

**MATERIAL**

CARBON STEEL

RATING
 ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ 100° F
 170 PSIG @ 500° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

A

 REVISION 7
 DATE: 06/27/22

MATER. APPROVAL

Matthew J. Martin

1F1037AA1859411...

HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

OPER. APPROVAL

[Signature]

230EFCB4FF5247D...

ENG. APPROVAL

Jeff Carkuff

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES
 BOILER FEED WATER, COOLING WATER, CONDENSATE, EDC, DEMINERALIZED WATER, FUEL GAS,
 ETHYLENE, PROPYLENE, FIRE WATER, HYDROCARBON, INSTRUMENT AIR, NITROGEN, NATURAL GAS,
 OXYGEN, STEAM, WASTE WATER

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1 1/2" 2" - 24" 30" 36"	SCH 80, A-106 GR. B SMLS, PE STD. WT., A-106 GR. B SMLS, BE STD. WT., API 5L GR. B, ERW, BE STD. WT., API 5L GR. B, EFW, BE, 100% R.T.	1, 2 1, 2 1, 2 1, 2
FITTINGS	1/2" - 1 1/2" 1/2" - 24" 30" - 36" 1/2" - 10"	3000#, A-105, SW, ASME B16.11 SCH TO MATCH PIPE, A-234 GR. WPB, BE, ASME B16.9 STD. WT., A-234 GR. WPB, EFW, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2 1, 2 1, 2 1, 2
FLANGES	1/2" - 1 1/2" 1/2" - 6" 8" - 24" 30" - 36" 1/2" - 24" 2" - 24"	150#, A-105, SCH 80, RF SW, ASME B16.5 150#, A-105, SCH TO MATCH PIPE, RF WN, ASME B16.5 150#, A-105, STD WT, RF SO, ASME B16.5 150#, A-105, STD WT, RF SO, ASME B16.47 SER. A 150#, A-105, RF BLIND, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 3, 4, 5 1, 2, 3, 4, 5 1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6 3
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B-7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL ALL	150#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET OR EQ. 150#, 1/8" THK. SPIRAL WOUND, 304SS WINDINGS WITH GRAPHITE FILLER, CS OUTER RING AND 304SS INNER RING, ASME B16.5, ASME B16.20, FLEXITALLIC STYLE CGI OR EQ.	3, 5 15
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VGA-120 VGA-112 VGA-101 VGA-101G VGL-292 VGL-200	1/2" - 1 1/2" 1/2" - 1 1/2" 1/2" - 14" 16" - 24" 1/2" - 1 1/2" 2" - 14"	GATE, EXTENDED BODY, CS, 800#, MSWxFNPT, TRIM #8 GATE, CS, 800#, SW, TRIM #8 GATE, CS, 150#, RF FLG, TRIM #8 GATE, CS, 150#, RF FLG, TRIM #8, GO GLOBE, CS, 150#, RF FLG, TRIM #8 GLOBE, CS, 150#, RF FLG, TRIM #8	7

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Mfg. Signed by <small>1F1037AA1859411...</small>	HSE Signed by <small>402213A8234D4F3...</small>	Oper. Signed by <small>230EFCB4FF5247D...</small>	Eng. Signed by <small>444C5CDEA51D49D...</small>
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VBFB-913	3" – 4"	B-FLY, CS, 150#, THD LUG, SS DISC, PTFE SEATS/SEAL	8, 9
VBFB-913G	6" – 24"	B-FLY, CS, 150#, THD LUG, SS DISC, PTFE SEATS/SEAL, GO	8, 9
VBFB-913GA	30" – 36"	B-FLY, CS, 150#, THD LUG, SS DISC, PTFE SEATS/SEAL, GO, ASME B16.47 SER. A	8, 9
VCH-415	1½" – 1½"	CHECK, PISTON, CS, 150#, RF FLG, TRIM #8	10
VCH-302	2" – 24"	CHECK, SWING, CS, 150#, RF FLG, TRIM #8	10, 11
VCH-303L	2" – 6"	CHECK, DUAL PLATE, CS, 150#, DRILLED LUG, CS DISC/TRIM	10, 11
VCH-303F	8" – 24"	CHECK, DUAL PLATE, CS, 150#, DBL FLG, CS DISC/TRIM	10, 11
VPL-504	1½" – 4"	PLUG, A-351 CF8M BODY/PLUG, 150#, RF FLG, SHORT	8, 9
VPL-504G	6" – 18"	PLUG, A-351 CF8M BODY/PLUG, 150#, RF FLG, SHORT, GO	8, 9
VBA-628	1½" – 4"	BALL, CS BODY, 316 SS BALL/STEM, 150#, RF FLG, XTREME SEATS, RED. PORT	12, 13, 14
VBA-628G	6" – 8"	BALL, CS BODY, 316 SS BALL/STEM, 150#, RF FLG, XTREME SEATS, RED. PORT, GO	13, 14
VBA-665	1½" – 4"	BALL, CS BODY, 316 SS BALL/STEM, 150#, RF FLG, XTREME SEATS, FULL PORT	13, 14
VBA-665G	6" – 8"	BALL, CS BODY, 316 SS BALL/STEM, 150#, RF FLG, XTREME SEATS, FULL PORT, GO	13, 14
VBA-675	1½" – 3"	BALL, CS BODY, MONEL BALL/STEM, 150#, RF FLG, XTREME SEATS, FULL PORT, LONG PATTERN	13, 14
VBA-675G	4" – 8"	BALL, CS BODY, MONEL BALL/STEM, 150#, RF FLG, XTREME SEATS, FULL PORT, LONG PATTERN, GO	13, 14
TEMPORARY STRAINERS	ALL	150# RF, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	
"Y" STRAINERS	1½" – 1½" 2" – 12"	600#, SW, A-216, 0.020" PERF. SS SCREEN 150#, RF FLG, A-216, 0.020" PERF. SS SCREEN	

NOTES:

- RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
- HYDROSTATIC TESTING SHALL BE PERFORMED AT 450 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
- USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.

**MATERIAL**

CARBON STEEL

RATING

ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ 100° F
 170 PSIG @ 500° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

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REVISION 7
 DATE: 06/27/22

MADEP Signed by:

Matthew J. Martin

1F1037AA1859411...

HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

OPERATION APPROVAL

230EFCB4FF5247D...

ENGINEER APPROVAL

Jeff Carlucci

444C5CDEA51D49D...

4. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
5. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
6. SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
7. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. ¾" SIZE IS THE DEFAULT SIZE, BUT ½" AND 1" MAY BE USED AS REQUIRED.
8. BUTTERFLY VALVES SHALL BE LIMITED TO 300°F PER API 609. PLUG VALVES SHALL BE LIMITED TO 400°F. HIGHER TEMPERATURE ALLOWED ONLY WITH ENGINEERING APPROVAL OF DESIGNATED MAKE/MODEL.
9. VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE.
10. INSTALL IN HORIZONTAL POSITION WITH COVER UP.
11. INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.
12. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVES. ¾" SIZE IS THE DEFAULT SIZE.
13. BUTTERFLY VALVES SHALL BE LIMITED TO 300°F PER API 609. PLUG VALVES SHALL BE LIMITED TO 400°F. BALL VALVES SHALL BE LIMITED TO 300°F. HIGHER TEMPERATURE ALLOWED ONLY WITH ENGINEERING APPROVAL OF DESIGNATED MAKE/MODEL.
14. VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE AND FURNISHED WITH A LOCKING DEVICE.
15. SPIRAL WOUND GASKETS WITH INNER RINGS SHALL NOT PROTRUDE MORE THAN 0.06" INTO FLANGE BORE PER ASME B16.21.



