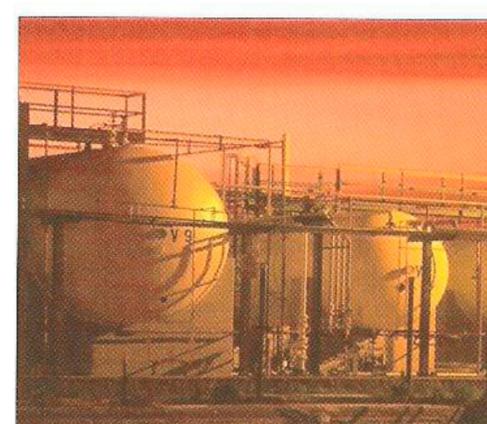
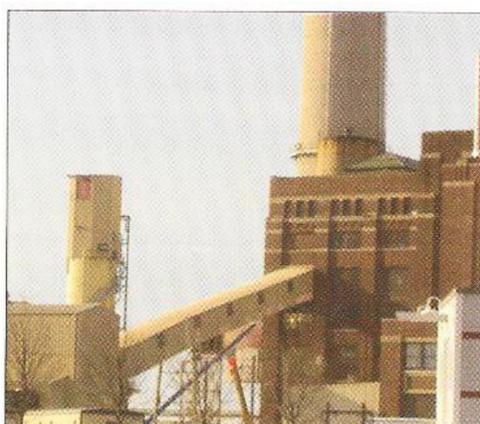




When you need a better connection™



Carbon Steel • Stainless Steel • Copper Nickel • Brass
Fittings for Pipe and Tubing Applications

