

Dear Sirs

Operation on very-low and ultra-low sulphur fuel oil (VLSFO and ULSFO) is becoming more frequent.

Since 2015, operation in SECAs (sulphur emission controlled areas) has been restricted to operation on 0.1% S fuel or lower. The number of dual fuel engines in operation on ULSF mixtures and, from 2020, also the compliant 0.5% S fuel will be increasing.

The owners of engines operated on VLSFO and ULSFO may face certain challenges with scuffing between the cylinder liner and piston rings. Operation on gas or other low-flashpoint fuels containing no sulphur gives challenges similar to those faced when operating on ULSFO in a SECA or on 0.5% S fuel. Prolonged operation on these fuels may lead to bore polished liner surfaces with a subsequent risk of liner scuffing as the consequence.

To increase the margin against damage to the piston rings and cylinder liners, which will lead to overhaul on short notice, we have introduced a piston ring configuration that incorporates the hard cermet-coating on the running side of all piston rings. Cermet-coating on the piston ring running surface increases the reliability of the main engine. In many cases, the cermet-coated rings continue to perform after an episode with momentary oil film breakdown, provided the oil film is restored. This ensures that the engine can continue in normal operation until the next planned overhaul. As 2020 is approaching, we recommend that introduction of this new ring configuration is done at the next overhaul.

Send an email to: PrimeServ-cph@mandieselturbo.com if you have further questions about ordering new piston rings.

Yours faithfully



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Action code: WHEN CONVENIENT

Cermet-Coated Piston Rings for Operation on Low-Sulphur Fuels (0.5% S or lower)

Including LNG, LPG, methanol and ethane
Replaces SL2016-633/JAP

SL2018-659/JAP

March 2018

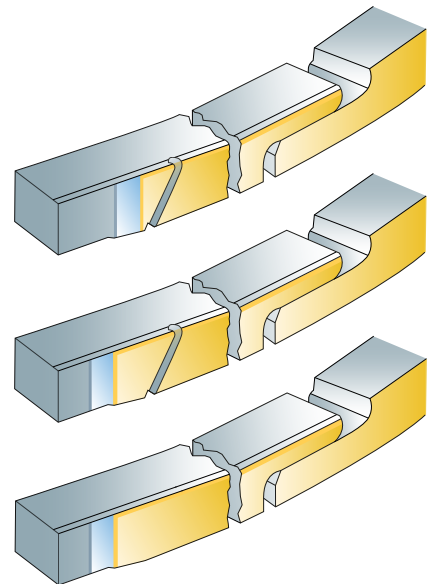
Concerns

Owners and operators of MAN B&W two-stroke marine diesel engines.
Type: MC/MC-C, ME/ME-C, ME-B, ME-GI, ME-GIE and ME-LGI

Summary

New hard cermet-coated piston rings for continued operation on low-sulphur fuel (0.5% or lower).

Reference is made to: SL00-382/JSB, SL12-562/JAP, SL2014-593/DOJA, SL2014-587/JAP and SL2016-611/JAP.



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Operation on low-sulphur fuels (LSFO, VLSFO and ULSFO)

Under normal conditions, when operating on fuel containing sulphur, the sulphuric acid formed during the combustion process is condensed on the liner surface, which will ensure a controlled amount of corrosion. This causes the liner surface to sustain an adequate level of wear that ensures a high number of open graphite lamellas in the cast iron matrix.

When operating on low-sulphur fuel, the level of corrosion is very low and the liner wear is negligible in most cases. Over time, this will lead to polishing of the running surface. When the liner surface is smeared, the open graphite lamellas are closed making it difficult to sustain a proper oil film. Operation on low-sulphur fuels thus increases the risk of bore polishing of the liner running surface.

When the oil film is compromised, the cast iron piston rings, which are in contact with the cast iron liner, may generate high friction due to metal-to-metal contact and, eventually lead to liner scuffing. During scuffing, the surface of the liner is hardened and will need machining before new rings can be run-in.

Cermet-coated piston rings

Cermet is a composite, part-ceramic, part-metal material. It combines the best properties of a ceramic, i.e. high temperature-resistance and hardness, with those of a metal.

When applying hard cermet-coating to the piston ring running side, see Figs. 1 and 2, the margin towards scuffing increases. The cermet will recover after an incident, provided the situation is timely discovered and action is taken to ensure that the development is stabilised. This requires increased lubrication and a reduction of the load (SL2014-587/JAP). However, the liner may need machining at the next overhaul to ensure proper running-in of the new rings.

Fig. 1 shows a three high-ring configuration for piston crowns with three grooves. To order the piston rings see the attached plate 8872-2272-0010. A three-ring configuration with one high- and two low-rings for piston crowns with four grooves, is also available, see attached plate 8872-2272-0011. When using a three-ring configuration for a crown with four grooves, the lowest groove must be left empty, see SL2016-611/JAP. Fig. 2 shows the 2020 CPR ring pack, see also plate 8872-2272-0005.

Please note that for 50 bore engines and smaller, the cermet CPR top rings will be of the CPR-CL not the CPR-POP type as before. For more information on the CPR-POP type please see SL12-562/JAP.

