Service Information

Caterpillar Motoren GmbH & Co. KG product support information for medium-speed engines

Engine plattform: all
Engine section: driving gear
Engine type: all current engines
Validity: until revoked
No. 0035com - Issue 2; Dec. 16, 2025

Action: For immediate attention!

Piston Pin Safety Checks

We refer to Service Information **No. 0018com**, in which we informed about safety checks for piston pins installed in engine platforms M20, M25, M32, M34, M43, and M46DF.

Based on additional field data, we would like to reiterate that a small number of piston pins installed in our engines have shown signs of crack formation over time. If such cracks remain undetected, the piston pin may eventually fail, potentially causing severe engine damage and posing a safety risk to personnel in the vicinity.

To reduce the risk of piston pin failure, we recommend the following inspections:

M43 / M46DF Engines

At the next opportunity, perform ultrasonic testing on the relevant piston pins in accordance with the attached inspection procedure.

NOTE

Relevant spare part number 432601-004: Piston pin marked 43-02, 43-04, 43-02-A or 43-04-A on the side surface.

This test should be conducted at least once for each relevant piston pin and is intended to detect internal cracks that may lead to failure. The ultrasonic inspection must be carried out by a certified ultra sonic inspector holding at least Level 2 certification according to **DIN EN ISO 9712** or an equivalent qualification.

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All engine platforms (including M43 / M46DF Engines)

During each scheduled piston maintenance as outlined in the engine manual, check the piston pins for surface cracks using either dye penetrant testing or magnetic particle testing. Additionally, carry out all other measures specified in Service Information **No. 0018com**. If piston maintenance was recently performed without these checks, please ensure they are completed at the next suitable opportunity.

In the case of OMD alarm events or unusually frequent flush cycles of the automatic lube oil filters during operation, check the small-end bush for damage. This should be done in addition to the standard checks on liners, connecting rods, main bearings, and other relevant components.

⚠ CAUTION

In this context, we would like to reiterate that, as a general precautionary measure, the personnel should avoid staying directly next to rotating equipment unless required.

The information in this Service Information reflects the status at the time of publication. Minor updates and adjustments are not communicated separately. Therefore, we recommend always using the latest documents. Check regularly, but at the latest before upcoming maintenance work, whether updates are available. The latest manuals can be obtained from your authorized **Caterpillar Motoren** dealer.

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See also: *A5.05.00.nn*

Spare parts sheets: *B1.05.02.nn.2680*

Personnel requirement: *1 Person*

Personnel qualification: ***Ultrasonic inspector*** *holding at least Level 2 certification according to DIN EN ISO 9712 or an equivalent qualification.*

Co-applicable standards: DIN EN ISO 16810 / DIN EN ISO 16811 DIN EN ISO 2223-1,-2,-3 / DIN EN ISO 10228-3

Fuel: *Every fuel*

Activities:

1. General Principle - Detection Zones / Evaluation Zones
2. Probe Adjustment - DGS (Distance / Gain / Size)
3. Measurement
4. Evaluation
5. Documentation

Engine type	Tools and auxiliary materials	Item	Tool no.	
M 43 / VM 43 M 46 DF / VM 46 DF	Ultrasonic test device: digital, impulse echo technique with DGS according to DIN EN ISO 22232-1,-2,-3	W1		*
	T/R probe 5 to 6 MHz, effective diameter max. 10mm. Recommendation: MSEB5	W2		*
	Straight beam probe 5 to 6 MHz, effective diameter max 10 mm. Recommendation: MB5 S / MB6 S	W3		*
	Coupling gel, water based with corrosion inhibitors	W4		*

