

UNIVERSITY OF IOWA MAIN POWER PLANT (MPP) PIPING STANDARD SPECIFICATIONS
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PIPE SPECIFICATION	SYSTEM	DESIGN CONDITIONS		MPP OPERATING CONDITIONS		UIHC OPERATING CONDITIONS		PAGE	REV	DATE
		PRESSURE (PSIG)	TEMPERATURE (°F)	PRESSURE (PSIG)	TEMPERATURE (°F)	PRESSURE (PSIG)	TEMPERATURE (°F)			
UI-GSP	GENERAL SERVICE PIPING	150	350	N/A	N/A	N/A	N/A	2	2	2/22/2021
UI-MPP-LPS	MAIN POWER PLANT LOW PRESSURE STEAM	50	530	20	300	12	300	3	5	2/22/2021
UI-MPP-MPS	MAIN POWER PLANT MEDIUM PRESSURE STEAM	325	775	155	350	155	370	4	6	2/22/2021
UI-MPP-HPS	MAIN POWER PLANT HIGH PRESSURE STEAM	600	775	500	750	N/A	N/A	5	6	2/22/2021
UI-MPP-LP-CON	MAIN POWER PLANT LOW PRESSURE CONDENSATE	50	530	20	300	12	300	6	4	2/22/2021
UI-MPP-MP-CON	MAIN POWER PLANT MEDIUM PRESSURE CONDENSATE	325	775	155	350	155	370	7	4	2/22/2021
UI-MPP-HP-CON	MAIN POWER PLANT HIGH PRESSURE CONDENSATE	600	775	500	750	N/A	N/A	8	4	2/22/2021
UI-MPP-VENT	RELIEF DEVICE VENT PIPING	600	775	NOTE 1		NOTE 1		9	1	2/22/2021
UI-MPP-ED	EQUIPMENT DRAIN PIPING	600	775	NOTE 1		NOTE 1		10	1	2/22/2021
UI-DSH	DESUPERHEATER	800	400	700	240	N/A	N/A	11	4	2/22/2021
UI-MPP-FW	BOILER FEEDWATER	800	400	700	245	250	245	12	4	2/22/2021
UI-GFS	NATURAL GAS	150	150	58	55		90	13	3	2/22/2021
UI-AIR	COMPRESSED AIR	150	150	80-100	75	90	75	14	3	2/22/2021
UI-MUS-PWS	MAKE-UP WATER	150	150	100	55	60	55	15	6	2/22/2021
UI-MUS-PWS	POTABLE WATER	150	150	60	55	60	55	15	6	2/22/2021
UI-NPW	NON-POTABLE WATER	150	150	60	55	60	55	16	5	2/22/2021
UI-CWS-CWR	COOLING WATER	100	100	65	98	N/A	N/A	17	6	2/22/2021
UI-SEW	SANITARY SEWER	15	140	0	75	0	75	18	0	2/22/2021
UI-RWS	RIVER WATER	100	120	75	90	N/A	N/A	19	2	2/22/2021
UI-MPP-BOS-BDS	BOILER BLOWOFF	600	500	535	480	180	370	20	4	2/22/2021
UI-MPP-BOS-BDS	BOILER BLOWDOWN	600	500	535	480	180	370	20	4	2/22/2021
UI-CHEM (SS)	CHEMICAL FEED	150	140	NOTE 1		NOTE 1		21	2	2/22/2021
UI-CHEM (PVC)	CHEMICAL FEED	150	140	NOTE 1		NOTE 1		22	0	2/22/2021
UI-TOS	TURBINE OIL	300	200	245	150	N/A	N/A	23	2	2/22/2021
UI-MPP-ASH	ASH SYSTEM	-6	685	-1	685	N/A	N/A	24	1	2/22/2021
UI-VAC	VACUUM SYSTEM	-6	100	--	--	N/A	N/A	25	1	9/22/2017
	BRANCH TABLE	N/A	N/A	N/A	N/A	N/A	N/A	26	1	2/22/2021

NOTES

- 1) OPERATING CONDITIONS DETERMINED ON A SYSTEM BY SYSTEM BASIS
- 2) ALL SYSTEMS ARE ABOVE GROUND UNLESS OTHERWISE STATED

GENERAL SERVICE PIPING (TO 150 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-GSP	PIPE SIZE (NPS)	GENERAL SERVICE		150 PSIG AT 350 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 24"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS		STD	
	CONSTRUCTION	A53 GRADE B - SEAMLESS		A53 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM A105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
	OTHER	WHERE FLANGE OR THREAD REQUIRED		WHERE FLANGE REQUIRED	
UNIONS:	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN		NOT PERMITTED	
	WALL THICKNESS	SAME AS ADJOINING PIPE		--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		--	
FLANGES:	CONSTRUCTION	CLASS 150 - WELD NECK - ASME B16.5			
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		FORGED CARBON STEEL - ASTM A105	
FLANGE BOLTS:	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7			
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H			
WASHER:	CONSTRUCTION	F436			
GASKETS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES			
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER			
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
	MATERIAL	ASTM A106 CARBON STEEL			
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1		2	2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
UI-GSP	CARBON STEEL	150 PSIG	ASME B31.1	ASME B16.34	
GATE VALVE	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 24"	
	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING: GRAPHITE		BODY/BONNET: A216 GR. WCB SEAT RING: STELLITE 6 FACED DISC/WEDGE: A217 GR. CA15 OR WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SS WITH GRAPHITE	
VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 1503 CRANE FIGURE 47 BONNEY FORGE 1-11 RF		
BUTTERFLY VALVE	CONNECTION AND RATING	--		CLASS 150 FLANGED ENDS (LUG STYLE)	
	CONSTRUCTION	--		BODY/BONNET: A216 GR. WCB SEAT RING: PTFE/RTFE/UHMWPE DISC: A351 CF8M SHAFT: 17-4 PH PACKING: PTFE GLAND: 304 SS	
	VALVE SELECTION	--		POWELL FIGURE 1572 JAMESBURY SERIES 815 FLOWSEAL TYPE 1LA	
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: STELLITE 6 FACED 410 SS DISC: 13% CR GASKET: SPIRAL WOUND		BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 1561 CRANE FIGURE 147 BONNEY FORGE 1-61 RF	
BALL VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS (UP TO 6")	
	CONSTRUCTION	BODY/BONNET: ASTM A216 TYPE WCB SEAT RING: PTFE BALL: SS 316 SEAL: PTFE PACKING: GRAPHITE LOCKING HANDLE		BODY/BONNET: A105 OR WCB (BOLTED) SEAT RING: MPTFE/PTFE/RPTFE BALL AND STEM: SS 316 PACKING: PTFE AND GRAPHITE BODY SEAL: SS 316 GRAPHITE LOCKING LEVER (3" AND SMALLER) LOCKING GEAR OPERATOR (4" AND LARGER)	
GLOBE VALVE	VALVE SELECTION	JAMESBURY SERIES 4000 MODEL A KITZ AW800 SCK KECKLEY BVM3		VELAN UB-150 JAMESBURY SERIES 7000 KECKLEY BVF1	
	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARDFACED) DISC: 420SST TRIM: 13% Cr STEM: A183 F6A PACKING: GRAPHITE GASKET: SPIRAL WOUND SST WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SST WITH GRAPHITE	
VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 1531 CRANE FIGURE 143 BONNEY FORGE 1-31 RF		
REVISION HISTORY					
NUMBER	DESCRIPTION			DATE	
1	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN			11/22/2017	
2	UPDATED LARGE BORE BUTTERFLY SPECIFICATION; VALVE SELECTIONS			2/22/2021	

LOW PRESSURE STEAM (TO 50 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-MPP-LPS	PIPE SIZE (NPS)	LOW PRESSURE STEAM		50 PSIG AT 530 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 24"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS		STD	
	CONSTRUCTION	A106 GRADE B - SEAMLESS		A106 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM A105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
	OTHER	WHERE FLANGE OR THREAD REQUIRED		WHERE FLANGE REQUIRED	
UNIONS:	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN		NOT PERMITTED	
	WALL THICKNESS	SAME AS ADJOINING PIPE		--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		--	
FLANGES:	CONSTRUCTION	CLASS 150 - WELD NECK - ASME B16.5			
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		FORGED CARBON STEEL - ASTM A105	
FLANGE BOLTS:	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7			
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H			
WASHER:	CONSTRUCTION	F436			
GASKETS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES			
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER			
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
	MATERIAL	ASTM A106 CARBON STEEL			
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:	REVISION:	DATE REVISED:	
CARBON STEEL	ASTM B36.10M	ASME B31.1	5	2/22/2021	
VENT PIPING FINISH:	SPECIFICATION MATERIAL:	2-COAT SYSTEM WITH SOLVENT-BASED INORGANIC ZINC PRIMER, AND INORGANIC SILICATE POLYMER TOP COAT COLOR TO MATCH RED OF EXISTING RELIEF DEVICE PIPING			
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
	CARBON STEEL	150 PSIG	ASME B31.1	ASME B16.34	
UI-MPP-LPS	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 24"	
GATE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD (1" THRU 2")		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING: GRAPHITE		BODY/BONNET: A216 GR. WCB SEAT RING: HARDFACED DISC/WEDGE: A217 GR. CA15 OR WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 1503 CRANE FIGURE 47 BONNEY FORGE 1-11 RF	
BUTTERFLY VALVE	CONNECTION AND RATING	--		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	--		BODY/BONNET: A216 GR. WCB SEAT RING: PTFE/RTFE/UHMWPE DISC: A351 CF8M SHAFT: 17-4 PH PACKING: PTFE GLAND: 304 SS	
	VALVE SELECTION	--		POWELL FIGURE 1572 DEZURIK STYLE BHP FLOWSEAL TYPE 1LA	
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: STELLITE 6 FACED 410 SS DISC: 13% CR GASKET: SPIRAL WOUND		BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 1561 CRANE FIGURE 147 BONNEY FORGE 1-61 RF	
BALL VALVE	CONNECTION AND RATING	CLASS 900 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS (UP TO 6")	
	CONSTRUCTION	BODY: A105, STEM SS 410 COND. 2 THRUST WASHER: STELLITE 6; BALL AND SEAT: SS 410/CHROME CARBIDE COATED; STEM: SS 410; THRUST BUSHING: BRONZE; PACKING FLANGE SS 304 STEM BUSHING: NITRIDED SS410 COND. 2; SEAT SS 410 COND.2 CHROME CARBIDE COATED LOCKABLE LEVER		BODY/BONNET: A105 OR WCB (BOLTED) SEAT RING: SS 316/STELLITE BALL AND STEM: SS 316 PACKING: GRAPHITE BODY SEAL: SS 316 GRAPHITE	
	VALVE SELECTION	VELAN TYPE R, METAL SEATED, CLASS 900		VELAN TYPE R	
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARDFACED) DISC: 420SST TRIM: 13% Cr STEM: A183 F6A PACKING: GRAPHITE GASKET: SPIRAL WOUND SST WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 1531 CRANE FIGURE 143 BONNEY FORGE 1-31 RF	
REVISION HISTORY					
NUMBER	DESCRIPTION			DATE	
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000			6/30/2017	
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS			9/22/2017	
3	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN			11/22/2017	
4	ADDED VENT PIPE COATING SPECIFICATION			10/19/2019	
5	UPDATED VALVE SELECTIONS			2/22/2021	