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 285 PSIG @ 100° F
 170 PSIG @ 500° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

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REVISION 7
 DATE: 06/27/22

DESIGNED BY Matthew J. Martin 1F1037AA1859411...	CHECKED BY Ryan Estevens 402213A8234D4F3...	OPER. APPROVAL [Signature] 230EFCB4FF5247D...	ENGR. APPROVAL Jeff Carlucci 444C5CDEA51D49D...
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BRANCH CONNECTIONS:

BRANCH

36	T																		
30	RT	T																	
24	F	RT	T																
20	F	F	RT	T															
18	F	F	P	RT	T														
16	F	F	P	P	RT	T													
14	F	F	P	P	P	RT	T												
12	F	F	P	P	P	P	RT	T											
10	W	W	P	P	P	P	P	RT	T										
8	W	W	W	W	W	W	W	W	RT	T									
6	W	W	W	W	W	W	W	W	W	RT	T								
4	W	W	W	W	W	W	W	W	W	W	RT	T							
3	W	W	W	W	W	W	W	W	W	W	W	(1)	T						
2	W	W	W	W	W	W	W	W	W	W	W	(1)	(1)	T					
1½	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T					
1	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T					
¾	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T				
½	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T			
	36	30	24	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

- F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)
 - O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)
 - P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)
 - RT – REDUCING TEE
 - T – TEE
 - W – WELDOLET
- (1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.



Piping Specification
Specification No: **GES-230-VCM-AA**

Revision No: 8
Rev Date: 05/16/2023

Title: **VCM Spec AA**

Geismar, LA
Page 1 of 3

GENERAL			
MATERIAL	CARBON STEEL		
RATING	ASME B16.5, CLASS 150, MATERIAL GROUP 1.1 285 PSIG @ 100°F 230 PSIG @ 300°F 1/16" CORROSION ALLOWANCE		
SERVICES	CHILLED WATER RETURN AND SUPPLY, CLARIFIED WATER, DEMINERALIZED WATER, FIRE WATER ABOVE AND BELOW GROUND, JACKET WATER COOLING AND HEATING, LUBE OIL, NITROGEN		
ITEM	SIZE	DESCRIPTION	NOTES
PIPE	½" – 1½"	SCH 40, A106 GR B SMLS, THD	1, 2
	2" – 24"	STD WT, A106 GR B SMLS, BE	1, 2
	30" – 36"	STD WT, API 5L GR B, EFW 100% RT, BE	1, 2
FITTINGS	½" – 1½"	CL 3000, A105, THD, ASME B16.11	1
	½" – 24"	SCH TO MATCH PIPE, A234 WPB, BE, ASME B16.9	1
	30" – 36"	STD WT, A234 WPB, EFW, BE, ASME B16.9	1
	3" – 36"	SCH/CLASS TO MATCH PIPE/FITTINGS, A105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1
FLANGES	½" – 1½"	CL 150, A105, SCH 80, THD, ASME B16.5	1, 3, 4
	2" – 6"	CL 150, A105, STD WT, RF WN, ASME B16.5	1, 3, 4
	8" – 24"	CL 150, A105, STD WT, RF SO, ASME B16.5	1, 3, 4, 5
	30", 36"	CL 150, A105, STD WT, RF SO, ASME B16.47 SER. A	1, 3, 4, 5
	½" – 24"	CL 150, A105, RF BLIND, ASME B16.5	
	2" – 24"	CL 300, A-105, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, ½" THD TAPS	
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A193 B7 STUD BOLTS, TEFLON COATED	
		A194 2H HEAVY NUTS, TEFLON COATED	
GASKETS	ALL	CL 150, 1/8" THK SPIRAL WOUND, 304SS WINDINGS WITH GRAPHITE FILLER, CS OUTER RING, ANTI-BUCKLING, ASME B16.20; VSP AB-326 OR EQ W/ ENGINEERING APPROVAL	5
THREAD	PIPE	PTFE TAPE	
LUBE	BOLTS	NONE	
TEMPORARY STRAINERS	ALL	CL 150 RF, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	
"Y" STRAINERS	½" – 1½"	CL 600, THD, A216, 0.020" PERF. SS SCREEN	
	2" – 12"	CL 150, RF FLG, A216, 0.020" PERF. SS SCREEN	



Piping Specification
Specification No: **GES-230-VCM-AA**

Revision No: 8
Rev Date: 05/16/2023

Title: **VCM Spec AA**

Geismar, LA
Page 2 of 3

VALVES

BALL	BUTTERFLY	CHECK	GATE	GLOBE	PLUG	OTHER	NOTES
VBA-628	VBF-913	VCH-303F	VGA-101	VGL-200	VPL-515		6, 7
VBA-664		VCH-303L	VGA-113	VGL-292	VPL-521		
VBA-665		VCH-415			VPL-581		

NOTES

1. REQUIREMENTS FOR DESIGN, FABRICATION, WELDING, NON-DESTRUCTIVE EVALUATION, INSTALLATION, DOCUMENTATION, ETC. IN WESTLAKE STANDARD GES-230 "PIPING SPECIFICATIONS" MUST BE FOLLOWED.
2. ALL BURIED PIPING SHALL BE COATED AND WRAPPED IN ACCORDANCE WITH GES-221 "COATING AND WRAPPING OF UNDERGROUND PIPING".
3. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
4. CL 300 FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
5. SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
6. VBA-664 IS THE DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. ¾" SIZE IS THE DEFAULT SIZE, BUT ½" AND 1" MAY BE USED AS REQUIRED.
7. CHECK VALVES MUST BE INSTALLED IN HORIZONTAL POSITION WITH COVER UP (SWING) OR HINGE PIN VERTICAL (DUAL PLATE). INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.

**MATERIAL**

CARBON STEEL / HDPE

RATINGLIMITED BY VGA-190/191 & HDPE
175 PSIG @ 100° F
1/16" CORR. ALLOW. (C.S. ONLY)

GES 2-3-0

VCM

AAFWREVISION 6
DATE: 04/05/22DocuSigned by:
MAIN: APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSB: APPROVAL

Ryan Estevens

402213A8234D4E3...

DocuSigned by:
OPER: APPROVAL

[Signature]

230FFCB4FF5247D...

DocuSigned by:
ENG: APPROVAL

Jeff Carkuff

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

FIRE WATER

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1 1/2" 2" - 24" 6" - 18"	SCH 80, A-106 GR. B SMLS, THD STD. WT., A-106 GR. B SMLS, BE FM CLASS 267, HDPE, SMLS, EXTRUDED, PE, ASTM F714 GR. PE4710, ASTM D3350 CELL CLASSIFICATION 445574C (GR. PE47), AWWA C906, FM APPROVED	1, 2, 4 1, 2, 3 12
FITTINGS	1/2" - 1 1/2" 2" - 24" 1/2" - 8" 6" - 18" 6" - 18"	3000#, A-105, THD, ASME B16.11 SCH TO MATCH PIPE, A-234, GR. WPB, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97 FM CLASS 267, HDPE, SMLS, FABRICATED OR MOLDED, BUTT FUSION ENDS, ASTM F714 GR. PE4710, ASTM D3350 CELL CLASSIFICATION 445574C (GR. PE47), AWWA C906, FM APPROVED, ASTM D3261 FLANGE ADAPTER, FM CLASS 267, HDPE, SMLS, MOLDED, BUTT FUSION ENDS, SERRATED SEALING SURFACE, ASTM F714 GR. PE4710, ASTM D3350 CELL CLASSIFICATION 445574C (GR. PE47), AWWA C906, FM APPROVED, ASTM D3261	1, 2, 4 1, 2, 3 1, 2, 3 12 12, 13
FLANGES	1/2" - 1 1/2" 2" - 6" 8" - 24" 1/2" - 24" 2" - 24" 6" - 18"	150#, A-105, SCH 80, FF THD, ASME B16.5 150#, A-105, STD. WT., FF WN, ASME B16.5 150#, A-105, STD WT, FF SO, ASME B16.5 150#, A-105, FF BLIND, ASME B16.5 300#, A-105, STD. WT., FF ORIFICE FLANGE, ASME B16.36, 1/2" THD TAPS FM CLASS 267, DUCTILE IRON, LAP JOINT BACK-UP RING, ASME B16.5 150# DRILLING, GALVANIZED, FM APPROVED	1, 2, 4, 5, 6 1, 2, 5, 6 1, 2, 5, 6, 7 13
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B-7 STUD BOLTS, BLUE TEFLON COATED A-194 GR. 2H HVY. NUTS, BLUE TEFLON COATED	
GASKETS	ALL 6" - 18"	150#, 1/8" THK. FF, FR PITA OR EQ 150#, 1/8" THK. FF, COMPRESSED NON-ASBESTOS WITH SBR BINDER, GARLOCK 3200 OR EQ, ASME B16.5, ASME B16.21	6 13
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VGA-190 VGA-191	1/2" - 2" 2 1/2" - 12"	GATE, B62 BRONZE BODY/TRIM, 175#, RS, THD, UL/FM GATE, A126 CL B CAST IRON, 125#, RS, FF FLG, UL/FM	8

