

Technical Service Bulletin Number

TSB150069



Technical Service Bulletin

Subject

Anti-Polishing Ring Cylinder Liner Release to Prevent Bore Polish and Elevated Oil Consumption Caused by Piston Top Land Carbon Packing

Warranty Statement

The information in this document has no effect on present warranty coverage or repair practices, nor does it authorize TRP or Campaign actions.

Contents

Product Affected

- ISX15 (All Versions)
- QSX15 (All Versions)

Issue

Cylinder liner bore polish and elevated oil consumption caused by piston top land carbon packing.

When heavy cylinder liner bore polish occurs the customer may experience the following symptoms:

- Oil consumption rate exceeding the maximum allowable limit. See Oil Consumption Evaluator by clicking the link below.
 - **NOTE:** https://qsol.cummins.com/qs3/portal/service/oil_consumption/index.html
- If equipped, aftertreatment diesel particulate filter (DPF) frequent regeneration [fault codes 3375, 3376, 2639, 1921, 1922, and 5383].
- Oil degradation and filter plugging [low oil pressure fault codes 143 or 415].
- If equipped, variable geometry turbocharger actuator sticking [fault code 2387].

For more information on lubricating oil consumption and causes of carbon packing. Refer to Service Bulletin, Lubricating Oil Consumption and Acceptable Limits, Bulletin [3379214](#).

Verification

For heavy cylinder liner bore polish inspection criteria. See Procedure 001-028 in Section 1 of the corresponding Service Manual.

Resolution

Anti-polishing ring cylinder liners have been released for production and service to control cylinder liner bore polish caused by piston top land carbon packing. If heavy cylinder liner bore polish is identified as a result of piston carbon packing, the cylinder liners should be replaced with anti-polishing ring cylinder liners.

NOTE: If an engine is equipped with a DPF, a DPF Restriction Test must be run after completion of carbon packing and cylinder liner polishing repairs. For instructions on completing the DPF Restriction Test see Procedure 011-085 in Section 11 of the corresponding Service Manual or within INSITE™ electronic service tool.

NOTE: Elevated oil consumption can lead to EGR, if equipped, and air handling component deposit formation. See the appropriate component service procedures for inspection and cleaning criteria.

Part Identification

The anti-polishing ring is a removable carbon scraper ring that installs in a counterbore machined into the top of the cylinder liner. The anti-polishing ring overhangs the cylinder liner bore and continuously scrapes carbon from the piston top land area. This overhang controls the carbon thickness so that the carbon does **not** contact the cylinder liner and accelerate bore polish. See Figure 1.



Figure 1, Cross-Section of Cylinder Liner, Anti-Polishing Ring, Piston, and Piston Ring Assembly

Part Compatibility

CAUTION

Not all pistons and cylinder blocks are compatible with anti-polishing ring cylinder liners. Pistons that are **not** compatible with anti-polishing ring cylinder liners can cause severe engine damage. Pistons can vary by piston skirt design, piston top ring location, and piston top land diameter. Identify the piston before proceeding to use anti-polishing ring cylinder liners

CAUTION

Closed skirt pistons are **not** compatible with engines that have open skirt pistons. Engines can **not** have a mix of open skirt and closed skirt pistons due to piston weight. Severe engine damage may occur if open skirt and closed skirt pistons are intermixed.

NOTE: Mixing of anti-polishing ring cylinder liner with non-anti-polishing ring cylinder liners within an engine is not recommended. The engine should have either all anti-polishing ring cylinder liners or all non-anti-polishing ring cylinder liners at the completion of repair

NOTE: If pistons are changed from high top ring pistons to low top ring pistons, the cylinder liners can not be reused. This piston change creates a ring spacing difference in the cylinder liner wear pattern and can lead to ring seating and sealing issues.

For more information on identifying pistons see Service Bulletin, ISX15 and QSX15 Piston and Cylinder Liner Change History, Identification and Compatibility, Bulletin [4383774](#).