MEDIUM PRESSURE STEAM (TO 325 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-MPP-MPS	PIPE SIZE (NPS)	MEDIUM PRESSURE STEAM		325 PSIG AT 775 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 18"	20" AND 24"
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS		STD	XS
FITTINGS:	CONSTRUCTION	A106 GRADE B - SEAMLESS		A106 GRADE B - SEAMLESS	
	WALL THICKNESS	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
PIPING JOINTS:	MATERIAL	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
	TYPE	FORGED CARBON STEEL - ASTM A105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
UNIONS:	OTHER	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
	CONSTRUCTION	WHERE FLANGE OR THREAD REQUIRED		WHERE FLANGE REQUIRED	
FLANGES:	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN		NOT PERMITTED	
	WALL THICKNESS	SAME AS ADJOINING PIPE		--	
FLANGE BOLTS:	MATERIAL	FORGED CARBON STEEL - ASTM A105		FORGED CARBON STEEL - ASTM A105	
	CONSTRUCTION	CLASS 300 - WELD NECK - ASME B16.5		SAME AS ADJOINING PIPE	
FLANGE NUTS:	CONSTRUCTION	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
WASHER:	CONSTRUCTION	FORGED CARBON STEEL - ASTM A105		FORGED CARBON STEEL - ASTM A105	
GASKETS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H		HEAVY HEX - A194 GRADE 2H	
	MATERIAL	F436		F436	
THERMOWELLS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES		SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES	
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER		FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER	
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:	REVISION:	DATE REVISED:	
CARBON STEEL	ASTM B36.10M	ASME B31.1	6	2/22/2021	
VENT PIPING FINISH:	SPECIFICATION MATERIAL:	2-COAT SYSTEM WITH SOLVENT-BASED INORGANIC ZINC PRIMER, AND INORGANIC SILICATE POLYMER TOP COAT COLOR TO MATCH RED OF EXISTING RELIEF DEVICE PIPING			
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
UI-MPP-MPS	CARBON STEEL	300 PSIG	ASME B31.1	ASME B16.34	
	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 24"	
GATE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD (1" THRU 2")		BUTTWELD ENDS	
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING: GRAPHITE		BODY/BONNET: A105 OR A216 GR. WCB SEAT RING: HARDFACED DISC/WEDGE: A217 GR. CA15 OR WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
BUTTERFLY VALVE	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 3003 CRANE FIGURE 33-1/2 BONNEY FORGE 3-11 BW	
	CONNECTION AND RATING	--		BUTTWELD ENDS	
CHECK VALVE	CONSTRUCTION	--		BODY: A216 GR. WCB CAP: A 516 GR 60 OR A 696 GR B CLOSE STOP: A 516 GR 60 DRIVE SHAFT: A 276 GR 431 DISC: A351 CF8M BEARING: A 439 TPD2 SEAL/SEAT GASKET: GRAPHITE GRAPHITE GASKET: GRAPHITE PACKING: GRAPHITE	
	VALVE SELECTION	--		ADAMS SERIES MAK	
BALL VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		BUTTWELD ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: 316 HF DISC: 13% CR GASKET: SPIRAL WOUND		BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: CORRUGATED SST WITH GRAPHITE	
GLOBE VALVE	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 3061 CRANE FIGURE 159-1/2 BONNEY FORGE 3-61 BW	
	CONNECTION AND RATING	CLASS 900 PSIG SOCKETWELD		--	
GLOBE VALVE	CONSTRUCTION	BODY: A105, STEM SS 410 COND. 2 THRUST WASHER: STELLITE 6; BALL AND SEAT: SS 410/CROME CARBIDE COATED; STEM: SS 410; THRUST BUSHING: BRONZE; PACKING FLANGE SS 304 STEM BUSHING: NITRIDED SS410 COND. 2; SEAT SS 410 COND.2 CHROME CARBIDE COATED LOCKABLE LEVER		--	
	VALVE SELECTION	VELAN TYPE R, METAL SEATED, CLASS 900		--	
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		BUTTWELD ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARDFACED) DISC: 420SST TRIM: 13% Cr STEM: A183 F6A PACKING: GRAPHITE GASKET: SPIRAL WOUND SST WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SST WITH GRAPHITE	
GLOBE VALVE	VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 3031 CRANE FIGURE 151-1/2 BONNEY FORGE 3-31 BW	
	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		BUTTWELD ENDS	
REVISION HISTORY					
NUMBER	DESCRIPTION	DATE			
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000	6/30/2017			
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS	9/22/2017			
3	CHANGED LARGE BORE VALVE CONNECTION TYPE; LARGE BORE BUTTERFLY VALVE SELECTION	11/15/2017			
4	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN	11/22/2017			
5	ADDED VENT PIPE COATING SPECIFICATION	10/19/2019			
6	UPDATED VALVE SELECTIONS	2/22/2021			

HIGH PRESSURE STEAM (TO 600 PSIG)

PIPING SPECIFICATION:		PROCESS:	DESIGN CONDITIONS:	
UI-MPP-HPS	PIPE SIZE (NPS)	2" AND SMALLER	2 1/2" THRU 10"	10"-20" (CONSULT DESIGN PROFESSIONAL IF GREATER THAN 20")
	PIPE MATERIAL: ASME B36.10M	WEIGHT/SCHEDULE MATERIAL	XS A106 GRADE B - SEAMLESS	STD SCHEDULE 40 A106 GRADE B - SEAMLESS
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11	BUTTWELD - ASME B16.9	BUTTWELD - ASME B16.9
	WALL THICKNESS	SAME AS ADJOINING PIPE	SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM 105	BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
	TYPE	SOCKETWELD	BUTTWELD - END PREP PER B16.25	
UNIONS:	OTHER	WHERE FLANGE OR THREAD REQUIRED	WHERE FLANGE REQUIRED	
	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN	NOT PERMITTED	
FLANGES:	WALL THICKNESS	SAME AS ADJOINING PIPE	--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105	--	
	CONSTRUCTION	CLASS 600 - WELD NECK - ASME B16.5	--	
FLANGE BOLTS:	WALL THICKNESS	SAME AS ADJOINING PIPE	--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105	FORGED CARBON STEEL - ASTM A105	FORGED CARBON STEEL - ASTM A105
	CONSTRUCTION	STUD - FULL-LENGTH ASME B1.1 - CLASS 2A THREADS		
FLANGE NUTS:	MATERIAL	HIGH-STRENGTH STEEL - ASTM A193 - GRADE B7		
	CONSTRUCTION	HEAVY HEX - ASME B1.1 - CLASS 2B THREADS		
GASKETS:	MATERIAL	CARBON STEEL - ASTM A194 GRADE 2H HEAVY - F436 WASHERS		
	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES		
THERMOWELLS:	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER		
	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS		
CARBON STEEL:	MATERIAL	ASTM A106 CARBON STEEL		
	PIPE CODE:	DESIGN/CONSTRUCTION CODE:	REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1	6	2/22/2021
VENT PIPING FINISH:	SPECIFICATION MATERIAL:	2-COAT SYSTEM WITH SOLVENT-BASED INORGANIC ZINC PRIMER, AND INORGANIC SILICATE POLYMER TOP COAT COLOR TO MATCH RED OF EXISTING RELIEF DEVICE PIPING		
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:	
	CARBON STEEL	600 PSIG	ASME B31.1	CLASS 150 FLANGED ENDS
UI-MPP-HPS	PIPE SIZE (NPS)	2" AND SMALLER	2 1/2" THRU 16"	18"-20" (CONSULT DESIGN PROFESSIONAL IF GREATER THAN 20")
GATE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD (1" THRU 2")		BUTTWELD ENDS
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING: GRAPHITE		BODY/BONNET: A217 GR. WC6 SEAT RING: A182 F11; STELLITE 6 FACED DISC/WEDGE: A217 GR. WC6; STELLITE 6 FACED STEM: 410 SS API TRIM 5 PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE
	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 6003 CRANE FIGURE 76 -1/2 BONNEY FORGE 6-11 BW
BUTTERFLY VALVE	CONNECTION AND RATING	--		BUTTWELD ENDS
	CONSTRUCTION	--		BODY: A216 GR. WCB CAP: A 516 GR 60 OR A 696 GR B CLOSE STOP: A 516 GR 60 DRIVE SHAFT: A 276 GR 431 DISC: A351 CF8M BEARING: A 439 TPD SEAL/SEAT GASKET: BEARING SEAL: GRAPHITE GRAPHITE GASKET: GRAPHITE PACKING: GRAPHITE
	VALVE SELECTION	--		ADAMS SERIES MAK
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		BUTTWELD ENDS
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: 316 HF DISC: 13% CR GASKET: SPIRAL WOUND		BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: SPIRAL WOUND SS WITH GRAPHITE
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 6061 CRANE FIGURE 175-1/2 BONNEY FORGE 6-61 BW
BALL VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		--
	CONSTRUCTION	BODY: A105, STEM SS 410 COND. 2 THRUST WASHER: STELLITE 6; BALL AND SEAT: SS 410/CHROME CARBIDE COATED; STEM: SS 410; THRUST BUSHING: BRONZE; PACKING FLANGE: SS 304 STEM BUSHING: NITRIDED SS410 COND. 2; SEAT SS 410 COND. 2 CHROME CARBIDE COATED LOCKABLE LEVER		--
	VALVE SELECTION	VELAN TYPE R, METAL SEATED, CLASS 900		--
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		BUTTWELD ENDS
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARDFACED) SEAT: CoCr ALLOY DISC: 420 SS, CA15 HT, OR CoCr ALLOY STEM: A182 F8a OR 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE
	VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 6031 CRANE FIGURE 171-1/2 BONNEY FORGE 6-31 BW
NOTES:	(1) 22" PIPE IS NOT ALLOWED IN HIGH PRESSURE STEAM SERVICE			

REVISION HISTORY		
NUMBER	DESCRIPTION	DATE
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000	6/30/2017
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS	9/22/2017
3	CHANGED LARGE BORE VALVE CONNECTION TYPE; LARGE BORE BUTTERFLY VALVE SELECTION	11/15/2017
4	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN	11/22/2017
5	ADDED VENT PIPE COATING SPECIFICATION	10/19/2019
6	UPDATED LARGE BORE DESIGN WALL THICKNESS; UPDATED VALVE SELECTIONS	2/22/2021

LOW PRESSURE CONDENSATE (TO 50 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-MPP-LP-CON	PIPE SIZE (NPS)	LOW PRESSURE CONDENSATE		50 PSIG AT 530 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 24"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS		XS	
	CONSTRUCTION	A106 GRADE B - SEAMLESS		A106 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM A105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
	OTHER	WHERE FLANGE OR THREAD REQUIRED		WHERE FLANGE REQUIRED	
UNIONS:	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN		NOT PERMITTED	
	WALL THICKNESS	SAME AS ADJOINING PIPE		--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		--	
FLANGES:	CONSTRUCTION	CLASS 150 - WELD NECK - ASME B16.5		--	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		FORGED CARBON STEEL - ASTM A105	
FLANGE BOLTS:	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7			
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H			
WASHER:	CONSTRUCTION	F436			
GASKETS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES			
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER			
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
	MATERIAL	ASTM A106 CARBON STEEL			
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1		4	2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
UI-MPP-LP-CON	CARBON STEEL	150 PSIG	ASME B31.1	ASME B16.34	
GATE VALVE	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 24"	
	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD (1" THRU 2")		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING: GRAPHITE		BODY/BONNET: A105 OR A216 GR. WCB SEAT RING: HARD FACED DISC/WEDGE: A217 GR. CA15 OR WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SS WITH GRAPHITE	
VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 1503 CRANE FIGURE 47 BONNEY FORGE 1-11 RF		
BUTTERFLY VALVE	CONNECTION AND RATING	--		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	--		BODY/BONNET: A216 GR. WCB SEAT RING: PTFE/RTFE/UHMWPE DISC: A351 CF8M SHAFT: 17-4 PH PACKING: PTFE GLAND: 304 SS	
	VALVE SELECTION	--		POWELL FIGURE 1572 DEZURIK STYLE BHP FLOWSEAL TYPE 1LA	
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: STELLITE 6 FACED 410 SS DISC: 13% CR GASKET: SPIRAL WOUND		BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARD FACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 1561 CRANE FIGURE 147 BONNEY FORGE 1-61 RF	
BALL VALVE	CONNECTION AND RATING	CLASS 900 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS (UP TO 6")	
	CONSTRUCTION	BODY: A105, STEM SS 410 COND. 2 THRUST WASHER: STELLITE 6; BALL AND SEAT: SS 410/CROME CARBIDE COATED; STEM: SS 410; THRUST BUSHING: BRONZE; PACKING FLANGE SS 304 STEM BUSHING: NITRIDED SS410 COND. 2; SEAT SS 410 COND.2 CHROME CARBIDE COATED LOCKABLE LEVER		BODY/BONNET: A105 OR WCB (BOLTED) SEAT RING: SS 316/STELLITE BALL AND STEM: SS 316 PACKING: GRAPHITE BODY SEAL: SS 316 GRAPHITE	
	VALVE SELECTION	VELAN TYPE R, METAL SEATED, CLASS 900		VELAN TYPE R	
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARD FACED) DISC: 420SST TRIM: 13% Cr STEM: A183 F6A PACKING: GRAPHITE GASKET: SPIRAL WOUND SST WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARD FACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 1531 CRANE FIGURE 143 BONNEY FORGE 1-31 RF	
REVISION HISTORY					
NUMBER	DESCRIPTION			DATE	
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000			6/30/2017	
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS			9/22/2017	
3	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN			11/22/2017	
4	UPDATED LARGE BORE PIPE SCHEDULE, VALVE SELECTIONS			2/22/2021	

