



Is it really the Water Ferrule's fault?

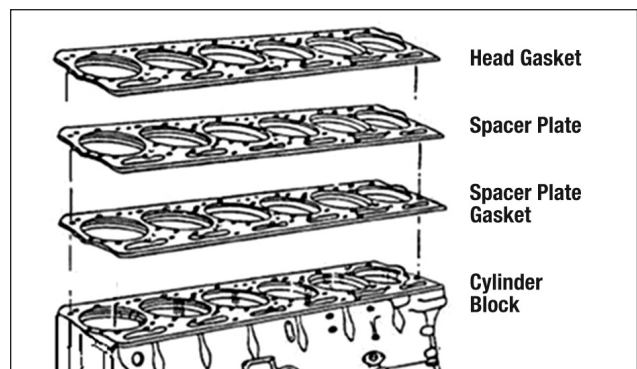
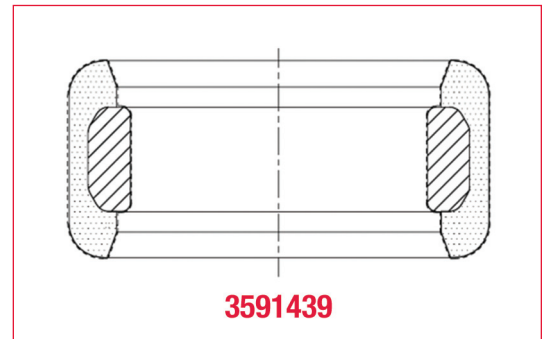
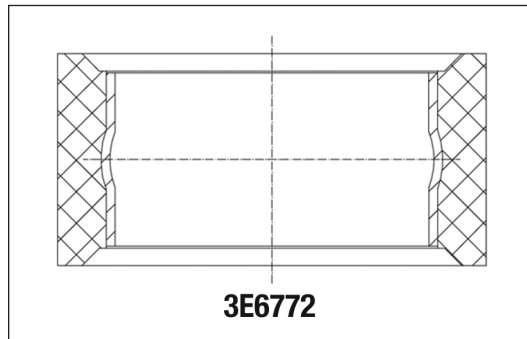
BY **STEVE SCOTT**

Over the years there have been several updates to the water ferrules in Caterpillar® 3406 and C15 engines (see sidebar “Background” further in this article). While a leaking ferrule may not cause a major failure, it’s not uncommon to remove the cylinder head and find rusted head bolts from a ferrule that was no longer sealing. A rough list of the updates and changes to these ferrules is outlined in the sidebar. However, that’s not the main point of this article. Our hope is to give you a short explanation of the two different water ferrules you may encounter, and a condition you might not expect to find.

The current 3E6772 water ferrule is made from black HSN (highly saturated nitrile) and incorporates a stainless-steel insert. There is another water ferrule that you may encounter that is not a direct replacement for the 3E6772, or at least not for in-line engines. Listed as an optional replacement by the OEM is the red, 3591439 ferrules. The OEM did not specify the material, but introduced it as having material and design improvements. The 3591439 is primarily listed in V-block engines (3408, 3412, C27, and C32) and in some select applications.

Beyond the color and material, the profiles of these water ferrules are also different. The black 3E6772 is straight sided, slightly taller, and made of softer material. The 3591439 is contoured, shorter, has a smaller insert, and is coated red.

If they are installed correctly, have reasonable sealing surfaces and operating conditions either water ferrule should function without issue. The surface conditions of the cylinder block and cylinder head is important for the ferrules to seal against. If either surface has been damaged by erosion the block or head may need to be repaired and resurfaced to restock the seal area. But it’s the



