|  |
| --- |
| *Tube Turns “W” Series Monolithic Insulated Joints* |
| **Series W insulated joints** are prefabricated one-piece unions of butt-weld forged body construction. IJs protect against corrosion damage by electrically isolating pipeline segments and equipment from stray DC picked-up from adjacent pipelines, electric railway systems, and other nearby sources of DC.  **Engineering To Order:** IJs are designed to ASME B31.4 and B41.8 and are **manufactured to any diameter or wall thickness** using ASME/ASTM materials that match the metallurgy and yield strength of your existing pipe. IJs are coated to prevent corrosion, are fully tested electrically, hydrostatically & weld tested and are **through-bored** to allow for the passage of pigs & scrapers.  Each IJ is **serialized**, **heat code identified** and **traceable** (MTRs furnished on all pressure retaining components).  **IJs are used where**   * High pressure gas transmission pipelines * Liquids pipelines of all types * To join **pipe ends** of **different yield strengths** and **wall thicknesses** * Onshore, offshore, buried, aboveground or subsea * In “sweet” (non-corrosive) or “sour” corrosive applications * Gas gathering systems; distribution and branch lines * Installed on inlet and outlet pipes to isolate meters, tanks, pump and compressor stations from the main CP system   **Benefits of Monolithic Construction**   * Solid one-piece butt-weld forged body construction * Simple Installation: one continuous weld on each side of the pipe to install * Factory assembled (eliminates field assembly) * **Same metallurgy, yield strength, WT as matching pipe** * Leak-proof (completely sealed internally and to the external environment) * **Boltless** monolithic design is maintenance-free (**eliminates bolted connections**) * **Fully tested** to verify mechanical integrity and electrical resistance (hydrostatically, electrically and weld tested) * **Coated internally and externally** w/non-conductive **two-part epoxy resin coatings** of different types * *Engineered to Order*: **custom built** to your specifications: **same metallurgy**, **yield strength**, **WT** as matching pipe * Hubs of **Dual Certified** or **Triple Certified:** SA105/SA350 LF2 CL1 and ASTM A694-F52; higher yield mat’l available * Each insulated joint is **traceable,** **serialized and heat code identified** * **Certified Material Test Reports (MTRs)** furnished on all pressure retaining components * **Made in the US** with **US sourced materials** at our **ISO Certified** ASME facility in **Louisville, KY** * **Standard 8-week delivery**   ***Design Codes and Standards***   * ASME B31.4 Liquid Petroleum Transportation Piping Systems * ASME B31.8 Gas Transmission and Distribution Piping Systems * ASME BPVC Sec VIII Div. 1 and 2 * ASME BPVC Sec II Materials * ASME BPVC Sec V NDE * ASME Sec IX Welding * ASTM applicable material standards (A694) |
| ***Sizes/Ratings***  ***Size 2 – 48-inch – ASME CL 150 - 900***   * ASME CL150 (**WP = 285 psi**) - hydrostatic test pressure **=** **450 psi** for 15 min **(**1.5x design pressure) * ASME CL300 (**WP = 740 psi**) - hydrostatic test pressure **= 1125 psi** for 15 min **(**1.5x design pressure) * ASME CL600 (**WP = 1480 psi**) - hydrostatic test pressure **=** **2225 psi** for 15 min **(1**.5x design pressure) * ASME CL900 (**WP = 2220 psi**) - hydrostatic test pressure **=** **3350 psi** for 15 min **(1**.5x design pressure) * **DF = 0.5** is standard (depends on **spec** and **“Location Class”** per B31.4/B31.8)   ***Prototype Testing (refer to page 4 of IJ brochure for test results)***   * **Prototype tested**: IJs have a resistance to mechanical and thermal stresses that ***exceed the strength of the pipeline*** * **Pressure Fatigue Tested**: subjected to rapid pressure cycles to 2300 psi then hydro tested for mechanical integrity * **Torsion Tested**: Subjected to a torsional moment enough to produce a stress in the attached X65 pipe of 10% of MSYS * **Bend Tested**: CL600 IJs subjected to externally applied bending loads while under full rated internal pressure |