MEDIUM PRESSURE CONDENSATE (TO 325 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-MPP-MP-CON	PIPE SIZE (NPS)	MEDIUM PRESSURE CONDENSATE		325 PSIG AT 775 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 24"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS		XS	
	CONSTRUCTION	A106 GRADE B - SEAMLESS		A106 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM 105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
	OTHER	WHERE FLANGE OR THREAD REQUIRED		WHERE FLANGE REQUIRED	
UNIONS:	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN		NOT PERMITTED	
	WALL THICKNESS	SAME AS ADJOINING PIPE		--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		--	
FLANGES:	CONSTRUCTION	CLASS 300 - WELD NECK - ASME B16.5		--	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		FORGED CARBON STEEL - ASTM A105	
FLANGE BOLTS:	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7, STUD - FULL LENGTH		--	
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H		--	
WASHER:	CONSTRUCTION	F436		--	
GASKETS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES		--	
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER		--	
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS		--	
	MATERIAL	ASTM A106 CARBON STEEL		--	
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1		4	2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
UI-MPP-MP-CON	CARBON STEEL	300 PSIG	ASME B31.1	ASME B16.34	
GATE VALVE	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 24"	
	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD (1" THRU 2")		CLASS 300 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING:		BODY/BONNET: A105 OR A216 GR. WCB SEAT RING: HARD FACED DISC/WEDGE: A217 GR. CA15 OR WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 3003 CRANE FIGURE 33 BONNEY FORGE 3-11 RF		
BUTTERFLY VALVE	CONNECTION AND RATING	--		CLASS 300 FLANGED ENDS (LUG STYLE)	
	CONSTRUCTION	--		BODY/BONNET: A216 GR. WCB SEAT RING: INCONEL METAL SEAT DISC: A351 CF8M SHAFT: 17-4 PH PACKING: PTFE GLAND: 304 SS	
	VALVE SELECTION	--		POWELL FIGURE 3072* (3" AND LARGER) FLOWSEAL METAL SEAT CLASS 300	
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 300 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: 316 HF DISC: 13% CR GASKET: SPIRAL WOUND		BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARD FACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 3061 CRANE FIGURE 159 BONNEY FORGE 3-61 RF	
BALL VALVE	CONNECTION AND RATING	CLASS 900 PSIG SOCKETWELD		CLASS 300 FLANGED ENDS	
	CONSTRUCTION	BODY: A105, STEM SS 410 COND. 2 THRUST WASHER: STELLITE 6; BALL AND SEAT: SS 410/CROME CARBIDE COATED; STEM: SS 410; THRUST BUSHING: BRONZE; PACKING FLANGE SS 304 STEM BUSHING: NITRIDED SS410 COND. 2; SEAT SS 410 COND.2 CHROME CARBIDE COATED LOCKABLE LEVER		BODY/BONNET: A351 GR. CF8M SEAT RING: SS 316/STELLITE BALL AND STEM: SS 316 PACKING: GRAPHITE BODY SEAL: SPIRAL WOUND SS 316 GRAPHITE	
	VALVE SELECTION	VELAN TYPE R, METAL SEATED, CLASS 900		VELAN TYPE R	
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 300 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARD FACED) DISC: 420SST TRIM: 13% Cr STEM: A183 F6A PACKING: GRAPHITE GASKET: SPIRAL WOUND SST WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARD FACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GLO8 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 3031 CRANE FIGURE 151 BONNEY FORGE 3-31 RF	
REVISION HISTORY					
NUMBER	DESCRIPTION			DATE	
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000			6/30/2017	
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS			9/22/2017	
3	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN			11/22/2017	
4	UPDATED LARGE BORE WALL THICKNESS; VALVE SELECTIONS			2/22/2021	

HIGH PRESSURE CONDENSATE (TO 600 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-MPP-HP-CON	PIPE SIZE (NPS)	HIGH PRESSURE CONDENSATE		600 PSIG AT 775 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 6"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS		XS	
	CONSTRUCTION	A106 GRADE B - SEAMLESS		A106 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM 105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
	OTHER	WHERE FLANGE OR THREAD REQUIRED		WHERE FLANGE REQUIRED	
UNIONS:	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN		NOT PERMITTED	
	WALL THICKNESS	SAME AS ADJOINING PIPE		--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		--	
FLANGES:	CONSTRUCTION	CLASS 600 - WELD NECK - ASME B16.5		--	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
	MATERIAL	- XS		FORGED CARBON STEEL - ASTM A105	
FLANGE BOLTS:	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7, STUD - FULL LENGTH		--	
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H		--	
WASHER:	CONSTRUCTION	F436		--	
GASKETS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES		--	
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER		--	
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS		--	
	MATERIAL	ASTM A106 CARBON STEEL		--	
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1		4	2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
	CARBON STEEL	600 PSIG	ASME B31.1	ASME B16.34	
UI-MPP-HP-CON	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 6"	
	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD (1" THRU 2")		CLASS 600 FLANGED ENDS	
GATE VALVE	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING:		BODY/BONNET: A217 GR. WC6 SEAT RING: A182 F11; STELLITE 6 FACED DISC/WEDGE: A217 GR. WC6; STELLITE 6 FACED STEM: 410 SS API TRIM 5 PACKING: GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 6003 CRANE FIGURE 76 BONNEY FORGE 6-11 RF	
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 800 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: 316 HF DISC: 13% CR GASKET: SPIRAL WOUND		BODY/BONNET: A217 GR. WC6 SEAT RING: A182 F11; STELLITE 6 FACED DISC/WEDGE: A217 GR. WC6; STELLITE 6 FACED STEM: 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 6061 CRANE FIGURE 175 BONNEY FORGE 6-61 RF	
	CONNECTION AND RATING	CLASS 900 PSIG SOCKETWELD		--	
BALL VALVE	CONSTRUCTION	BODY: A105; STEM SS 410 COND. 2 THRUST WASHER: STELLITE 6; BALL AND SEAT: SS 410/CROME CARBIDE COATED; STEM: SS 410; THRUST BUSHING: BRONZE; PACKING FLANGE SS 304 STEM BUSHING: NITRIDED SS410 COND. 2; SEAT SS 410 COND.2 CHROME CARBIDE COATED LOCKABLE LEVER		--	
	VALVE SELECTION	VELAN TYPE R, METAL SEATED, CLASS 900		--	
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		BUTTWELD ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARDFACED) SEAT: CoCr ALLOY DISC: 420 SS, CA15 HT, OR CoCr ALLOY STEM: A182 F6a OR 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 6031 CRANE FIGURE 171 BONNEY FORGE 6-31 RF	
REVISION HISTORY					
NUMBER	DESCRIPTION			DATE	
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000			6/30/2017	
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS			9/22/2017	
3	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN			11/22/2017	
4	UPDATED LARGE BORE PIPE SCHEDULE			2/22/2021	

EQUIPMENT DRAIN PIPING (TO 600 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-MPP-ED	PIPE SIZE (NPS)	EQUIPMENT DRAINS 2" AND SMALLER		600 PSIG AT 775 °F	
	WEIGHT/SCHEDULE	STD		2 1/2" THRU 10"	12" THRU 24"
PIPE MATERIAL: ASME B36.10M	MATERIAL	A106 GRADE B - SEAMLESS		A106 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM a 105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
UNIONS:	OTHER	WHERE FLANGE OR THREAD REQUIRED		WHERE FLANGE REQUIRED	
	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT - FACE WITH SPIRAL WOUND GASKET DESIGN		NOT PERMITTED	
FLANGES:	WALL THICKNESS	SAME AS ADJOINING PIPE		--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		--	
FLANGE BOLTS:	CONSTRUCTION	CLASS 3000 - WELD NECK - ASME B16.5			
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
FLANGE NUTS:	MATERIAL	FORGED CARBON STEEL - ASTM A105		FORGED CARBON STEEL - ASTM A105	
	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7, STUD - FULL LENGTH			
WASHER:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H F436			
GASKETS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES			
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER			
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
	MATERIAL	ASTM A106 CARBON STEEL			
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:	REVISION:	DATE REVISED:	
CARBON STEEL	ASTM B36.10M	ASME B31.1	1	2/22/2021	
FINISH:	SPECIFICATION MATERIAL:	REFER TO PROJECT SPECIFICATION PAINT EQUIPMENT DRAIN PIPING WHITE			
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
UI-MPP-ED	CARBON STEEL	300 PSIG	ASME B31.1	ASME B16.34	
	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" AND LARGER	
GATE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD (1" THRU 2")		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING: GRAPHITE		BODY/BONNET: A217 GR. WC6 SEAT RING: A182 F11; STELLITE 6 FACED DISC/WEDGE: A217 GR. WC6; STELLITE 6 FACED STEM: 410 SS API TRIM 5 PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 6003 CRANE FIGURE 76 BONNEY FORGE 6-11 RF	
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: 316 HF DISC: 13% CR GASKET: SPIRAL WOUND		BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 6061 CRANE FIGURE 175 BONNEY FORGE 6-61 RF	
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARDFACED) SEAT: CoCr ALLOY DISC: 420 SS, CA15 HT, OR CoCr ALLOY STEM: A182 F6a OR 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 6031 CRANE FIGURE 171 BONNEY FORGE 6-31 RF	
NOTES:	(1) 22" PIPE IS NOT ALLOWED IN EQUIPMENT DRAIN SERVICE				
REVISION HISTORY					
NUMBER	DESCRIPTION		DATE		
0	INITIAL ISSUE		10/23/2019		
1	UPDATED VALVE SELECTIONS		2/22/2021		

RELIEF DEVICE VENT PIPING (TO 600 PSIG)

PIPING SPECIFICATION:		PROCESS:	DESIGN CONDITIONS:	
UI-MPP-VENT		RELIEF DEVICE VENT PIPING	600 PSIG AT 775 °F	
	PIPE SIZE (NPS)	2" AND SMALLER	2 1/2" THRU 10"	12" THRU 24"
PIPE MATERIAL: ASME B36.10M	WEIGHT/SCHEDULE	XS	STD	SCHEDULE 40
	MATERIAL	A106 GRADE B - SEAMLESS	A106 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11	BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		
	MATERIAL	FORGED CARBON STEEL - ASTM A105	BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
PIPING JOINTS:	TYPE	SOCKETWELD		
	OTHER	WHERE FLANGE OR THREAD REQUIRED	WHERE FLANGE REQUIRED	
UNIONS:	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN	NOT PERMITTED	
	WALL THICKNESS	SAME AS ADJOINING PIPE		
	MATERIAL	FORGED CARBON STEEL - ASTM A105	--	
FLANGES:	CONSTRUCTION	CLASS 300 - WELD NECK - ASME B16.5		
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE
	MATERIAL	FORGED CARBON STEEL - ASTM A105	FORGED CARBON STEEL - ASTM A105	
FLANGE BOLTS:	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7, STUD - FULL LENGTH		
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H		
WASHER:	CONSTRUCTION	F436		
GASKETS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES		
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER		
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS		
	MATERIAL	ASTM A106 CARBON STEEL		
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:	REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1	1	2/22/2021
FINISH:	SPECIFICATION MATERIAL:	2-COAT SYSTEM WITH SOLVENT-BASED INORGANIC ZINC PRIMER, AND INORGANIC SILICATE POLYMER TOP COAT - REFER TO PROJECT SPECIFICATIONS COLOR TO MATCH RED OF EXISTING RELIEF DEVICE PIPING		
NOTES:	(1) 22" PIPE IS NOT ALLOWED IN RELIEF VENT SERVICE			
REVISION HISTORY				
NUMBER	DESCRIPTION	DATE		
0	INITIAL ISSUE	10/23/2019		
1	UPDATED LARGE BORE PIPE SCHEDULE	2/22/2021		

