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MAINTENANCE BULLETIN

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TO: Fleet

Subject: Procedure for Testing Machinery Alarm and Safety Shut Downs.

It is all too often observed that the Engineers are not entirely following the procedures for testing the Safety Alarms and Shut Downs on the installed Machinery.

The purpose of this circular is to provide a guideline on procedures to be followed for Testing the various safety alarms and shut downs. (However, the ship specific Equipment Instruction Manuals onboard must be used for final guidance).

Every vessel is provided with the Instruction / Operating Manual for the Machinery that is installed on-board. In those manuals you will find a section wherein the Normal Operating Temperatures and Pressures are stated. Additionally you will also find High and Low Limits (as applicable) that have been recommended by the original equipment manufacturer (OEM).

Additionally you will find specific values at which the alarms and safety shut downs are designed to activate. There should be no deviation from these limits.

In the Planned Maintenance System there is a schedule for testing alarms and safety shut downs.

Although these intervals for testing should not be exceeded, there could occur situations that could influence the date and time of testing. In such instances the testing must be carried out at the first safe opportunity.

Considerations and cautions that must be made before testing:

- 1) Alarm and shut downs should be tested:
 - During vessel manoeuvring
 - In coastal or narrow channels.
 - In heavy weather
 - During loading or discharging cargo operations (applicable to Auxiliary Engines / Boilers/ Inert Gas Plant)

The Procedure for testing alarms and safety shut downs are related only to the following parameters in this general circular:

- Temperature

- Pressure
- Over speed (Main & Auxiliary Engines)
- Manual Safety Shut down
- Under and Over Voltage (Generator)
- Reverse Power (Generator)
- Over current (Generator)
- Frequency Alarm(Generator)
- Preferential Trips (MSB)

Test Equipment required for testing Alarms and Safety Shut Downs:

- Temperature Calibrator instrument.



- Pressure Calibrator instrument.



The test equipment should be calibrated ashore once a year.

Testing Temperature Alarms & Shut Downs:



- a) With the relevant machinery in idle operation remove the PT sensor and place it inside the temperature calibrator instrument.
- b) First verify that the temperature being measured and transmitted by the PT sensor is the same as that set in the calibrator instrument.
- c) If the 2 temperatures are the same then gradually increase the temperature in the calibrator to the alarm limit stated in the Manual. Verify that when the temperature measured by the PT sensor reaches the value set in the calibrator instrument, the alarm is activated. Log down the temperature at which the alarm sounded.

If there is a deviation between the temperatures set in the calibrator instrument and the one being registered by the PT sensor, then either make the adjustment to correct the error if possible or otherwise replace the PT sensor.

- d) Once the alarm has been tested then further increase the set point on the calibrator instrument to the shut-down value stated in the manual.
- e) If the engine shuts down with the alarm activated, then the test is satisfactory and the same should be logged down.

Testing Pressure Alarms & Shut Downs:



- a) With the machinery under test in idle operation connect the pressure calibrator instrument to the test cock which is normally fitted on the line to the electric pressure transmitter/transducer. If there is no test cock provided, then the procedure would be to shut the cock and disconnect the pipe to the transducer. Connect the pressure calibrator directly to the transducer and then continue with step (b),
- b) Build up the pressure using the calibrator instrument to the value being transmitted by the pressure transducer. Verify that the 2 values are the same.
- c) If the 2 values are the same, gradually reduce the pressure in the calibrator to the alarm limit stated in the Manual, and check to see if the alarm is activated. If there is a deviation between the pressure set in the calibrator instrument and the one being transmitted by the electric transducer, then either make the adjustment to correct the error if possible or otherwise replace the transducer.
- d) Once the alarm has been tested, then further reduce the set point on the calibrator instrument to the shut-down value stated in the manual.
- e) If the engine shuts down and the alarm activated, then the test is satisfactory and the same should be logged down.

Overspeed (this test must only be undertaken in the presence of the Chief Engineer):

For a 2 Stroke Main Engine:



- Operate the engine at Full Ahead RPM
- Operate
- Mark the over-speed RPM setting in the Electrical Control Cabinet for the Main Engine.
- Reduce the over-speed setting to the value of the Full Ahead RPM.
- Then very slowly further reduce the over-speed setting and the engine should shut down along with activation of the alarm.