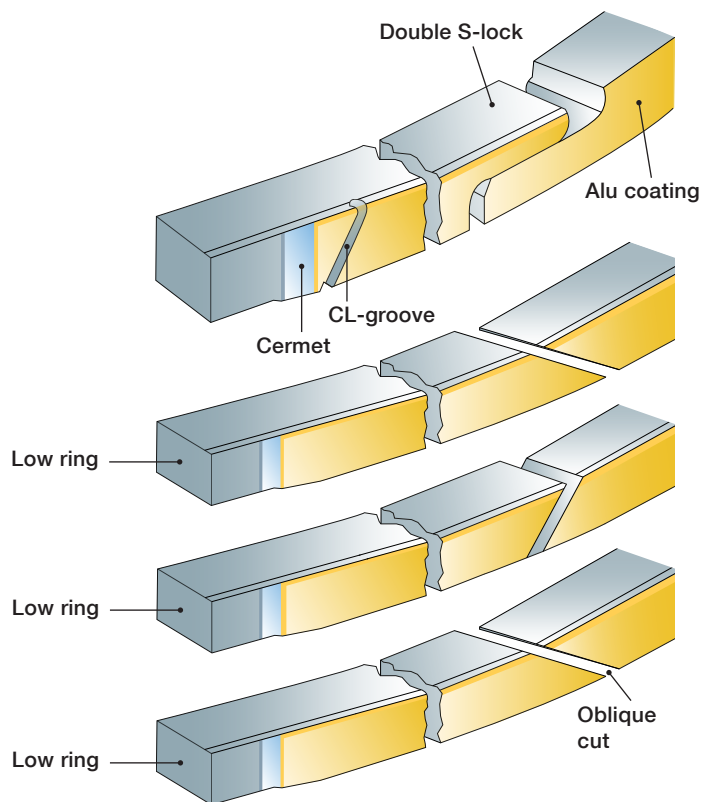
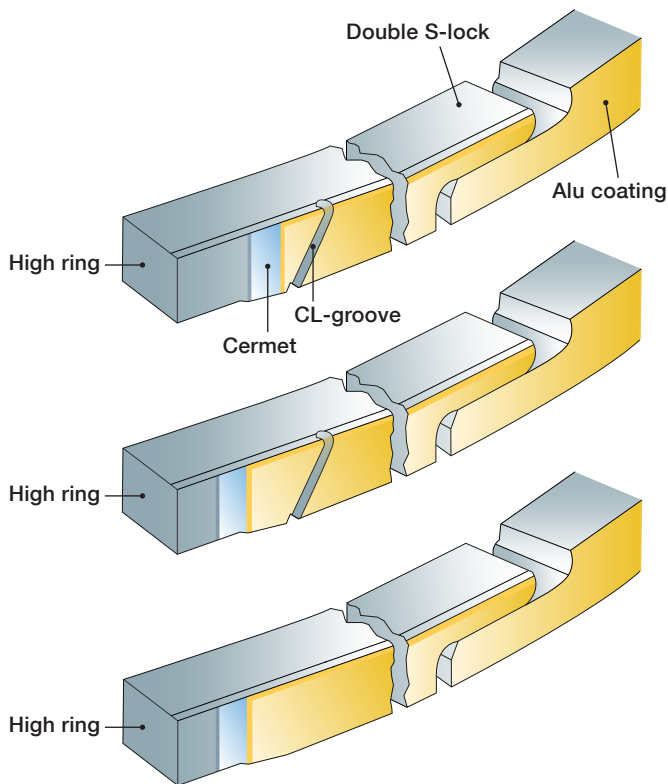


Fig. 1: The CPR ring pack containing three high rings with cermet-coating on all rings for pistons with three grooves. This ring pack is also available in a configuration with one high and two low rings.

Fig. 2: The 2020 CPR ring pack containing one high ring and three low rings with cermet-coating on all rings.

**New engines**

When ordering new vessels, we recommend cermet coating on all rings to prepare for operation on 0.5% S fuel.

Engines in service on VLSFO or ULSFO

If the engine is already operating on VLSFO or ULSFO fuel, or if it is intended to do so after 1 January 2020, we recommend to install cermet-coated rings at the next scheduled overhaul.

During overhaul it is important to evaluate the liner surface. If it appears to be polished, machining of the liner surface may be needed to open up the surface and facilitate easy running-in of the new piston rings. If the wave-cut surface has been worn away, it can be re-freshened by wave-cut grinding.

Engines fitted with SO_x scrubbers

Engines fitted with exhaust gas scrubbers can continue to operate on high-sulphur fuel after 2020. Omitting cermet-coated rings is thus an option for some engines. However, cermet-coated rings are standard for new large-bore engines, also if operating on high-sulphur fuels.

Lubrication

It is very important to keep a correct level of lubrication and not to overdose, both when operating on high-sulphur fuel as well as on VLSFO and ULSFO. Lubrication according to the adaptive cylinder-oil control (ACC) scheme (feed rate factor multiplied with the sulphur percentage of the fuel) is recommended. Otherwise, polishing of the liner surface may occur and, thereby, increase the risk of seizures, see SL14-587/JAP or the latest guidance on lubrication.

Piston cleaning (PC) ring

The deposits that build up on the piston crown have a big influence on liner polishing and smearing. Most engines built after year 2000 have PC rings installed in the top of the liner to scrape away deposits which build up on the piston crown topland. PC rings are recommended for all engines and can be retrofitted on most older engines. If needed contact MAN Diesel & Turbo for further details. Furthermore, check the liner wear after honing, if it is too large, the PC ring should be omitted or a dummy ring be fitted, see SL00-382/JSB.