DESUPERHEATER (TO 800 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-DSH	PIPE SIZE (NPS)	DESUPERHEATER WATER		800 PSIG AT 400 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 6"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS		XS	
	CONSTRUCTION	A106 GRADE B - SEAMLESS		A106 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM 105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
	OTHER	WHERE FLANGE OR THREAD REQUIRED		WHERE FLANGE REQUIRED	
UNIONS:	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN		NOT PERMITTED	
	WALL THICKNESS	SAME AS ADJOINING PIPE		--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		--	
FLANGES:	CONSTRUCTION	CLASS 600 - WELD NECK - ASME B16.5			
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		FORGED CARBON STEEL - ASTM A105	
FLANGE BOLTS:	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7, STUD - FULL LENGTH			
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H			
WASHER:	CONSTRUCTION	F436			
GASKETS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES			
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER			
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
	MATERIAL	ASTM A106 CARBON STEEL			
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1		4	2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
UI-DSH	CARBON STEEL	600 PSIG	ASME B31.1	ASME B16.34	
GATE VALVE	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 6"	
	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, STELLITE 6 SEATS, CLASS 800 PACKING: GRAPHITE		BODY/BONNET: A217 GR. WCB SEAT RING: A182 F11; STELLITE 6 FACED DISC/WEDGE: A217 GR. WCB; STELLITE 6 FACED STEM: 410 SS API TRIM 5 PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 6003 CRANE FIGURE 76 BONNEY FORGE 6-11 RF		
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SEAT RING: 410 SS + STELLITE 6 FACE DISC: A276 T420, CA15 HT, OR CoCr ALLOY GASKET: SPIRAL WOUND SS WITH GRAPHITE		BODY/CAP: A216 GR. WCB SEAT RING: CARBON STEEL + STELLITE 6 FACED DISC/WEDGE: A105 + 13% CR FACED OR WCB + 13% CR GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 6061 CRANE FIGURE 175 BONNEY FORGE 6-61 RF	
BALL VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		--	
	CONSTRUCTION	BODY: A105, STEM SS 410 COND. 2 THRUST WASHER: STELLITE 6; BALL AND SEAT: SS 410/CHROME CARBIDE COATED; STEM: SS 410; THRUST BUSHING: BRONZE; PACKING FLANGE SS 304 STEM BUSHING: NITRIDED SS410 COND. 2; SEAT SS 410 COND.2 CHROME CARBIDE COATED LOCKABLE LEVER		--	
	VALVE SELECTION	VELAN TYPE R, METAL SEATED, CLASS 900		--	
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARDFACED) SEAT: CoCr ALLOY DISC: 420 SS, CA15 HT, OR CoCr ALLOY STEM: A182 F6a OR 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 6031 CRANE FIGURE 171 BONNEY FORGE 6-31 RF	
REVISION HISTORY					
NUMBER	DESCRIPTION		DATE		
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000		6/30/2017		
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS		9/22/2017		
3	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN		11/22/2017		
4	SET UPPER SIZE AT 6"; UPDATED VALVE SELECTIONS		2/22/2021		

BOILER FEEDWATER (TO 800 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-MPP-FW	PIPE SIZE (NPS)	BOILER FEEDWATER		800 PSIG AT 400 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 10"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS		XS	
	CONSTRUCTION	A106 GRADE B - SEAMLESS		A106 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM A105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
	OTHER	INSERTION THERMOWELLS - ASTM A105 - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
UNIONS:	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN		NOT PERMITTED	
	WALL THICKNESS	SAME AS ADJOINING PIPE		--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		--	
FLANGES:	CONSTRUCTION	CLASS 600 - WELD NECK - ASME B16.5			
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		FORGED CARBON STEEL - ASTM A105	
FLANGE BOLTS:	CONSTRUCTION	STUD - FULL LENGTH ASME B1.1 - CLASS 2A THREADS			
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - ASME B1.1 - CLASS 2B THREADS			
GASKETS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES			
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER			
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
	MATERIAL	ASTM A106 CARBON STEEL			
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1		4	2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
UI-MPP-FW	CARBON STEEL	600 PSIG	ASME B31.1	ASME B16.34	
	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 10"	
GATE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, STELLITE 6 SEATS, CLASS 800 PACKING: GRAPHITE		BODY/BONNET: A217 GR. WC6 SEAT RING: A182 F11; STELLITE 6 FACED DISC/WEDGE: A217 GR. WC6; STELLITE 6 FACED STEM: 410 SS API TRIM 5 PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 6003 CRANE FIGURE 76 BONNEY FORGE 6-11 RF	
BUTTERFLY VALVE	CONNECTION AND RATING	--		CLASS 600 FLANGED - LUG STYLE	
	CONSTRUCTION	--		BODY/BONNET: A216 GR. WCB OR A105 SEAT RING: INCONEL DISC: 316SS A351 CF8M OR A182 F316 NITRIDED SHAFT & PINS: 17-4 PH SS A564 GR 630 PACKING: PTFE	
	VALVE SELECTION	--		FLOWSEAL METAL SEAT TYPE 6LA (THRU 8") 6LC (10")	
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SEAT RING: 410 SS + STELLITE 6 FACE DISC: A276 T420, CA15 HT, OR CoCr ALLOY GASKET: SPIRAL WOUND SS WITH GRAPHITE		BODY/CAP: A216 GR. WCB SEAT RING: CARBON STEEL + STELLITE 6 FACED DISC/WEDGE: A105 + 13% CR FACED OR WCB +13% CR GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 6061 CRANE FIGURE 175 BONNEY FORGE 6-61 RF	
BALL VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		--	
	CONSTRUCTION	BODY: A105, STEM SS 410 COND. 2 THRUST WASHER: STELLITE 6; BALL AND SEAT: SS 410/CROME CARBIDE COATED; STEM: SS 410; THRUST BUSHING: BRONZE; PACKING FLANGE SS 304 STEM BUSHING: NITRIDED SS410 COND. 2; SEAT SS 410 COND.2 CHROME CARBIDE COATED LOCKABLE LEVER		--	
	VALVE SELECTION	VELAN TYPE R, METAL SEATED, CLASS 900		--	
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARDFACED) SEAT: CoCr ALLOY DISC: 420 SS, CA15 HT, OR CoCr ALLOY STEM: A182 F0a OR 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 6031 CRANE FIGURE 171 BONNEY FORGE 6-31 RF	
REVISION HISTORY					
NUMBER	DESCRIPTION			DATE	
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000			6/30/2017	
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS			9/22/2017	
3	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN			11/22/2017	
4	SET MAXIMUM SIZE AT 10"; UPDATED LARGE BORE PIPE SCHEDULE; UPDATED VALVE SELECTIONS			2/22/2021	

NATURAL GAS (TO 150 PSIG)

PIPING SPECIFICATION:		PROCESS:	DESIGN CONDITIONS:	
UI-GFS	PIPE SIZE (NPS)	NATURAL GAS	150 PSIG AT 150 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER	2 1/2" THRU 10"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS	STD	
	CONSTRUCTION	ASTM A53 GRADE B, SEAMLESS	ASTM A53 GRADE B, SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 SOCKETWELD - ASME B16.11	BUTTWELD - ASME B16.25	
	WALL THICKNESS	SAME AS ADJOINING PIPE	SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM A105	BUTTWELD FITTING - ASTM A234, GR. B SEAMLESS	
	TYPE	SOCKETWELD	BUTTWELD - END PREP PER ASME B16.25	
	OTHER	INSERTION THERMOWELLS - ASTM A105 - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS		
UNIONS:	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN	NOT PERMITTED	
	WALL THICKNESS	SAME AS ADJOINING PIPE	--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105	--	
FLANGES:	CONSTRUCTION	CLASS 150 - WELD NECK - ASME B16.5		
	WALL THICKNESS	SAME AS ADJOINING PIPE	SAME AS ADJOINING PIPE	
	MATERIAL	FORGED CARBON STEEL - ASTM A105	FORGED CARBON STEEL - ASTM A105 - STD WT	
FLANGE BOLTS:	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7		
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H		
WASHER:	CONSTRUCTION	F436		
GASKETS:	CONSTRUCTION	SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES		
	MATERIAL	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER		
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:	REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1/NFPA 54	3	2/22/2021
FINISH:	SPECIFICATION MATERIAL:	REFER TO PROJECT SPECIFICATION - PAINT NATURAL GAS PIPING SAFETY YELLOW		
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE	
UI-GFS	CARBON STEEL	150 PSIG	ASME B31.1	ASME B16.34
	PIPE SIZE (NPS)	2" AND SMALLER		2-1/2" THRU 10"
BALL VALVE	CONNECTION AND RATING		CLASS 150 FLANGED ENDS	
	CONSTRUCTION		BODY: A216 WCB BALL AND STEM: TYPE 316 STAINLESS STEEL SEATS: RTFE OR NYLON WITH SEAT RING AND GASKET SEALS: TFE FIRE-SAFE OPERATOR: LEVER HANDLE BLOWOUT PROOF PACKING ANTI-STATIC GROUNDING SPRING	
	VALVE SELECTION		JAMESBURY SERIES 7150 KECKLEY BVF1 VELAN TYPE R	
PLUG VALVE	CONNECTION AND RATING	--	CLASS 150 RAISED FACE FLANGED ENDS	
	CONSTRUCTION	--	BODY/BONNET: A105 OR A216 GR WCB COVER, GLAND: CARBON STEEL PLUG: CARBON STEEL STEM: CARBON STEEL PACKING: GRAPHITE/TFE COMPOUND GASKET: SS WITH GRAPHITE	
	VALVE SELECTION	--	NORDSTROM FIGURE 1925 (THRU 4"); FIGURE 1945 (6"-8"); FIGURE 1949 (10")	

REVISION HISTORY		
NUMBER	DESCRIPTION	DATE
1	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS	9/22/2017
2	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN	11/22/2017
3	UPDATED VALVE SELECTIONS; ADDED PIPE FINISH SPECIFICATION	2/22/2021

