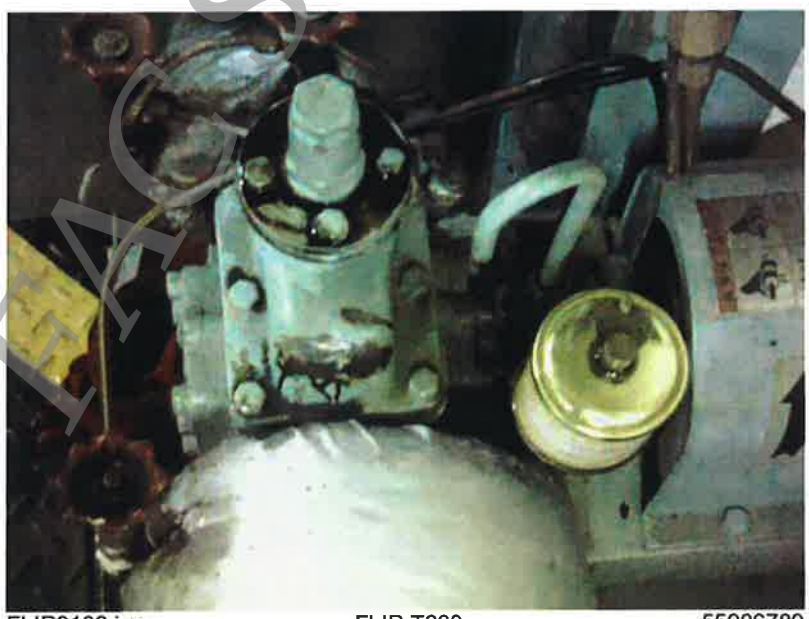
Measurements	°C
Sp1	52.4

Parameters	
Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation	
Compass	283° W



FLIR3108.jpg FLIR T660 55906789



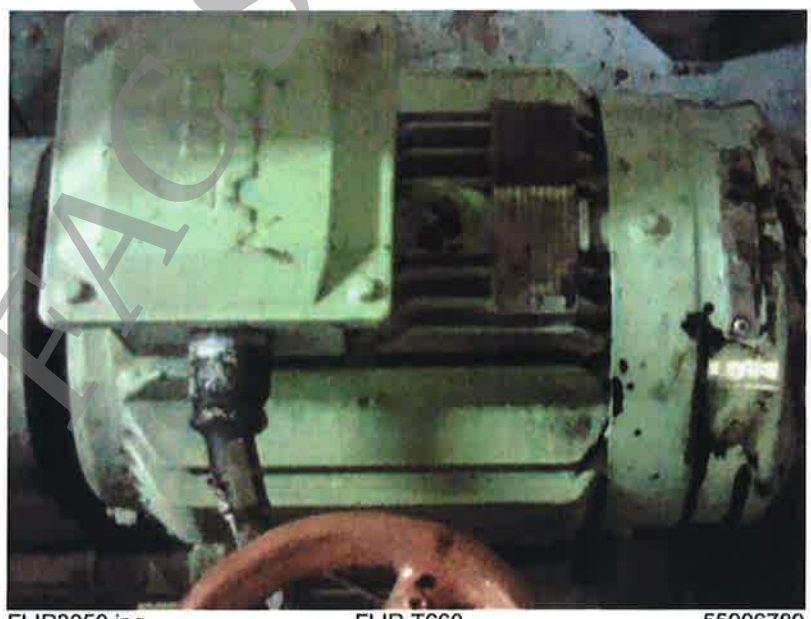
FLIR3108.jpg FLIR T660 55906789

Measurements	°C
Sp1	55.0

Parameters	
Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation	
Compass	284° W

FLIR3050.jpg FLIR T660 55906789



FLIR3050.jpg FLIR T660 55906789

SHIPS & INDUSTRY SERVICE

THERMOGRAPHIC ANALYSIS REPORT		Ns.RIF:
		Vs. RIF:
COSTUMER:	PLACE:	DATE:
		SHEET:
OBJECT:		
INFRARED THERMOGRAPHIC CONTROL ON STEERING GEAR PUMP No. 1		

EQUIPMENT:	POSITION:	APPARATUS:
FLIR T660 - S.N. 55906789	ENGINE ROOM	STEERING GEAR PUMP No. 1

GENERAL INFO:

Starting time	15:47 LT
Completion time	15:48 LT
NOTE:	

INSPECTED PARTS:

ITEM:	COMMENT:
ELECTRIC MOTOR	Distribution of temperature found uniform no evidence of overheathing parts.
PUMP	Range of temperature normal, no problems to be reported.

