Sweep Test Procedure for MAN B&W Two-Stroke Diesel Engines

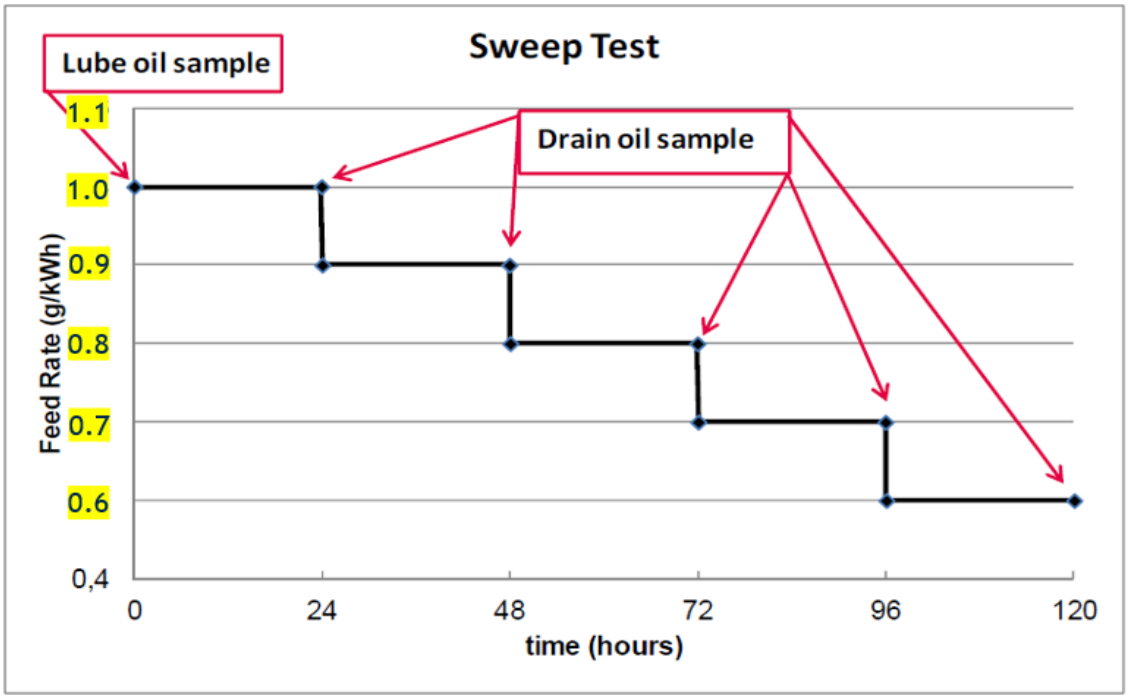
Continuous monitoring of drain oil samples is a good way to optimise the cylinder oil feed rate consumption and to safeguard the engine against excessive wear. The fastest way to evaluate the corrosive & abrasive behaviour of an engine and optimise the feed rate is to do a stress test, a known as a sweep test.

The sweep test takes 5 full days and should be performed during a longer voyage where the engine load remains as constant as possible . The feed rate of the cylinder oil is fixed for 24 hours and drain oil samples are taken at the end of the 24 hour period for Scrape Down Analysis (SDA). The feed rate is then lowered for the next 24 hours (with the steps being repeated at the correspondingly lowered feed-rates till the end of 5th day).

Before the Sweep Test commences, the following should be noted and samples taken

- A under piston scavenge port inspection should be completed
- Previous overhaulg records for all units should be provided to GOM
- A sample of the fuel in use should be taken and fuel oil specification provided to GOM
- A sample of the M/E System oil in use should be taken and sent to GOM
- A fresh (unused) M/E cylinder oil sample should be taken and sent to GOM

Sweep Test Procedure (Example):



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- Feed Rate @ 1.0g/kWh, running 24 hrs, take 1st SDA sample
- Feed Rate @ 0.9g/kWh, running 24 hrs, take 2nd SDA sample
- Feed Rate @ 0.8g/kWh, running 24 hrs, take 3rd SDA sample
- Feed Rate @ 0.7g/kWh, running 24 hrs, take 4th SDA sample
- Feed Rate @ 0.6/kWh, running 24 hrs, take 5th SDA sample
- Back to original Feed Rate.