**MATERIAL**

CARBON STEEL / HDPE

RATINGLIMITED BY VGA-190/191 & HDPE
175 PSIG @ 100° F
1/16" CORR. ALLOW. (C.S. ONLY)

GES 2-3-0

VCM

AAFWREVISION 6
DATE: 04/05/22

MATERIAL APPROVAL		HSE APPROVAL		OPERATING APPROVAL		ENGINEERING APPROVAL	
DocuSigned by: <i>Matthew J. Martin</i> 1F1037AA1859411...		DocuSigned by: <i>Ryan Estevens</i> 402213A8234D4F3...		DocuSigned by: <i>[Signature]</i> 230EFCB4FF5247D...		DocuSigned by: <i>Jeff Carlucci</i> 444C5CDEA51D49D...	
VGA-216 VGA-176	2½" – 12" 2" – 12"	GATE, DUCTILE IRON, 125#, NRS, FF FLG, UL/FM POST INDICATOR GATE, A126 CL B, IBBM, NRS, FF FLG					
VBF-905	4" – 24"	POST INDICATOR B-FLY, DUCTILE IRON, 125#, FF FLG, UL/FM				9	
VCH-328	2½" – 12"	CHECK, SWING, A126 CL B CAST IRON, 125#, FF FLG, UL/FM				10, 11	
HYDRANT	6"	CAST IRON BODY, CLASS 125 ASTM B16.1 FLANGED INLET TO MATCH WATER MAIN PIPE SIZE, 5 ¼" VALVE OPENING, TWO (2) 2 ½" NST HOSE CONNECTIONS, NATIONAL STD. OPERATING NUT, LEFT TO OPEN (CCW), AWWA C502, KENNEDY GUARDIAN K81D OR EQ.					
TEMPORARY STRAINERS	ALL	150# FF, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE					
"Y" STRAINERS	½" – 1½" 2" – 12"	3000#, THD, A-216, 0.020" PERF. SS SCREEN 125#, FF FLG, A-216, 0.020" PERF. SS SCREEN					

NOTES:

- RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
- HYDROSTATIC TESTING SHALL BE PERFORMED AT 265 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B31.3.
- ALL BURIED CARBON STEEL PIPING SHALL BE COATED AND WRAPPED IN ACCORDANCE WITH GES 2-2-1.
- THREADED COMPONENTS ARE NOT ALLOWED IN UNDERGROUND PIPING.
- FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
- 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
- SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS.
- DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. ¾" SIZE IS THE DEFAULT SIZE.
- VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE AND FURNISHED WITH A LOCKING DEVICE.
- INSTALL IN HORIZONTAL POSITION WITH COVER UP.
- INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.

**MATERIAL**

CARBON STEEL

RATING
 ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ 100° F
 230 PSIG @ 300° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AAO

 REVISION 4
 DATE: 04/05/22

MAN. APPROVAL

 DecuSigned by
 Matthew J. Martin

1F1037AA1859411...

HSE APPROVAL

 DecuSigned by
 Ryan Estevens

402213A8234D4F3...

OPER. APPROVAL

 DecuSigned by

230EFCB4FF5247D...

ENG. APPROVAL

 DecuSigned by
 Jeff Carkeuff

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES
 OXYGEN – [ALL PIPING COMPONENTS FOR OXYGEN SERVICE MUST BE CLEANED, DEGREASED,
 LUBRICATED, SHIPPED AND STORED IN ACCORDANCE WITH GES 2-4-2.]

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1 1/2" 2" - 24"	SCH 80, A-106 GR. B SMLS, PE STD. WT., A-106 GR. B SMLS, BE	1, 2 1, 2
FITTINGS	1/2" - 1 1/2" 1/2" - 24" 1/2" - 10"	3000#, A-105, SW, ASME B16.11 SCH TO MATCH PIPE, A-234, GR. WPB, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2 1, 2 1, 2
FLANGES	1/2" - 1 1/2" 1/2" - 24" 1/2" - 24" 2" - 24"	150#, A-105, SCH 80, RF SW, ASME B16.5 150#, A-105, SCH TO MATCH PIPE, RF WN, ASME B16.5 150#, A-105, RF BLIND, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 3, 4, 5 1, 2, 3, 4, 5 3, 5
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. RING TYPE, EXPANDED PTFE GASKET WITH FULLY ENCAPSULATED CORRUGATED, C276 INSERT OR EQ.	3, 5
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-219	1/2" - 1 1/2"	GATE, EXTENDED BODY, CS, 800#, MSWxFNPT, TRIM #9, WB	6
VGA-179	1/2" - 1 1/2"	GATE, CS, 800#, SW, TRIM #9, WB	
VGA-180	2" - 14"	GATE, CS, 150#, RF FLG, TRIM #9	
VGA-180G	16" - 24"	GATE, CS, 150#, RF FLG, TRIM #9, GO	
VGL-334	1/2" - 1 1/2"	GLOBE, CS, 150#, RF FLG, TRIM #9	
VGL-293	2" - 8"	GLOBE, CS, 150#, RF FLG, TRIM #9	
VGL-293G	10" - 24"	GLOBE, CS, 150#, RF FLG, TRIM #9, GO	
VCH-448	1/2" - 1 1/2"	CHECK, PISTON, CS, 150#, RF FLG, TRIM #9	7
VCH-389	2" - 24"	CHECK, SWING, CS, 150#, RF FLG, TRIM #9	7, 8
TEMPORARY STRAINERS	ALL	150# RF, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	
"Y" STRAINERS	1/2" - 1 1/2" 2" - 12"	600#, SW, A-216, 0.020" PERF. SS SCREEN 150#, RF FLG, A-216, 0.020" PERF. SS SCREEN	

**MATERIAL**

CARBON STEEL

RATING

ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ 100° F
 230 PSIG @ 300° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AAO

REVISION 4
 DATE: 04/05/22

DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OP APPROVAL

[Signature]

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DocuSigned by:
ENG. APPROVAL

Jeff Carkuff

444C5CDEA51D49D...

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 450 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
4. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
5. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
6. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
7. INSTALL IN HORIZONTAL POSITION WITH COVER UP.
8. INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL CARBON STEEL
RATING ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ 100° F
 230 PSIG @ 300° F
 1/16" CORR. ALLOW.

GES 2-3-0
 VCM
AAO
 REVISION 4
 DATE: 04/05/22

DocuSigned by:
 MAIN: APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
 HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
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[Signature]

230EFCB4FF5247D...

DocuSigned by:
 ENG. APPROVAL

Jeff Carkeuff

444C5CDEA51D49D...

BRANCH CONNECTIONS:

BRANCH

24	T															
20	RT	T														
18	P	RT	T													
16	P	P	RT	T												
14	P	P	P	RT	T											
12	P	P	P	P	RT	T										
10	P	P	P	P	P	RT	T									
8	W	W	W	W	W	W	RT	T								
6	W	W	W	W	W	W	W	RT	T							
4	W	W	W	W	W	W	W	W	RT	T						
3	W	W	W	W	W	W	W	W	W	(1)	T					
2	W	W	W	W	W	W	W	W	W	(1)	(1)	T				
1½	O	O	O	O	O	O	O	O	O	(1)	(1)	T				
1	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T			
¾	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T		
½	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T	
	24	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.

**MATERIAL**

CARBON STEEL, GALVANIZED

RATING
 MSS SP-70, CLASS 125
 150 PSIG @ 100° F
 125 PSIG @ 250° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AB
 REVISION 5
 DATE: 04/05/22

MAINT. APPROVAL

 DocuSigned by:
 Matthew J. Martin

1F1037AA1859411...

HSE APPROVAL

 DocuSigned by:
 Ryan Estevens

402213A8234D4F3...

