



MAN B&W Diesel

Piston ring, 98 MC/MC-C



<http://MarEngine.com>

Original design

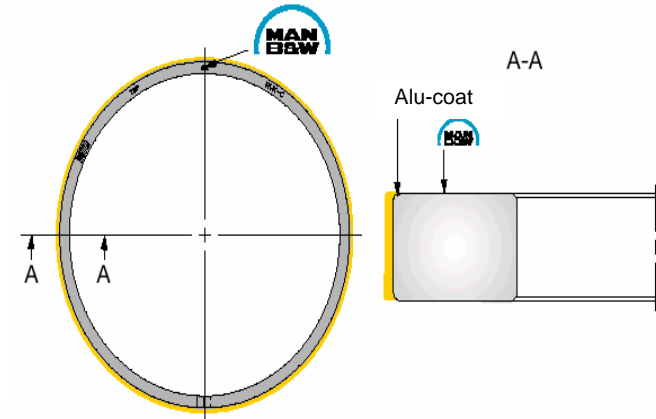
Expected lifetime 12-16,000 hours.

Genuine spare part

Alu-coated piston ring

Developed at our Research Centre

- Reduced running-in time more than 50%
- Saving cylinder oil
- Thickness about 0.3 mm



Based on ring pack equipped with :

Upper ring designed with controlled pressure relief *(CPR) alu-coated chrome.

The rest of the rings are alu-coated.





MAN B&W Diesel

Piston ring, 90 MC/C



<http://MarEngine.com>

Original design

Expected lifetime 12-16,000 hours.

Cylinder liner equipped with PC ring

Based on ring pack equipped with :

Upper ring produced with controlled pressure relief *(CPR) alu-coated chrome/alu coated.

The rest of the rings are alu-coated.

Alternative :

The whole ring pack is taper faced with/without CPR and without alu-coating.

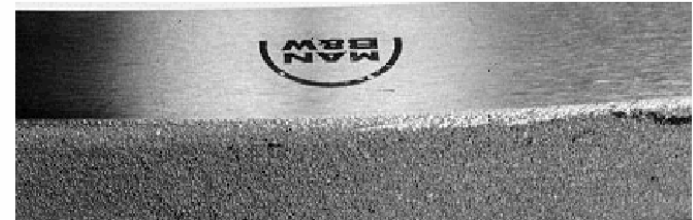
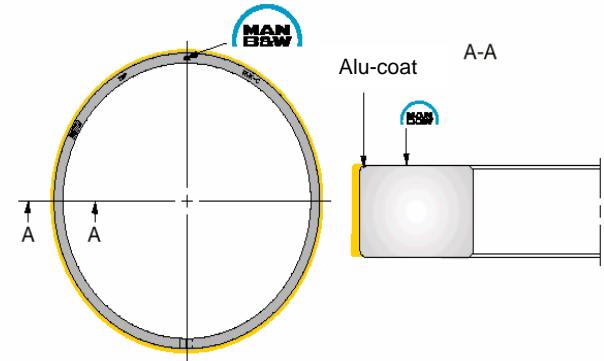
Price-wise cheaper but without the same expected lifetime.

Genuine spare part

Alu-coated piston ring

Developed at our Research Centre

- Reduced running in time more than 50%
- Saving cylinder oil
- Thickness about 0,3 mm





Piston ring, 90 MC/MC-C



MBD-C supply

Always supplied according to latest design.

Upper ring : Height reduced by 0.1mm
(Reduced risk of sticking).

Position of relief grooves has been modified.
(grooves moved away from stress area).