RESULTS:

All parts inspected found in order.

Measurements °C

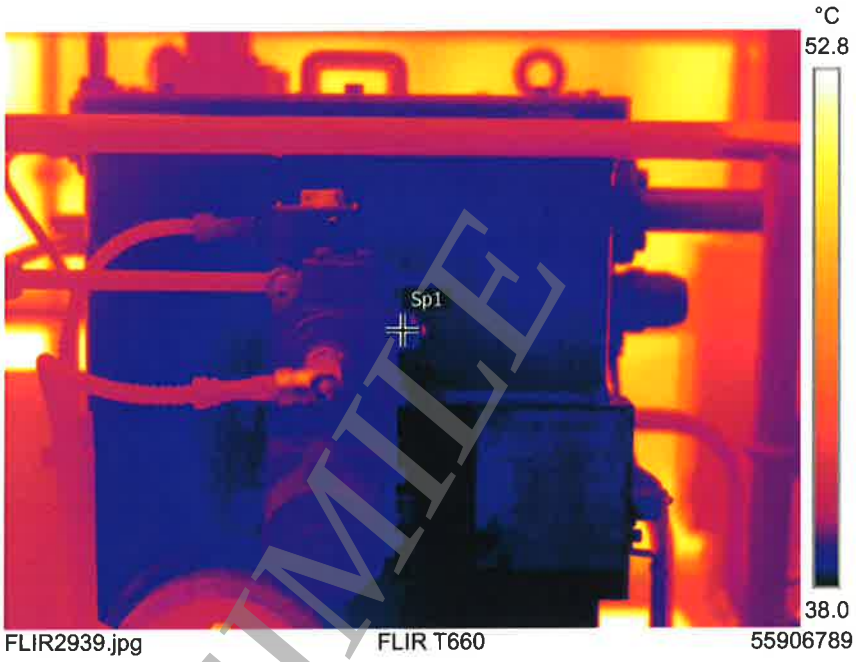
Sp1	38.7

Parameters

Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	287° W



FLIR2939.jpg FLIR T660 55906789

FLIR2939.jpg FLIR T660 55906789

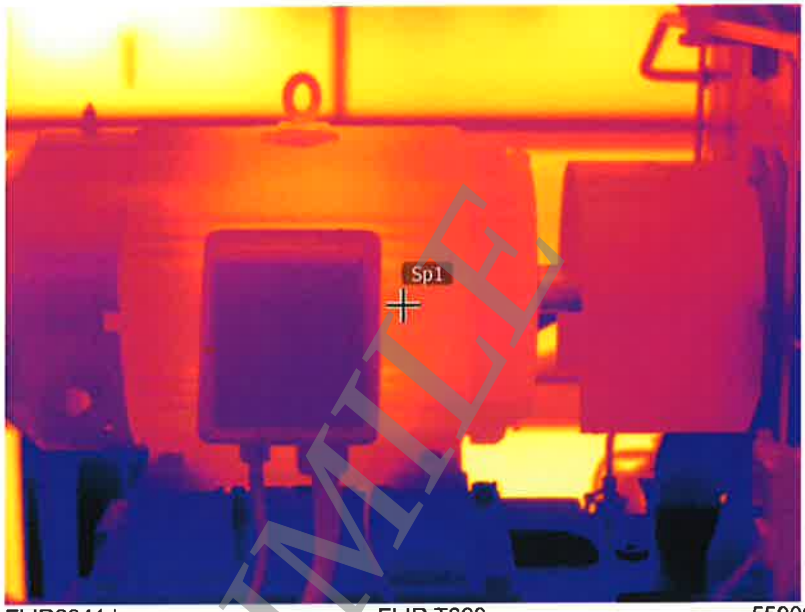
Measurements	°C
Sp1	44.7

Parameters

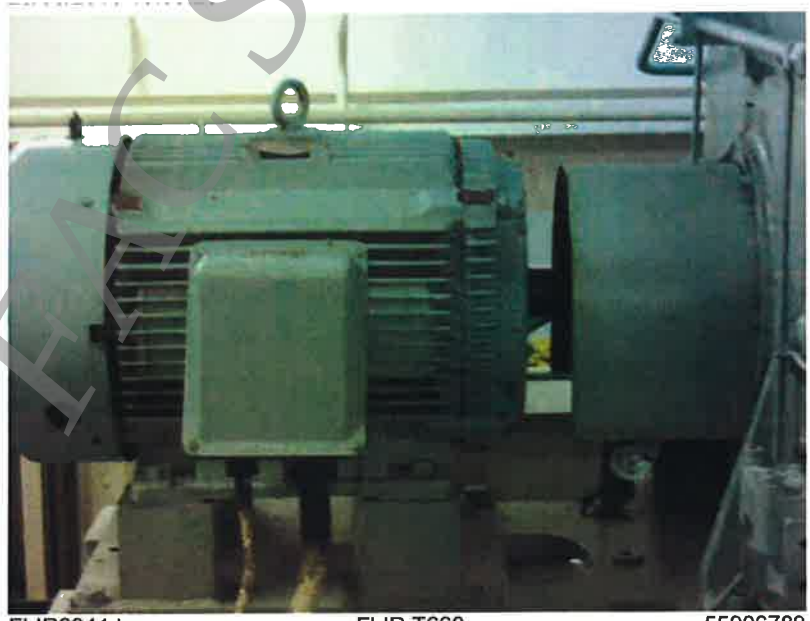
Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	286° W



FLIR2941.jpg FLIR T660 55906789



FLIR2941.jpg FLIR T660 55906789

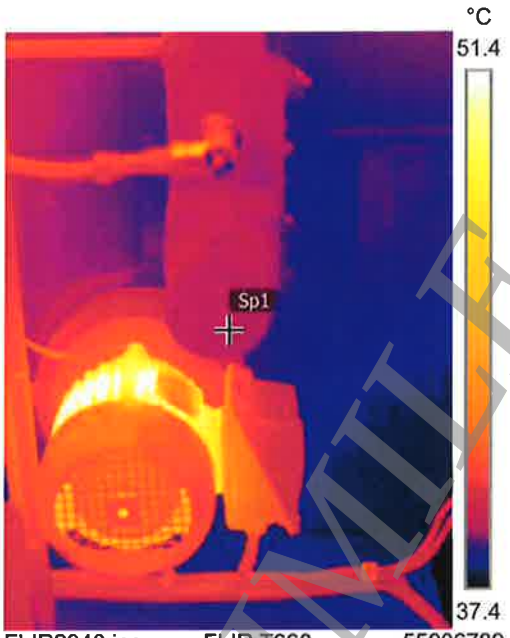
Measurements	°C
Sp1	39.2

Parameters

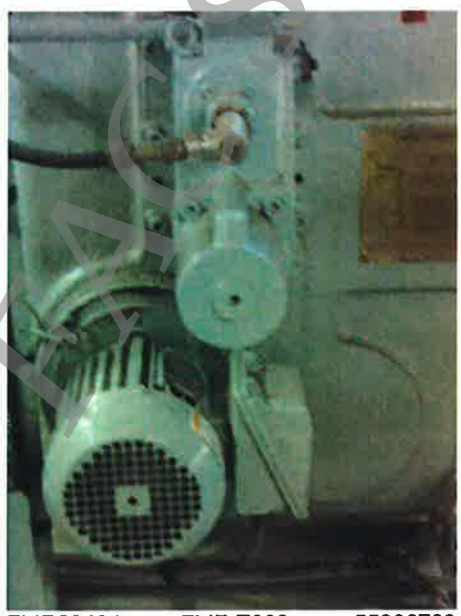
Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	10° N



FLIR2940.jpg FLIR T660 55906789



FLIR2940.jpg FLIR T660 55906789

SHIPS & INDUSTRY SERVICE

THERMOGRAPHIC ANALYSIS REPORT		Ns.RIF:
		Vs. RIF:
COSTUMER:	PLACE:	DATE:
		SHEET:
OBJECT:		
INFRARED THERMOGRAPHIC CONTROL ON MAIN COOLING S.W. PUMP No. 1		

EQUIPMENT:	POSITION:	APPARATUS:
FLIR T660 - S.N. 55906789	ENGINE ROOM	MAIN COOLING S.W. PUMP No. 1

GENERAL INFO:

Starting time	11:35 LT
Completion time	11:36 LT
NOTE:	

INSPECTED PARTS:

ITEM:	COMMENT:
ELECTRIC MOTOR	Distribution of temperature found uniform no evidence of overheathing parts.
PUMP	Range of temperature normal, no evidence of leakages.

