MES SERVICE NOTE

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
DIESEL TECHNICAL INVESTIGATION GROUP.

for MITSUI－MAN B&W engines,		No. 179	
Low Load Operation (Special attention and modification based on recent service experience)		APPROVED	N. Osako
		CHECKED	
		PREPARED	M. Kotake
ENGINE TYPE	All engines	DATE	27th Aug. 2012

Guidance and special attention on continuous 10% to 40% low-load operation are described in the Service Note No.169

Recently it has been reported that vessels in service with operating continuously down to 10% engine load has been in good condition after low load operation. Special attention about fouling of exhaust gas ways and turbocharger(s) is directed in the service note No.169, but no major difficulties have been reported so far.
From the experience of operating continuously down to 10% engine load, this service letter describes the special attention newly obtained as follows.
This service note is published as content that conform to the Service letter SL11-544/MTS issued by licensor MAN Diesel and Turbo.

1. Auxiliary blowers

In connection with continuous low-load operation and, thereby, increased operation time of auxiliary blowers (A/B), an increasing number of troubles of the A/B has been reported. An increased running hours will require increased maintenance, but still a number of troubles have been reported.

If the venting pipe is closed or plugged, the scavenge air pressure will push air, sludge and impurities from the scavenge air through the bearing and, thereby, remove the lubricant from the bearing.

PRIORITY							
IMMEDIATELY	☐	AT FIRST OPPORTUNITY	☐	WHEN CONVENIENT	■	OTHERS	☐

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It is recommended to open the valve equipped at the top of venting hole at least once a week regularly for drain from the venting pipe. This valve can open and close during engine operation. Change the shaft sealing if an excessive air amount is experienced from the drain.

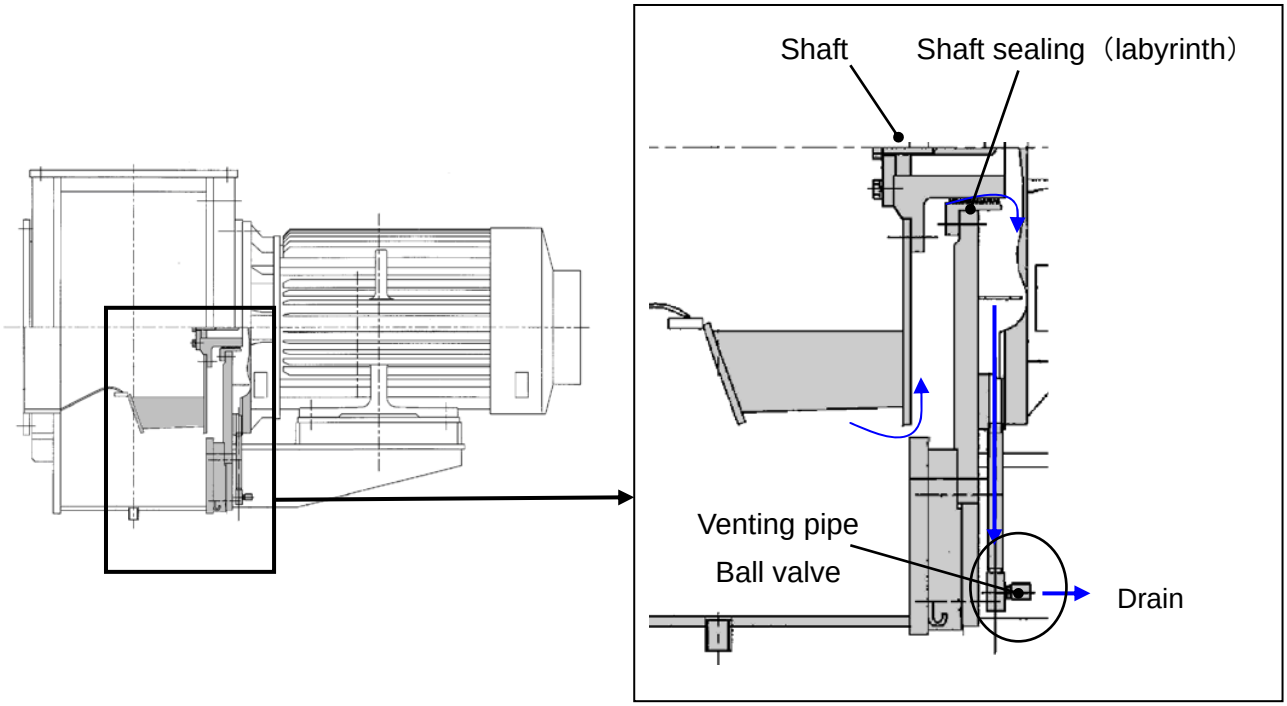

Fig. 1: Aux. blower

This is also described in the service note No.169, it is a general recommendation to carry a complete spare blower on board the vessel if low-load operation is employed for longer periods

2. Flap valves- scavenge air receiver

There have been several reports of broken flap valves in connection with low-load operation

At some point in the load area around the switch point of the A/B, the flap valves (non-return valves) in the scavenge air receiver will be continuously opening and closing due to the pressure pulsations in the scavenge air receiver. This load area can be recognized by a distinct hammering noise from the flap valves.

