CAT® Marine Power

MaK SERVICE Focused on Customer Needs

Service Information No. 01 / 05

Date: 14.01.2005

Piston Connection Screws RM 43 / VM 43

With Service Information No. 3 / 4 of 2nd June 2004 we pointed out that the oil pan of all cylinder units and the lubricating oil filter at engine inlet are to be checked at regular intervals with regard to presence of metal particles. These could have been particles of the screws connecting piston crown and skirt.

These checks are not required any more, effective immediately.

In the meantime extensive investigations, checks, and calculations by independent institutions, the piston supplier and at our own facilities have taken place. These activities have shown that the respective connection is designed with the required safety factor. Damages may only occur in case of overload or as the result of assembly or material faults.

The piston is one of the very sensitive components in an engine. In cooperation with the piston manufacturer we have, therefore, taken diverse measures to enhance process safety in the assembly of crown and skirt.

One of these measures was the decision to have the assembly of a piston carried out at the manufacturer or authorized workshops only.

Effective on receipt of this Service Information it is not allowed any more to have piston crowns exchanged by the board personnel or workshops that have not been authorized by us.

The respective job card in the Operating and Maintenance Manual is now invalid and must be destroyed.

We are kindly asking for your understanding for this decision which was taken with the exclusive aim to ensure safe and reliable engine operation.

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See also:	*02.06.01.nn, 02.07.01.nn, 02.08.01.nn*
Spare parts list:	*B1.05.02.432601*
Time requirement:	*2 Pers./ 0,70 h*
Personnel qualification:	*Cat/MaK-specialist*
Operating medium:	*Heavy fuel and distillate fuel*

Tools:

Piston lifting unit (piston crown)	W1	439223 A
Piston lifting unit (big end)	W2	439223 A
Torque wrench 20 - 90 Nm	W3 *	1.9454-020
Torque wrench 100 - 400 Nm	W4 *	1.9454-400

* no picture

Auxiliary materials:

Molykote Paste “G-n plus” **

** or equivalent product

Procedure:

1. Turn the piston

1.1 Attach crane to piston lifting unit (**Fig. 1/**W1) , lift piston.

1.2 Mount second piston lifting unit (W2) on the big end (1) and attach second crane or sling.

1.3 Turn the piston carefully and place on suitable surface.

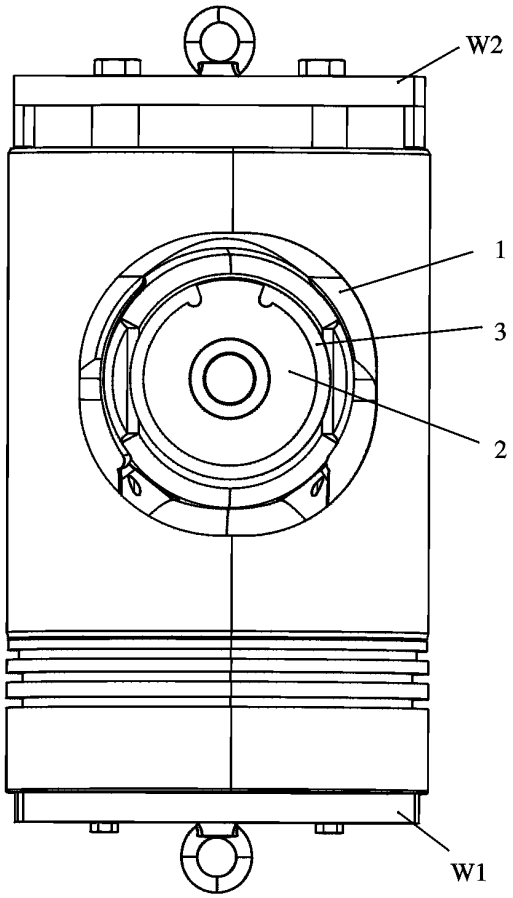
2. Dismantling the piston crown

Note:

The piston crown should only be replaced by the CAT Customer Service.

