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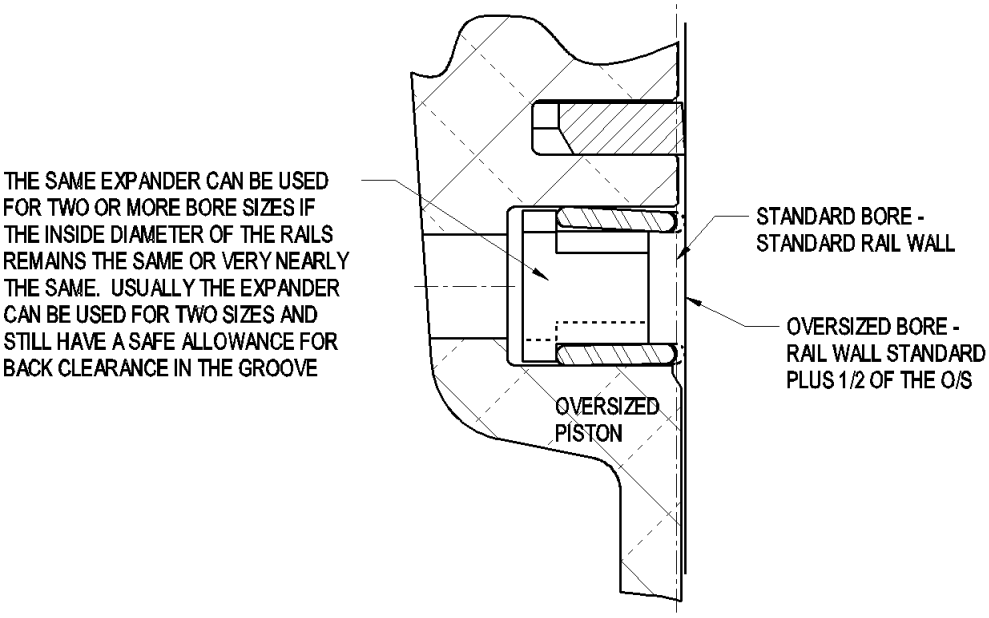
Tough Guy Tech Tip: *Oil Rail Expander and Rail Function and Operation*

An oil ring expander has two functions: One is to act as a spacer to keep the rails apart and positioned in the groove. The other is to provide outward or expansive force on the rails to make them scrape oil from the cylinder bore.

In order to provide the outward force, the expander must be compressed by the rails acting upon the tabs or ears on the inner edge of the expander. It is the inside diameter of the rail that controls the expander compression.

The rail outside diameter must be sized to fit the cylinder bore. There are rails made for each standard and oversize ring set offered with the 3-piece oil rings.

The selection of the rail radial wall and the bore diameter determine the rail inside diameter. Since a rail must be made for every oversize it is possible in some cases to select a rail wall that will allow the same expander used for the standard size to be used in an oversized bore with a rail having a thicker radial wall.



Hastings does use more than one rail with a given expander in many cases in order to build more than one ring set. For this reason and several others, the use of a flexible band to determine the suitability of an expander for a particular bore size is not practical.

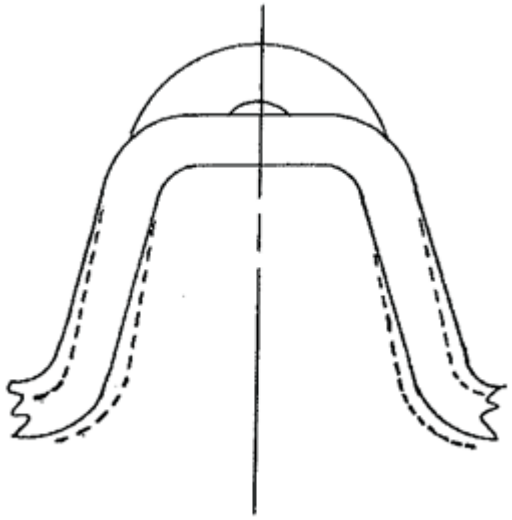
Another reason that the flexible band is not a reliable indicator of expander to bore size fit is the variation in spring rates that results from different wire thickness. Wire is selected for expanders from stock sizes, which have widths varying in .002” increments and wall dimensions in .005” increments. With bigger diameter bores the same wire will produce an expander that has more diameter change (called deflection), all other aspects being equal.

Hastings Manufacturing Company, 325 N. Hanover St., Hastings, MI 49058 USA
Phone 269-945-2491 • Fax 269-945-4667 • www.hastingspistonrings.com

YEARS OF INNOVATION

Placing an oil ring expander in a cylinder bore without the correct rails to access tension or proper application will not work. Expander tension is very complex taking into account wire size, pitch length, rail wall, bore diameter, unit pressure, and deflection all playing a factor in the mathematical calculation.

This illustration depicts expander deflection, which generates tension:



The solid line is the expander relaxed and the dotted line is the compressed state.

The only reliable method of checking oil ring expanders is to assemble the oil ring assembly (expander and correct rails) into a grooved plug and measure the tension required to close the assembly to bore diameter with a flexible band. Hastings Manufacturing Company and other ring manufacturers all employ this method of checking 3-piece oil ring tension.

Regarding installation into the engine cylinder bore, the free (non-installed) gap of the flex-vent is immaterial since it is an abutment type expander and the ends of the expander are butted together when installed and compressed to bore diameter. The expander is a compression spring and the ends must butt when installed to compress the expander. The free gap of the expander is inconsequential except in regards to the ease of loading on the piston.

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