RESULTS:

All parts inspected found in order.

Measurements °C

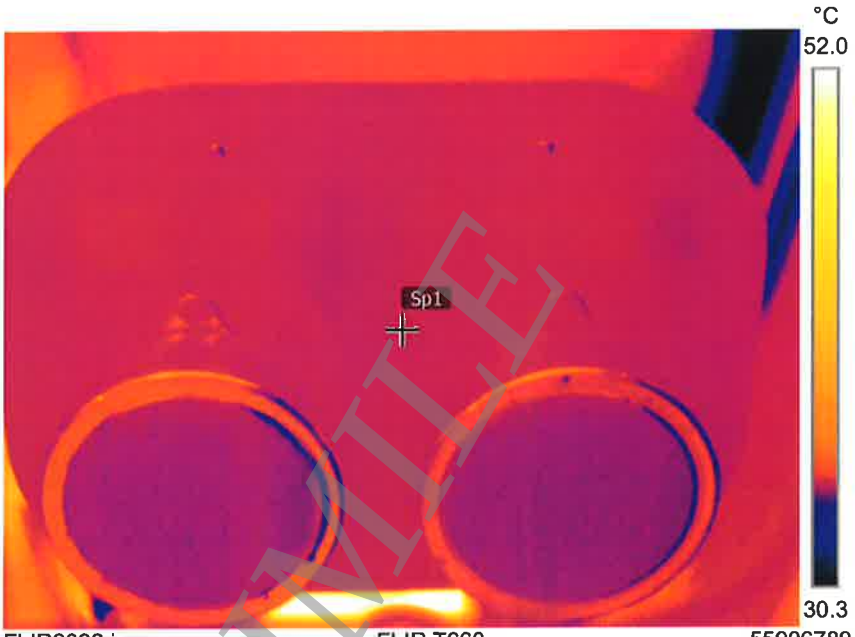
Sp1	34.9

Parameters

Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	80° E



FLIR2892.jpg FLIR T660 55906789

25/06/2016 11:35:22

FLIR2892.jpg FLIR T660 55906789

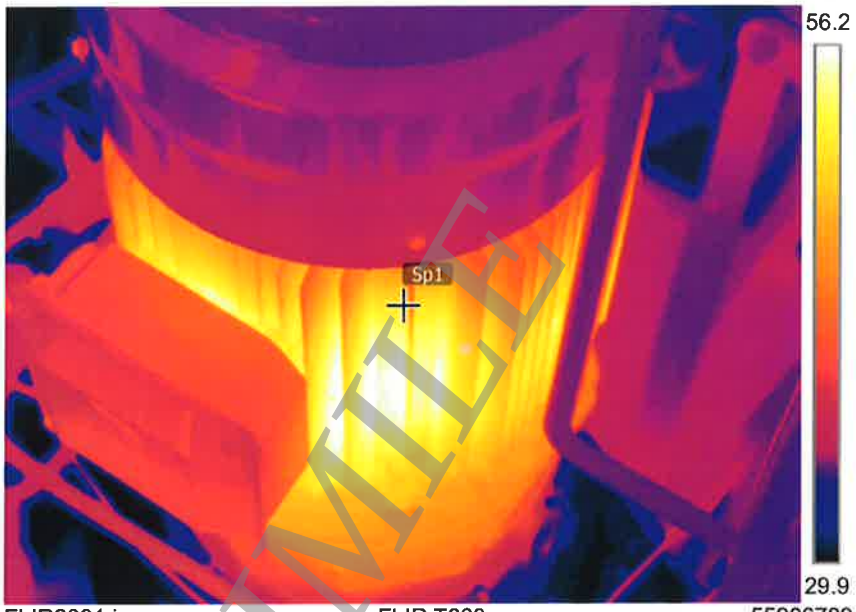
Measurements	°C
Sp1	51.3

Parameters

Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	271° W



FLIR2891.jpg FLIR T660 55906789

25/06/2016 11:35:13

FLIR2891.jpg FLIR T660 55906789

SHIPS & INDUSTRY SERVICE

THERMOGRAPHIC ANALYSIS REPORT		Ns.RIF:
		Vs. RIF:
COSTUMER:	PLACE:	DATE:
		SHEET:
OBJECT: INFRARED THERMOGRAPHIC CONTROL ON FIRE & GS PUMP No.1		