OPER. APPROVAL

 DocuSigned by:

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ENG. APPROVAL

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 Jeff Carkuff

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CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

INSTRUMENT AIR, POTABLE WATER ABOVE GROUND

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" – 1 1/2" 2" – 24"	SCH 80, A-106 GR. B, GALVANIZED, SMLS, THD STD. WT., A-106 GR. B, GALVANIZED, SMLS, BE	2 1, 2, 9
FITTINGS	1/2" – 1 1/2" 1/2" – 24" 1/2" – 10"	3000#, A-105, THD, GALVANIZED, ASME B16.11 SCH TO MATCH PIPE, A-234, GR. WPB, BE, GALVANIZED, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), GALVANIZED, MSS SP-97	2 1, 2, 9 1, 2, 9
FLANGES	1/2" – 1 1/2" 2" – 24" 1/2" – 24" 2" – 24"	150#, A-105, SCH 80, FF THD, GALVANIZED, ASME B16.5 150#, A-105, STD. WT., FF WN, GALVANIZED, ASME B16.5 150#, A-105, FF BLIND, GALVANIZED ASME B16.5 300#, A-105, STD. WT., FF ORIFICE FLANGE, GALVANIZED, ASME B16.36, 1/2" THD TAPS	2, 3, 4 1, 2, 3, 4, 9
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. FF, EXPANDED PTFE WITH FULLY ENCAPSULATED CORRUGATED, C276 INSERT OR EQ.	4
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VGA-189 VGA-114 VGA-114G VGL-313 VGL-217 VCH-413 VCH-311 VBA-642	1/2" – 1 1/2" 2" – 12" 14" – 24" 1/2" – 1 1/2" 2" – 8" 1/2" – 1 1/2" 2" – 24" 1/2" – 2"	GATE, B61 BRONZE, 200#, UNION BONNET, RS, THD GATE, A-126 CL. B CAST IRON, 125#, FF FLG GATE, A-126 CL. B CAST IRON, 125#, FF FLG, GO GLOBE, B61 BRONZE, 200#, UNION BONNET, THD GLOBE, A-126 CL. B CAST IRON, 125#, FF FLG CHECK, B61 BRONZE, 200#, SWING, THD CHECK, WAFER, A-126 CL. B CAST IRON, 125# BALL, BRASS BODY/BALL, 200#, THD, PTFE SEATS	5 8 8 6, 7
TEMPORARY STRAINERS	ALL	150#, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	
"Y" STRAINERS	1/2" – 1 1/2" 2" – 12"	600#, THD, A-216, 0.020" PERF. SS SCREEN 150#, FF FLG, A-216, 0.020" PERF. SS SCREEN	

**MATERIAL**

CARBON STEEL, GALVANIZED

RATING

MSS SP-70, CLASS 125
 150 PSIG @ 100° F
 125 PSIG @ 250° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AB

REVISION 5
 DATE: 04/05/22

DocuSigned by:
MATERIAL APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

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DocuSigned by:
ENG. APPROVAL

Jeff Cartuff

444C5CDEA51D49D...

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 225 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
4. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
5. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
6. BALL VALVES SHALL BE LIMITED TO 300°F. HIGHER TEMPERATURE ALLOWED ONLY WITH ENGINEERING APPROVAL OF DESIGNATED MAKE/MODEL.
7. VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE.
8. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.
9. HOT DIP GALVANIZE WELDED SPOOLS AFTER FABRICATION.



MATERIAL

CARBON STEEL, GALVANIZED

RATING

MSS SP-70, CLASS 125
 150 PSIG @ 100° F
 125 PSIG @ 250° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AB

REVISION 5
 DATE: 04/05/22

DocuSigned by:
 MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
 HSE APPROVAL

Ryan Estevens

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DocuSigned by:
 OPER. APPROVAL

[Signature]

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DocuSigned by:
 ENG. APPROVAL

Jeff Carlucci

444C5CDEA51D49D...

BRANCH CONNECTIONS:

BRANCH

24	T																		
20	RT	T																	
18	P	RT	T																
16	P	P	RT	T															
14	P	P	P	RT	T														
12	P	P	P	P	RT	T													
10	P	P	P	P	P	RT	T												
8	W	W	W	W	W	W	RT	T											
6	W	W	W	W	W	W	W	RT	T										
4	W	W	W	W	W	W	W	W	RT	T									
3	W	W	W	W	W	W	W	W	W	(1)	T								
2	W	W	W	W	W	W	W	W	W	(1)	(1)	T							
1½	O	O	O	O	O	O	O	O	O	(1)	(1)	T							
1	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T						
¾	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T					
½	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T				
	24	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½			

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.

**MATERIAL**

CARBON STEEL

RATING
 ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ 100° F
 125 PSIG @ 650° F
 1/8" C.A. (NPS≤3), 1/16" C.A. (NPS≥4)

GES 2-3-0

VCM

ABC
 REVISION 5
 DATE: 04/05/22

MAINT. APPROVAL

 DecuSigned by
 Matthew J. Martin

1F1037AA1859411...

HSD APPROVAL

 DecuSigned by
 Ryan Estevens

402213A8234D4F3...

OPER. APPROVAL

 DecuSigned by

230EFCB4FF5247D...

ENG. APPROVAL

 DecuSigned by
 Jeff Carkuff

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

BOILER BLOW DOWN, STEAM, STEAM CONDENSATE

[FOR USE WITH NON-BOILER EXTERNAL PIPING ONLY, IN ACCORDANCE WITH ASME B31.3. NOT UNDER THE JURISDICTION OF ASME BPVC OR ASME B31.1.]

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" 3/4" - 1 1/2" 2" 3" - 24" 30" 36"	SCH 160, A-106 GR. B SMLS, PE SCH 80, A-106 GR. B SMLS, PE SCH 80, A-106 GR. B SMLS, BE STD. WT., A-106 GR. B, SMLS, BE STD. WT., API 5L GR. B, ERW, BE STD. WT., API 5L GR. B, EFW, BE, 100% R.T.	1, 2, 3 1, 2, 3 1, 2 1, 2 1, 2 1, 2
FITTINGS	1/2" 3/4" - 1 1/2" 1/2" - 24" 30" - 36" 1/2" - 10"	6000#, A-105, SW, ASME B16.11 3000#, A-105, SW, ASME B16.11 SCH TO MATCH PIPE, A-234, GR. WPB, BE, ASME B16.9 STD. WT., A-234, GR. WPB, EFW, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2 1, 2 1, 2 1, 2 1, 2
FLANGES	1/2" - 1 1/2" 1/2" - 24" 8" - 24" 30" - 36" 30" - 36" 1/2" - 24" 2" - 24"	150#, A-105, SCH TO MATCH PIPE, RF SW, ASME B16.5 150#, A-105, SCH TO MATCH PIPE, RF WN, ASME B16.5 150#, A-105, STD WT, RF SO, ASME B16.5 150#, A-105, STD WT, RF WN, ASME B16.47 SER. A 150#, A-105, STD WT, RF SO, ASME B16.47 SER. A 150#, A-105, RF BLIND, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 4, 5, 6 1, 2, 4, 5, 6 1, 2, 4, 5, 6, 7 1, 2, 4, 5, 6 1, 2, 4, 5, 6, 7 4
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET OR EQ.	4, 6
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-120	1/2" - 1 1/2"	GATE, EXTENDED BODY, CS, 800#, MSWxFNPT, TRIM #8	8
VGA-112	1/2" - 1 1/2"	GATE, CS, 800#, SW, TRIM #8	
VGA-101	2" - 14"	GATE, CS, 150#, RF FLG, TRIM #8	
VGA-101G	16" - 24"	GATE, CS, 150#, RF FLG, TRIM #8, GO	
VGL-292	1/2" - 1 1/2"	GLOBE, CS, 150#, RF FLG, TRIM #8	
VGL-200	2" - 12"	GLOBE, CS, 150#, RF FLG, TRIM #8	

**MATERIAL**

CARBON STEEL

RATING
 ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ 100° F
 125 PSIG @ 650° F
 1/8" C.A. (NPS≤3), 1/16" C.A. (NPS≥4)