After identifying the existing piston that an engine has installed, see Table 2 to determine if a piston upgrade is necessary. If the part number can **not** be found on the piston, reference QuickServe® Online parts section for the specific Engine Serial Number (ESN).

Open skirt pistons will remain available for single cylinder repairs on engines equipped with open skirt pistons.

For six cylinder piston upgrades, upgrade to low top ring, closed skirt pistons which are compatible with anti-polishing ring cylinder liners. If replacing all 6 pistons, use the engine overhaul kits listed in the following link. The engine overhaul kits already contain the correct pistons and anti-polishing cylinder liners.

NOTE: https://qsol.cummins.com/qs3/qsol/products/newparts/cummins_ISX_overhaul_prog_2011.html

Service Parts Availability

The cylinder liners are kitted with either a service shim or captive shim that is .8128 mm [.032 inch] thick.

The liner has been cutback to accommodate this shim therefore the use of this shim is required. On blocks that have been machined, a second service shim will need to be stacked to account for the block machined depth. Block machining is **only** permitted to maximum of .8128 mm [.032 inch] so shims can **not** continue to be stacked to allow deeper block machining.

Service parts are available. See Table 1.

Anti-polishing ring cylinder liner kits include the anti-polishing ring. The anti-polishing ring is serviceable and can be replaced without replacing the cylinder liner. The anti-polishing ring, Part Number 3689871, can be ordered separately from the liner kits.

Table 1, Cylinder Liner Types						
Cylinder Liner Part Number	Cylinder Liner Kit Part Number	Anti-Polishing Ring	Cylinder Liner Outer Diameter	Mid Stop Liner Shim	Cylinder Liner Top	Identification Bands Machined Around The Bottom O.D. of Cylinder Liner
3690557	4376168	Yes	150 mm	Captive Shim Pre-Installed	Flat Top	2
4373362	4376391	Yes	152 mm	Shim	Flat Top	2
4311633	4309389	No	150 mm	Captive Shim Pre-Installed	Flat Top	1
4374092	4376392	No	152 mm	Shim	Flat Top	1
3682025	3800453	No	150 mm	No Shim	Groove Top	0

For more information on visual identification and measurement locations. Refer to Service Bulletin, ISX15 and QSX15 Piston and Cylinder Liner Change History, Identification and Compatibility, Bulletin [4383774](#).

Table 2, Piston Compatibility with Anti-Polishing Ring Cylinder Liners						
Piston Part Number	Piston Skirt Type	Piston Top Ring Location	Piston Top Land Diameter	Anti-Polishing Ring Cylinder Liner Compatible	Replacement Piston Part Number Compatible with Anti-Polishing Ring Cylinder Liner	Replacement Piston Kit Part Number Compatible with Anti-Polishing Ring Cylinder Liner
3687897 (CM2250)	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	2882080 (CM2250)
3687897 (CM2350)	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	4309337 (CM2350)
			Reduced			

3688405	Closed	Low Top Ring	Diameter Top Land	Yes	3687897	2882080
3688099	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	2881758
3688100 (CM2250)	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	2882023 (CM2250)
3688100 (CM2350)	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	4309338 (CM2350)
4357149	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	4376245
4357150	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	4376241
4367126	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	4376242
4367132	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	4376246
4367161	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	4376243
4367173	Closed	Low Top Ring	Reduced Diameter Top Land	Yes	Current Piston	4376244
3687605	Closed	Low Top Ring	Non-Reduced Diameter Top Land	No	3687897	2882080
			Non-Reduced			

3686366	Closed	Low Top Ring	Diameter Top Land	No	3688099	2881758
3687177	Closed	Low Top Ring	Non-Reduced Diameter Top Land	No	3688100	2882023
4298991	Open	High Top Ring	Reduced Diameter Top Land	No	4357149 ¹	4376245 ¹
4298992	Open	High Top Ring	Reduced Diameter Top Land	No	4367132 ¹	4376246 ¹
2882635	Closed	High Top Ring	Reduced Diameter Top Land	No	4357150	4376241
2882636	Closed	High Top Ring	Reduced Diameter Top Land	No	4367126	4376242
2882630	Closed	High Top Ring	Reduced Diameter Top Land	No	4367161	4376243
2882631	Closed	High Top Ring	Reduced Diameter Top Land	No	4367173	4376244
4923747	Open	High Top Ring	Non-Reduced Diameter Top Land	No	4367161 ¹	4376243 ¹
4923743	Open	High Top Ring	Non-Reduced Diameter Top Land	No	4367173 ¹	4376244 ¹
4923746	Open	High Top Ring	Non-Reduced Diameter Top	No	4367126 ¹	4376242 ¹

