

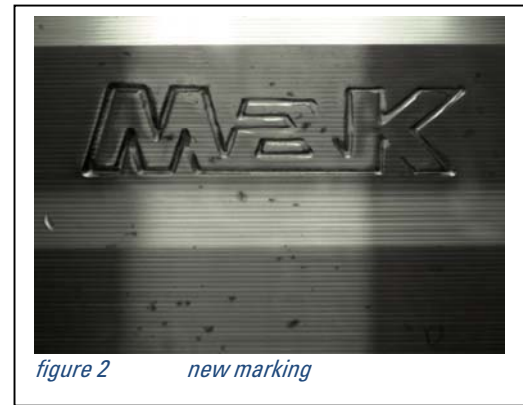
Date: November 28, 2017
Subject: OEM valve appearance and marking
Engine type: All

Caterpillar confidential: green

Information about OEM valves used in MaK and Caterpillar branded Medium Speed Engines and distributed as OEM spare parts.

Continuous product development, new production methods and meeting today's environmental needs have led to different visual appearances of our valves. In the following we would like to inform about different possible appearances to avoid confusion.

- Newly produced valves will bear our **MAK** brand logo instead of the letters "MaK" (see figure 1 and 2). Valves with both markings can be original.



- Most valves used for new engines were made on a different production line, where the marking looked slightly different again (smaller letters, "MAK" instead of "MaK" only on a certain small production batch, see figure 3). Valves with such markings as initial equipment in an engine or on complete cylinder heads delivered as spare part are original as well.



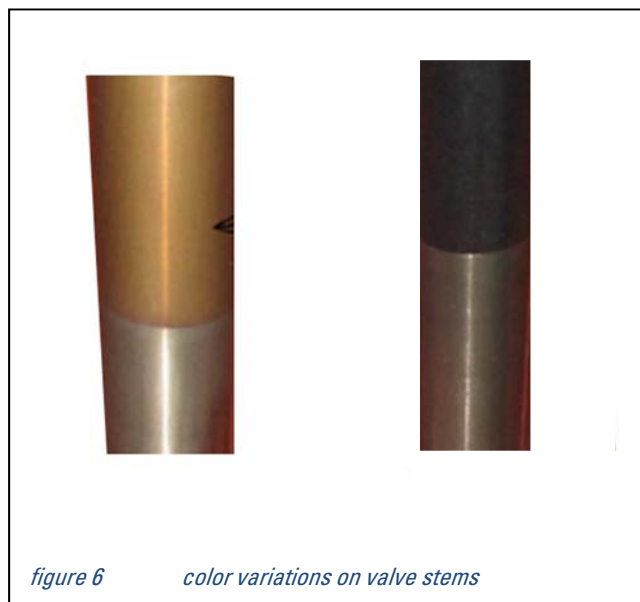
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- Newly produced exhaust valves will be marked with "EX" instead of "OUT" (see figures 4 and 5)



- Valve stems can be of different color caused by acceptable variations in the manufacturing process (see figure 6). The stem of an original valve can be of almost any color between yellow and black. This is a visual difference only and has no relevance for the performance of the valve.



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- The appearance of the top valve disk side has changed from dull (drag finished) to shiny (deep rolled) (see figures 7 and 8). On a small production batch ball blasting had to be used, creating a dull, grey surface (see figure 9). Valves with all three variants can be original. This is a visual difference only and has no relevance for the performance of the valve.



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- The appearance of the bottom valve disk side on exhaust valves has changed from a unicolor dull surface (drag finished) to multi colored (precision turned and heat treated, see figure 10 and 11). Valves of both variants can be original. This is a visual difference only and has no relevance for the performance of the valve.



figure 10 drag finished, dull surface

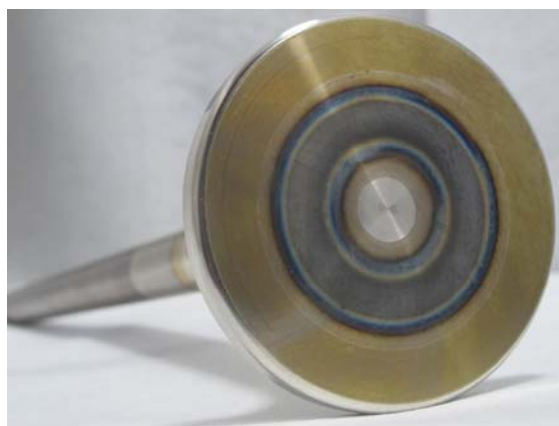


figure 11 Precision turned and heat treated surface