Scrape Down Samples are to be submitted for the following feed rate with an interval of 24hrs between each adjustment.

Lubrication	Engine Type	Feed Rate (g/KWh)				
Electronic	MAN G-Type	1.4	1.3	1.2	1.1	1.0
Electronic	All Types (Except MAN G-Type)	1.0	0.9	0.8	0.7	0.6
Mechanical	All Types	1.1	1.0	0.9	0.8	0.7

The sweep test is based on a 4 to 6-day test at steady load. Each feed rate must be applied for 24 hours before taking a sample and switching to the next feed rate. During the sweep test period the engine operation must be kept as consistent as possible to avoid interference from load up and fuel change.

The below section explains with more details about the process and procedures for the scrape down analysis.

Scrape Down Analysis

Procedure

Scrape down analysis samples are to be taken at normal engine operating conditions once the engine has stabilized during voyage. Taking samples during maneuvering operations or heavy weather is not recommended and should be avoided. These samples will produce high iron results.

If operationally possible/feasible it is best to take samples within 24hrs of cleaning the scavenge space.

Each cylinder performs differently and produces different results due to age of the liner, pistons and rings. Older cylinders will have a tendency to produce more blow-by due to wear and will have more lube oil for sampling available. This will directly impact the length of time the shut off valve is to remain closed to capture lube oil going into the main drain line.

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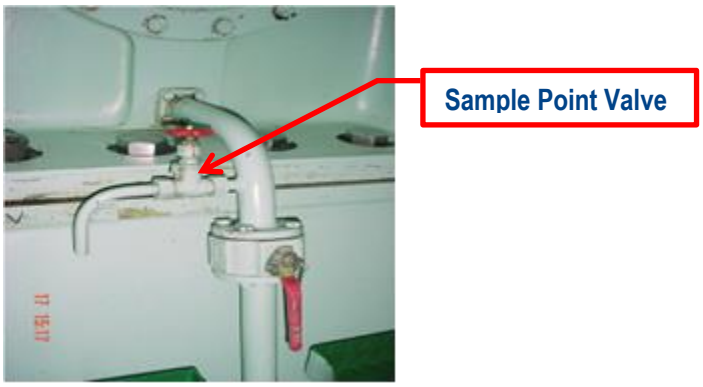
Typical sampling procedure is to close the drain line valve which prevents the blow-by from going into the drain line (refer to left photograph of typical set-up). The blow-by residue builds up in the scavenge area and then a sample is taken. The length of time required to capture enough blow-by to permit purging and sampling will depend on the condition of each cylinder. A trial period will need to be conducted to establish the fill rate per cylinder. A cylinder with high running hours will fill faster than a newer or fresh cylinder.



The existing UOA sample bottles are suitable for Scrape down analysis use. Each sample Labels must be completed fully, particularly, Vessel name, Cylinder number, Cylinder running hours, Sample date, Fuel Sulphur Content and Main Engine Power at time of sampling.

It is recommended but not essential to establish the fill rate per cylinder by conducting a "time-to-fill" test during normal engine operations. Note each cylinder will fill at a different rate.

Sampling procedure

1. Close drain valve on cylinder to be sampled.
2. Wait for established time to produce enough blow-by for purging and sampling.
3. Open sample valve – Purge at least 500ml.
4. Collect between 0.5 litres and 1.0 litre of sample using a very clean container.
5. Shut off sampling valve.
6. **OPEN DRAIN VALVE**
   - Leave drain valve OPEN for normal engine operations.
7. Thoroughly mix the collected sample and fill a standard UOA sample bottle, disposing of the excess oil remaining in an appropriate manner.
8. Each unit's sample to be collected separately and suitably marked.
9. After collecting all the samples and ensuring that they are correctly marked and the sample labels completed fully, send the samples to the UOA Lab for analysis.
10. A sample of the **main engine system oil must also be included** whenever SDA samples are sent.

If you have any enquiries about this program and its cost, please contact your technical or sales contacts or our global team at technical.engineer@gulf-marine.com

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