The hammering of the valves will damage and/or break the valves after a short period.
Operating the engine continuously in this load area must be avoided.

Broken and damaged valves must be changed at first opportunity, and valve pieces should be removed from the scavenge air space to prevent them from causing damage downstream. Broken and missing valves will have a negative impact on the engine performance when the auxiliary blowers are running.

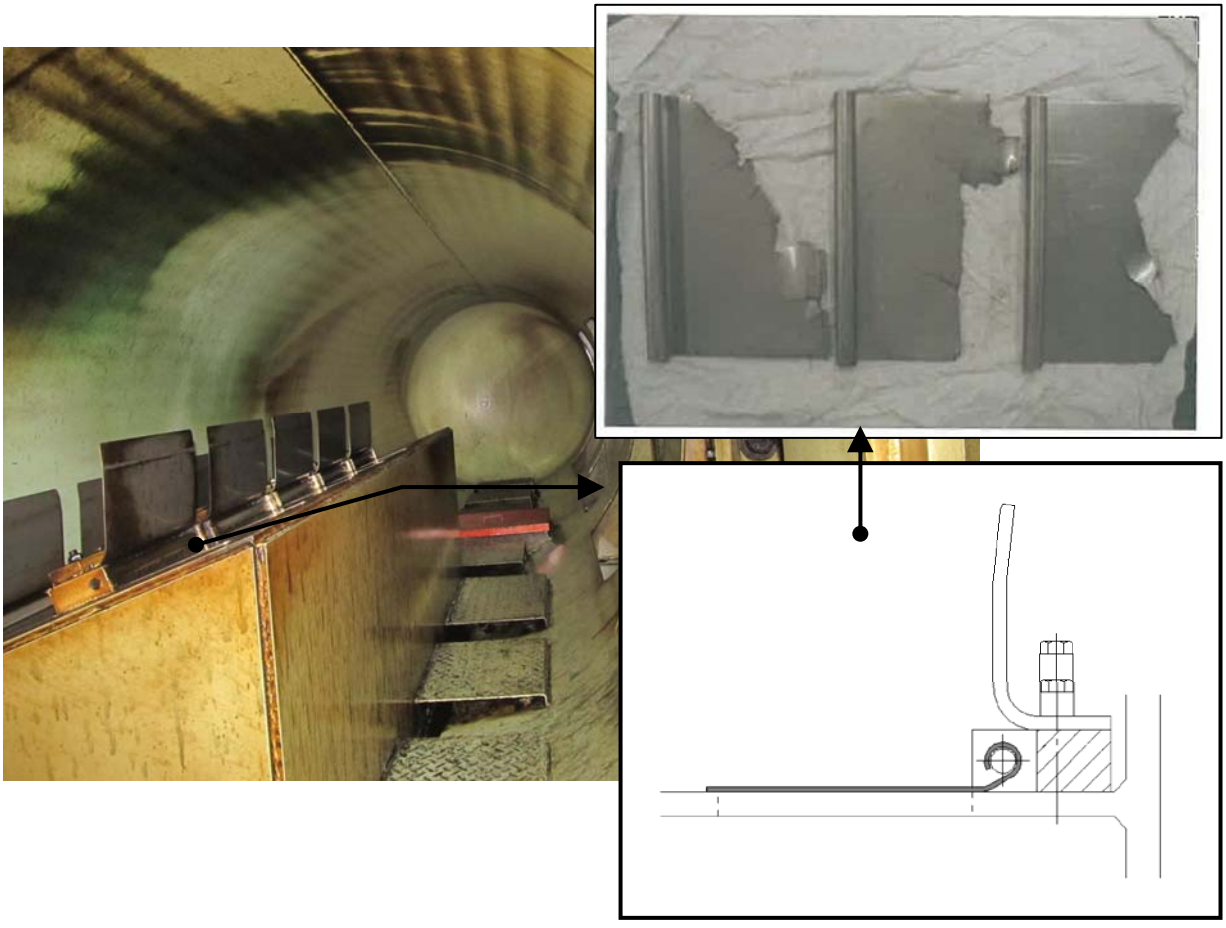

Fig. 2: Broken flap valves

3. Cylinder lubrication

Lower-load operation will result in an increase in the specific cylinder oil dosage (g/kWh).