GES 2-3-0

VCM

ABC

REVISION 5

DATE: 04/05/22

DocuSigned by: MATERIAL APPROVAL <i>Matthew J. Martin</i> 1F1037AA1859411...		DocuSigned by: HSE APPROVAL <i>Ryan Estevens</i> 402213A8234D4F3...		DocuSigned by: OPERATOR APPROVAL <i>[Signature]</i> 230EFCB4FF5247D...		DocuSigned by: ENG. APPROVAL <i>Jeff Carkuff</i> 444C5CDEA51D49D...	
VGL-230	3" - 12"	GLOBE, STOP CHECK ANGLE, CS, 300#, RF FLG. TRIM #5				6	
VCH-415	1/2" - 1 1/2"	CHECK, PISTON, CS, 150#, RF FLG, TRIM #8				6, 9	
VCH-302	2" - 24"	CHECK, SWING, CS, 150#, RF FLG, TRIM #8				9, 10	
VCH-304	30" - 36"	CHECK, DUAL PLATE, CS, 150#, WAFER				9, 10	
TEMPORARY STRAINERS	ALL	150#, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE					
"Y" STRAINERS	1/2" - 1 1/2" 2" - 12"	600#, SW, A-216, 0.020" PERF. SS SCREEN 150#, RF FLG, A-216, 0.020" PERF. SS SCREEN					

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 450 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. IF 1/2" THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCH XXS. IF 3/4" - 1 1/2" THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCH 160.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
7. SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
8. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
9. INSTALL IN HORIZONTAL POSITION WITH COVER UP.
10. INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL CARBON STEEL
RATING ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ 100° F
 125 PSIG @ 650° F
 1/8" C.A. (NPS≤3), 1/16" C.A. (NPS≥4)

GES 2-3-0
 VCM
ABC
 REVISION 5
 DATE: 04/05/22

DocuSigned by: MAINT. APPROVAL <i>Matthew J. Martin</i> 1F1037AA1859411...	DocuSigned by: HSE APPROVAL <i>Ryan Estevens</i> 402213A8234D4F3...	DocuSigned by: OPER. APPROVAL <i>[Signature]</i> 230EFCB4FF5247D...	DocuSigned by: ENG. APPROVAL <i>Jeff Carlucci</i> 444C5CDEA51D49D...
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BRANCH CONNECTIONS:

BRANCH

36	T																		
30	RT	T																	
24	F	RT	T																
20	F	F	RT	T															
18	F	F	P	RT	T														
16	F	F	P	P	RT	T													
14	F	F	P	P	P	RT	T												
12	F	F	P	P	P	P	RT	T											
10	W	W	P	P	P	P	P	RT	T										
8	W	W	W	W	W	W	W	W	RT	T									
6	W	W	W	W	W	W	W	W	W	RT	T								
4	W	W	W	W	W	W	W	W	W	W	RT	T							
3	W	W	W	W	W	W	W	W	W	W	(1)	T							
2	W	W	W	W	W	W	W	W	W	W	(1)	(1)	T						
1½	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T						
1	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T						
¾	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T					
½	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T				
	36	30	24	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

- F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)
 - O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)
 - P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)
 - RT – REDUCING TEE
 - T – TEE
 - W – WELDOLET
- (1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.

**MATERIAL**

CARBON STEEL (LOW TEMP)

RATING
 ASME B16.5, CLASS 150, M.G. 2.2
 275 PSIG @ -50° F
 195 PSIG @ 400° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AC

 REVISION 4
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

[Signature]

230EFCB4FF5247D...

DocuSigned by:
ENG. APPROVAL

Jeff Carakuff

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

DRY HYDROGEN CHLORIDE

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1 1/2" 2" - 24"	SCH 80, A-333 GR. 6, SMLS, PE STD. WT., A-333 GR 6, SMLS, BE	1, 2, 3 1, 2
FITTINGS	1/2" - 1 1/2" 2" - 24" 1/2" - 10"	3000#, A-350 LF2 CL. 1, SW, ASME B16.11 STD. WT., A-420 GR. WPL6, BW, SMLS, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-350 GR. LF2 CL. 1, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2, 3 1, 2 1, 2
FLANGES	1/2" - 1 1/2" 2" - 24" 10" - 24" 1/2" - 24" 2" - 24"	150#, A-350 LF2 CL. 1, SCH 80, RF SW, ASME B16.5 150#, A-350 LF2 CL. 1, STD. WT., RF WN, ASME B16.5 150#, A-350 LF2 CL. 1, RF SO, ASME B16.5 150#, A-350 LF2 CL. 1, RF BLIND, ASME B16.5 300#, A-350 LF2 CL. 1, STD. WT., RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 4, 5, 6 1, 2, 4, 5, 6 1, 2, 4, 5, 6, 7, 8 4
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-320 GR. L7 STUD BOLTS, TEFLON COATED A-194 GR. 7 HEX NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. RING TYPE, EXPANDED PTFE GASKET WITH FULLY ENCAPSULATED CORRUGATED, C276 INSERT OR EQ.	4, 6
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-231	1/2" - 1 1/2"	GATE, A-350 GR. LF2 CL. 1, 150#, RF FLG, TRIM #12	9, 12
VGA-230	2" - 12"	GATE, A-352 GR. LCC, 150#, RF FLG, TRIM #12	12
VGA-230G	14" - 24"	GATE, A-352 GR. LCC, 150#, RF FLG, TRIM #12, GO	12
VGL-444	1/2" - 8"	GLOBE, A-352 GR. LCC, 150#, RF FLG, HAST. TRIM/FULL HF	12
VGL-444G	10" - 12"	GLOBE, A-352 GR. LCC, 150#, RF FLG, HAST. TRIM/FULL HF, GO	12
VCH-457	1/2" - 2"	CHECK, PISTON, A-350 LF2 CL. 1, 150#, RF FLG, TRIM #8	11, 12
VPL-504	1/2" - 1 1/2"	PLUG, A-351 CF8M BODY/PLUG, 150#, RF FLG, SHORT	10
VPL-509	2" - 4"	PLUG, A-352 LCC BODY/PLUG, 150#, RF FLG, SHORT	10, 12
VPL-509G	6" - 12"	PLUG, A-352 LCC BODY/PLUG, 150#, RF FLG, SHORT, GO	10, 12
VPL-512G	14" - 24"	PLUG, A-352 LCC BODY/PLUG, 150#, RF FLG, VENTURI, GO	10, 12

**MATERIAL**

CARBON STEEL (LOW TEMP)

RATING

ASME B16.5, CLASS 150, M.G. 2.2
 275 PSIG @ -50° F
 195 PSIG @ 400° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AC

REVISION 4
 DATE: 04/05/22

DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037/AA1859411...

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HSE APPROVAL

Ryan Estevens

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OPER. APPROVAL

[Signature]

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DocuSigned by:
ENG. APPROVAL

Jeff Carlucci

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VBA-648	½" – 6"	BALL, 316SS BODY/TRIM, 150#, RF FLG, XTREME SEATS, RED. PORT, SHORT	10
VBA-648G	8" – 12"	BALL, 316SS BODY/TRIM, 150#, RF FLG, XTREME SEATS, RED. PORT, SHORT, GO	10
TEMPORARY STRAINERS	ALL	150# RF, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	
"Y" STRAINERS	½" – 1½" 2" – 12"	600#, SW, A-351 GR. CF8M, 0.020" PERF. SS SCREEN 150#, RF FLG, A-351 GR. CF8M, 0.020" PERF. SS SCREEN	

NOTES:

- RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
- HYDROSTATIC TESTING SHALL BE PERFORMED AT 415 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
- THREADED COMPONENTS ARE NOT ALLOWED.
- USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
- FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
- 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
- WELD NECK FLANGES ARE PREFERRED OVER SLIP-ON FLANGES. SLIP-ON FLANGES MAY BE USED, WHEN NEEDED, DUE TO SPACING/FIT CONCERNS.
- SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
- DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. ¾" SIZE IS THE DEFAULT SIZE, BUT ½" AND 1" MAY BE USED AS REQUIRED.
- VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE.
- INSTALL IN HORIZONTAL POSITION WITH COVER UP.
- SUBSTITUTION OF STAINLESS STEEL VALVES ALLOWED WITH ENGINEERING APPROVAL. VERIFY PRESSURE AND TEMPERATURE RATINGS OF VALVE MEET OR EXCEED SPEC RATINGS.