EQUIPMENT:	POSITION:	APPARATUS:
FLIR T660 - S.N. 55906789	ENGINE ROOM	FIRE & GS PUMP No.1

GENERAL INFO:

Starting time	14:14 LT
Completion time	14:16 LT
NOTE:	

INSPECTED PARTS:

ITEM:	COMMENT:
ELECTRIC MOTOR	Distribution of temperature found uniform no evidence of overheathing parts
PUMP	Distribution of temperature uniform no leaking detected

RESULTS:

All part inspected found in order.

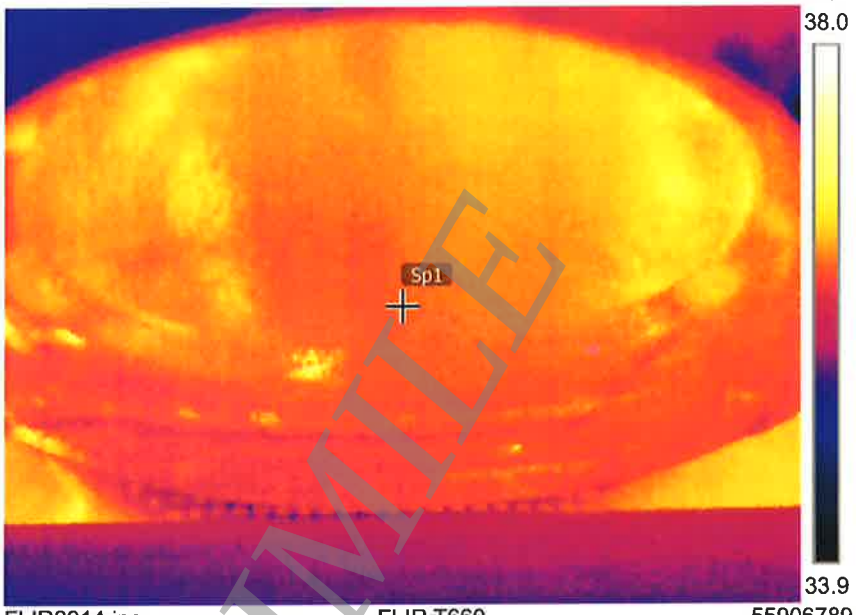
Measurements	°C
Sp1	36.3

Parameters

Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	278° W



FLIR2914.jpg FLIR T660 55906789

25/06/2016 14:15:01

FLIR2914.jpg FLIR T660 55906789

05/07/2016 12:56:20

FLIR2914-...