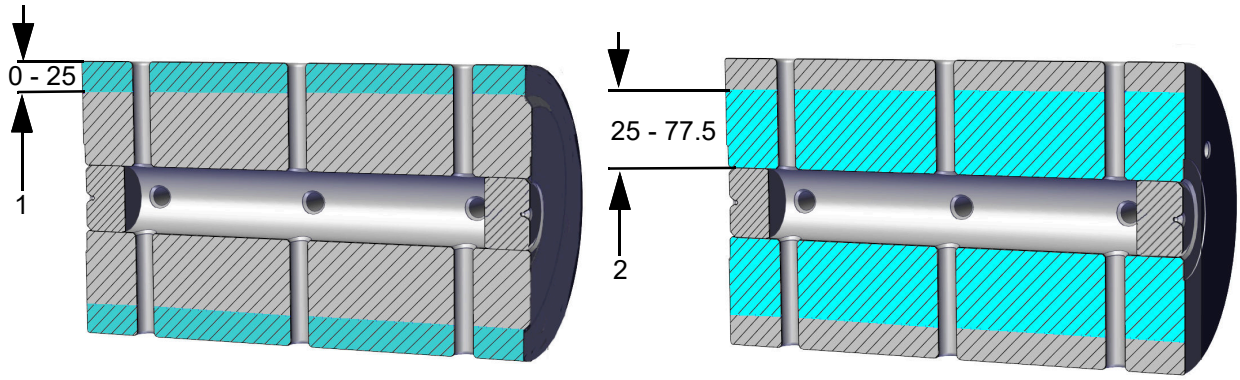
* not illustrated

NOTE

This procedure describes the extent and process of ultrasonic inspection on piston pins type M 43 / VM 43 / M 46 DF/ VM 46 DF for manual test with contact technique, refer to service information **No. 0035com**.

1. General Principle - Detection Zones

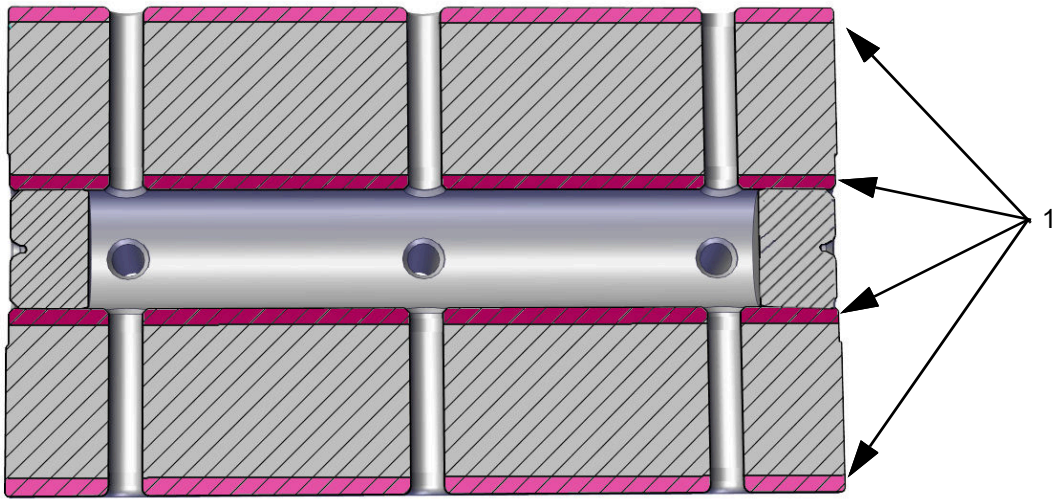
- Ultrasonic testing is done with probes from the outer diameter of the piston pin.
- To cover the entire pin volume two types of probes are necessary:
  - **T/R probe** to cover the outer area from **0 mm** to **25 mm** (**1**/1).
  - **Straight beam probe** to cover the inner volume from **25 mm** to **77.5 mm** (**1**/2).



1 Schematic diagram

1.1 General Principle – Evaluation Zones

- Piston pins are case hardened.
- In the transition zone from hardened layer to base material residual stresses due to the hardening process develop.
- Therefore, in these marked zones (**2**/1) tighter rejection limits must be applied.



