

FROM: Product Engineering **DATE:** January 5, 2016
SUBJECT: Forged Steel Valves and Fittings; Phosphate Coating Surface Protection;
Update to BF-PE-LTR-2013-018
KEYWORDS: Carbon Alloy Steel
PERMISSIONS: External

In late 2014, Bonney Forge issued letters BF-PE-LTR-2013-018-1 and -2, for “Corrosion Protective Coating” requirements. As a follow up, Bonney Forge has conducted additional testing at 3rd party laboratories showing the benefits of phosphate coating and the dangers with using a product that has an oil coating.

To recap, the product design standards (e.g. ASME B16.11 Fittings, MSS SP-97 Branch Connections, and ASME B16.34 / API 602 Valves) reference the ASTM material standards (e.g. ASTM A105, A182 and A350). These ASTM material standards all require ASTM A961, which covers common requirements for manufacture, heat treatment, mechanical testing, etc. Because of the hierarchy of standards, the corrosion protective coating requirement is invoked in all products manufactured to the material and design standards. Some manufacturers utilize a non-compliant method of corrosion protection, which includes using oil in the manufacturing process or even simply using the residual cutting oils applied during machining steps as the surface protectant.

New test data has identified serious dangers and risks associated with using an oil-coated product. First, oil is a fuel, and inherently welding on any oil-coated part will react in the presence of oxygen. To validate this fact, independent 3rd party testing was conducted to compare the effects of welding oil-coated fittings versus phosphate-coated fittings. The results in Figure 1 shows that oil can cause a dangerous flame that is not present when a phosphate fitting is welded as shown in Figure 2.



Figure 1: Flame After Welding Oil Coated Fitting



Figure 2: No Flame After Welding Phosphate Coated Fitting

Second, welding on fittings oil-coated or corroded or both corrosion and oil contamination results in weld porosity. Weld porosity causes pinhole leaks and premature cracking failure of the weld, which is dangerous and costly to fix.

Third, oil coating is not a corrosion protection while phosphate coating is. Testing was conducted by 3rd party on oil-coated and phosphate-coated fittings to measure the corrosion resistance in the presence of salt. A 24-hour salt spray fog test was performed in accordance with ASTM B117-11, which yielded results of shown in Figure 3.



Figure 3: Oil-Coated and Phosphate-Coated Fittings After 24-Hour Salt Fog Test

Bonney Forge has supplied fittings and valves with phosphate coatings as a standard for over 40 years. Some of the key benefits are:

- Meets ASTM A961 – 14 requirements
- No danger from fire / flame-ups
- No danger from weld-porosity
- Is a corrosion protection (oil-coating is NOT)
- Reduces thread friction
- Phosphate is also used for general painting without a primer where there are no severe service requirements



Videos of the welding testing and additional resources on phosphate coating performance can be found at www.bonneyforge.com.

Please contact Bonney Forge for more information on phosphate coatings or any questions related to the above information.

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