

Threaded Connections on High Temperature Applications

Purpose

This bulletin advises customers of problems encountered with threaded connections (radiograph plugs, thermowells, drains or pressure connections) in high temperature applications.

Problem

Creep swelling, coupled with forces resulting from high temperature oxidation of the threads, has a significant effect on the retaining capacity of threaded connections operating above 900F.

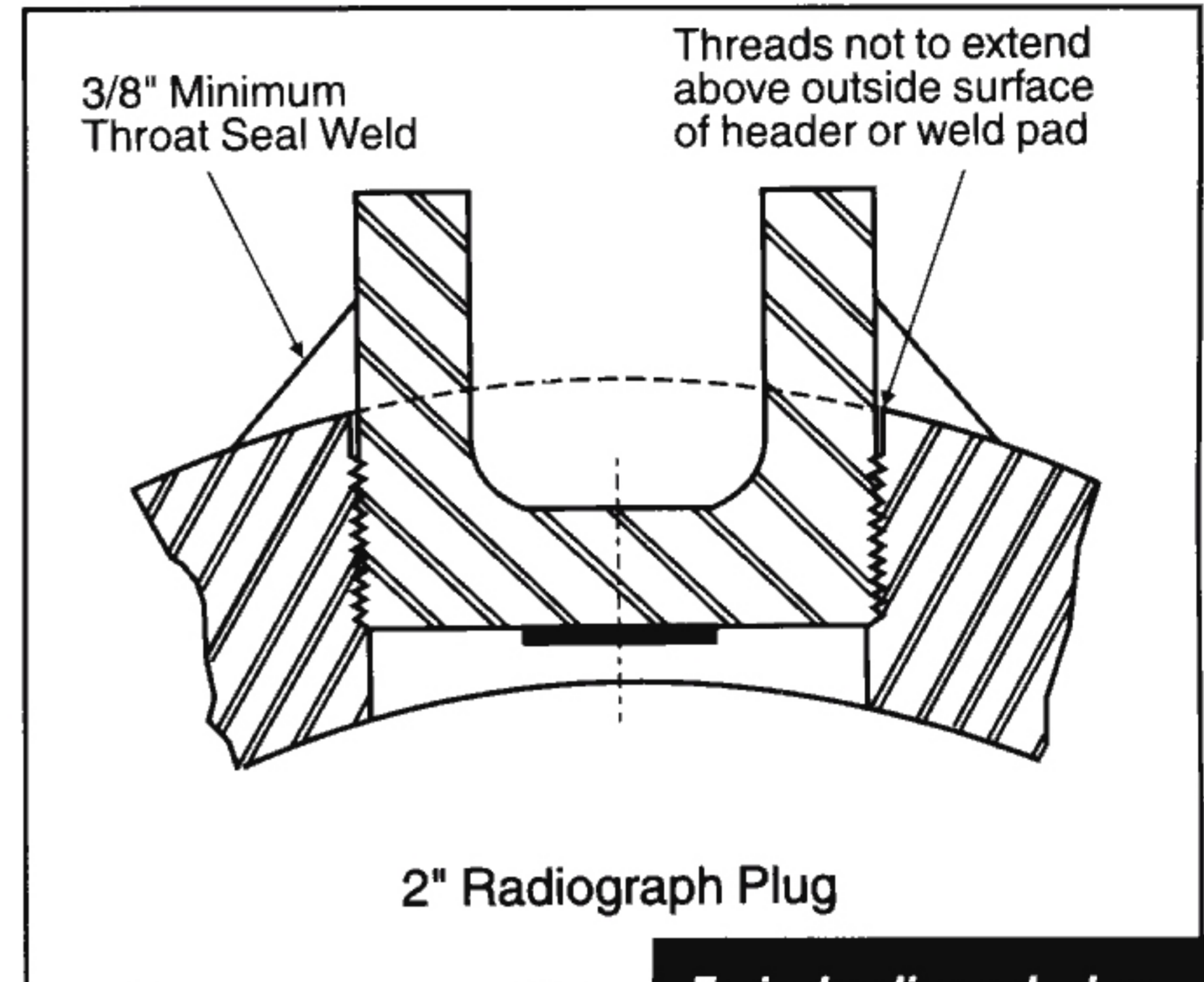
The threaded connections are designed to have the threads retain the design pressure of the component, with a seal weld for additional leakage protection. Due to creep (elongation) of the threaded hole, thread engagement loss may occur, particularly on high pressure units in components operating at or above 900F. In addition, oxidation of the threads slowly reduces their load-carrying cross-section. The retention load on the threaded connection may gradually shift from the threads to the seal weld. Since these seal welds are not designed for full design pressure retention, failure may occur after threads have lost engagement.

Warning

Failures may cause excessive leakage and over-pressurize casing enclosures (such as the boiler pent-house) if the location of the threaded connection happens to be inside the enclosure. This could result in extensive casing failure and possible personnel injury.

Recommendations

All threaded connections in headers, piping and other boiler components operating at or above 900F should be dye penetrant or magnetic particle inspected. Components which may contain these connections include the primary superheater outlet header, secondary superheater outlet header, reheater outlet header, all header drain and vent piping associated



with these components, and any other high temperature areas not mentioned above.

A visual inspection could reveal the following:

1. Seal weld cracks
2. Stainless steel fittings — dissimilar material is a potential problem
3. Creep swelling of the header or piping diameter — dimensional measurements should be taken and compared to the original
4. Thread deterioration (both male and female threads) — inspect all removed plugs

The following is a step-by-step procedure to assist in evaluating the extent of the problems:

1. Review plant operating and maintenance records of weld repairs made to all threaded connections. If any connections have been repaired, even once after long-term operation, this could indicate a general deterioration of threads.
2. Perform dye penetrant or magnetic particle inspection of the seal welds and the surrounding

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- base metal. If this inspection uncovers cracking, the connection should be removed and carefully examined for thread condition.
3. Replace all stainless fittings with fittings of the same alloy as the piping or header to avoid dissimilar welds in high temperature applications.
 4. The absence of surface cracks does not necessarily mean the threads are good. Creep swelling of the threaded hole should be measured during outages and the percent increase from original design noted. Any increase from the original is a potential problem.

5. Changing the seal weld to a larger strength weld may be considered. Replacing threaded connections with welded type may be considered. All such welds should be stress relieved.

Support

If any questions arise or assistance is required, contact Babcock & Wilcox Field Service Engineering.

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