Measurements °C

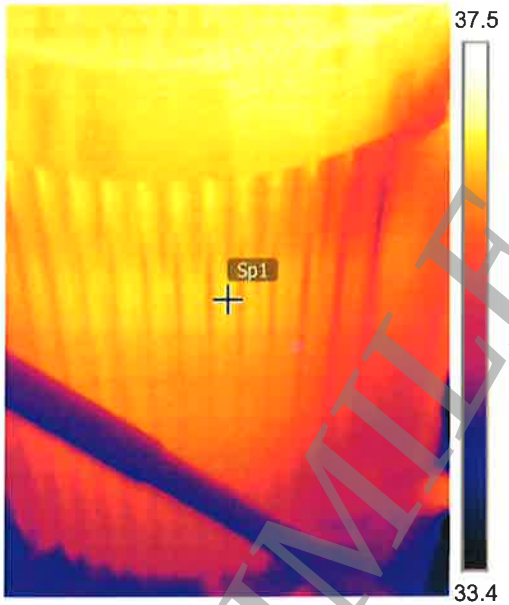
Sp1	36.6

Parameters

Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	203° SW



FLIR2915.jpg FLIR T660 55906789

25/06/2016 14:15:19

FLIR2915.jpg FLIR T660 55906789

Measurements	°C
Sp1	35.4

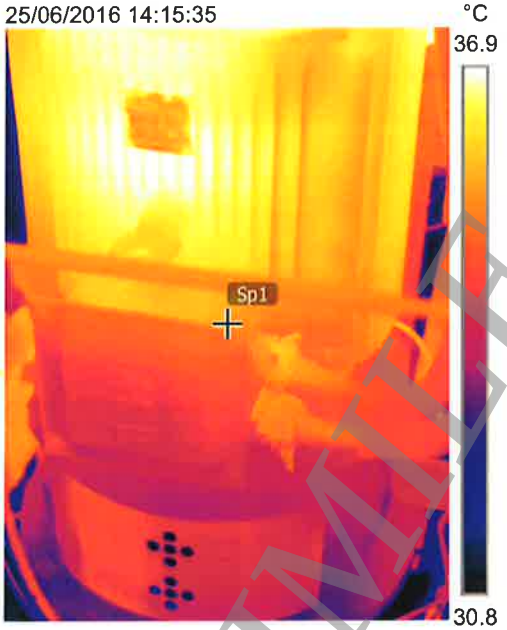
Parameters

Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	183° S

25/06/2016 14:15:35



FLIR2916.jpg FLIR T660 55906789

25/06/2016 14:15:35

FLIR2916.jpg FLIR T660 55906789

05/07/2016 14:34:52

FLIR2916-...

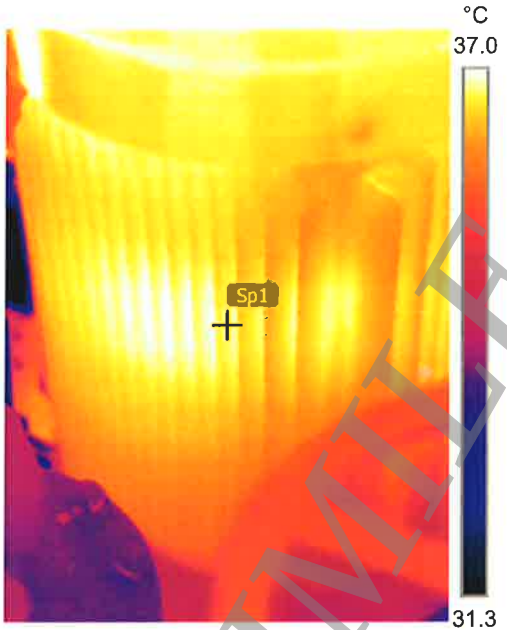
Measurements	°C
Sp1	36.8

Parameters

Emissivity	0.94
Refl. temp.	35 °C
Distance	2 m
Atmospheric temp.	24 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Geolocation

Compass	62° NE



FLIR2917.jpg FLIR T660 55906789

05/07/2016 13:30:14

FLIR2917-...

FLIR2917.jpg FLIR T660 55906789

POWER QUALITY CONTROL

Instrument Information

Model Number	FLUKE 430-II
Serial Number	33233112
Firmware Revision	V04.05

Software Information

Power Log Version	5.1
FLUKE 430-II DLL Version	1.1.0.14

General Information

Recording location
Client
Notes

Measurement Summary

Measurement topology	Wye without neutral mode
Application mode	Monitor
First recording	24/06/2016 14:42:34 597msec
Last recording	24/06/2016 18:42:24 597msec
Recording interval	0h 10m 0s 0msec
Nominal Voltage	480 V
Nominal Current	6000 A
Nominal Frequency	60 Hz
File start time	24/06/2016 14:42:24 597msec
File end time	24/06/2016 18:42:24 733msec
Duration	0d 4h 0m 0s 136msec
Number of events	Normal: 36 Detailed: 182
Events downloaded	Yes
Number of screens	10
Screens downloaded	No
Power measurement method	Unified
Cable type	Copper
Harmonic scale	%H1
THD mode	THD 40
CosPhi / DPF mode	Cos Phi