| ***Standard Welding Hub Materials: ASTM A694/ASME SA105 or SA106 Gr C 52k min yield)***   * **Pipe** (2 – 6 inch) SA 106 Gr C 52,000K min yield strength * **Forgings** (8-inch +) **A694 F52** ***Dual Certified*** (52,000 min yield strength) and either **SA105** or **SA350LF2 CL1**    + Or hubs are ***Triple Certified*** – SA105/SA350LF2 CL1/A694-F52   + **When matching higher yield strength pipe**, dia. at weld bevel can be increased to meet piping code requirements such as ASME B31.8 Fig. I5 or higher yield materials can be used; F60, F65, F70 * All material **serialized, heat code identified and traceable** * **Forged** or **pipe bodies** welded under a **compression load** (design calcs available) * **Strict limits on Carbon Equivalent** **(%CE)** .045% max or to customer spec   + %CEregards how different alloying elements affect the hardness of steel and its weldability   + Material chemistry impacts weld quality |
| ***Mechanical Leak Test***   * Each IJ individually **Hydrostatically Tested to 1.5 x design pressure** (or customer spec) |
| ***Electrical testing:***   * *Resistance* test (std) – able to withstand an applied voltage of 1000 V DC (std is 25 megohm min resistance)   + Most IJs exhibit resistance > 2000 megohms * *Dielectric Strength* test (std test to meas. **current leakage**): 5kV AC @50 Hz for 1 min. (max leakage 5mA)   + A *non-destructive test*; no data on voltage that would cause arcing; safely say it’s > 5,000 VAC   + A test to determine “***breakdown voltage***” would be a destructive test |
| ***ASME Section IX Welding***   * All welding done in-house by company certified welders working to **written welding procedure specifications** * SMAW, GTAW, GMAW, SAW, ERW * Full-time welding engineer in-house * Weld Test report (UT) furnished on yoke closure welds |
| **Coating - Non-Conductive Two-Part Bonded Epoxy Resin Coatings**   * Each IJ blast cleaned to white metal and coated inside/outside w/2 coats of non-conductive epoxy resin * Sprayed to within 2” of each weld end * Internally coated w/ non-conductive epoxy resin to prevent bridging of the insulating gap * Two-part bonded epoxy coating options:   + **Akzo Noble** std two-part non-conductive epoxy coatings inside/outside   + **Denso Protal 7200** two-part non-conductive epoxy coatings inside/outside |
| ***Data Package Includes:***   * **Hydrostatic** **test report** (1.5 x design pressure) * **Electrical test report** (resistance & withstand) * **Weld test report** (UT of closure welds/ends) * **Certified MTRs** for all metallic components * **Approval Drwg** – when requested (includes SN, Heat #, Size, Class, Materials, Hydrotest pressure, Insulator, Coating) * **Stress calculations** (when requested) |
| ***Insulator (GRE)***   * Type **FR-4 (Flame Retardant) H**igh Strength **Glass Reinforced Epoxy Resin Laminate** (GRE) * **Ultra-strong plastic** – Ultimate Tensile Strength of 45,000 psi (Cast Iron 29K, Cooper 31K, Alum 45K) * Min electrical strength 15,000 Volts * The world’s most commonly used electrical insulator * **Non-hygroscopic**, waterproof (Near zero water absorption) * Highly **chemically resistant** to a range of hydrocarbons * Retain its high **mechanical values** and **electrical insulating** qualities in both dry and humid conditions * ***Dielectric filler material*** *is liquid epoxy fills body cavity voids (data sheet available)* |
| ***FKM O-rings (Internal seals) are:***   * Dual static, self-energized **FKM/Viton** * Housed in grooves machined into each weld hub * Under compression and locked into position to provide a positive pressure seal * Completely sealed internally and to atmosphere |
| ***Marking – Forging and Pipe Traceability***   * ***Each IJ marked by low stress steel stencil on outside of yoke:*** * Mfg name * Serial # * Size/Pressure Class * Material Heat # * Material Heat # also marked on outside of hub |
| ***Bore/Beveled Weld Ends:***   * All IJs **through-bored** to allow passage of pigs and scrapers * Weld ends to **match corresponding pipe ends** per API 5L (30 deg), ASME B31.8, B16.25, MSS SP75 or customer spec |
| ***Tube Turns Certifications/ASME Designations Louisville, KY plant:***   * ISO Certified 9001-2015 Quality Mgt System * U Stamp holder * U2 Stamp holder * R Stamp holder – NB Cert of Auth for shop/field repair * Continuous Improvement: Lean Mfg concepts, Six Sigma, PMP * 10 degreed engineers * 1 Full time welding engineer * 1 Full time NB Authorized Inspector |
| **US made at our ASME facility in Louisville, KY**   * Weld Hubs made with **US sourced** forged carbon steel rolled rings * Series W complies with “**Buy America**” provisions * Standard **8-week delivery** after approvals, if required |