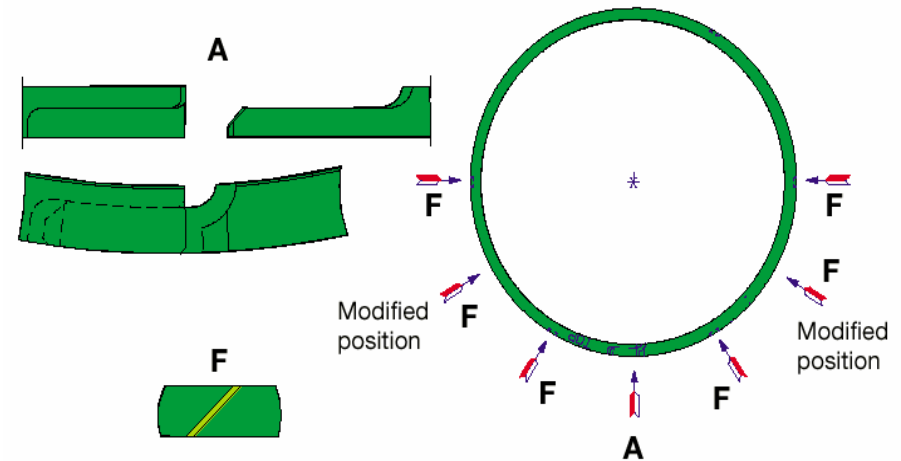
Ensures the correct ring configuration.

Ensures the correct ring material for the original
cylinder liner.

*CPR ring ensures :

- Improved pressure drop across the ring pack.
- Reduced heat load on second piston ring.
- Longer lifetime of ring pack.

Controlled pressure relief piston ring (CPR)





MAN B&W Diesel

Piston ring, 80 MC/MC-C – 26 MC



<http://MarEngine.com>

Original design

Expected lifetime 12-16,000 hours.

Cylinder liner equipped with PC ring

Based on ring pack is equipped with :

Upper ring produced with controlled pressure relief *(CPR) alu-coated.

The rest of the rings are alu-coated.

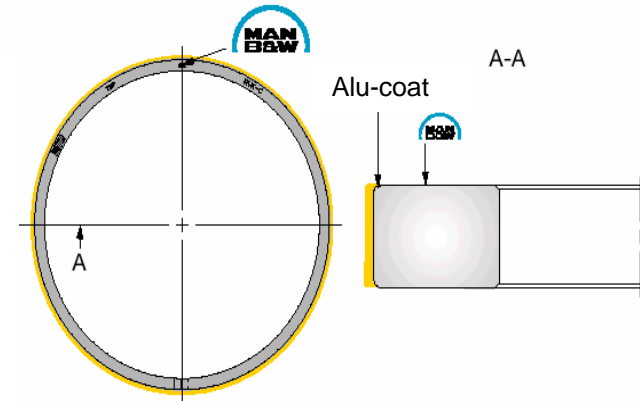
Alternative :

The whole ring pack is taper faced with/without CPR and without alu-coat.

Price-wise cheaper but without the same expected life-time.

Genuine spare part
Alu-coated piston ring
Developed at our Research Centre

- Reduced running in time more than 50%
- Saving cylinder oil
- Thickness about 0,3 mm





Piston ring, 80 MC/MC-C – 26 MC



MBD-C supply

Always supplied according to latest design.

Upper ring : Height reduced by 0.1mm. (Reduced risk of sticking).

Position of relief grooves has been modified (grooves moved away from the stress area).

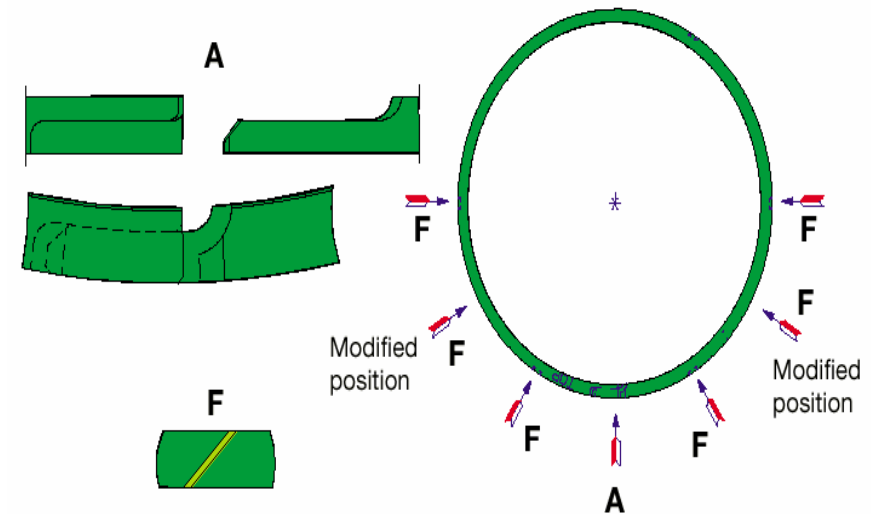
Ensures the correct ring configuration.