2 Schematic diagram

2. Probe Adjustment – DGS (Distance / Gain / Size)

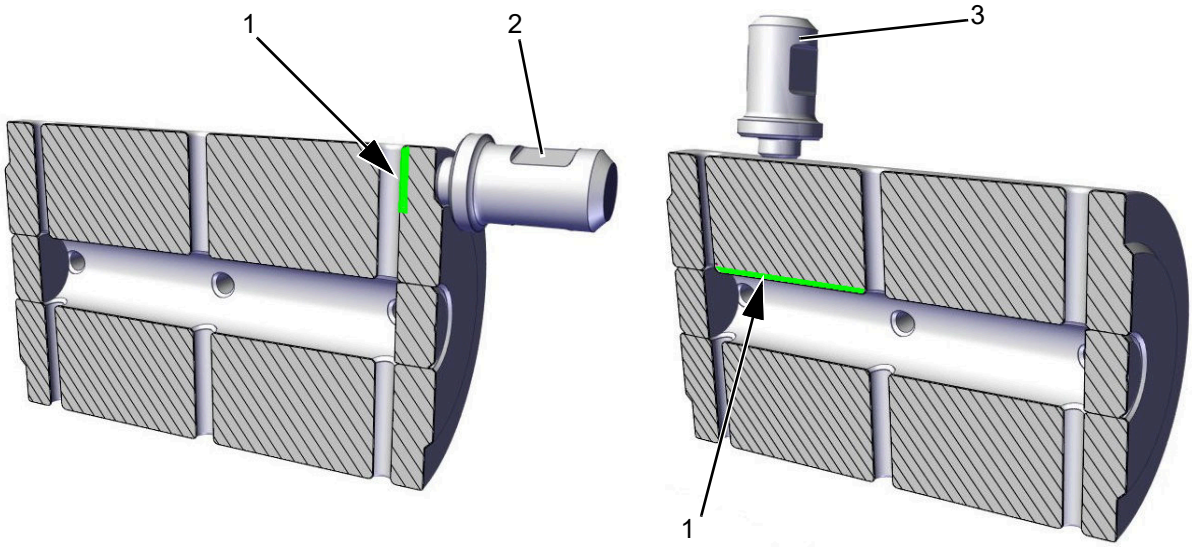
- The sensitivity of both probes must be adjusted by the DGS method at the shown back walls (**3**/1).
- Distance between reference curve and noise must be 6 dB or more in given test area. Reject part, if distance cannot be achieved.

2.1 T/R probe (**3**/2)

- Use the wall of the radial bore to generate a back wall signal.
- The distance from the back wall to the end of the pin is **14 mm** (var. -04) and **42 mm** (var. -02).
- The reference curve should be based on ERS = 0.6 mm.
- Apply transfer correction of - 6 dB for both variants (var. -02 and var. -04)

2.2 Straight beam probe (**3**/3)

- Use the wall of the axial bore to generate a back wall signal.
- The reference curve should be based on ERS = 0.4 mm.
- No transfer correction is necessary.



3 Schematic diagram

3. Measurement

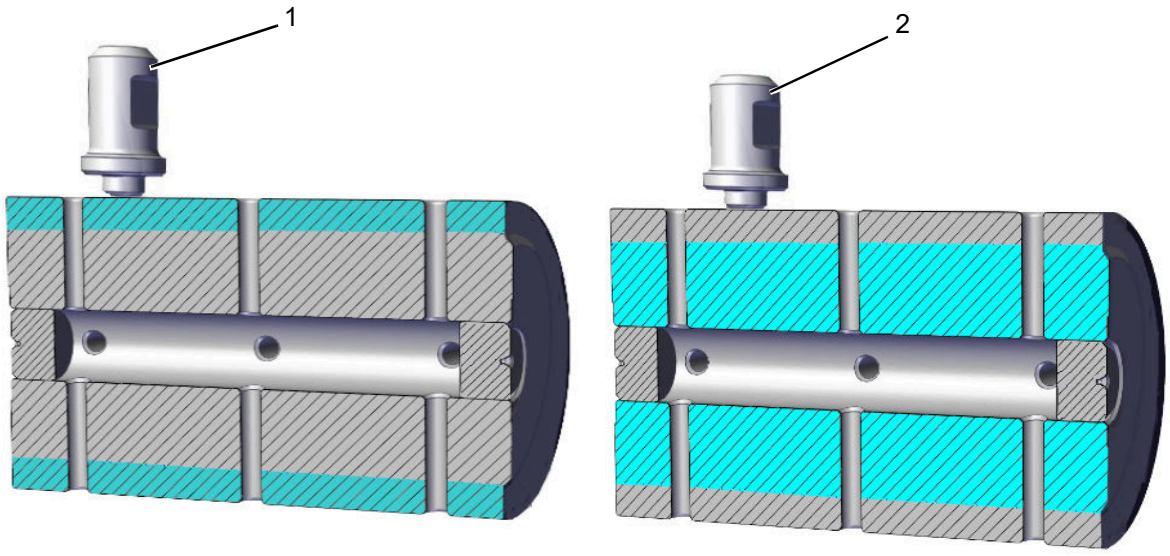
- The test area is the entire piston pin volume. This volume must be tested by radial scanning with T/R and straight beam probes.
- The required overlap of the probe track is at least 50% of the probe's effective diameter.

