

# ***PERFECT CIRCLE®***

## ***The Piston Ring of Choice When Only The Best Will Do.***

### **Piston Ring Materials**

Until recently, grey iron or ductile iron has been the material of choice for automotive applications. Today, steel is preferred over iron by more and more engine designers.

Steel compression ring technology, pioneered by Perfect Circle, has been used in heavy-duty engine applications for nearly thirty years. That knowhow has become essential to the design and engineering of today's automotive engines.

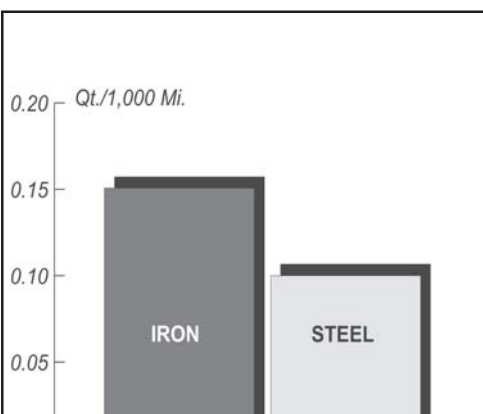
### **Why Steel?**

Today's engines put greater demand on piston rings than ever before: Higher operating temperatures, higher compression, higher stress and tighter restrictive emission standards. All of these factors have created the need for a ring that is stronger, harder, seals better and resists breakage and wear under load. The answer is steel-SAE-9254 high alloy steel. It's another evolution in engine design and rebuilding.

### **Lower Oil Consumption**

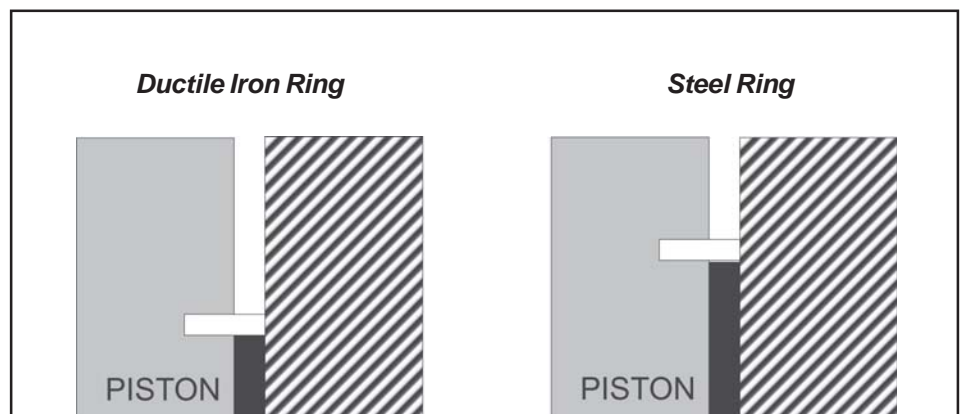
The use of steel in the design of a piston ring allows a reduction in the radial wall thickness which will provide several benefits. First, the lighter ring will seal against the bottom of the ring groove more effectively. Secondly, the smaller cross section, permitted by the greater strength, improves the ability of the ring to conform better to less than perfect cylinders. Both features mean that oil consumption is reduced.

### ***Here's why:***



**Figure 1**  
**Oil Consumption and Blow-By**

The smaller cross-section of a steel ring seals against the bottom of the groove more effectively. Steel also improves the ring's ability to conform to the cylinder wall.



**Figure 2**  
**Ring Placement**

In new engines, the smaller cross-section and reduced ring wall of steel rings allow the top ring groove to be placed nearer the top of the piston to reduce exhaust emissions.

## Lower Exhaust Emissions

In the design and engineering of pistons for new engines, the strength of the steel permits the ring groove to be nearer to the top of the piston to reduce exhaust emissions (see figure 2). The design reduces the crevice volume between the top of the ring and the top of the piston. In turn, this means that fewer unburned particulates in diesel engines and fewer hydrocarbons in gasoline engines are being trapped and exhausted to the atmosphere.

## The Strength of Steel

Compared to ductile or grey iron, the inherent strength of high alloy steel means there's less chance of ring breakage (see figure 3). Steel also provides longer service life and a reduction in ring side wear and ring groove poundout (see figure 4). Note that these road tests were conducted in both automotive and truck engines.

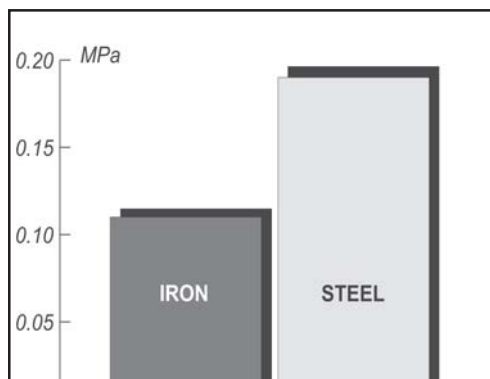
## Steel Piston Rings

### Advantages:

- Higher tensile strength
- Higher yield strength
- Greater fatigue life
- Greater hardness
- Lower ring mass

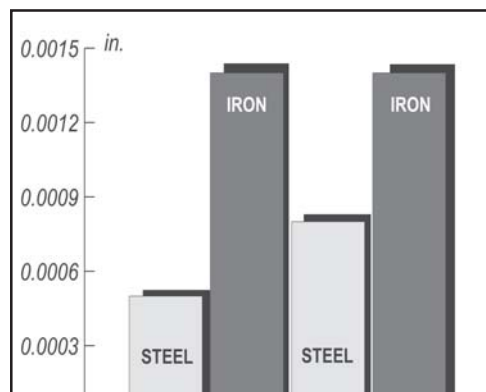
### Benefits:

- Better stress resistance
- Reduced groove poundout
- Longer service life
- Better conformability
- Superior oil economy
- Superior blow-by control
- Lower friction



**Figure 3**  
**Tensile Strength**

Only top rings of steel can provide the tensile strength, hardness and fatigue resistance required on today's engines.



**Figure 4**  
**Piston Ring Side Wear**

Steel rings provide longer service life, reduces side wear and minimizes groove poundout.

## **Perfect Circle® – The Ring Leader**

Whether you're repairing a modern computer controlled engine or rebuilding an older engine, be sure to specify Perfect Circle quality piston rings - trusted by professional automotive technicians for nearly 100 years.

Perfect Circle® piston rings are the most extensive and technically advanced rings in the industry. Driven by today's requirements for reduced oil consumption, lower friction, higher power output and longer life, Perfect Circle is out front with the latest technology.

All three piston rings have been pre-lapped to remove edges, ensuring the smoothest fit possible. Plus, dozens of combinations allow for specific materials that match exact engine requirements — including lightweight steel for high-speed applications. Ring tension is optimized due to engine-specific design configurations. And unlike our competitors, we even test each ring to be "Light tight."

Our easy-to-install CP-20™ piston ring sets outmatch the competition every time. There's no needed for wire latches or nylon blocks and the chances of pop-out and assembly overlap are next to none.