Ensures the correct ring material for the original cylinder liner.

*CPR ring ensures :

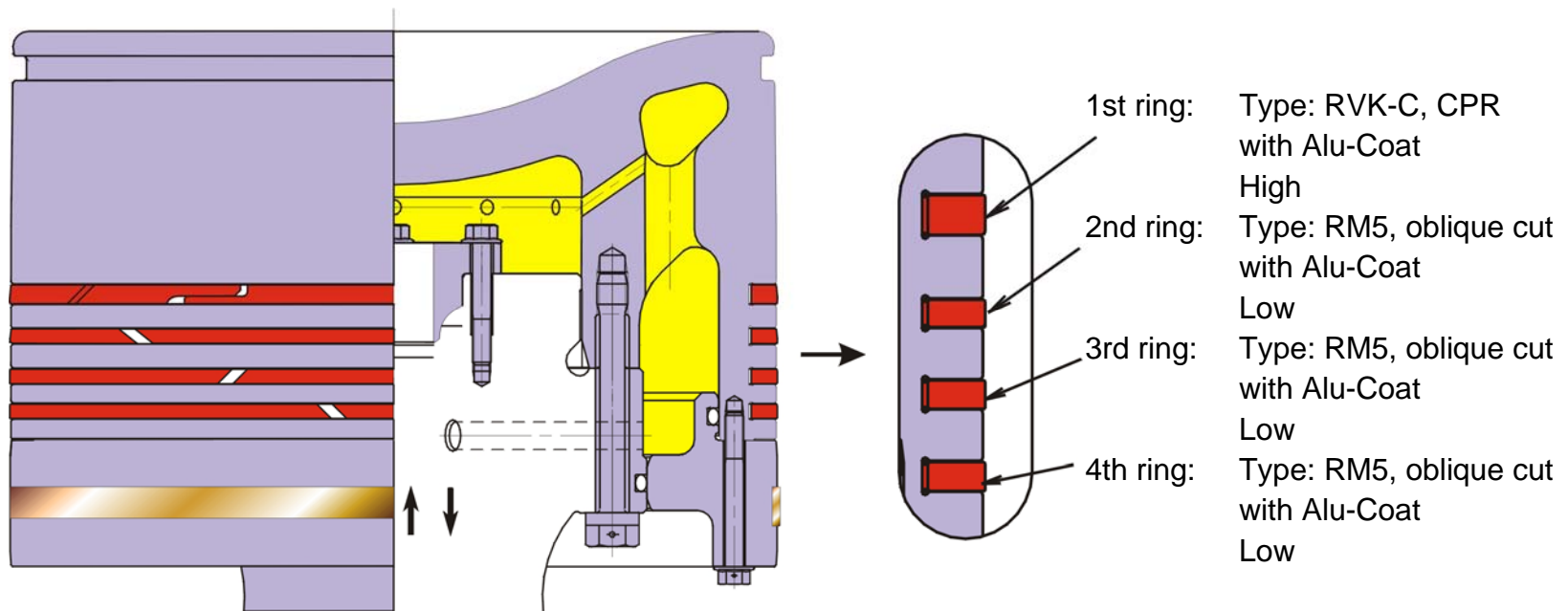
- Improved pressure drop across the ring pack.
- Reduced heat load on second piston ring.
- Longer lifetime of ring pack.

Controlled pressure relief piston ring (CPR)





Ring pack – When the liner is equipped with PC ring



For L/K90MC, K80MC
See special plate

- High topland piston crown
- 1st piston ring with increased height
- Copper band on piston skirt



Ring pack for L/K90MC, K80MC



The stated type of engines are sensitive for coke formations and thereby for scuffing.

The guide line for the ring pack is following:

Ring pack with CPR ring and liner **with** PC ring.

1st ring: CPR with alu-coat.

