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| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | August 12, 2014 | First draft review (AV) |
| 3 | June 8, 2015 | Second Draft for Review (AV) |
| **4** | **September 16, 2015** | **Updated, Finalized Specification – Reference eDOCS #5823665-v5 (AV)** |
| 5 | May 25, 2017 | Updated references to standards ASME B16.11-2016, ASTM A182/A182M-16a, ASTM A194/A194M-17, ASTM A307-14e1, ASTM A312/A312M-17, ASTM A320/A320M-17a, ASTM A403/A403M-16, ASTM A563-15, MSS SP-43-2013/AM 2015, (AAM) |
| 6 | August 16, 2017 | Revised listed products (CPD, OMM) |

NOTE:

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| **Item** | **Size** | **Description** |
| Pipe | All | ASTM A312/A312M-17 Type 304 or Type 316 welded annealed, pickled and passivated. Use Type 304L or Type 316L for welded joints. |
| 50 mm & smaller | Schedule 40S. |
| 60 mm to 200 mm | Schedule 10S. |
| 200 mm & larger | Schedule 5S. |
| Tubing | 19 mm OD & smaller | ASTM A312/A312M-17 Type 316 seamless, soft annealed, 2 mm wall thickness minimum. |
| Pipe Joints | 19 mm & smaller | Threaded or flanged at equipment as required or shown on the Drawings. |
| 25 mm & 40 mm | Socket weld or flanged at equipment as required or shown on the Drawings. |
| 50 mm & larger | Butt-welded or flanged at valves and equipment as required or shown on the Drawings. |
| Tubing Joints | All | Flare-less compression fitting or socket-weld. |
| Pipe Fittings | 19 mm & smaller | Threaded Forged: ASTM A182/A182M-16a, Grade F304 or F316, 20,700 kPag WOG. |
| 25 mm and 40 mm | Socket Weld Forged: ASTM A182/A182M-16a, Grade F304L or F316L, 13,800 kPag WOG. |
| 50 mm & larger | Butt Welded: ASTM A403/A403M-16, Grade WP304L or WP316L conforming to ANSI B16.9-2012 and MSS SP-43-2013/AM 2015, annealed, pickled and passivated; fitting wall thickness to match adjoining pipe; long radius elbows unless shown otherwise. |
| Tubing Fittings | All | Flare-less Compression Type Forged: ASTM A182/A182M-16a, Grade F304 or F316. |
| Socket Welded: ASTM A182/A182M-16a, ASTM F1387 - 99(2012), Grade F304L or F316L. |

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| Pipe Branch Connections | Smaller than 19mm | Tee or reducing tee in conformance with Fittings above. |
| 50mm & smaller to 19 mm | 40mm and Smaller Branch: Forged Sockolet or half coupling, 13,800kpag WOG ASTM A182/A182M-16a, Grade F304L or F316L. |
| Larger than 50 mm | Butt-Welded Tee or Reducing Tee: In accordance with Fittings above; Forged Weldolet, 13,800 kPag WOG ASTM A182/A182M-16a, Grade F304L or F316L same inside diameter as branch pipe. |
| Tubing Branch Connections | All | Compression type or socket-weld tees or reducing tees in accordance with Tubing Fittings above. |
| Flanges | All | Forged: ASTM A182/A182M-16a Rev C Grade F304L or F316L, Class 150 or Class 300, slip-on welding neck, 1.5 mm raised face, ASME B16.5-2013 standard. |
| Unions | 19 mm & smaller | Threaded Forged: ASTM A182/A182M-16a, Grade F304 or F316, 13,800 kPag- or 20,700 kPag WOG, integral ground seats, AAR design meeting the requirements of ASME B16.11-2016, bore to match pipe. |
| 25 mm & 40 mm | Socket Weld Forged: ASTM A182/A182M-16a Rev C Grade F304L or F316L, 13,800 kPag- or 20,700 kPag WOG, integral ground seats, AAR design meeting the requirements of ASME B16.11-2016, bore to match pipe. |
| Bolting | All | General Conditions: Type 316, ASTM A193/A193M-16, Grade B8M hex head bolts and ASTM A194/A194M-17 Grade 8M hex head nuts.  Corrosive Conditions: Type 304 stainless steel bolts, ASTM A320/A320M-17a Grade B8 with copper-silicon hex head nuts ASTM B98/B98M-13 Grade A.  When mating flange on valve or equipment is cast iron and gasket is flat ring, provide ASTM A307-14e1 Grade B hex head bolts and ASTM A563-15 Grade A heavy hex nuts. |
| Gaskets | All Flanges | 1.5 mm thick virgin Teflon or inorganic filled Teflon flat ring type for raised face flanges and full face type for flat face flanges[, NSF-61 approved].  Acceptable Manufacturers:   1. EnPro Industries, Garlock® 2. Chesterton® Global Solutions 3. Approved Equivalent |
| Thread Lubricant | 50 mm & smaller | *[Designer Note: Ensure product meets design pressure requirements]*  Approved products:   1. Teflon tape 2. Oxyseal thread lubricant 3. Approved Equivalent. |

**END OF SECTION**