COMPRESSED AIR SYSTEMS (TO 150 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-AIR	PIPE SIZE (NPS)	COMPRESSED AIR/INSTRUMENT AIR		150 PSIG AT 150 °F	
	WEIGHT/SCHEDULE	4" AND SMALLER (NOTE 1)		2-1/2" THRU 24" (NOTE 1)	
PIPE MATERIAL: ASME B36.10M	MATERIAL	ASTM B88 COPPER, TYPE L, HARD DRAWN		STD	
	CONSTRUCTION	SOLDERED OR PRESS FIT		ASTM A106 GRADE B - SEAMLESS (NON-BLACK STEEL)	
FITTINGS:	WALL THICKNESS	SAME AS ADJOINING PIPE		BUTTWELD	
	MATERIAL	ASME B16.18 CAST COPPER OR ASME B16.22 WROUGHT COPPER ALLOY		SAME AS ADJOINING PIPE	
PIPING JOINTS:	TYPE	SOLDERED OR PRESS FIT		BUTTWELD - END PREP PER B16.25	
	OTHER	SEE BELOW FOR JOINT DETAILS		--	
SOLDER/FLANGES:	CONSTRUCTION	SOLDER: ASTM B32 ALLOY, GRADE Sb-5 95/5 TIN-ANTIMONY, LEAD FREE OR: ASTM B32 ALLOY, GRADE SN95 TIN-SILVER, LEAD FREE		CLASS 150 - WELD NECK - ASME B16.5	
	WALL THICKNESS			SAME AS ADJOINING PIPE	
SOLDER/FLANGE BOLTS:	MATERIAL			FORGED STEEL - ASTM A105	
	CONSTRUCTION	SOLDER: FILLER METAL LEAD-FREE - WATER-FLUSHABLE FLUX ASTM B813 - SILVER BRAZING FILLER METAL SHALL BE BcUp SERIES, COPPER PHOSPHORUS ALLOYS FOR GENERAL DUTY BRAZING - AWS A5.8		STUD - FULL-LENGTH ASME B1.1	
PRESS FIT/FLANGE NUTS:	MATERIAL	PRESS FIT: MATERIALS CONFORM TO ASME B16.18 OR: ASME B16.22 AND CRITERIA UNDER IAPMO PS 117 - SEALING ELEMENTS: EPDM - SEALING ELEMENTS FACTORY INSTALLED - FITTINGS SHALL BE PRESSED BY TOOLS RECOMMENDED BY FITTING MANUFACTURER		HEAVY HEX - ASME B1.1 - CLASS 2B THREADS	
	CONSTRUCTION			CARBON STEEL - ASTM A194 GRADE 2H HEAVY - F436 WASHERS	
PRESS FIT/GASKETS:	MATERIAL			SPIRAL WOUND - SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES	
	CONSTRUCTION			TYPE 304 SS - FULL FACE - FLEXITALLIC FLEXICARB STYLE CGI OR EQUAL	
UNIONS:	CONSTRUCTION	THREADED		NOT PERMITTED	
	MATERIAL	SAME AS ADJOINING PIPE			
	OTHER	INSTALL UNIONS: IN LONG RUNS AT 80' INTERVALS - IN BYPASS OF VALVES/EQUIPMENT - AT EQUIPMENT CONNECTIONS			
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
COPPER	ASTM B36.10M	ASME B31.1		3	2/22/2021
FINISH:	SPECIFICATION MATERIAL:	DO NOT PAINT COPPER AIR PIPING		REFER TO PROJECT SPECIFICATION PAINT COMPRESSED AIR PIPING WHITE	
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
UI-AIR	AS NOTED	150 PSIG	ASME B31.1	ASME B16.34	
	PIPE SIZE (NPS)	4" AND SMALLER (NOTE 1)		2 1/2" THRU 24" (NOTE 1)	
GATE VALVE	CONNECTION AND RATING	--		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	--		BODY/BONNET: A216 GR. WCB SEAT RING: STELLITE 6 FACED DISC/WEDGE: A217 GR. CA15 OR WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SS WITH GRAPHITE	
	VALVE SELECTION	--		POWELL FIGURE 1503 CRANE FIGURE 47 BONNEY FORGE 1-11 RF	
BUTTERFLY VALVE	CONNECTION AND RATING	--		CLASS 150 FLANGED - LUG STYLE	
	CONSTRUCTION	--		BODY/BONNET: A216 GR. WCB SEAT RING: PTFE/RTFE/UHMWPE DISC: A351 CF8M SHAFT: 17-4 PH PACKING: PTFE GLAND: 304 SS	
	VALVE SELECTION	--		POWELL FIGURE 1572 JAMESBURY SERIES 815 FLOWSEAL TYPE 1LA	
CHECK VALVE	CONNECTION AND RATING	CLASS 200 PSIG THREADED OR SOLDERED		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: BRONZE DISC: BRONZE SEAT DISC: BUNA-N HINGE PIN AND PLUG: BRONZE ASTM B140 ALLOY DISC HANGER: SAME AS BODY		BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	NIBCO 433 SERIES APOLLO 161S SERIES (THRU 2")		POWELL FIGURE 1561 CRANE FIGURE 147 BONNEY FORGE 1-61 RF	
BALL VALVE	CONNECTION AND RATING	CLASS 600 PSIG THREADED OR SOLDERED		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY: CAST BRONZE OR BRASS, FULL PORT BALL: CHROME PLATED BRONZE OR BRASS STEM: BRONZE OR BRASS SEATS/SEALS: RPTFE PACKING: RPTFE LOCKABLE, QUARTER TURN LEVER HANDLE		BODY/BONNET: A105 OR WCB (BOLTED) SEAT RING: MPTFE/PTFE/RPTFE BALL AND STEM: SS 316 PACKING: PTFE AND GRAPHITE BODY SEAL: SS 316 GRAPHITE LOCKING LEVER (3" AND SMALLER) LOCKING GEAR OPERATOR (4" AND LARGER)	
	VALVE SELECTION	APOLLO 70-200 SERIES MILWAUKEE BA-485B NIBCO S-FP-600A SERIES		VELAN UB-150 JAMESBURY SERIES 7000 KECKLEY BVF1	

NOTES:

1) EITHER COPPER OR CARBON STEEL PIPE MATERIAL MAY BE USED FOR PIPE SIZES BETWEEN 2-1/2" AND 4". FINAL PIPE MATERIAL SHALL BE SELECTED BASED UPON THE INDIVIDUAL PROJECT NEEDS. DESIGN PROFESSIONAL SHALL COORDINATE SELECTION OF PIPE MATERIAL WITH UTILITY OPERATOR.

REVISION HISTORY		
NUMBER	DESCRIPTION	DATE
1	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS	9/22/2017
2	ADDED 'FINISH' SPECIFICATION	10/10/2019
3	UPDATED VALVE SELECTIONS; INCREASED UPPER LIMIT FOR COPPER PIPE SIZE TO 4" AND ADDED OVERLAP SIZE RANGE	2/22/2021

MAKEUP WATER AND POTABLE WATER (TO 150 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-MUS-PWS	PIPE SIZE (NPS)	MAKEUP AND POTABLE WATER		150 PSIG AT 150 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 24"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	SCH 40S		SCH 10S	
	CONSTRUCTION	A312 TYPE 304 - SEAMLESS OR WELDED		A312 GRADE 304 - SEAMLESS OR WELDED	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED STEEL - ASTM A182, F304L, ASME B16.25		ASTM A403, WP304L - SEAMLESS, B16.25	
	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
FLANGES:	OTHER	UNIONS: CLASS 3000 - SW - B16.11 - FLAT- FACE WITH SPIRAL WOUND GASKET DESIGN		WHERE FLANGE REQUIRED	
	CONSTRUCTION	FLANGES NOT PERMITTED		CLASS 150 PSIG	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
FLANGE BOLTS:	MATERIAL	--		SS, ASTM A182, F330L, ASME B16.5	
	CONSTRUCTION	--		HIGH-STRENGTH STAINLESS STEEL, GRADE B8, CLASS 2, STUD - FULL LENGTH	
FLANGE NUTS:	CONSTRUCTION	--		HEAVY HEX - A194 GRADE 8	
WASHER:	CONSTRUCTION	--		SS304	
GASKETS:	CONSTRUCTION	--		SUITABLE FOR RAISED-FACE OR FLAT-FACE FLANGES	
	MATERIAL	--		1/16" ARAMID FIBER WITH SBR BINDER - GARLOCK BLUE-GA	
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
	MATERIAL	304/304L STAINLESS STEEL			
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
STAINLESS STEEL	ASTM B36.10M	ASME B31.1		6	2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
	STAINLESS STEEL	150 PSIG	ASME B31.1		ASME B16.34
UI-MUS-PWS	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 24"	
	CONNECTION AND RATING	CLASS 800 SOCKETWELD		CLASS 150 FLANGED ENDS	
GATE VALVE	CONSTRUCTION	BODY: ASTM A182 F316 BONNET: ASTM A182 F316 DISC: ASTM A182 F316 STEM: ASTM A182 F316 PACKING: PTFE		BODY: ASTM A351 CF8M BONNET: ASTM A351 CF8M DISC: ASTM A351 CF8M STEM: ASTM A276 T316 PACKING: PTFE	
	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12401 BONNEY FORGE HL-18-SW		POWELL FIGURE 1503 CRANE FIGURE 47 (THRU 24") BONNEY FORGE 1-18 RF	
	CONNECTION AND RATING	--		CLASS 150 PSIG FLANGED ENDS	
BUTTERFLY VALVE	CONSTRUCTION	--		BODY: A182 GR. F316 OR A351 GR. CF8M SEAT: TFE/VITON DISC: A182 GR. F316 OR A351 GR. CF8M SHAFT: 17-4 PH PACKING: TFE	
	VALVE SELECTION	--		POWELL FIGURE 1572 CRANE FLOWSEAL TYPE 1LA (12" AND SMALLER) TYPE 1LC (14" AND LARGER) JAMESBURY SERIES 815	
	CONNECTION AND RATING	CLASS 800 SOCKETWELD		CLASS 150 FLANGED ENDS (2-1/2" THRU 12")	
CHECK VALVE	CONSTRUCTION	BODY/CAP: A182 F316L CARRIER/CARRIER PIN: 316SS DISC: A276 T316 SEAT RING: 316 SST GASKET: SPIRAL WOUND SST WITH PTFE		BODY: ASTM A351 GR. CF8M CAP: ASTM A351 GR. CF8M CARRIER/CARRIER PIN: 316SS DISC: ASTM A351 GR. CF8M GASKET: PTFE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SERIES SWS718 BONNEY FORGE HL-68-SW		POWELL FIGURE 1561 CRANE FIGURE 147 (THRU 24") BONNEY FORGE 1-68 RF	
	CONNECTION AND RATING	CLASS 800 SOCKETWELD		CLASS 150 FLANGED ENDS (2-1/2" THRU 20")	
BALL VALVE	CONSTRUCTION	BODY/BONNET: ASTM A351, CF8M STAINLESS STEEL, FULL-PORT SEAT RING: XTREME BALL: SS 316 SEAL: PTFE PACKING: GRAPHITE		BODY/INSERT: A351 CF8M BALL: 316 SS STEM: 316 SS SEAT: PTFE BODY SEAL: TFM STEM SEAL: PTFE GEAR OPERATOR 4" AND LARGER	
	VALVE SELECTION	JAMESBURY SERIES 4000 MODEL A KECKLEY SYTE BVM3 KITZ U3T2M		JAMESBURY SERIES 7150 KECKLEY BVF1 (THRU 6") VELAN SB-150	
	CONNECTION AND RATING	CLASS 800 SOCKETWELD		CLASS 150 FLANGED ENDS (2 1/2" THRU 12")	
GLOBE VALVE	CONSTRUCTION	BODY: ASTM A182 F316 BONNET: ASTM A182 F316 DISC: ASTM A182 F316 STEM: ASTM A182 F316 PACKING: PTFE		BODY: ASTM A351 CF8M BONNET: ASTM A351 CF8M DISC: ASTM A351 CF8M STEM: ASTM A276 T316 PACKING: PTFE	
	VALVE SELECTION	POWELL FIGURE GL08 VOGT SERIES SW12501 BONNEY FORGE HL-38-SW		POWELL FIGURE 1531 CRANE FIGURE 143 (THRU 24") BONNEY FORGE 1-38 RF	
	CONNECTION AND RATING	CLASS 800 SOCKETWELD		CLASS 150 FLANGED ENDS (2 1/2" THRU 12")	
REVISION HISTORY					
NUMBER	DESCRIPTION			DATE	
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000			6/30/2017	
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS			9/22/2017	
3	CHANGED SMALL BORE BALL VALVES TO JAMESBURY FROM KECKLEY			11/15/2017	
4	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN			11/22/2017	
5	CHANGED SMALL BORE CHECK VALVES TO SWING CHECKS RATHER THAN BALL CHECKS			2/27/2018	
6	UPDATED VALVE SELECTIONS			2/22/2021	

COOLING WATER (TO 100 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-CWS-CWR	PIPE SIZE (NPS)	COOLING WATER		100 PSIG AT 100 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 24"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS		STD	
	MATERIAL	A53 GRADE B - SEAMLESS		A53 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	SOCKETWELD: CLASS 3000, B16.11 THREADED: CLASS 2000, B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
	MATERIAL	FORGED CARBON STEEL - ASTM 105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
JOINTS:	TYPE	SOCKETWELD CLASS 3000 OR THREADED CLASS 2000		BUTTWELD - END PREP PER B16.25	
	OTHER	UNIONS: CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN		--	
FLANGES:	CONSTRUCTION	FLANGES NOT PERMITTED		CLASS 150 - WELD NECK - ASME B16.47 AND B16.5	
	WALL THICKNESS	--		SAME AS ADJOINING PIPE	
	MATERIAL	--		FORGED STEEL - ASTM A105 OR ASTM A516 GRADE 70	
FLANGE BOLTS:	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7			
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H			
WASHER:	CONSTRUCTION	F436			
GASKETS:	CONSTRUCTION	SUITABLE FOR RAISED FACE OR FLAT FACE FLANGES			
	MATERIAL	FULL FACE - 1/8" ARAMID FIBER WITH NITRILE (NBR) BINDER - GARLOCK BLUE-GARD 3000 OR EQUAL			
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
	MATERIAL	ASTM A53 CARBON STEEL			
PIPE MATERIAL: CARBON STEEL	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
	ASME B36.10M	ASME B31.1		6	2/22/2021
FINISH:	SPECIFICATION MATERIAL:	REFER TO PROJECT SPECIFICATION COLOR TO MATCH DARK GREEN OF EXISTING COOLING WATER PIPING			
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
	CARBON STEEL	150 PSIG	ASME B31.1	ASME B16.34	
UI-CWS-CWR	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 24"	
GATE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING: GRAPHITE		BODY/BONNET: A216 GR. WCB SEAT RING: STELLITE 6 FACED DISC/WEDGE: A217 GR. CA15 OR WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 1503 CRANE FIGURE 47 BONNEY FORGE 1-11 RF	
BUTTERFLY VALVE	CONNECTION AND RATING	--		CLASS 150 FLANGED ENDS (LUG STYLE)	
	CONSTRUCTION	--		BODY/BONNET: A216 GR. WCB SEAT RING: PTFE/RTFE/UHMWPE DISC: A351 CF8M SHAFT: 17-4 PH PACKING: PTFE GLAND: 304 SS	
	VALVE SELECTION	--		POWELL FIGURE 1572 JAMESBURY SERIES 815 FLOWSEAL TYPE 1LA	
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: STELLITE 6 FACED 410 SS DISC: 13% CR GASKET: SPIRAL WOUND		BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARD FACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 1561 CRANE FIGURE 147 BONNEY FORGE 1-61 RF	
BALL VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS (UP TO 6")	
	CONSTRUCTION	BODY/BONNET: ASTM A216 TYPE WCB SEAT RING: PTFE BALL: SS 316 SEAL: PTFE PACKING: GRAPHITE		BODY/BONNET: A105 OR WCB (BOLTED) SEAT RING: MPTFE/PTFE/RTFE BALL AND STEM: SS 316 PACKING: PTFE AND GRAPHITE BODY SEAL: SS 316 GRAPHITE GEAR OPERATOR 4" AND LARGER	
	VALVE SELECTION	JAMESBURY SERIES 4000 MODEL A KITZ AW800 SCTK KECKLEY BVM3		VELAN UB-150 JAMESBURY SERIES 7000 KECKLEY BVF1	
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARD FACED) DISC: 420SST TRIM: 13% Cr STEM: A183 F6A PACKING: GRAPHITE GASKET: SPIRAL WOUND SST WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARD FACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 1531 CRANE FIGURE 143 BONNEY FORGE 1-31 RF	