2nd ring: RM5 with alu-coat

3rd ring: RM5 with alu-coat

4th ring: RM5 with alu-coat

Ring pack with CPR ring and liner **without** PC ring.

1st ring: CPR with PM14

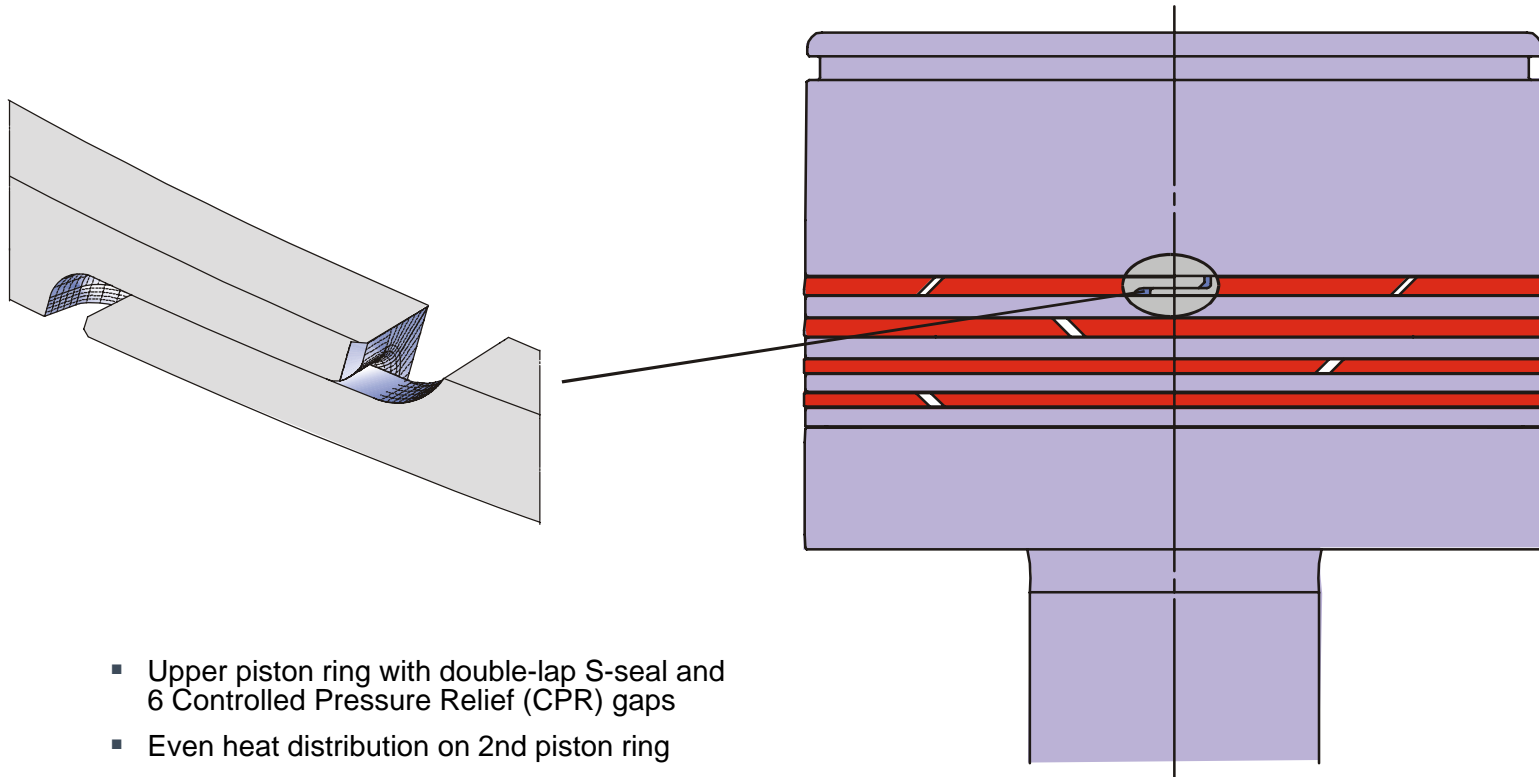
2nd ring: RM5 with alu-coat

3rd ring: RM5 with alu-coat

4th ring: RM5 with alu-coat



Piston Rings for MC Engines



- Upper piston ring with double-lap S-seal and 6 Controlled Pressure Relief (CPR) gaps
- Even heat distribution on 2nd piston ring
- 2nd, 3rd and 4th piston rings with oblique cut ring gaps
- New piston ring material:
RVK-C for 70-26 cm bores and RVK-C with Alu-coating on 98-80 cm bores