MATERIAL

CARBON STEEL (LOW TEMP)

RATING

ASME B16.5, CLASS 150, M.G. 2.2
 275 PSIG @ -50° F
 195 PSIG @ 400° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AC

REVISION 4
 DATE: 04/05/22

DocuSigned by:
 MAINT. APPROVAL

Matthew J. Martin

1F1037AA1839411...

DocuSigned by:
 HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
 OPER. APPROVAL

[Signature]

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DocuSigned by:
 ENG. APPROVAL

Jeff Carlucci

444C5CDEA31D49D...

BRANCH CONNECTIONS:

BRANCH

24	T																	
20	RT	T																
18	P	RT	T															
16	P	P	RT	T														
14	P	P	P	RT	T													
12	P	P	P	P	RT	T												
10	W	W	W	W	W	RT	T											
8	W	W	W	W	W	W	RT	T										
6	W	W	W	W	W	W	W	RT	T									
4	W	W	W	W	W	W	W	W	RT	T								
3	W	W	W	W	W	W	W	W	W	(1)	T							
2	W	W	W	W	W	W	W	W	W	(1)	(1)	T						
1½	O	O	O	O	O	O	O	O	O	(1)	(1)	T						
1	O	O	O	O	O	O	O	O	O	(1)	(1)	T						
¾	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T					
½	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T				
	24	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½		

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.

**MATERIAL**

CARBON STEEL

RATING
 ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ -20°F to 100°F
 230 PSIG @ 300°F
 1/8" CORR. ALLOW.

GES 2-3-0

ACM
 REVISION 7
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1839411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

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DocuSigned by:
OPT. APPROVAL

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DocuSigned by:
ENG. APPROVAL

Jeff Carkeuff

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SERVICES

DRY CL2 GAS

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1" - 6" 8" - 24" 30"	SCH 80, A-106 GR. B, SMLS, BE STD. WT., A-106 GR. B, SMLS, BE STD. WT., A-672 GR. C65 CL. 22, EFW, BE	1, 2, 5 1, 2, 5, 6 1, 2, 5, 6
FITTINGS	1" - 24" 30" 1" - 10"	SCH TO MATCH PIPE, A-234, GR. WPB, BE, ASME B16.9 STD. WT., A-234, GR. WPB, EFW, BE, ASME B16.9 SCH TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2, 5, 6 1, 2, 5, 6 1, 2, 5
FLANGES	1" - 24" 30" 1" - 24" 30"	150#, A-105, SCH TO MATCH PIPE, RF WN, ASME B16.5 150#, A-105, STD. WT., RF WN, ASME B16.47 SER. A 150#, A-105, RF BLIND, ASME B16.5 150#, A-105, RF BLIND, ASME B16.47 SER. A	1, 2, 5, 6, 8 1, 2, 5, 6, 8 5
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B-7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. HEX NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET OR EQ. <u>DO NOT APPLY LUBRICANT TO FLANGE FACES OR GASKETS FOR CHLORINE SERVICE</u>	8
THRD. LUBE	BOLTS	<u>NO THREAD LUBRICANT ALLOWED FOR CHLORINE SERVICE</u>	
<u>VALVES</u> VGL-297	1" - 10"	GLOBE, LTCS, 150#, RF FLG, TRIM #16, BELLOWS SEAL	5, 10, 11
VBF-929G	3" - 24"	BUTTERFLY, CS BODY/DISC, 150#, HF SEAT, MONEL+GRAPHITE SEAL RING, SHORT, GO	5, 10, 11
VBA-608 VBA-608G	1" - 3" 4" - 10"	BALL, LTCS BODY/HAST. BALL, 150#, RF FLG, PTFE SEATS BALL, LTCS BODY/HAST. BALL, 150#, RF FLG, PTFE SEATS, GO	5, 10, 11 5, 10, 11
VCH-394	1" - 12"	CHECK, SWING, ALLOY 20 BODY/TRIM, 150#, RF FLG	5, 10, 11, 12
VPL-578	1" - 4"	PLUG, CS BODY/MONEL PLUG, 150#, RF FLG, PTFE SLEEVE	5, 10, 11
VPL-578G	6" - 12"	PLUG, CS BODY/MONEL PLUG, 150#, RF FLG, PTFE SLEEVE, GO	5, 10, 11

**MATERIAL**

CARBON STEEL

RATING

ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ -20°F to 100°F
 230 PSIG @ 300°F
 1/8" CORR. ALLOW.

GES 2-3-0

ACM

REVISION 7
 DATE: 04/05/22

MATERIAL APPROVAL

1F1037AA1859411...

HSE APPROVAL

402213A8234D4F3...

OPER. APPROVAL

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ENG. APPROVAL

444C5CDEA51D49D...

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 450 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6. DRAIN AND BLOW FREE OF LIQUID. WESTLAKE PERSONNEL TO DRY BY BLOWING WITH MINUS (-)40°F DEWPOINT AIR OR NITROGEN UNTIL DEWPOINT LEAVING IS SAME AS DEWPOINT ENTERING. BALL VALVES AND PLUG VALVES SHOULD BE HALF OPEN TO DRY THE BODY CAVITY.
3. PURGE GAS / DRYING GAS / INERTING GAS MUST BE **OIL FREE.**
4. WELDING SHALL BE PER ASME CODE SECTION IX, LATEST EDITION.
5. ALL PIPING AND VALVES MUST CONFORM TO CHLORINE INSTITUTE PAMPHLET #6.
6. FOR PIPING SYSTEMS 8 INCH AND LARGER, CONSULT THE CHLORINE INSTITUTE PAMPHLET #6 AND WESTLAKE ENGINEERING REPRESENTATIVE FOR APPROVAL.
7. FLANGED CONNECTIONS ARE PREFERRED FOR CHLORINE SERVICE INCLUDING VENTS AND DRAINS. THREADED CONNECTIONS ARE NOT PERMITTED.
8. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
9. SEVERAL VALVE MANUFACTURERS MAKE EQUIVALENT CHLORINE SERVICE VALVES. THESE "OR EQUAL" VALVES MAY BE USED IF CHECKED AND APPROVED BY A WESTLAKE ENGINEERING REPRESENTATIVE. (CHECK FACE TO FACE DIMENSIONS)
10. ALL VALVES AND INSTRUMENTS ARE TO BE PREPARED, DOUBLE BAGGED, AND TAGGED FOR CHLORINE SERVICE. VALVES SHALL BE CLEANED AND PACKAGED AS PER REQUIREMENTS OF CHLORINE INSTITUTE PAMPHLET #6.
11. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.
12. PIPE SADDLES ARE REQUIRED AT ALL STRUCTURAL STEEL/CONCRETE SUPPORT POINTS. PIPING IN CONTACT WITH SUPPORTS SHALL USE PLASTIC SADDLES. TAR OR ROOFING COMPOUND SHALL BE PLACED BETWEEN THE PIPE AND THE SADDLE TO PREVENT MOISTURE ACCUMULATION.
13. WHEN CONNECTING OTHER PIPING SYSTEMS TO CL2 SPECIFIED PIPING, IT IS REQUIRED TO HAVE A PRIMARY ISOLATION VALVE, A BLEED VALVE, AND A SECONDARY ISOLATION VALVE. THE PRIMARY ISOLATION VALVE AND BLEED VALVE MUST BE OF THE AFFECTED CL2 PIPING SPECIFICATION. THE PIPE SPECIFICATION BREAK WILL BE AT THE SECONDARY ISOLATION VALVE.



MATERIAL

CARBON STEEL

RATING

ASME B16.5, CLASS 150, M.G. 1.1
 285 PSIG @ -20°F to 100°F
 230 PSIG @ 300°F
 1/8" CORR. ALLOW.