REVISION HISTORY		
NUMBER	DESCRIPTION	DATE
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000	6/30/2017
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS	9/22/2017
3	CHANGED SMALL BORE BALL VALVES TO JAMESBURY FROM KECKLEY	11/15/2017
4	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN	11/22/2017
5	ADDED 'FINISH' SPECIFICATION	10/10/2019

NON-POTABLE WATER (TO 150 PSIG)

PIPING SPECIFICATION:		PROCESS:	DESIGN CONDITIONS:	
UI-NPW	PIPE SIZE (NPS)	NON-POTABLE WATER	150 PSIG AT 150 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER	2 1/2" THRU 24"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	STD BLACK STEEL, ASTM A795		
FITTINGS:	CONSTRUCTION	SCH 40 - THREADED - 125 PSIG STANDARD FLAT BAND WATER PATTERN	WELDED - GROOVED AND ROLL-GROOVE FITTINGS AS APPROVED BY CODE	
	WALL THICKNESS	SAME AS ADJOINING PIPE	SAME AS ADJOINING PIPE	
JOINTS:	MATERIAL	MALLEABLE IRON FITTINGS	BLACK STEEL	
	TYPE	THREADED - USE TEFLON TAPE	WELDED - GROOVED AND ROLL-GROOVE FITTINGS AS APPROVED BY CODE	
	WALL THICKNESS	SAME AS ADJOINING PIPE	SAME AS ADJOINING PIPE	
FLANGES:	OTHER	UNIONS: CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN	--	
	CONSTRUCTION	FLANGES NOT PERMITTED	CLASS 150 FLANGED ENDS	
	WALL THICKNESS	--	SAME AS ADJOINING PIPE	
NIPPLES:	MATERIAL	--	BLACK STEEL - WELD NECK OR SLIP-ON	
	CONSTRUCTION	WHEN UNTHREADED PORTION IS EXCEEDS 1 1/2", USE EXTRA-STRONG NIPPLE - DO NOT USE CLOSE NIPPLES	--	
	MATERIAL	SAME AS ADJOINING PIPE	--	
UNIONS:	CONSTRUCTION	THREADED	FLANGED UNIONS	
	MATERIAL	SAME AS ADJOINING PIPE	CAST IRON FLANGES - GASKET TYPE	
	OTHER	INSTALL UNIONS: IN LONG RUNS AT 80° INTERVALS - IN BYPASS OF VALVES/EQUIPMENT - AT EQUIPMENT CONNECTIONS	--	
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS		
	MATERIAL	ASTM A53 CARBON STEEL		
PIPE MATERIAL: CARBON STEEL	PIPE CODE: ASTM B36.10M	DESIGN/CONSTRUCTION CODE: ASME B31.1	REVISION: 5	DATE REVISED: 2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL: CARBON STEEL	PRESSURE CLASS: 150 PSIG	DESIGN CODE: ASME B31.1	ASME B16.34
UI-NPW	PIPE SIZE (NPS)	2" AND SMALLER	2 1/2" THRU 24"	
GATE VALVE	CONNECTION AND RATING	CLASS 800 THREADED	CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING: GRAPHITE	BODY/BONNET: A216 WCB SEAT RING: HARDFACED DISC/WEDGE: A217 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11T	POWELL FIGURE 1503 CRANE FIGURE 47 BONNEY FORGE 1-11 RF	
BUTTERFLY VALVE	CONNECTION AND RATING	--	CLASS 150 FLANGED ENDS (LUG STYLE)	
	CONSTRUCTION	--	BODY/BONNET: A216 GR. WCB SEAT RING: PTFE/RTFE/UHMWPE DISC: A351 CF8M SHAFT: 17-4 PH PACKING: PTFE GLAND: 304 SS	
	VALVE SELECTION	--	POWELL FIGURE 1572 JAMESBURY SERIES 815 FLOWSEAL TYPE 1LA	
CHECK VALVE	CONNECTION AND RATING	CLASS 150 THREADED	CLASS 150 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: CAST OR FORGED STEEL SEAT: HARDFACED SS DISC: A276 T420 OR SS, WAFER OR SWING TYPE BOLTED BONNET GASKET: SPIRAL WOUND SS WITH GRAPHITE	BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: CORRUGATED SST WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW	POWELL FIGURE 1561 CRANE FIGURE 147 BONNEY FORGE 1-61 RF	
BALL VALVE	CONNECTION AND RATING	CLASS 150 THREADED	GROOVED ENDS (THROUGH 6")	
	CONSTRUCTION	BODY/BONNET: ASTM A216 TYPE WCB SEAT RING: PTFE BALL: SS 316 SEAL: PTFE PACKING: GRAPHITE LOCKING HANDLE	BODY/END CAP: ASTM A395 DUCTILE IRON BALL: 316 SS STEM: 316SS SEATS: PTFE SEALS: FLUOROELASTOMER LOCKING OPERATOR (GEAR OPERATOR OVER 4")	
	VALVE SELECTION	JAMESBURY SERIES 4000 MODEL A KITZ AW800 SCKT KECKLEY BVM3	VICTAULIC SERIES 726 GRUVLOK SERIES 7500	
REVISION HISTORY				
NUMBER	DESCRIPTION	DATE		
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000	6/30/2017		
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS	9/22/2017		
3	CHANGED SMALL BORE BALL VALVES TO JAMESBURY FROM KECKLEY	11/15/2017		
4	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN	11/22/2017		
5	UPDATED VALVE SELECTIONS; ADDED GROOVED JOINT BALL VALVES	2/22/2021		

SANITARY/STORM SEWER/VENT

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-SEW		SANITARY SEWER, SEWER VENT, STORM		15 PSIG AT 140 °F	
PIPE SIZE (NPS)		4" AND SMALLER		ALL SIZES	
WEIGHT/SCHEDULE		--		SERVICE WEIGHT	
MATERIAL		ASTM B306, DWV		CAST IRON, ASTM A74	
CONSTRUCTION		SOLDERED OR PRESS FIT		BELL AND SPIGOT	
MATERIAL		ASME B16.23 CAST BRONZE OR ASME B16.29 WROUGHT COPPER		CAST IRON, ASTM A74	
ABOVE GRADE TYPE		SOLDERED OR PRESS FIT		ASTM C564, RUBBER GASKETS JOINT DEVICES OR LEAD AND OAKUM	
SOLDER/BURIED TYPE		SOLDER: ASTM B32 ALLOY, GRADE Sb-5 95/5 TIN-ANTIMONY, LEAD FREE OR: ASTM B32 ALLOY, GRADE SN95 TIN-SILVER, LEAD FREE		HUB AND SPIGOT, CISPI HSN COMPRESSION TYPE WITH ASTM C564 NEOPRENE GASKETS OR LEAD AND OAKUM	
NOTES:		1) THIS SPECIFICATION IS INTENDED FOR MAIN DRAIN AND VENT LINES WITHIN THE POWER AND CHILLED WATER PLANTS ON MAIN CAMPUS AND OAKDALE CAMPUS. FOLLOW THE UNIVERSITY OF IOWA DESIGN STANDARDS AND PROCEDURES FOR BUILDING PLUMBING SYSTEMS (I.E. RESTROOMS, KITCHEN AREAS, ETC.) WITHIN THESE PLANTS. 2) EITHER COPPER OR CAST IRON PIPE MATERIAL MAY BE USED FOR PIPE SIZES BETWEEN 4" AND SMALLER. FINAL PIPE MATERIAL SHALL BE SELECTED BASED UPON THE INDIVIDUAL PROJECT NEEDS. DESIGN PROFESSIONAL SHALL COORDINATE SELECTION OF PIPE MATERIAL WITH UTILITY OPERATOR. 3) PROVIDE TRAPS ON ALL SANITARY BRANCH WASTE CONNECTIONS FROM FIXTURES WITHOUT TRAPS 4) EXPOSED BRASS SHALL BE CHROME- PLATED POLISHED BRASS WITH NIPPLE AND SET SCREW ESCUTCHEONS 5) CONCEALED TRAPS MAY BE ROUGH CAST BRASS OR SAME MATERIAL AS PIPE CONNECTED TO 6) SLIP JOINTS NOT ALLOWED ON SEWER SIDE OF TRAP 7) TRAPS SHALL CORRESPOND TO FITTINGS ON CAST IRON SOIL PIPE OR STEEL PIPE 8) SIZE SHALL BE AS REQUIRED BY CONNECTED SERVICE OR FIXTURE			
PIPE MATERIAL:		PIPE CODE		TYPE	
COPPER/CAST IRON		ASTM B306/A74		PRESS FIT, SOLDER, BELL AND SPIGOT OR HUBLESS	
VALVE SPECIFICATION:		SPECIFICATION MATERIAL:		DESIGN CODE:	
UI-SEW		CAST IRON		ASME B31.1 / ASME B16.34	
PIPE SIZE (NPS)		--		ALL SIZES	
CONNECTION AND RATING		--		PER ADJOINING PIPING SPECIFICATIONS	
CONSTRUCTION		--		BODY: CAST IRON COVER: CAST IRON HANDWHEEL: CAST IRON (REMOVABLE) GATE/FLAPPER: BRONZE EXTENSIONS: CAST IRON	
VALVE SELECTION		--		POWELL FIGURE 1787 (2" THRU 24") MILWAUKEE SERIES F-2882 CRANE F53	
CONNECTION AND RATING		--		PER ADJOINING PIPING SPECIFICATIONS	
CONSTRUCTION		--		BODY/BONNET: ASTM A126 CAST IRON BODY BEARING: SS 316 PACKING: PTFE HANDWHEEL: CAST IRON (REMOVABLE) PLUG: SS 316 EXTENSIONS: CAST IRON	
STANDARD		--		ANSI/AWWA C517	
VALVE SELECTION		--		DEZURIK PEC SERIES OR EQUAL BY MILLIKEN	

CARBON STEEL:		
NUMBER	DESCRIPTION	DATE
1	INITIAL ISSUE	4/14/2017
2	UPDATED VALVE SELECTIONS; ADDED COPPER DWV PIPING AS AN OPTION FOR SMALLER SIZES	2/22/2021

RIVER WATER (TO 100 PSIG)