When the liner is equipped with PC ring



Piston Ring and Cylinder Liner Wear 98 to 80 Bores

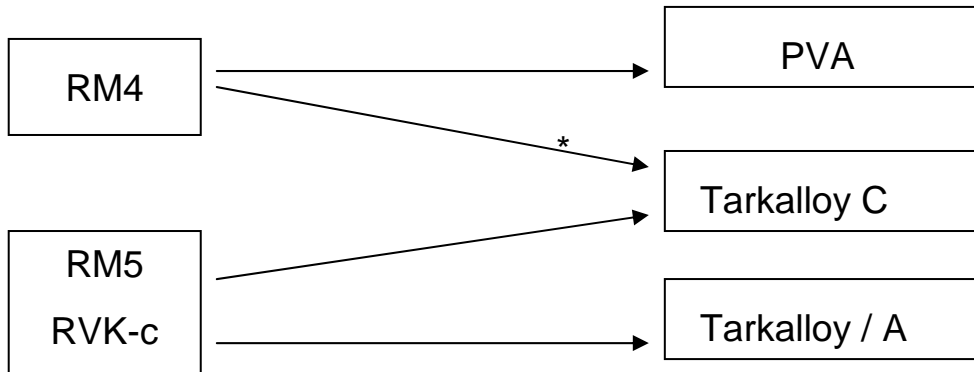


MAN B&W standard piston rings and their compatibility with different kinds of cylinder liner materials

Ring No. 1	CPR, high	RVK-C with Alu-coating	} Standard
Ring No. 2	Low, left cut	RM5 with Alu-coating	
Ring No. 3	Low, right cut	RM5 with Alu-coating	
Ring No. 4	Low, left cut	RM5 with Alu-coating	

Piston ring

Cylinder liner



*RM4 piston ring has in special cases been used successfully in tarkalloy C-Va cylinder liner

For the existing engines without a PC ring, the top ring of RVK-C with PM 14 (relatively hard material) coating is still necessary

Other combinations of piston ring/cylinder liner materials can lead to increased wear of either the piston rings or the cylinder liners



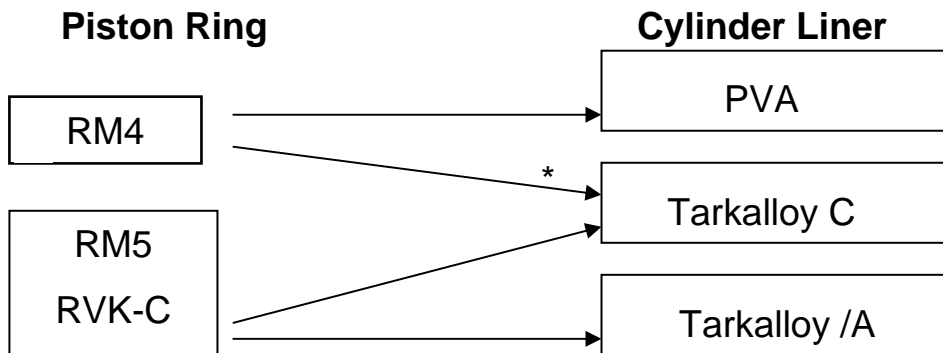
Piston Ring and Cylinder Liner Wear 70 to 26 Bores



<http://MarEngine.com>

Man B&W standard piston rings and their compatibility with different kinds of cylinder liner materials.

		Standard	Optional
Ring No. 1	CPR, high	RVK-C	Alu-coating
Ring No. 2	Low, left cut	RM5	Alu-coating
Ring No. 3	Low, right cut	RM5	Alu-coating
Ring No. 4	Low, left cut	RM5	Alu-coating



*RM4 piston ring has in special cases been used successfully in C-Va cylinder liner

Other combinations of piston ring/cylinder liner materials can lead to increased wear of either the piston rings or the cylinder liners



Piston Ring - Cylinder Liner compatibility



Cylinder liner and piston ring wear highly depends on the compatibility between the cylinder liner and the piston ring material.