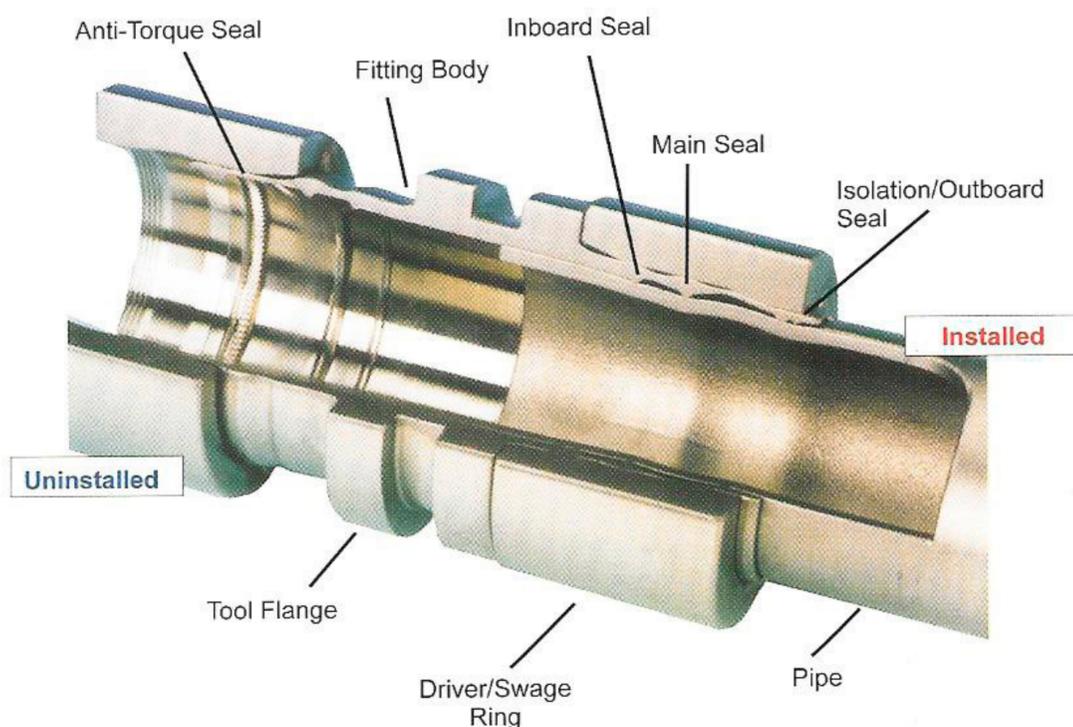
Advantages of Lokring Fittings

1. Permanent Connection — No Maintenance and No Repair
 2. No Hot Work — Potential Reduction of OSHA Incidents
 3. Secure Tamper-Proof Fittings — No Threads, Ferrule-Free, No Wrenches
 4. No Purge or Flushing — Zero Contamination Compared to Welding
 5. ANSI/ASME B31.1 & B31.3 Qualified
 6. Visual Inspection — Non-Destructive (X-Ray) Testing is Unnecessary
 7. Reliable Weld Equivalent Connection
 8. The Only Mechanically Attached Fitting to Meet API 607 Fire Test
 9. Increased Job Scheduling — Ten Times Faster than Welding
 10. Increased Productivity — Fast and Easy to Install
 11. U-Shaped LOKTOOL™ Allows for Single Plane of Axis During Assembly — Easy Access for Close Space Pipe/Tube Runs
- (Detailed documentation at www.lokring.com)

WHEN and WHERE Should LOKRING Fittings Be Used?

- ✓ In confined spaces
- ✓ Underwater
- ✓ On jobs where flammable or explosive conditions may exist
- ✓ On jobs where plant downtime is costly and problematic
- ✓ On jobs that require working with medical gas systems
- ✓ For quick and easy repair/rework
- ✓ To free up ASME-certified welders for large bore pipe or pressure vessel welding
- ✓ In all weather conditions
- ✓ On small or large projects

Elastic Strain Preload (ESP®) Technology



During installation, the axial movement of the LOKRING™ driver over the fitting body swages the body onto the pipe surface, compressing the pipe wall first elastically and then plastically. The pipe wall resists this swaging action, generating high unit compressive loads at the contact points between narrow sealing lands inside the fitting body and the pipe surface.

These contact stresses are sufficiently high to plastically yield the pipe surface under the multiple sealing lands, forming a 360 degree circumferential, permanent, metal-to-metal seal between the pipe and fitting body. The driver, which experiences a small increase in diameter (elastic strain) during installation, exerts an elastic, radial pre-load on the metallic seals for the life of the connection.

LOKRING Meets the Strictest Air Resource Board Qualification (California)

No other connector (flanged or threaded) is capable of passing helium leak testing anywhere close to the level of a LOKRING fitting. LOKRING was independently tested to 2×10^{-11} atmospheric cc/sec Helium leak rate.

In fact, the fitting meets all the criteria of a welded connection, except that no heat is required to make the connection.

The quality of a LOKRING connection has now been recognized by the California Air Resources Board (CARB). CARB, through their equipment and process pre-certification program, has granted LOKRING pre-certification status through executive order G-096-029-R03.

The California Air Resources Board through their evaluation program has given LOKRING equivalent to WELDED status.

NOTE: Please contact LOKRING Customer Services for a copy of our preliminary Position Paper Relating to Fugitive Emissions.



Technical Approvals/Qualifications

Lloyd's Register #98-60070(E1)
CRN #0A0481
TSSA-QA 00899
Hartford Boiler CSA-B51-95
API-607 Rev 4 Fire Test
ASTM-F1387 NAVSEA
ANSI/ASME B31.1, B31.3
Association of American Railroads
U.S. Coast Guard
NFPA 30
California Air Resources Board
American Bureau of Shipping
NFPA 99



ASME B31 Qualifications and Testing

Both stainless and carbon steel LOKRING fittings are qualified to the requirements of the ASME B31.1 and B-31.3 pressure piping codes for pressure and fatigue design and materials of construction.

Extensive mechanical and environmental testing has demonstrated the mechanical and sealing integrity of the LOKRING connection in a wide range of applications and environmental conditions.