The intention is to switch from Mep-proportional control or Load-proportional control to Speed-proportional control below 25% engine load. However, since the Alpha lubricator system has a limitation of maximum 15 rev. per injection in order to avoid too long intervals between lube injections on MC/MC-C engines, MEP-proportional control or Load-proportional control will be switched to Speed-proportional control at 35-40 % load, depends on cylinder oil feed rate. This may result in excessive lubrication at very low loads, which could lead to deposit build-up on the piston top lands.
We have not received any reports of damage in relation with over lubrication at low loads. However, Deposit build-up of unused lube oil and additives may be harmful to the cylinder condition, especially in connection with subsequent loading up to higher engine loads.

As illustrated in Fig. 3 and Fig. 4, smaller alpha lubricator pumps can be retrofitted, so that the Mep proportional (or the load proportional) breakpoint can be moved down to a lower engine load and Mep proportional (or the load proportional) control can be kept in more low engine load. Depending on the load pattern of the engine, this modification could show profitable for reducing operation cost, and it would reduce the fouling of the scavenge air space with excessive lube oil.

If mechanical lubricators are installed, it is highly recommended to retrofit the Alpha Lubricator. Especially during low-load operation, the mechanical lubricator will have a very high feed rate compared to the specified need.
If you need further advice and question regarding the above smaller Alpha Lubricator pump or Alpha Lubricator retrofit, please contact with the MES TECHNOSERVICE CO., LTD.
（Please refer to Service Note No. 111）

For retrofitting to smaller alpha lubricator, plunger, cylinder cover and their accessories are replaced. (Red portion)