3.1 T/R probe (4/1)

- Set the screen to a range of **0 mm** to **95 mm** to display also the back wall signal for coupling control. This also enables the observation of (moving) signals from potential surface cracks which appear "behind" the back wall.

3.2 Straight beam probe (4/2)

- Set the screen to a range that starts at a value between **15 and 25 mm** and ends at **85 mm** to achieve good resolution of the critical zone close to the axial bore.



4 Schematic diagram

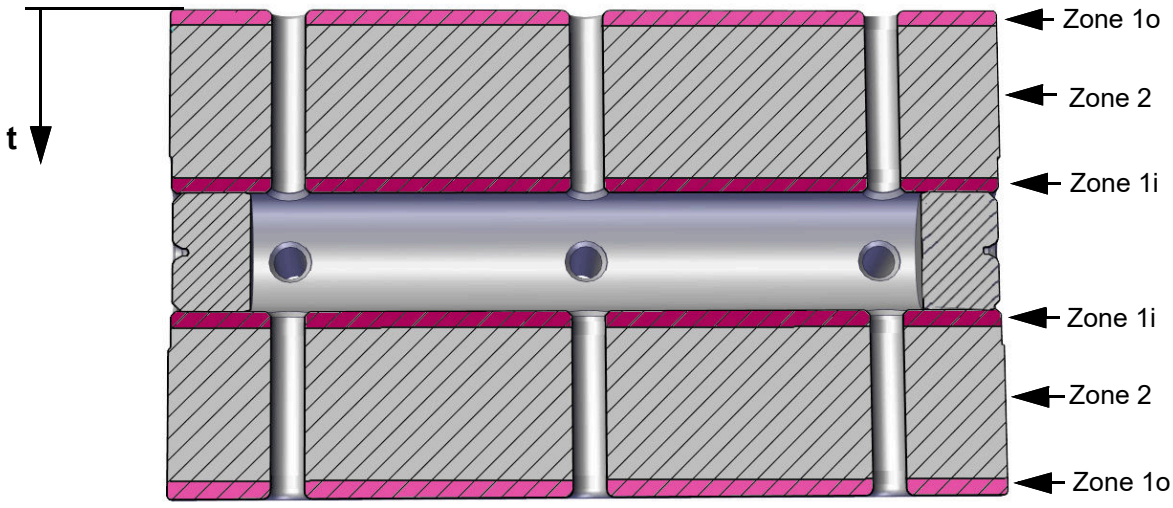
4. Evaluation

4.1 Zone 1 comprises hardening layer

- Zone 1o (outer): **0 mm < t < 10 mm**
  - Rejection level for single indication: **ERS ≥ 0.6 mm**
- Zone 1i (inner): **67.5 mm < t < 77.5mm**
  - Rejection level for single indication: **ERS ≥ 0.4 mm**

4.2 Zone 2 comprises internal volume

- Zone 2: **10 mm ≤ t ≤ 67.5 mm**
  - Rejection level for single indication: **ERS ≥ 1.0 mm**
  - Registration limit: **ERS ≥ 0.6 mm**
- Cluster of indications with ERS < 1.0 mm to be rejected if distance between single indications is below **40 mm**.