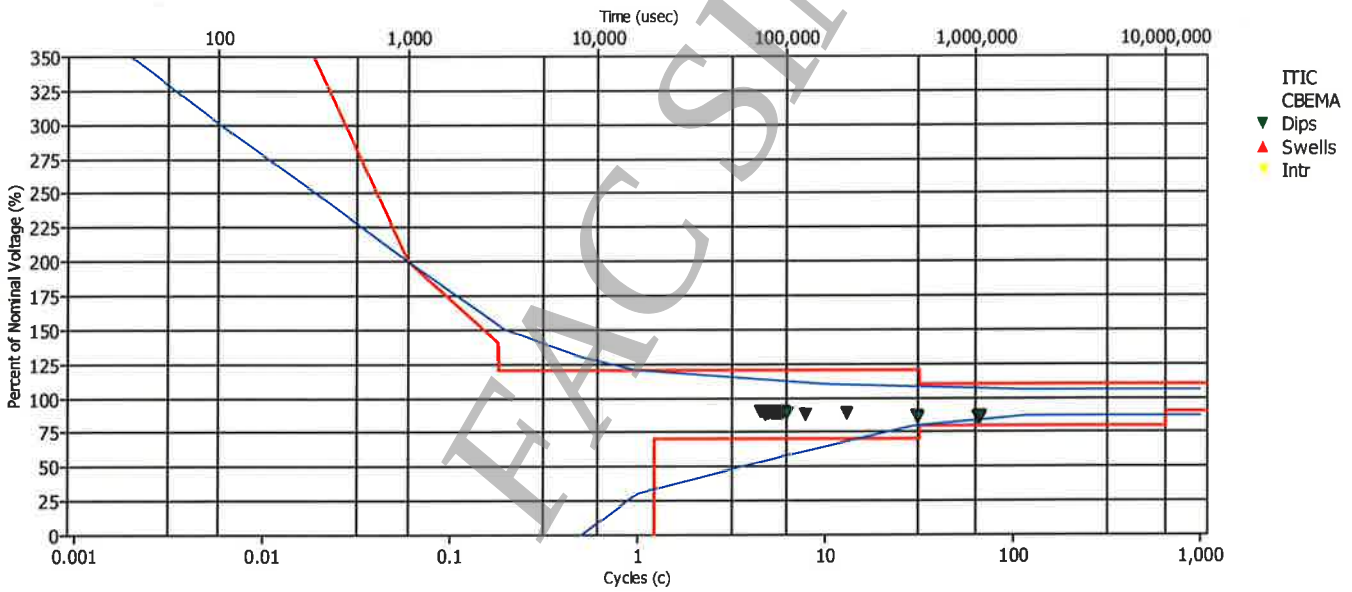
Recording Summary

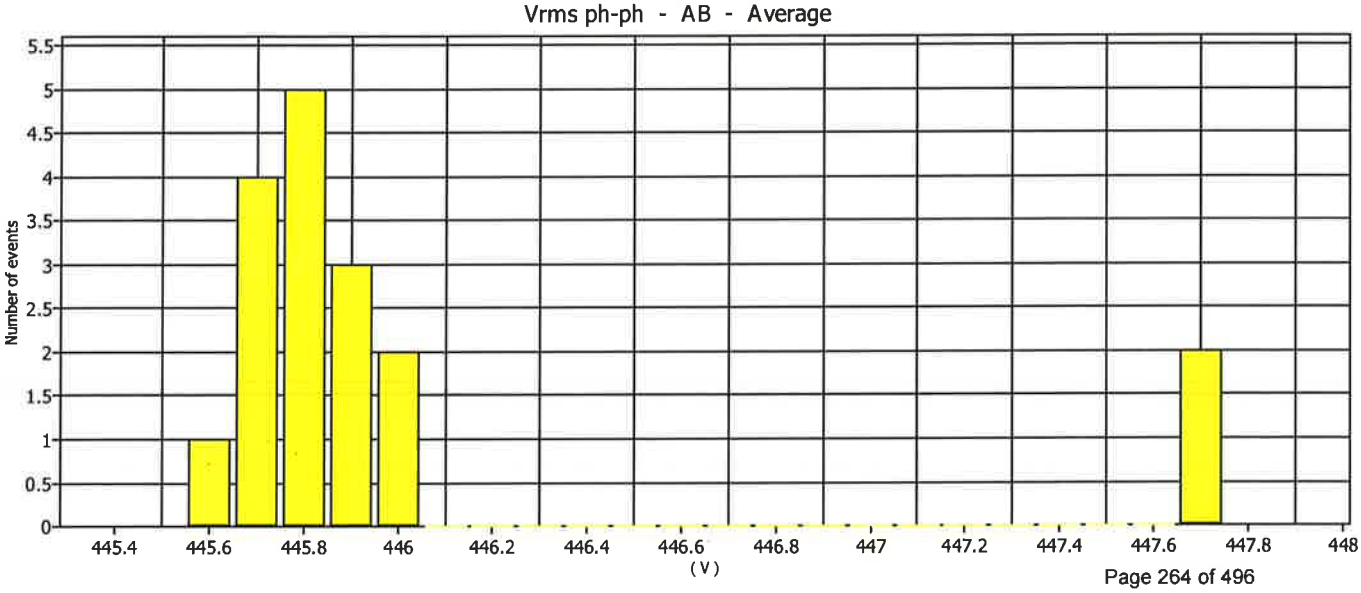
RMS recordings	24
DC recordings	0
Frequency recordings	1440
Unbalance recordings	24
Harmonic recordings	24
Power harmonic recordings	0
Power recordings	0
Power unbalance recordings	0
Energy recordings	0
Energy losses recordings	0
Flicker recordings	24
Mains signaling recordings	24