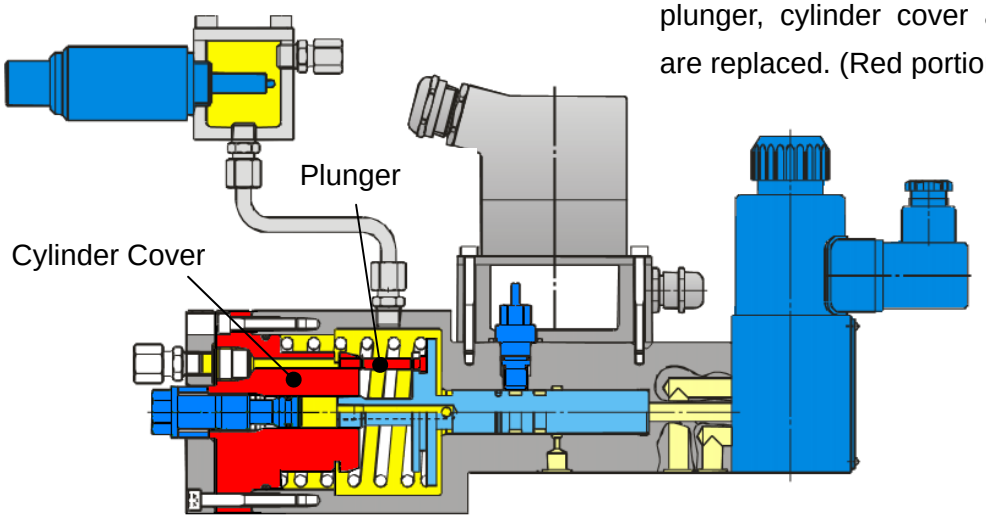

Fig. 3: Alpha Lubricator

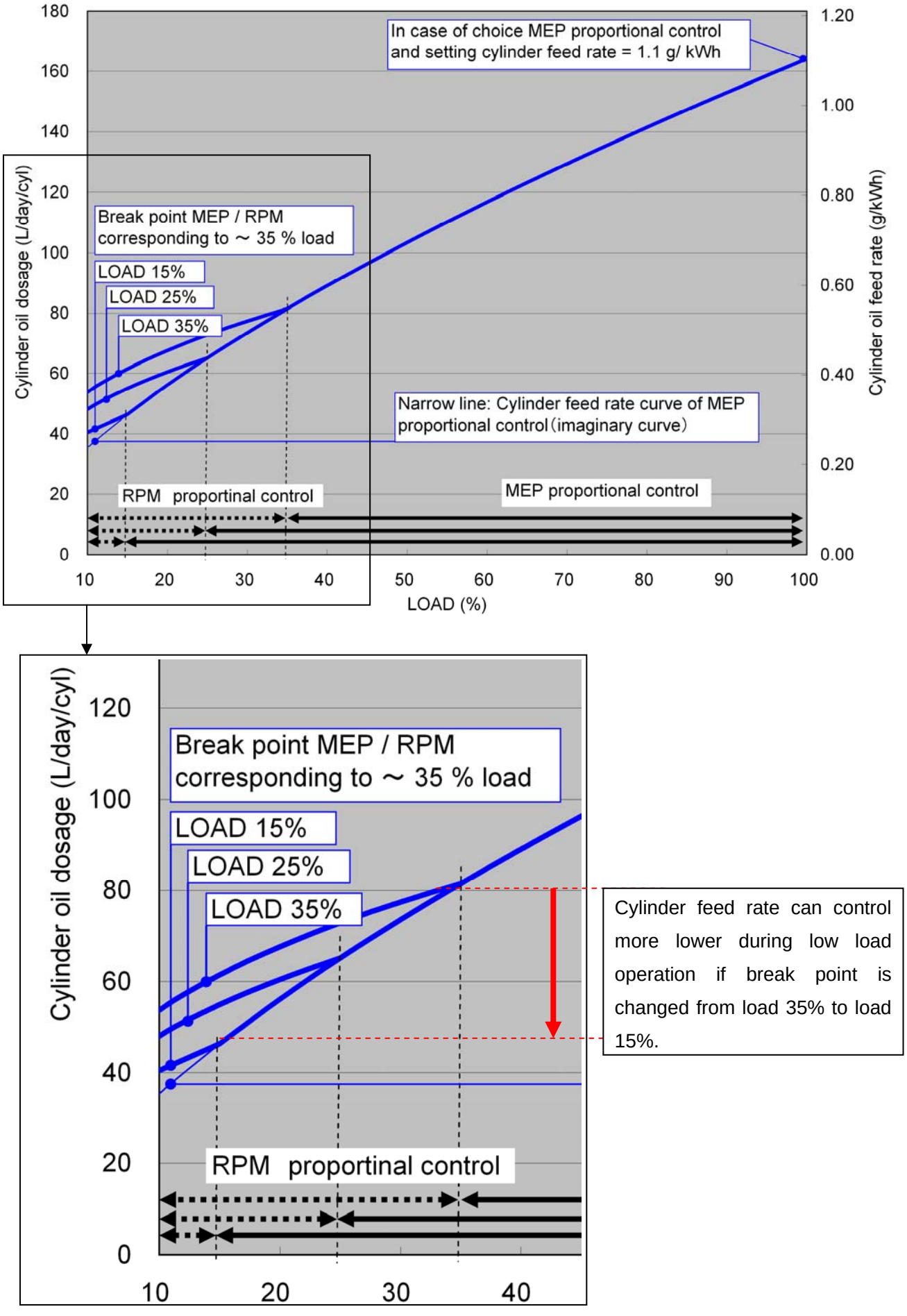

Fig. 4: Alpha Lubricator feed rate algorithm

4. Turbocharger cleaning by solid material and engine load-up

The tendency to form deposits of turbocharger depends on the maintenance condition of fuel injection equipment, fuel cleaning equipment, and the quality of the fuel used. Accordingly, the cleaning interval must be based on the experience of the turbocharger fouling in the specific plant,

Engine load-up should be not operated as much as possible in order not to compromise the cylinder condition. Engine load-up level and frequency should be decided, depends on the actual engine condition with trial operation to 50 – 75% load once a day.

The necessary cleaning intervals of the turbocharger are specified by the turbocharger designer, and the latest recommendation should be followed

ABB: increase load to >50% engine load
– minimum once every 20-50 hours.

MAN: to be effected during normal service load. Not need to increase engine load. But, carry out the cleaning during load-up operation for effective cleaning as possible.
– minimum once every 24 hours.

MET: load to be between a minimum and a maximum T/C speed depending on T/C type
– minimum once every 100 hours.

Table 1: MET turbocharger T/C cleaning recomandation

Type	MET33	MET42	MET53	MET60	MET66	MET71	MET83	MET90
Cleaner amount (Liter)	0.4	0.7	1.6	2.1	2.6	3.0	3.5	3.5
min T/C speed (rpm)	9,200	7,400	5,900	5,300	4,700	4,400	3,700	3,400
max T/C speed (rpm)	23,300	18,800	14,800	13,300	11,900	11,000	9,400	8,500
inlet gas temp	below 500°C							