			Land			
4923745	Open	High Top Ring	Non-Reduced Diameter Top Land	No	4357150 ¹	4376241 ¹
3104186	Open	High Top Ring	Non-Reduced Diameter Top Land	No	4357149 ¹	4376245 ¹
3684467	Closed	High Top Ring	Non-Reduced Diameter Top Land	No	4367173	4376244
3684472	Closed	High Top Ring	Non-Reduced Diameter Top Land	No	4367161	4376243
2863938	Closed	High Top Ring	Non-Reduced Diameter Top Land	No	4357150	4376241
2863939	Closed	High Top Ring	Non-Reduced Diameter Top Land	No	4367126	4376242
4923744	Open	High Top Ring	Non-Reduced Diameter Top Land	No	4367132 ¹	4376246 ¹

¹The replacement anti-polishing ring compatible pistons in this row can **only** be up fit as a 6 cylinder upgrade. If less than 6 pistons are being replaced and the engine currently has open skirt pistons then the replacement piston **must** be the open skirt design.

Anti-Polishing Ring Service Tools Available

Service tool kit part number 5299448 has been created for repairs involving cylinder liner removal. The following tools are included in this kit.

For more information on the use of anti-polishing ring service tools, see Procedure 001-054 in Section 01 in the corresponding Service Manual.

1. Piston Ring Compressor Adaptor, Part Number 5299339, is required to install the piston, piston ring, and connecting rod assembly into an anti-polishing ring cylinder liner. See Procedure 001-054 in Section 1 for more information on using the Piston Ring Compressor Adaptor.
 - o The piston, piston ring, and connecting rod assembly will **not** install into the anti-polishing ring cylinder liner with the anti-polishing ring installed because the inside diameter of the anti-polishing ring is too small for the piston rings to fit through. The Piston Ring Compressor Adaptor installs into the counterbore at the top of the cylinder liner which creates a flush surface so that the piston, piston ring, and connecting rod assembly can pass into the bore without catching the piston rings in the counterbore See Figure 2.
2. Anti-Polishing Ring Removal Snap Rings, Part Number 5299447, can be used to remove the anti-polishing ring from the cylinder liner when removing the anti-polishing ring by hand is difficult. Most anti-polishing ring's will be removable by hand. Install the Anti-Polishing Ring Removal Snap Rings tool into the cylinder liner below the anti-polishing ring. Bar the engine over. As the piston moves to top dead center, the piston will push the snap ring up against the anti-polishing ring. This action will drive the anti-polishing ring out of the cylinder liner. See Figure 3.



[SMALL](#) | [MEDIUM](#) | [LARGE](#)

Figure 2, Piston Ring Compressor Adapter



[SMALL](#) | [MEDIUM](#) | [LARGE](#)

Figure 3, Anti-Polishing Ring Removal Snap Rings

Production Status

Anti-polishing ring cylinder liners have been implemented for production. See Table 4.

Table 4, Anti-Polishing Ring Cylinder Liner Production Information		
Product	ESN First	Build Date
ISX15/QSX15 CM2250 & CM2350 [Single Camshaft Engines]	79797859	5 December 2014
ISX/QSX CM871, CM870, CM570 [Dual Camshaft Engines]	Not Available	30 January 2015
Engine build date can be found on the engine dataplate.		

Document History

Date	Details
2015-5-13	Module Created
2016-1-26	Inserted note in Part Compatibility section. Removed note in Service Parts Availability section. Added statement on shim stacking. Updated Table 1 part numbers.

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