5 Schematic diagram

02

5. Documentation

5.1 Engine

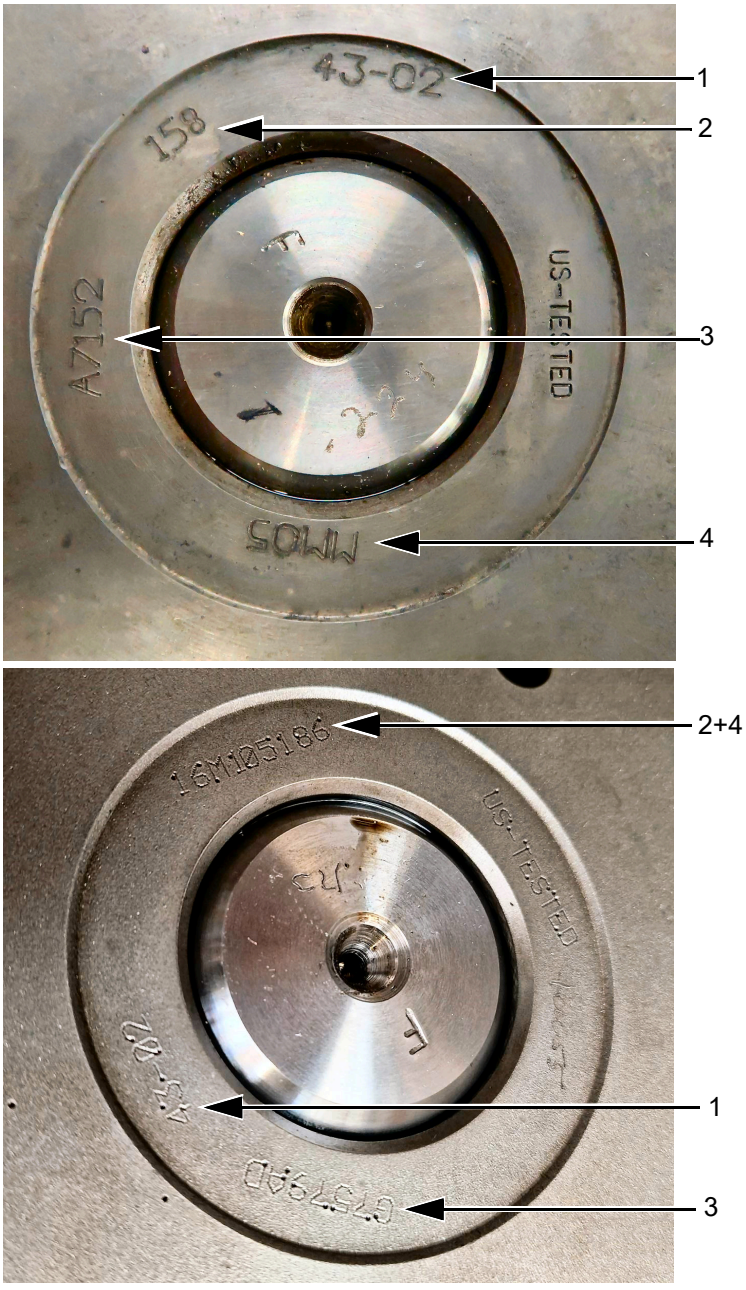
- Serial number
- Cylinder unit
- Running hours

5.2 UT equipment

- Type
- Serial number
- Adjustment values

5.3 Piston pin

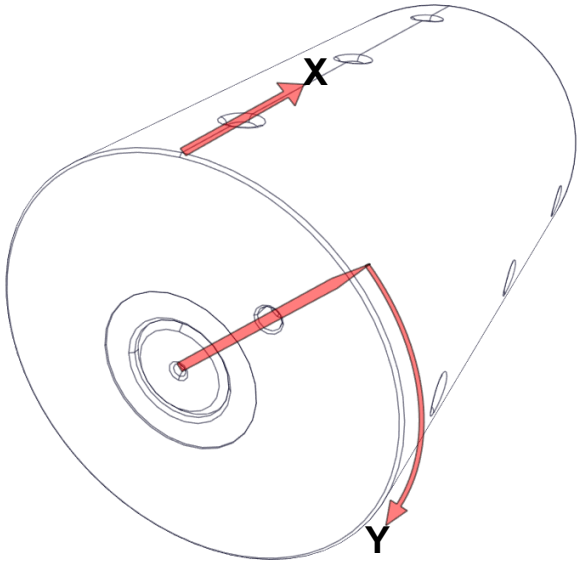
- Variant (**6**/1)
- Serial number (**6**/2)
- Batch number (**6**/3)
- Production year (**6**/4)
- Running hours



6 Schematic diagram

5.4 Test result for each piston pin

- Size of indication (ERS)
- Location of indication:
  - **X** [mm], axial distance from piston pin face side with pivot hole.
  - **Y** [mm], circumferential distance from pivot hole angular position.
  - depth



7 Schematic diagram