PIPING SPECIFICATION:		PROCESS:	DESIGN CONDITIONS:
UI-RWS	PIPE SIZE (NPS)	RIVER WATER	100 PSIG AT 120 °F
	WEIGHT/SCHEDULE	2" AND SMALLER	2 1/2" THRU 30"
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS	STD
	MATERIAL	A53 GRADE B - SEAMLESS	A53 GRADE B - SEAMLESS
FITTINGS:	CONSTRUCTION	SOCKETWELD: CLASS 3000, B16.11 THREADED: CLASS 2000, B16.11	BUTTWELD - ASME B16.9
	WALL THICKNESS	SAME AS ADJOINING PIPE	SAME AS ADJOINING PIPE
	MATERIAL	FORGED CARBON STEEL - ASTM 105	BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS
JOINTS:	TYPE	SOCKETWELD CLASS 3000 OR THREADED CLASS 2000	BUTTWELD - END PREP PER B16.25
	OTHER	UNIONS: CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN	--
FLANGES:	CONSTRUCTION	FLANGES NOT PERMITTED	CLASS 150 - WELD NECK - ASME B16.47 AND B16.5
	WALL THICKNESS	--	SAME AS ADJOINING PIPE
	MATERIAL	--	FORGED STEEL - ASTM A105 OR ASTM A516 GRADE 70
FLANGE BOLTS:	CONSTRUCTION	ALLOY STEEL, AISI 4140/4142 QUENCHED AND TEMPERED, A193 GRADE B7	
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - A194 GRADE 2H	
WASHER:	CONSTRUCTION	F436	
GASKETS:	CONSTRUCTION	SUITABLE FOR RAISED FACE OR FLAT FACE FLANGES	
	MATERIAL	FULL FACE - 1/8" ARAMID FIBER WITH NITRILE (NBR) BINDER - GARLOCK BLUE-GARD 3000 OR EQUAL	
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - ASTM A403 - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS	
	MATERIAL		
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:	REVISION:
CARBON STEEL	ASME B36.10M	ASME B31.1	2
DATE REVISID:	2/22/2021		
FINISH:	SPECIFICATION MATERIAL:	3-COAT SYSTEM WITH EPOXY PRIMER, ACRYLIC INTERMEDIATE COAT AND POLYURETHANE TOP COAT/COLOR TO MATCH RED-ORANGE OF EXISTING RIVER WATER PIPING	
VALVE SPECIFICATION	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:
UI-RWS	CARBON STEEL	150 PSIG	ASME B16.34
	PIPE SIZE (NPS)	2" AND SMALLER	ASME B16.34
GATE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD	CLASS 150 FLANGED ENDS
	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING: GRAPHITE	BODY/BONNET: A216 GR. WCB SEAT RING: STELLITE 6 FACED DISC/WEDGE: A217 GR. CA15 OR WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: CORRUGATED SS WITH GRAPHITE
	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW	POWELL FIGURE 1503 CRANE FIGURE 47 (THRU 24") BONNEY FORGE 1-11 RF
BUTTERFLY VALVE	CONNECTION AND RATING	--	CLASS 150 FLANGED ENDS
	CONSTRUCTION	--	BODY: 316SS SEAT: XTREME SHAFT: 316SS DISC: 316SS GLAND/BEARING: BRONZE OR ALUMINIZED BRONZE O-RING/GASKET: EPDM 200 PSIG WORKING PRESSURE FURNISH WITH MASTERGEAR M12 MANUAL OPERATOR
	VALVE SELECTION	--	VANESSA/EMERSON TRIPLE OFFSET
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD	CLASS 150 FLANGED ENDS
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: STELLITE 6 FACED 410 SS DISC: 13% CR GASKET: SPIRAL WOUND	BODY/CAP: A216 GR. WCB (BOLTED) SEAT RING: HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY GASKET: CORRUGATED SST WITH GRAPHITE
	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW	POWELL FIGURE 1561 CRANE FIGURE 147 (THRU 24") BONNEY FORGE 1-61 RF
BALL VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD	--
	CONSTRUCTION	BODY/BONNET: ASTM A216 TYPE WCB SEAT RING: PTFE BALL: SS 316 SEAL: PTFE PACKING: GRAPHITE LOCKING HANDLE	--
	VALVE SELECTION	JAMESBURY SERIES 4000 MODEL A KITZ AW800 SCK KECKLEY BVM3	--
NOTES	(1) FURNISH VALVES WITH GEAR OPERATORS GREATER THAN 8"		

REVISION HISTORY		
NUMBER	DESCRIPTION	DATE
1	ADDED 'FINISH' AND CHANGED BUTTERFLY VALVE SPEC	10/10/2019
2	ADDED THERMOWELL SPEC AND UPDATED VALVE SELECTIONS	2/22/2021

BOILER BLOWOFF/BLOWDOWN (TO 600 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-MPP-BOS-BDS	PIPE SIZE (NPS)	BLOWOFF/BLOWDOWN SYSTEM		600 PSIG AT 500 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 10"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	XS		XS	
	CONSTRUCTION	A106 GRADE B - SEAMLESS		A106 GRADE B - SEAMLESS	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
PIPING JOINTS:	MATERIAL	FORGED CARBON STEEL - ASTM 105		BUTTWELD FITTING - ASTM A234 GRADE B - SEAMLESS	
	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
UNIONS:	OTHER	--		--	
	CONSTRUCTION	CLASS 3000 - SW - B16.11 - FLAT FACE WITH SPIRAL WOUND GASKET DESIGN		NOT PERMITTED	
FLANGES:	WALL THICKNESS	SAME AS ADJOINING PIPE		--	
	MATERIAL	FORGED CARBON STEEL - ASTM A105		--	
FLANGE BOLTS:	CONSTRUCTION	CLASS 600 - WELD NECK - ASME B16.5			
	MATERIAL	SAME AS ADJOINING PIPE			
FLANGE NUTS:	CONSTRUCTION	FORGED CARBON STEEL - ASTM A105			
	MATERIAL	STUD - FULL LENGTH ASME B1.1 - CLASS 2A THREADS			
GASKETS:	CONSTRUCTION	HIGH STRENGTH STEEL - ASTM A193 - GRADE B7			
	MATERIAL	HEAVY HEX - ASME B1.1 - CLASS 2B THREADS			
THERMOWELLS:	CONSTRUCTION	CARBON STEEL - ASTM A194 GRADE 2H HEAVY - F436 WASHERS			
	MATERIAL	SPIRAL WOUND - SUITABLE FOR RAISED FACE OR FLAT FACE FLANGES			
PIPE MATERIAL: CARBON STEEL	CONSTRUCTION	FLEXITALLIC STYLE CGI - TYPE 304 STAINLESS - FLEXICARB FILLER			
	MATERIAL	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
VALVE SPECIFICATION:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
	SPECIFICATION MATERIAL:	ASME B31.1		4	2/22/2021
UI-MPP-BOS-BDS	PIPE CODE:	600 PSIG		ASME B16.34	
	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD (1" THRU 2")		CLASS 600 FLANGED ENDS	
GATE VALVE	CONSTRUCTION	BODY/BONNET: A105, TRIM 13% CR OUTSIDE SCREW & YOKE, BOLTED GLAND, SOLID WEDGE, HARD FACED SEATS, CLASS 800 PACKING:		BODY/BONNET: A217 GR. WC6 SEAT RING: A182 F11; STELLITE 6 FACED DISC/WEDGE: A217 GR. WC6; STELLITE 6 FACED STEM: 410 SS API TRIM 5 PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
	VALVE SELECTION	POWELL FIGURE GA08 VOGT SW12111 BONNEY FORGE FIG. H11SW		POWELL FIGURE 6003 CRANE FIGURE 76 BONNEY FORGE 6-11 RF	
CHECK VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/CAP: A105 (BOLTED) SWING CHECK SEAT RING: 316 HF DISC: 13% CR GASKET: SPIRAL WOUND		BODY/BONNET: A217 GR. WC6 SEAT RING: A182 F11; STELLITE 6 FACED DISC/WEDGE: A217 GR. WC6; STELLITE 6 FACED STEM: 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
BALL VALVE	VALVE SELECTION	POWELL FIGURE SW08 VOGT SW701 BONNEY FORGE FIG. H61SW		POWELL FIGURE 6061 CRANE FIGURE 175 BONNEY FORGE 6-61 RF	
	CONSTRUCTION	CLASS 900 PSIG SOCKETWELD		--	
GLOBE VALVE	CONSTRUCTION	BODY: A105, STEM SS 410 COND. 2 THRUST WASHER: STELLITE 6, BALL AND SEAT: SS 410/CHROME CARBIDE COATED; STEM: SS 410; THRUST BUSHING: BRONZE; PACKING FLANGE SS 304 STEM BUSHING: NITRIDED SS410 COND. 2; SEAT SS 410 COND.2 CHROME CARBIDE COATED LOCKABLE LEVER		--	
	VALVE SELECTION	VELAN TYPE R, METAL SEATED, CLASS 900		--	
GLOBE VALVE	CONNECTION AND RATING	CLASS 800 PSIG SOCKETWELD		CLASS 600 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: A105 (BOLTED) (BODY HARDFACED) SEAT: CoCr ALLOY DISC: 420 SS, CA15 HT, OR CoCr ALLOY STEM: A182 F6a OR 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE		BODY/BONNET: A216 GR. WCB (BOLTED) SEAT RING: A105 OR A216 HARDFACED DISC: A105 OR A216 WCB WITH 13% CR OVERLAY STEM: 410 SS PACKING: GRAPHITE GASKET: SPIRAL WOUND SS WITH GRAPHITE	
GLOBE VALVE	VALVE SELECTION	POWELL FIGURE GL08 VOGT SW12141 BONNEY FORGE FIG. H31SW		POWELL FIGURE 6031 CRANE FIGURE 171 BONNEY FORGE 6-31 RF	

NOTES:

REVISION HISTORY		
NUMBER	DESCRIPTION	DATE
1	CHANGED SMALL BORE VALVES TO CLASS 800 FROM CLASS 3000	6/30/2017
2	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS	9/22/2017
3	CHANGED UNIONS TO A FLAT-FACED GASKETED DESIGN	11/22/2017
4	SET UPPER SIZE LIMIT TO 10"; UPDATED VALVE SELECTIONS; REVISED DESIGN TEMPERATURE TO 500F	2/22/2021

CHEMICAL FEED (SS) (TO 150 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:											
UI-CHEM (SS)	PIPE SIZE (NPS)	CHEMICAL FEED		150 PSIG AT 140 °F											
	WEIGHT/SCHEDULE	2" AND SMALLER													
PIPE MATERIAL: ASME B36.10M	MATERIAL	TUBE WALL THICKNESS VARIES BY LINE SIZE													
TUBING WALL:	TUBING OD (IN.)	1/16	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	2
	WALL THICKNESS (IN.)	0.010	0.028	0.028	0.028	0.035	0.035	0.035	0.049	0.049	0.049	0.065	0.083	0.095	0.109
FITTINGS:	CONSTRUCTION	SWAGelok COMPRESSION TUBING FITTINGS													
	WALL THICKNESS	SAME AS ADJOINING PIPE													
	MATERIAL	ASTM A276, TYPE 316 AND ASTM A182 TYPE 316													
PIPING JOINTS:	TYPE	SWAGelok COMPRESSION TUBING FITTINGS													
	OTHER	--													
FLANGES:	CONSTRUCTION	FLANGES NOT PERMITTED													
	WALL THICKNESS	--													
	MATERIAL	--													
FLANGE BOLTS:	CONSTRUCTION	FLANGES NOT PERMITTED													
	MATERIAL	--													
FLANGE NUTS:	CONSTRUCTION	FLANGES NOT PERMITTED													
	MATERIAL	--													
GASKETS:	CONSTRUCTION	FLANGES NOT PERMITTED													
	MATERIAL	--													
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:						REVISION:			DATE REVISED:				
STAINLESS STEEL	ASTM A269/A269M	ASME B31.1						2			2/22/2021				
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:												
UI-CHEM (SS)	STAINLESS STEEL	150 PSIG	ASME B31.1												
	PIPE SIZE (NPS)	2" AND SMALLER													
	CONNECTION AND RATING	SWAGelok COMPRESSION TUBING FITTINGS													
	CONSTRUCTION	BODY: ASTM A479 316SS BALL: ASTM A276 OR A479 316SS STEM: STM A276 OR A479 316SS SEATS, STEM BEARING AND PACKING: PEEK													
BALL VALVE	VALVE SELECTION	SWAGelok SS-62P													
REVISION HISTORY															
NUMBER	DESCRIPTION														DATE
1	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS														9/22/2017
2	CHANGED CONSTRUCTION TO 2" AND SMALLER TUBING SPEC														2/22/2021

CHEMICAL FEED (PVC) (TO 150 PSIG)