2.1 Connect piston lifting unit (W1) to crane, remove piston pin (2) (**02.08.01.nn**).

2.2 Measure piston pin bearing (3) (**02.09.01.nn**) and evaluate if necessary (**02.03.03.nn**).



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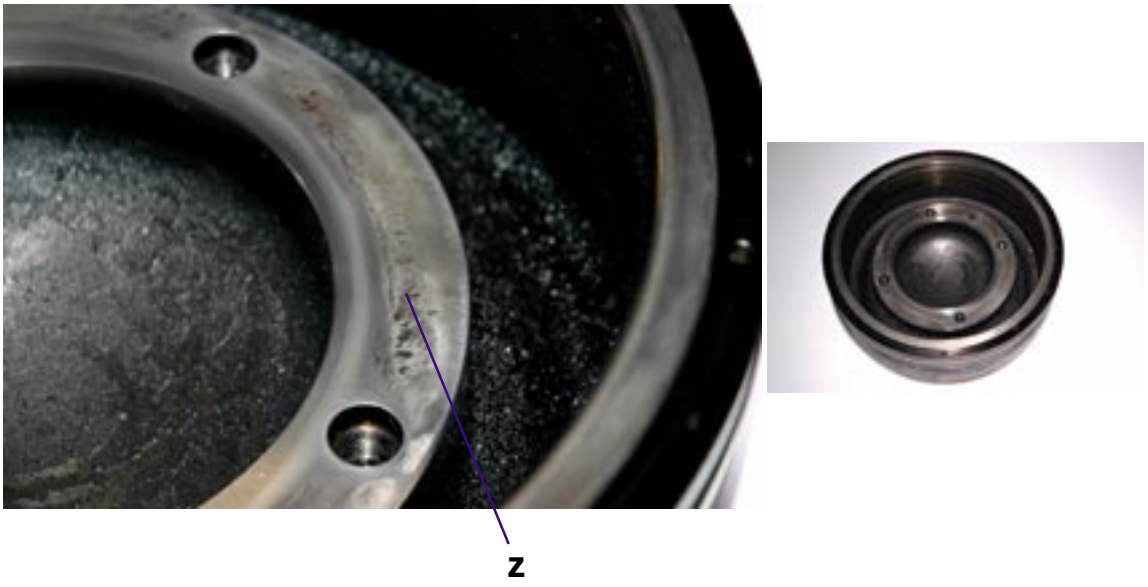
2.3 Loosen the piston screws (**Fig. 3**/5) and remove with piston skirt (12).

2.4 Clean piston crown (8) and piston skirt (12). Make sure that the contact surfaces of piston parts and spacer sleeves (6) are clean.

Attention:

Check the contact surfaces for friction marks / cold welding (Fig. 2/Z), if necessary consult the CAT Customer Service!



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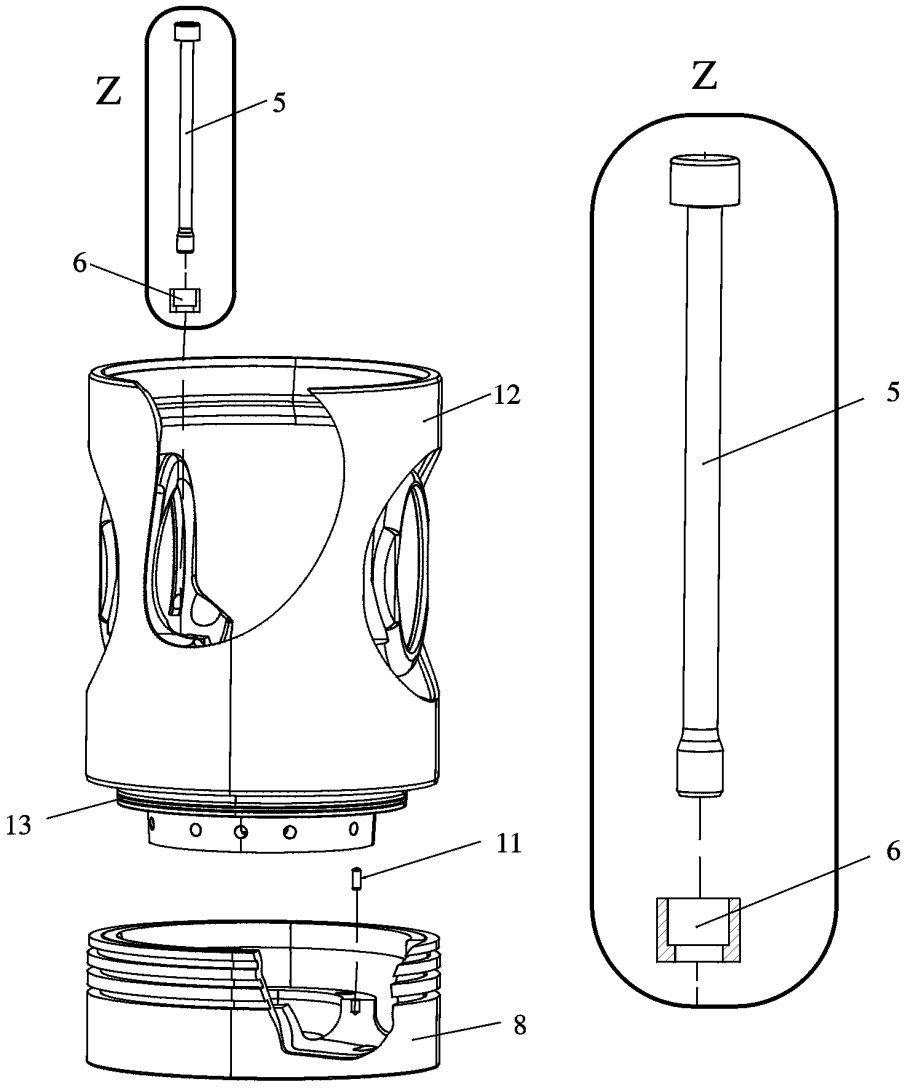
2.5 Clean and inspect the oil bores in the piston skirt (**Fig. 3**/12).