Pressure-Torsion Testing:

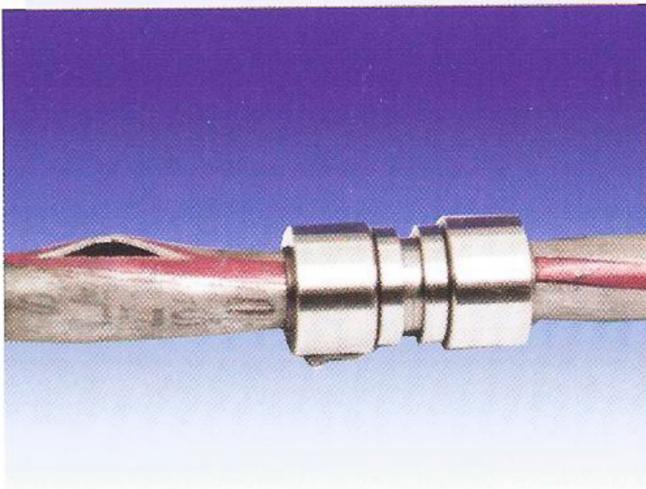


Figure 1: ASME testing

The 1/2" NPS stainless steel test fitting was subjected to torsional loading high enough to twist the pipe in a spiral without leakage of the joint.

Afterwards, during hydraulic testing, the pipe ruptured at 22,000 psi (1497 bar).

Flexural Testing:

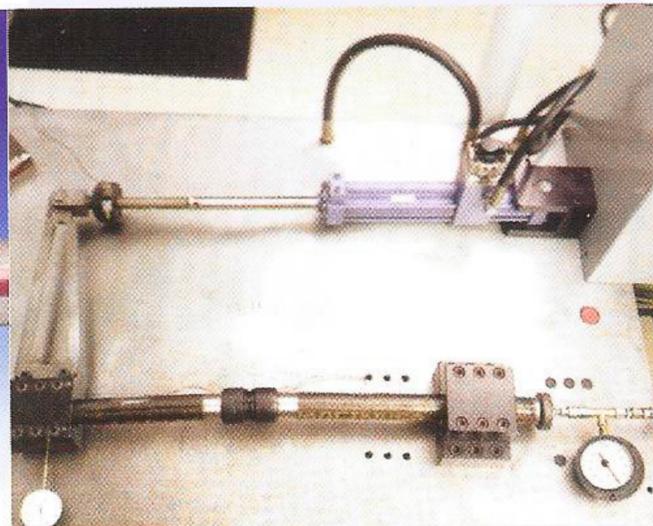


Figure 2: Fatigue testing

The 2" NPS carbon steel coupling above has been deflected to 3x the yield strength of the matching pipe without leaking.

The performance of this fitting in severe bending, fatigue, and vibration loads is comparable or superior to a socket weld fitting.

Fire Testing:

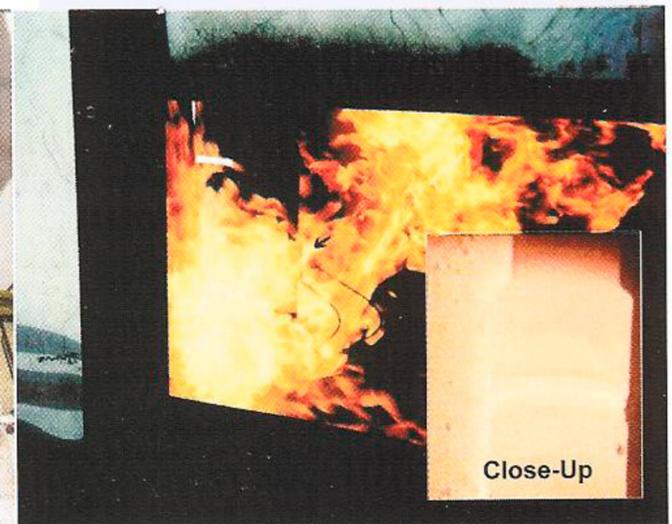


Figure 3: Fire Testing

The metal-to-metal LOKRING seal remains intact when subjected to extreme thermal loads, including fire (above). Stainless and carbon steel LOKRING fittings are qualified to the API-607 Rev 4, fire test standards. Stainless steel fittings and CuNi 90/10 and 70/30 are also qualified to F1387 (U.S. Navy) fire test standards. Both are widely used on volatile and flammable services.