GES 2-3-0

ACM

REVISION 7
 DATE: 04/05/22

DocuSigned by:
 MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
 HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
 OPER. APPROVAL

[Signature]

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DocuSigned by:
 ENG. APPROVAL

Jeff Carlucci

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BRANCH CONNECTIONS

BRANCH

30	T															
24	RT	T														
20	F	RT	T													
18	F	P	RT	T												
16	F	P	P	RT	T											
14	F	P	P	P	RT	T										
12	F	P	P	P	P	RT	T									
10	W	P	P	P	P	P	RT	T								
8	W	W	W	W	W	W	W	RT	T							
6	W	W	W	W	W	W	W	W	RT	T						
4	W	W	W	W	W	W	W	W	W	RT	T					
3	W	W	W	W	W	W	W	W	W	W	(1)	T				
2	W	W	W	W	W	W	W	W	W	W	W	(1)	(1)	T		
1½	W	W	W	W	W	W	W	W	W	W	W	W	(1)	(1)	T	
1	W	W	W	W	W	W	W	W	W	W	W	W	W	(1)	(1)	T
	30	24	20	18	16	14	12	10	8	6	4	3	2	1½	1	

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) - USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.

**MATERIAL**

CARBON STEEL

RATING
 LIMITED BY VBF-903
 150 PSIG @ 100° F
 145 PSIG @ 300° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AD
 REVISION 4
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1839411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

[Signature]

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DocuSigned by:
ENG. APPROVAL

Jeff Carkuff

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

DECANTER LIQUID, QUENCH LIQUID, UTILITY VENT SYSTEM, VENT GAS, WASTE TAR

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1 1/2" 2" - 24"	SCH 80, A-106 GR. B SMLS, BE STD. WT., A-106 GR. B SMLS, BE	1, 2 1, 2
FITTINGS	1/2" - 24" 1/2" - 8"	SCH TO MATCH PIPE, A-234 GR. WPB, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2 1, 2
FLANGES	1/2" - 24" 1/2" - 24" 2" - 24"	150#, A-105, SCH TO MATCH PIPE, RF WN, ASME B16.5 150#, A-105, RF BLIND, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 3, 4, 5 3
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. RING TYPE, EXPANDED PTFE WITH FULLY ENCAPSULATED CORRUGATED, C276 INSERT OR EQ.	3, 5
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGL-297	1/2" - 10"	GLOBE, LTCS, 150#, RF FLG, TRIM #16, BELLOWS SEAL	
VBF-903	4" - 6"	B-FLY, DI BODY, 150#, THD LUG, PTFE LINER/TRIM	7
VBF-903G	8" - 24"	B-FLY, DI BODY, 150#, THD LUG, PTFE LINER/TRIM, GO	7
VCH-301	1" - 3"	CHECK, BALL, DI BODY, 150#, RF FLG, PFA LINED, SOLID PTFE BALL	8
VCH-322	4" - 8"	CHECK, WAFER SWING, DI BODY, 150#, PFA LINED	8, 9
VPL-501	1/2" - 4"	PLUG, DI BODY, 304 SS PLUG, 150#, RF FLG, PTFE SLEEVE	6, 7
VPL-501G	6" - 12"	PLUG, DI BODY, 304 SS PLUG, 150#, RF FLG, PTFE SLEEVE, GO	7
VBA-652	1/2" - 6"	BALL, CS BODY, 316 SS BALL/STEM, 150#, RF FLG, PTFE SEATS, RED. PORT, LONG	7
VBA-652G	8" - 14"	BALL, CS BODY, 316 SS BALL/STEM, 150#, RF FLG, PTFE SEATS, RED. PORT, LONG, GO	7
TEMPORARY STRAINERS	ALL	150# RF, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	

**MATERIAL**

CARBON STEEL

RATING
 LIMITED BY VBF-903
 150 PSIG @ 100° F
 145 PSIG @ 300° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AD
 REVISION 4
 DATE: 04/05/22
DocuSigned by:
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OPER. APPROVAL

230EFCB4FF5247D...

DocuSigned by:
ENG. APPROVAL

Jeff Carkuff

444C5CDEA51D49D...

"Y" STRAINERS	ALL	150#, RF FLG, A-216, 0.020" PERF. SS SCREEN
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NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 225 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
4. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
5. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
6. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
7. VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE.
8. INSTALL IN HORIZONTAL POSITION WITH COVER UP.
9. INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL CARBON STEEL
RATING LIMITED BY VBF-903
 150 PSIG @ 100° F
 145 PSIG @ 300° F
 1/16" CORR. ALLOW.

GES 2-3-0
 VCM
AD

REVISION 4
 DATE: 04/05/22

DocuSigned by: MAINT. APPROVAL <i>Matthew J. Martin</i> <small>1F1037AA1859411...</small>	DocuSigned by: HSE APPROVAL <i>Ryan Estevens</i> <small>402213A8234D4F3...</small>	DocuSigned by: OPER. APPROVAL <small>230EFCB4FF5247D...</small>	DocuSigned by: ENG. APPROVAL <i>Jeff Cartuff</i> <small>444C5CDEA51D49D...</small>
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BRANCH CONNECTIONS:

BRANCH

24	T																	
20	RT	T																
18	P	RT	T															
16	P	P	RT	T														
14	P	P	P	RT	T													
12	P	P	P	P	RT	T												
10	P	P	P	P	P	RT	T											
8	W	W	W	W	W	W	RT	T										
6	W	W	W	W	W	W	W	RT	T									
4	W	W	W	W	W	W	W	W	RT	T								
3	W	W	W	W	W	W	W	W	W	(1)	T							
2	W	W	W	W	W	W	W	W	W	(1)	(1)	T						
1½	O	O	O	O	O	O	O	O	O	(1)	(1)	T						
1	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T					
¾	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T				
½	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T			
	24	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½		

SYMBOLS

- F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)
 - O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)
 - P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)
 - RT – REDUCING TEE
 - T – TEE
 - W – WELDOLET
- (1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.

**MATERIAL**

STAINLESS STEEL, 316L

RATING
 ASME B16.5, CLASS 150, M.G. 2.3
 230 PSIG @ 100° F
 150 PSIG @ 500° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

AF

 REVISION 5
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

Eyr

230EFCB4FF3247D...

DocuSigned by:
ENG. APPROVAL

Jeff Carlucci

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES
 BOILER FEED WATER, CHEM. FEED BOILER FEED WATER TREATMENT, DEMINERALIZED WATER, OXYGEN –
 [ALL PIPING COMPONENTS FOR OXYGEN SERVICE MUST BE CLEANED, DEGREASED, LUBRICATED,
 SHIPPED AND STORED IN ACCORDANCE WITH GES 2-4-2.]

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" – 1 1/2" 2" – 20" 2" – 20" 24" – 30" 36"	SCH 40S, A-312 TP-316L, SMLS OR EFW, PE SCH 10, A-312 TP-316L, SMLS OR EFW, BE SCH 40, A-312 TP-316L, SMLS OR EFW, BE SCH 10, A-312 TP-316L, EFW, BE, 100% R.T. SCH 40S, A-312 TP-316L, EFW, BE, 100% R.T.	1, 2 1, 2 1, 2, 10 1, 2 1, 2
FITTINGS	1/2" – 1 1/2" 2" – 20" 24" – 36" 1/2" – 10"	3000#, A-182, GR. 316L, SW, ASME B16.11 SCH 10, A-403, WP-316L, BE, ASME B16.9 SCH TO MATCH PIPE, A-403, WX-316L, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-182, GR. 316L, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2 1, 2, 3 1, 2, 3 1, 2
FLANGES	1/2" – 1 1/2" 2" – 24" 30", 36" 1/2" – 24" 2" – 24"	150#, A-182, GR. 316L, SCH 40S, RF SW, ASME B16.5 150#, A-105, LAP JOINT, ASME B16.5 150#, A-182, GR. 316L, SCH TO MATCH PIPE, RF WN, ASME B16.47 SER. A 150#, A-182, GR. 316L, RF BLIND, ASME B16.5 300#, A-182, GR. 316L, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 4, 5 1, 2, 4, 5 1, 2, 4, 5
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. RING TYPE, EXPANDED PTFE WITH FULLY ENCAPSULATED CORRUGATED, C276 INSERT OR EQ. 150#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET OR EQ.	5, 10 5, 10
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-153	1/2" – 1 1/2"	GATE, EXTENDED BODY, 316L SS, 800#, SWxNPT, TRIM #12	6
VGA-122	1/2" – 1 1/2"	GATE, 316L SS, 800#, SW, TRIM #10	
VGA-130	2" – 12"	GATE, 316 SS, 150#, RF FLG, TRIM #10	
VGL-239	1/2" – 10"	GLOBE, 316 SS, 150#, RF FLG, TRIM #10	
VBF-921	2" – 4"	B-FLY, 316 SS, 150#, THD LUG, SS DISC, XTREME/SS SEATS, GRAPHITE SEAL	7, 8