2.6 Piston assembly

It is imperative for piston assembly to use only new piston srews (5) and new spacer sleeves (6)!



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2.7 Clean the contact surfaces of piston skirt (12) and piston crown (8) and check for unevenness. Carefully smooth out any raised spots with oil stone.

2.8 Clean bores for piston screws (5) and contact surfaces for spacer sleeves (6) in the piston skirt (12).

2.9 Clean the 4 threaded holes in the piston crown (8). Turn tap drill M20x1,5 in until reaching the root of the thread. After that clean again. By means of a limit plug gauge check for 35 mm thread depth (from main contact surface).

2.10 Insert **new** O ring (13) untwisted into groove.

2.11 Put on piton skirt (12), fixation hole and spring dowel pin (11) must match.

2.12 Lubricate **new** spacer sleeves (6) with Molykote paste “G-n plus“ on recess side and insert into the screw bore of the piston crown (8) with recess up.

2.13 Lubricate thread and head contact surface of **new** piston pins (5) with Molykote paste “G-n plus“ and screw by hand.

2.14 Tighten piston screws (5) crosswise to a torque of

M = 20 Nm.

Measure recession (**Fig. 6/**X) of the screw heads with regard to the lowest bolt bore contour.

X = 8 mm ± 1,5 mm

(**Check whether all spacer sleeves (Fig. 3/6) have been inserted with recess up.**)

2.15 Tighten piston screws (5) crosswise to a torque of

M = 140 Nm.

2.16 Loosen piston screws (5) again crosswise.

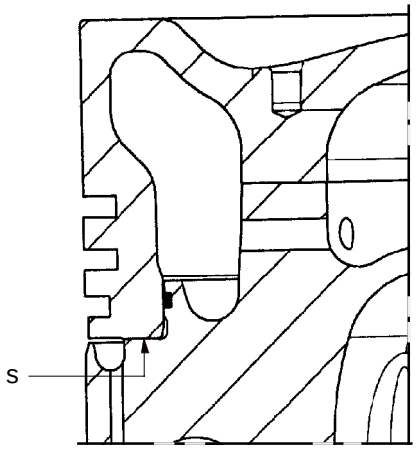
2.17 Check clearance (**Fig. 4**/s)

s = 0,24 - 0,28 mm

with non tightened piston screws.

2.18 Pretighten piston screws (**Fig. 6**/5) crosswise to a torque of

M = 40 Nm.



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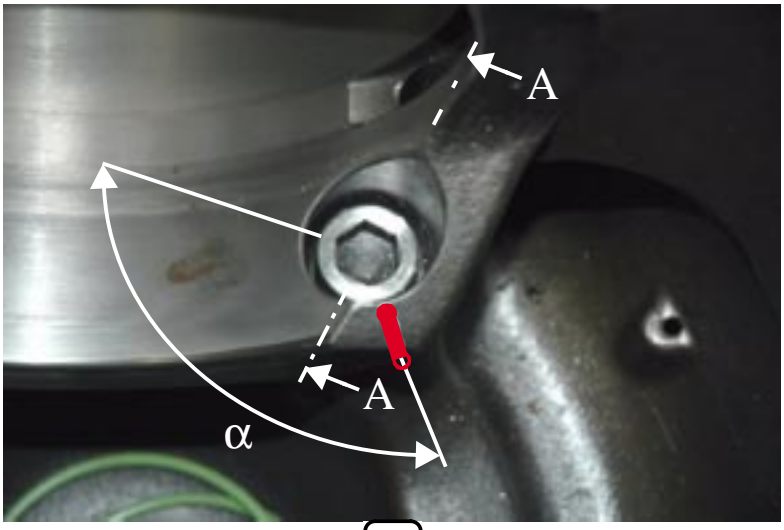
2.19 Mark screw head (**Fig. 5**).

2.20 Continue tightening by

α = 120 ° (2 hexagon corners).



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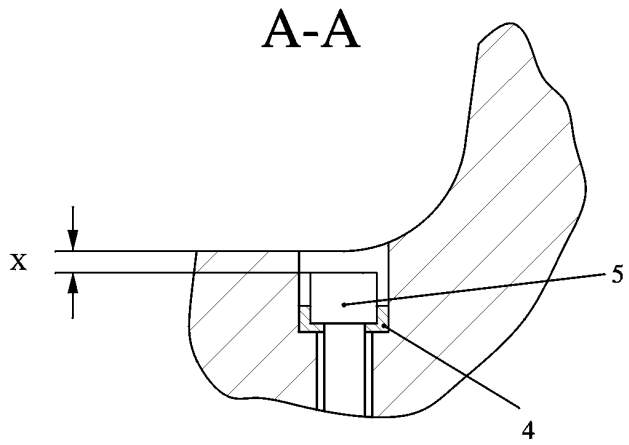
2.21 **Check by a second person:**

When applying a torque of

M = 115 Nm

the oiston screws must not turn any more in tightening direction!
The marking on the screw head must be turned further by 2 hexagon corners.



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