PIPING SPECIFICATION:		PROCESS:	DESIGN CONDITIONS:	
UI-CHEM (PVC)		CHEMICAL FEED	150 PSIG AT 140 °F	
PIPE MATERIAL: ASME B36.10M	PIPE SIZE (NPS)	2" AND SMALLER		
	WEIGHT/SCHEDULE	SCH 80, SDR 21 OR 26		
	MATERIAL	POLYVINYL CHLORIDE (PVC) ASTM D1784, WITH CELL CLASS OF 12454		
FITTINGS:	CONSTRUCTION	SOLVENT WELD TYPE		
	STANDARD	ASTM D2467		
	WALL THICKNESS	SAME AS ADJOINING PIPE		
JOINTS:	SOLVENT MATERIAL	SOLVENT CEMENT IN ACCORDANCE WITH ASTM D2564		
	CONSTRUCTION	SOLVENT WELD TYPE		
	WALL THICKNESS	SAME AS ADJOINING PIPE		
FLANGES:	SOLVENT MATERIAL	SOLVENT CEMENT IN ACCORDANCE WITH ASTM D2564		
	CONSTRUCTION	FLANGE ONLY PERMITTED FOR EQUIPMENT OR VALVE CONNECTIONS		
	WALL THICKNESS	SAME AS ADJOINING PIPE		
FLANGE BOLTS:	MATERIAL	POLYVINYL CHLORIDE (PVC) ASTM F1970, WITH CLASS 150 FLANGE DIMENSIONS		
	CONSTRUCTION	CARBON STEEL BOLTS AND STUDS IN ACCORDANCE WITH ASTM A307		
FLANGE NUTS:	MATERIAL	HEAVY HEX - A194 GRADE 8		
GASKETS:	CONSTRUCTION	SUITABLE FOR FLAT-FACE FLANGES		
	MATERIAL	FULL FACE - 1/8" POLYTETRAFLUOROETHYLENE (PTFE) - GARLOCK 3500 OR EQUAL		
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:	REVISION:	DATE REVISED:
PVC 1120	ASTM B36.10M	ASME B31.1	0	2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:	
UI-CHEM (PVC)	PVC	150	ASME B31.1	ASME B16.34
CHECK VALVE	PIPE SIZE (NPS)	2" AND SMALLER		
	CONNECTION AND RATING	CLASS 150 SOCKETWELD		
	CONSTRUCTION	BODY: ASTM D1784 CELL CLASS 12454, PVC, TYPE IV, "TRUE UNION" STYLE BALL: PVC, TYPE IV, ASTM D1784, CELL CLASSIFICATION 12454 SEAT PLATE: PVC, TYPE IV, ASTM D1784, CELL CLASSIFICATION 12454 PACKING: GRAPHITE O-RING: FKM		
VALVE SELECTION	SPEARS TRUE UNION 2000 COLONIAL TRUE UNION CHECK VALVE HAYWARD TC SERIES			
BALL VALVE	CONNECTION AND RATING	CLASS 150 SOCKETWELD		
	CONSTRUCTION	BODY: ASTM D1784 CELL CLASS 12454, PVC, SCH. 80, FULL-PORT, "TRUE UNION" STYLE BALL: PVC, TYPE 1, ASTM D1784, CELL CLASSIFICATION 12454 SEAT: PTFE STEM: PVC, TYPE 1, ASTM D1784, CELL CLASS 12454 HANDLE: POLYPROPYLENE PACKING: GRAPHITE O-RING: EPDM		
	VALVE SELECTION	SPEARS TRUE UNION 2000 COLONIAL FULL BLOCK INDUSTRIAL TRUE UNION BALL VALVE HAYWARD TB SERIES		
REVISION HISTORY				
NUMBER	DESCRIPTION			DATE
0	INITIAL ISSUE			2/22/2021

TURBINE OIL (TO 300 PSIG)

PIPING SPECIFICATION:		PROCESS:		DESIGN CONDITIONS:	
UI-TOS	PIPE SIZE (NPS)	TURBINE OIL SYSTEM		300 PSIG AT 200 °F	
	WEIGHT/SCHEDULE	2" AND SMALLER		2 1/2" THRU 6"	
PIPE MATERIAL: ASME B36.10M	MATERIAL	SCH 40S		SCH 10S	
	MATERIAL	A312 TYPE 304 - SEAMLESS OR WELDED		A312 GRADE 304 - SEAMLESS OR WELDED	
FITTINGS:	CONSTRUCTION	CLASS 3000 - SOCKETWELD - B16.11		BUTTWELD - ASME B16.9	
	WALL THICKNESS	SAME AS ADJOINING PIPE		SAME AS ADJOINING PIPE	
	MATERIAL	FORGED STEEL - ASTM A182, F304L, ASME B16.25		ASTMA403, WP304L - SEAMLESS, B16.25	
PIPING JOINTS:	TYPE	SOCKETWELD		BUTTWELD - END PREP PER B16.25	
	OTHER			--	
FLANGES:	CONSTRUCTION	FLANGES NOT PERMITTED		CLASS 300	
	WALL THICKNESS	--		SAME AS ADJOINING PIPE	
	MATERIAL	--		SS, ASTM A182, F330L, ASME B16.5	
FLANGE BOLTS:	CONSTRUCTION	--		--	
	MATERIAL	HIGH STRENGTH STAINLESS STEEL - GRADE B8 - CLASS 2			
FLANGE NUTS:	CONSTRUCTION	--		--	
	MATERIAL	STAINLESS STEEL - ASTM A194 GRADE 8 - SS304 WASHERS			
GASKETS:	CONSTRUCTION	SUITABLE FOR RAISED FACE OR FLAT FACE FLANGES			
	MATERIAL	FULL FACE - 1/16" ARAMID FIBER WITH SBR BINDER - GARLOCK BLUE-GARD OR EQUAL			
THERMOWELLS:	CONSTRUCTION	INSERTION THERMOWELLS - 3000 PSIG PRESSURE CLASS - SEAL WELDED WELLS			
	MATERIAL	304/304L STAINLESS STEEL			
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:		REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1		2	2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:		
UI-TOS	STAINLESS STEEL	150 PSIG	ASME B31.1		
	PIPE SIZE (NPS)	2" AND SMALLER		2 1/2" THRU 6"	
BALL VALVE	CONNECTION AND RATING	CLASS 800 SOCKETWELD		CLASS 300 FLANGED ENDS	
	CONSTRUCTION	BODY/BONNET: ASTM A351, CF8M STAINLESS STEEL, FULL-PORT SEAT RING: XTREME BALL: SS 316 SEAL: PTFE PACKING: GRAPHITE		BODY/INSERT: A351 CF8M BALL: 316 SS STEM: 316 SS SEAT: PTFE BODY SEAL: TFM STEM SEAL: PTFE	
	VALVE SELECTION	JAMESBURY SERIES 4000 MODEL A VELAN TYPE R (CLASS 900) KITZ AW800 SCTK		JAMESBURY SERIES 7150 VELAN TYPE R KECKLEY BVF-1	

REVISION HISTORY		
NUMBER	DESCRIPTION	DATE
1	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS	9/22/2017
2	SET SIZE LIMIT AT 6"; UPDATED VALVE SELECTIONS; UPDATED DESIGN CONDITIONS, PIPE SCHEDULE AND FLANGE RATING	2/22/2021

ASH SYSTEM (VACUUM)

PIPING SPECIFICATION:		PROCESS:	DESIGN CONDITIONS:	
UI-MPP-ASH		ASH SYSTEM	-6 PSIG AT 685 °F	
	PIPE SIZE (NPS)	6" THRU 8"		
PIPE MATERIAL:	WEIGHT/SCHEDULE	WALL THICKNESS 0.5" MINIMUM		
ASME B36.10M	MATERIAL	CENTRIFUGALLY CAST, CHROME ALLOY CAST IRON HARDNESS 285-400 BHN, PLAIN ENDS		
FITTINGS:	CONSTRUCTION	INTEGRALLY CAST FLANGES - TO INCLUDE 2" REMOVABLE WEARBACK SECTION - INTEGRAL HANDHOLES		
	MATERIAL	CHROME ALLOY CAST IRON - BRINELL HARDNESS NO LESS THAN 350 - WALL THICKNESS 1" MINIMUM		
PIPING JOINTS:	TYPE	MECHANICAL LOCKING CLAMPS/FLANGES ACCORDING TO MANUFACTURER'S RECOMMENDATIONS		
EXPANSION JOINTS:	CONSTRUCTION	EXPANSION JOINTS SHALL BE PROVIDED AT LOCATIONS DETERMINED BY THE ASH PIPNG SUPPLIER	O.D. OF LINER SHALL BE MACHINED TO ALLOW SMOOTH MOVEMENT - INTEGRAL STOPS TO LIMIT MOVEMENT	
	MATERIAL		CHROME ALLOY CAST IRON - BRINELL HARDNESS 280 MINIMUM	
FLANGE BOLTS:	CONSTRUCTION	MANUFACTURER'S RECOMMENDATION		
	MATERIAL	MANUFACTURER'S RECOMMENDATION		
FLANGE NUTS:	CONSTRUCTION	MANUFACTURER'S RECOMMENDATION		
	MATERIAL	MANUFACTURER'S RECOMMENDATION		
GASKETS:	CONSTRUCTION	MANUFACTURER'S RECOMMENDATION		
	MATERIAL	MANUFACTURER'S RECOMMENDATION		
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:	REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1	1	2/22/2021
VALVE SPECIFICATION:	SPECIFICATION MATERIAL:	PRESSURE CLASS:	DESIGN CODE:	
UI-MPP-ASH	CARBON STEEL	150 PSIG	ASME B31.1	
	PIPE SIZE (NPS)	6" THRU 8"		
GATE VALVE	CONNECTION AND RATING	MECHANICAL LOCKING CLAMPS/FLANGES ACCORDING TO MANUFACTURER'S RECOMMENDATIONS		
	CONSTRUCTION	TOTALLY ENCLOSED ROTARY SLIDE GATE VALVE POWER CHAMBER OPERATED		

REVISION HISTORY		
NUMBER	DESCRIPTION	DATE
1	CHANGED FORMATTING; ADDED VALVE SPEC	2/22/2021

VACUUM SYSTEM

PIPING SPECIFICATION:		PROCESS:	DESIGN CONDITIONS:	
UI-VAC		VACUUM SYSTEM	-6 PSIG AT 100 °F	
	PIPE SIZE (NPS)	2" THRU 3"	4" THRU 6"	
PIPE MATERIAL: ASME B36.10M	WEIGHT/SCHEDULE	5S	10S	
	MATERIAL	TYPE 304 SS	TYPE 304 SS	
FITTINGS:	CONSTRUCTION	COMPRESSION COUPLINGS - SWEEP RADIUS TYPE ELBOWS	BUTTWELD FITTINGS - SWEEP RADIUS TYPE ELBOWS	
	WALL THICKNESS	SAME AS ADJOINING PIPE	SAME AS ADJOINING PIPE	
	MATERIAL	TYPE 304 SS	TYPE 304 SS	
PIPING JOINTS:	TYPE	COMPRESSION COUPLINGS	BUTTWELD	
	OTHER	BLACK NEOPRENE GASKETS	END PREP ASME B16.25	
FLANGES:	CONSTRUCTION	FLANGES NOT PERMITTED	CLASS 150 - WELD NECK - ASME B16.5	
	WALL THICKNESS	SAME AS ADJOINING PIPE	SAME AS ADJOINING PIPE	
	MATERIAL	UNIONS: GROUND JOINT; SOCKETWELD: CLASS 3000 - THREADED: CLASS 2000	ASME B16.5, ASTM A182, F3304L	
FLANGE BOLTS:	CONSTRUCTION	STUD - FULL LENGTH ASME B1.1 - CLASS 2A THREADS		
	MATERIAL	HIGH STRENGTH STEEL - ASTM A193 - GRADE B7		
FLANGE NUTS:	CONSTRUCTION	HEAVY HEX - ASME B1.1 - CLASS 2B THREADS		
	MATERIAL	CARBON STEEL - ASTM A194 GRADE 2H HEAVY - F436 WASHERS		
GASKETS:	CONSTRUCTION	SUITABLE FOR RAISED FACE OR FLAT FACE FLANGES		
	MATERIAL	FULL FACE - 1/8" ARAMID FIBER WITH NITRILE (NBR) BINDER - GARLOCK BLUE-GARD 3000 OR EQUAL		
PIPE MATERIAL:	PIPE CODE:	DESIGN/CONSTRUCTION CODE:	REVISION:	DATE REVISED:
CARBON STEEL	ASTM B36.10M	ASME B31.1	1	9/22/2017

REVISION HISTORY		
NUMBER	DESCRIPTION	DATE
1	ADDED WALL THICKNESS TO TABLE, REMOVED OTHER REFERENCES TO WALL THICKNESS	9/22/2017
2	UPDATED DESIGN CONDITIONS	2/22/2021