This will confirm that the electronic over speed shut down device is operating satisfactory.

Log down the result of the test and then raise the set point in the Electrical Control Cabinet to the original value.

Note: During sea trials the engine over speed test must be performed at the RPM stated by the OEM.

For a 4 –Stroke Main and Auxiliary Engine



- The engine must be running idle.
- First test to establish that the mechanical or electrical over-speed shut down device is working.
It is mechanical then this can be achieved by gradually reducing the tension on the rotating fly wheel springs until the mechanical shut down activates and physically stops the engine. There after increase the tension on the springs to the original setting.
Note: the mechanical over speed device can vary in construction and the related Manual should be referred to for guidance.
If it is an electrical shut down device then adjustment should be made at the Engine Control Cabinet.
- Then restart the engine and test to confirm that the Manual Shut Down device is also working.
- Again restart the engine to its rated RPM and then very gradually increase the RPM of the engine using the Governor Speed Limiting device to a value not more than that specified in the manual, and test that the mechanical / electrical shut down activates and stops the engine.
If the engine does not shut down at the rated RPM limit immediately lower the RPM back to the rated limit, and readjust the tension on the flyweight springs in the mechanical over-speed shut down device.(vice –a-versa the tension on the spring is to be increased if the engine shuts down at an RPM lower than the designed max RPM.

For engines with solenoid shut down over-speed devices, the test can be undertaken by adjusting the over-speed limit in the Engine Control Cabinet.

Manual Shut Down Device

With the machinery running in idle condition, test the device by means of actually operating it.

Under & Over Voltage Alarm & Trip (Generator)

Before the start of this test please ensure that you have atleast 2 generators on the MSB. Thereafter test only one generator at a time.



The voltage limits will be mentioned in the Instruction Manual for the ACB or in its Test Report.

The test can be performed by manually adjusting the set points.

A low voltage situation is normally provided with an alarm and a trip, whereas for the high voltage it is only an alarm. Upon completion of test, the original 'set point' must be reinstated.

Reverse Power Trip (Generator)

Before the start of this test please ensure that you have atleast 2 generators on the MSB. Thereafter test only one generator at a time.



The limits will be mentioned in the Instruction Manual for the MCB or in its Test Report.

The test can normally be performed in 2 ways – (1) by manually adjusting the set point located inside the MSB, and (2) by manually reducing the power on the generator under test, to a value below the set point. Upon completion of test, the original 'set point' must be reinstated.

Over-current Alarm and Trip (Generator)



Before the start of this test please ensure that you have atleast 2 generators on the MSB. Thereafter test only one generator at a time.

The limits will be mentioned in the Instruction Manual for the MCB or in its Test Report.

The test can normally be performed by manually altering the set point located inside the MCB, to a value below the set points. Upon completion of tests, the original 'set point' must be reinstated.

High and Low Frequency Alarms (Generator)

Before the start of this test please ensure that you have atleast 2 generators on the MSB. Thereafter test only one generator at a time.



The limits will be mentioned in the Instruction Manual for the MCB or in its Test Report.

The high frequency test must be performed in the presence of the Chief Engineer and it is equally very important to station an Engineer locally near the engine to monitor the engine RPM should it become necessary to stop the engine in an emergency.

Then manually increase the frequency to the set value where the high frequency alarm is initiated. Similarly lower the frequency to the set value where the low frequency alarm is activated. Upon completion of test, manually increase the frequency to the normal level.

Preferential Trips (MSB)

The limits will be mentioned in the Instruction Manual for the MCB and in its Test Report.

This test can be performed using 2 methods:

- a) By manually increasing the load on the generator to the preferential trip set value at which point the alarm should be activated and the corresponding "group of electrical machinery will shut down.
- b) By altering the preferential trip set point to a value which corresponds with the load on the running generator.

Upon completion of test, the original 'set point' must be reinstated.

All tests must be logged down.

If there is any doubt in performing any of the above mentioned tests then please ask the Office for guidance.

If any alarm or safety shut device does not work, the cause must be investigated and rectified as soon as possible.

If the cause for the malfunction is not found or rectified then the machinery must be stopped and the Superintendent informed for further instructions.