Action code: WHEN CONVENIENT

# Low Load Update
## Down to 40% load

SL08-501/SBE
October 2008

**Concerns**
Owners and operators of MAN B&W two-stroke marine diesel engines.
Types: MC/MC-C and ME/ME-C

**Summary**
Long-term low load operation down to 40% load is generally feasible without any engine modifications.
A 24% speed reduction may cut a container vessel's fuel consumption in half!

Dear Sirs

Generally, MAN B&W MC/MC-C and ME/ME-C engines can operate down to 40% load without any engine modifications. As an example, a 24% speed reduction can cut a container vessel's fuel consumption per travelled nautical mile in half.

Today, the only issue with long-term low load operation is to avoid soot fouling of the gas ways, turbocharger and boiler/economiser in particular.

Slide type fuel valves provide the optimal protection against soot development at any load level. By delivering efficient injection at all load levels, slide type fuel valves set new and very excellent fuel injection standards.

Our low load recommendations boil down to two:
- Retrofit slide type fuel valves, if not already installed
- Monitor the gas ways for fouling

Part load optimisation and engine de-rating can reduce fuel consumption further, also at loads below 40%. Questions and requests concerning part load optimisation and long-term operation below 40% load can be directed to our Technical Service Department at ae-cph@mandiesel.com

Yours faithfully

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*Long-term low load operation is feasible for most ME/ME-C and MC/MC-C engines*

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## Low Load Benefits

Operation down to 40% load is feasible for all ME/ME-C and most MC/MC-C engines without any engine modifications.

The container vessel example in Fig. 1 shows the benefits of low load operation: A 24% speed reduction can reduce fuel consumption per travelled nautical mile to approximately 50%.

A further 3g/kWh fuel, approximately, can be saved by part load optimisation and by de-rating the engine. Such engine component alterations require a new IMO $NO_X$ certificate.

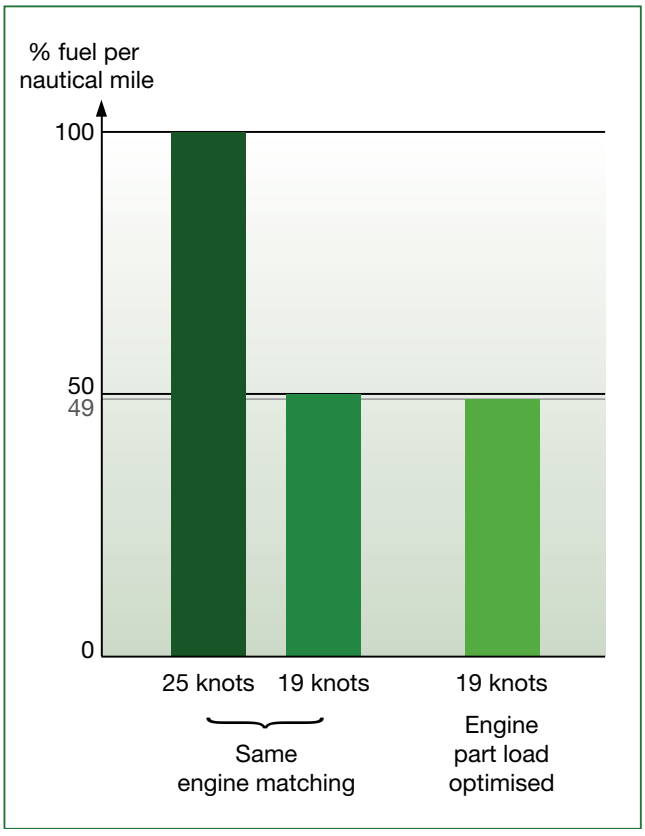


*Fig. 1: Example showing a container vessel's fuel consumption in relation to its speed*

## Soot

Soot formation in the gas ways constitutes a potential risk when operating at low load. Soot deposits may impair turbocharger performance, and imply a risk of boiler soot fires. Always ensure that turbocharger and boiler heat surfaces are clean and soot free!

### Boiler types

Soot formation is in general very limited in modern smoke tube exhaust gas boilers/economisers.

In water tube boilers with fins, more soot may be deposited at low load operation. Thus, water tube boilers may require extra attention and more cleaning during long-term low load operation.

*Fig. 2: Smoke tube boiler inside, after 7 days below 40% load. Limited soot deposits.*

### Inspections

We generally recommend operators to follow the boiler and turbocharger manufacturers' instructions for monitoring and cleaning.

However, during an introductory low load period, we recommend increasing the gas way and turbocharger inspection frequency. If no or limited fouling is observed, inspection intervals may be re-extended and/or adjusted to the general service routines on board.

A gas way soot inspection includes:

- exhaust gas boiler/economiser
- exhaust gas receiver with turbine inlet grid

Blow back and reduced scavenge air velocity may increase sludge deposits in the scavenge air receiver during long-term low load operation. This increased fouling is harmless; no action is required to prevent or remove it.

### Load ups

From an engine point of view, regular load ups are not necessary when operating at 40% load and above.

However, boiler manufacturers and some turbocharger manufacturers recommend regular load ups during low load operation as part of the cleaning procedure. In such cases, we recommend this procedure:

| Manual load up procedure | Duration |
|---|---|
| Load up, 40 → 75% load | 60 minutes |
| Load down | 30 minutes |

## Slide Type Fuel Valves

The risk of soot development during long-term low load operation depends on engine type and fuel valve type.

| Engine type | Soot development |
|---|---|
| ME/ME-C engines | Very low |
| MC/MC-C engines with slide valves | Generally low |
| MC/MC-C, former standard or mini sac valves | Higher |

All ME/ME-C engines are equipped with slide type fuel valves. Slide type fuel valves were introduced in MC/MC-C engines in the late 1990s, and have been standard on all new MC/MC-C engines since 2005.

Compared to former fuel valve types, slide type fuel valves have improved injection quality dramatically, thereby reducing soot development in the gas ways. Slide type fuel valves have also proved to be very well suited for low load operation.

Before initiating long-term low load operation on MC/MC-C engines fitted with our former standard or mini-sac valves, we recommend retrofitting slide type fuel valves.

*Fig. 3: Slide type fuel valve and HIP-compound nozzle*

## Other Issues

### Auxiliary blowers

Generally, auxiliary blowers are switched off automatically well below 40% engine load. However, in a few cases the engine rating differs from the standard rating, which may cause the blowers to switch off around 40% engine load.

If the blowers switch off near or at the desired load level, e.g. 42%, the blowers may continuously switch on/switch off while operating at 42% load. To avoid this unfortunate condition, we recommend adjusting the engine load, in this example to 40% or 44%, so that the blowers are either continuously running or permanently switched off.

### Combustion chamber components

Combustion chamber components are generally lower loaded when operating at low load. We have observed minor exhaust valve temperature elevations during low load, but none above our recommended range.

Please note, that a higher average exhaust valve temperature may increase the valve spindle wear, thereby reducing the time between overhaul.

## Further Information

In this service letter, emphasis is on what to expect and consider when initiating long-term low load operation of ME/ME-C and MC/MC-C engines, down to 40% load.

For further information on long-term low load operation, please refer to the following:

Paper: *Low Container Ship Speed Facilitated by Versatile ME/ME-C Engines, 2008*

The paper can be downloaded here:
www.mandiesel.com/article_008410.html

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