Daros	Nippon	Riken	Properties	Cylinder liner material
RM 5	Uballoy	Rik 45	Grey cast iron	Tarkalloy
RM 5	NPR Uballoy S	Rik 47	Copper-molybdenum alloyed,flake graphite	Tarkalloy Tarkalloy-C
RM 4			Vanadium and copper molybdenum alloyed, flake graphite	PVA *(Tarkalloy C)
RVK-C	Tarkalloy G	Rik 29	Alloyed high strength CV graphite iron	Tarkalloy C/A
RVK/pm 14			Base material RKV with ceramic coating on the running surface	All
RVK-C	Tarkalloy G	Rik 29V	Alloyed high strength CV graphite iron with wear reducing carbides	Tarkalloy C/A
RVK-C/Alu-bronze	Tarkalloy G/ Alu-bronze	Rik29V/ Alu-bronze	Alloyed high strength CV graphite iron,with wear reducing coating	All

CV : Compact vermicular iron

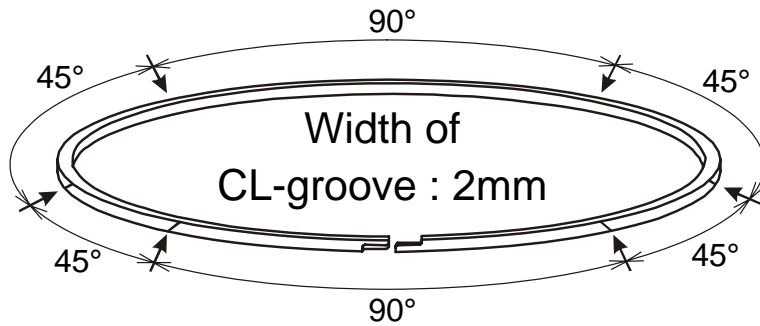
Please view page 2 for further remarks



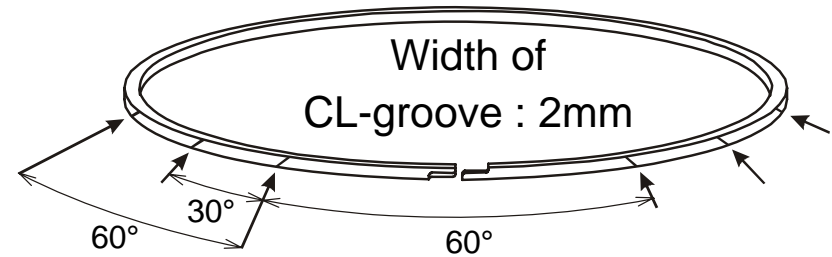
CPR Piston Ring Development



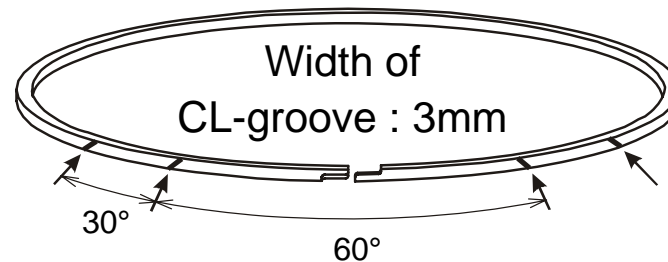
**Original location of grooves
(6 CL-grooves)**



**6 relocated CL-grooves
(E-Type from Jan. 2002)**



**4 relocated CL-grooves
(E4-Type)**





New material specification for piston rings supplied from MBD-C



- 1) **CV1** "C for Cast iron – V for Vermicularjern – 1 for identification" ex. RVK-C
- 2) **CF4** "C for Cast iron – F for Flagegrafitjern – 4 for Identification" ex. RM4
- 3) **CF5** "C for Cast iron – F for Flagegrafitjern – 5 for Identification" ex. RM5

Juni 2004