Events Summary

Dips	31
Swells	0
Transients	5
Interruptions	0
Voltage profiles	0
Rapid voltage changes	0
Screens	0
Waveforms	0
Intervals without measurements	0
Inrush current graphics	0
Wave events	36
RMS events	36


Mains Signaling. From 24/06/2016 14:42:34 To 24/06/2016 18:42:24
Mains Signaling 1V3s Min
Mains Signaling 1V3s Max
Mains Signaling 1V3s Avg
CA (V)
CA (%)
0.128
0.112
0.096
0.08
0.064
0.048
0.032
15:00 15:15 15:30 15:45 16:00 16:15 16:30 16:45 17:00 17:15 17:30 17:45 18:00 18:15 18:30


Time (usec)
100 1,000 10,000 100,000 1,000,000 10,000,000
Percent of Nominal Voltage (%)
350 325 300 275 250 225 200 175 150 125 100 75 50 25 0
0.001 0.01 0.1 1 10 100 1,000
Cycles (c)
ITIC
CBEMA
Dips
Swells
Intr


Vrms ph-ph - AB - Average
Number of events
5.5 5 4.5 4 3.5 3 2.5 2 1.5 1 0.5 0
445.4 445.6 445.8 446 446.2 446.4 446.6 446.8 447 447.2 447.4 447.6 447.8 448
(V)

EN50160 Report

General Information

Recording Location:
Client:
Notes:

Device Information

Instrument: 435-II **Serial:** 33233112
User:
Address: **Site:**
FW Version: V04.05 2.1 **FW Date:** 01/09/2015

Measurement Information

Start Date:
End Date:
Duration:
Mode: Monitor
Topology: Wye without neutral mode
Freq: 60Hz
Vnom: 480V
Limits: GR32144

Limit Summary

RMS	>	432.0 V	<	528.0 V	100.0 % of time
THD	<	8 %			100 % of time
Plt	<	1			100.0 % of time
Dip	<	432 V			20 % per week
Swell	>	528 V			20 % per week
Unbal.	<	2 %			95.0 % of time
Hz	>	59.8 Hz	<	60.2 Hz	95.0 % of time

Supply Voltage Variations

L1 RMS Voltage:	100.0 %	Value = 445.50 V
L2 RMS Voltage:	100.0 %	Value = 444.78 V
L3 RMS Voltage:	100.0 %	Value = 444.44 V

Voltage Harmonics

L1	THD:			100 % Value = 1.7 %	PASS
	H2:	95.0	% Value = 1.0%	100 % Value = --.- %	PASS
	H3:	95.0	% Value = 0.5%	100 % Value = --.- %	PASS
	H4:	95.0	% Value = 0.3%	100 % Value = --.- %	PASS

Instrument Information

Model Number	FLUKE 430-II
Serial Number	33233112
Firmware Revision	V04.05

Software Information

Power Log Version	5.1
FLUKE 430-II DLL Version	1.1.0.14

General Information

Recording location	
Client	
Notes	