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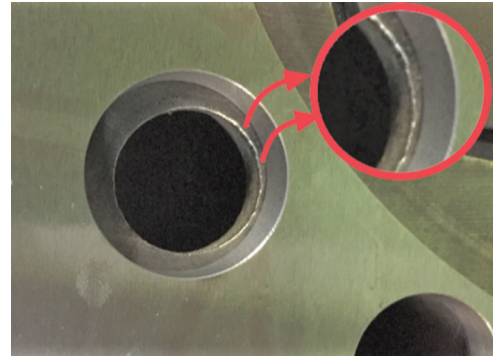
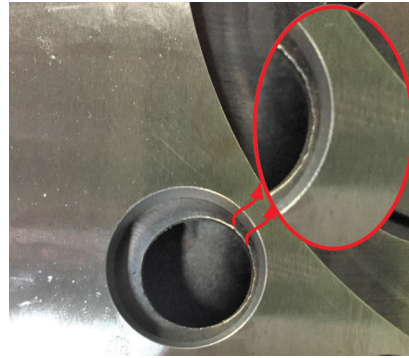
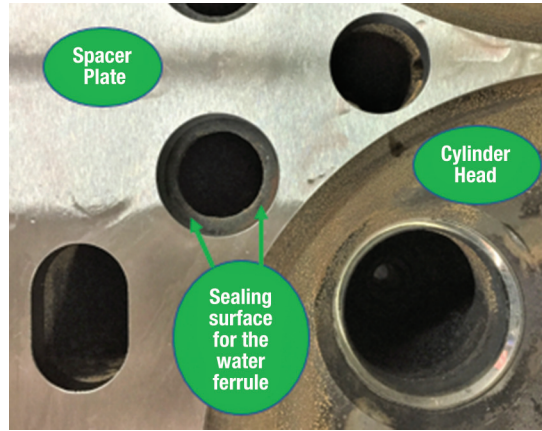
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unexpected condition mentioned above that could keep either ferrule from sealing. If you've read this far into this article, you're likely familiar with where these water ferrules go and how they are installed. Generally, you install the spacer plate gasket (shim), spacer plate, ferrules, head gasket, and cylinder head (do not forget the o-rings).

With the spacer plate positioned on a used cylinder head, the photo at the right shows what you would typically expect to see. The water port in the spacer plate and head are aligned leaving an even sealing surface for the water ferrule.

Before assembling these components, you might be amazed at what you may find if you turn the cylinder head over and align the spacer plate on it first. Regrettably, you might be disappointed to find that some of the ports do not align and leave little or no surface for the water ferrule to seal to.

It is possible that the location of the holes in the spacer plate are out of position, and that certainly needs to be investigated and eliminated first since it's the least expensive to replace. Unfortunately, the examples shown in these photos



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were confirmed to be problems with the locations of the ports in these cylinder heads. This leaves the rebuilder, or engine owner, in a difficult situation. Depending on how far off the misalignment is, the black 3E6772 ferrule may seal better due to its straight sided profile, or possibly the red 3591439 ferrule due to its shorter height and harder material. If the misalignment is too far off then replacing the cylinder head may be the only option.

Hopefully the information provided in this article will help someone identify a potentially unique condition before it evolves into a bigger problem. Mistakes happen, and parts can fail, but if there's not enough surface area to support the seal its not the ferrule's fault. Don't blame the messenger. The ferrule may only be telling you of a condition you may not have considered looking for. ■

Background

The history of these updates is a little cloudy, but roughly goes back in the 1980s when the 4N2269 ferrule was replaced by the 4W1055. The 4W1055 was made from EPDM material that resisted becoming prematurely set or hardened by steam but would soften or swell if it encountered oil or fuel. This ferrule was replaced by the 7C9912, made of silicone. These ferrules were then followed by the current 3E6772, made from black HSN (highly saturated nitrile), which had even a greater resistance to coolant, fuel, or oil than the previous ferrules. The 3E6772 also incorporated a stainless-steel insert. The 3591439 was introduced as an optional replacement by the OEM as having material and design improvements. The 3591439 is primarily listed in V-block engines (3408, 3412, C27, and C32) and in some select applications.

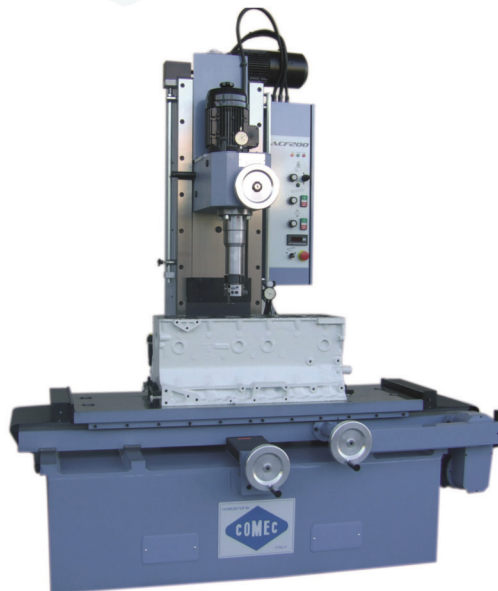


Steve Scott joined the service department at IPD in 1982, working with parts, service and sales for a variety of equipment, diesel, and natural gas engines. Since 2004, he has been the director of product development and technical support for IPD. For more information, email sscott@ipdparts.com.



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