**MATERIAL**

STAINLESS STEEL, 316L

RATING

ASME B16.5, CLASS 150, M.G. 2.3
 230 PSIG @ 100° F
 150 PSIG @ 500° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

AF

REVISION 5
 DATE: 04/05/22

DocuSigned by: MAINT. APPROVAL Matthew J. Martin 1F1037AA1859411...		DocuSigned by: HSE APPROVAL Ryan Estevens 402213A8234D4F3...		DocuSigned by: OPER. APPROVAL [Signature] 230EFCB4FF5247D...		DocuSigned by: ENG. APPROVAL Jeff Carlucci 444C5CDEA51D49D...	
VBF-921G	6" – 24"	B-FLY, 316 SS, 150#, THD LUG, SS DISC, XTREME/SS SEATS, GRAPHITE SEAL, GO				7, 8	
VBF-921GA	26" – 36"	B-FLY, 316 SS, 150#, THD LUG, SS DISC, XTREME/SS SEATS, GRAPHITE SEAL, GO, ASME B16.47 SER. A				7, 8	
VCH-342	½" – 1½"	CHECK, SWING, 316 SS, 150#, RF FLG, TRIM #10				9	
VBA-643	½" – 4"	BALL, 316 SS BODY/BALL/STEM, 150#, RF FLG, XTREME SEATS, FULL PORT, LONG				7, 8	
VBA-643G	6" – 8"	BALL, 316 SS BODY/BALL/STEM, 150#, RF FLG, XTREME SEATS, FULL PORT, LONG, GO				7, 8	
TEMPORARY STRAINERS	ALL	150# RF, CONICAL, 150% OPEN AREA, 316/316 SS SCREEN/PLATE					
"Y" STRAINERS	½" – 1½" 2" – 12"	600#, SW, A-351 GR. CF3, 0.020" PERF. SS SCREEN 150#, RF FLG, A-351 GR. CF3, 0.020" PERF. SS SCREEN					

NOTES:

- RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
- HYDROSTATIC TESTING SHALL BE PERFORMED AT 350 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
- STUB ENDS SHALL BE USED FOR FLANGED CONNECTIONS. THEY SHALL BE SHORT PATTERN AND LIMITED TO 24" PIPE SIZE PER ASME B16.9.
- FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
- 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
- DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. ¾" SIZE IS THE DEFAULT SIZE, BUT ½" AND 1" MAY BE USED AS REQUIRED.
- BUTTERFLY VALVES SHALL BE LIMITED TO 300°F PER API 609. BALL VALVES SHALL BE LIMITED TO 300°F. HIGHER TEMPERATURE ALLOWED ONLY WITH ENGINEERING APPROVAL OF DESIGNATED MAKE/MODEL.
- VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE.
- INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL

STAINLESS STEEL, 316L

RATING

ASME B16.5, CLASS 150, M.G. 2.3
230 PSIG @ 100° F
150 PSIG @ 500° F
0.030" CORR. ALLOW.

GES 2-3-0

VCM

AF

REVISION 5
DATE: 04/05/22

DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

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HSE APPROVAL

Ryan Estevens

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DocuSigned by:
OPER. APPROVAL

[Signature]

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DocuSigned by:
ENG. APPROVAL

Jeff Carkuff

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10. TO BE USED IN OXYGEN SERVICE.



MATERIAL

STAINLESS STEEL, 316L

RATING

ASME B16.5, CLASS 150, M.G. 2.3
 230 PSIG @ 100° F
 150 PSIG @ 500° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

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REVISION 5
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Ryan Estevens

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Jeff Caruff

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BRANCH CONNECTIONS:

BRANCH

36	T																		
30	RT	T																	
24	F	RT	T																
20	F	F	RT	T															
18	F	F	P	RT	T														
16	F	F	P	P	RT	T													
14	F	F	P	P	P	RT	T												
12	F	F	P	P	P	P	RT	T											
10	W	W	P	P	P	P	P	RT	T										
8	W	W	W	W	W	W	W	W	RT	T									
6	W	W	W	W	W	W	W	W	W	RT	T								
4	W	W	W	W	W	W	W	W	W	W	RT	T							
3	W	W	W	W	W	W	W	W	W	W	W	(1)	T						
2	W	W	W	W	W	W	W	W	W	W	W	W	(1)	(1)	T				
1½	O	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T				
1	O	O	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T			
¾	O	O	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T		
½	O	O	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T	
	36	30	24	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.

**MATERIAL**

STAINLESS STEEL, 304L

RATING
 ASME B16.5, CLASS 150, M.G. 2.3
 230 PSIG @ 100° F
 160 PSIG @ 400° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

AFU
 REVISION 3
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

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DocuSigned by:
OPER. APPROVAL

[Signature]

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ENG. APPROVAL

Jeff Carlucci

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

CHILLED WATER SUPPLY/RETURN, CAUSTIC SODA TO 50%, FUEL GAS, ROOF DRAINS ABOVE GROUND & IN BUILDINGS, VENT, STEAM CONDENSATE

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" – 1 1/2" 2" – 20" 24" – 30"	SCH 40S, A-312 TP-304L, SMLS OR EFW, PE SCH 10, A-312 TP-304L, SMLS OR EFW, BE STD. WT., A-358 TP-304L, EFW, BE	1, 2 1, 2 1, 2
FITTINGS	1/2" – 30" 1/2" – 10"	SCH TO MATCH PIPE, A-403, WP-304L, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-182, GR. 304L, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2 1, 2
FLANGES	1/2" – 24" 26" – 30" 1/2" – 24" 2" – 12"	150#, A-182, GR. 304L, SCH TO MATCH PIPE, RF WN, ASME B16.5 150#, A-182, GR. 304L, STD WT, RF WN, ASME B16.47 SER. A 150#, A-182, GR. 304L, RF BLIND, ASME B16.5 300#, A-182, GR. 304L, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 3, 4, 5 1, 2, 3, 4, 5 3
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET OR EQ.	3, 5
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VGL-239 VGL-442	1/2" – 12" 1/2" x 3/4"	GLOBE, 316 SS, 150#, RF FLG, TRIM #10 SAMPLING, 316SS BODY/TRIM, 150#, RF FLG, SPECIFY PISTON LENGTH	
VCH-342	1/2" – 12"	CHECK, SWING, 316 SS, 150#, RF FLG, TRIM #10	9
VPL-504	1/2" – 4"	PLUG, 316 SS BODY/PLUG, 150#, RF FLG, PTFE SLEEVE, SHORT	6, 7, 8
VPL-504G	6" – 12"	PLUG, 316 SS BODY/PLUG, 150#, RF FLG, PTFE SLEEVE, SHORT, GO	7, 8
TEMPORARY STRAINERS	ALL	150#, CONICAL, 150% OPEN AREA, 304/316 SS SCREEN/PLATE	
"Y" STRAINERS	1/2" – 12"	150#, RF FLG, A-351 GR. CF8M, 0.020" PERF. SS SCREEN	

**MATERIAL**

STAINLESS STEEL, 304L

RATING

ASME B16.5, CLASS 150, M.G. 2.3
 230 PSIG @ 100° F
 160 PSIG @ 400° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

AFU

REVISION 3

DATE: 04/05/22

DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Stevens

402213A8234D4F3...

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OPER. APPROVAL

[Signature]

230EFCB4FF5247D...

DocuSigned by:
ENG. APPROVAL

Jeff Carkuff

444C5CDEA51D49D...

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 350 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
4. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
5. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
6. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. ¾" SIZE IS THE DEFAULT SIZE, BUT ½" AND 1" MAY BE USED AS REQUIRED.
7. PLUG VALVES SHALL BE LIMITED TO 400°F. HIGHER TEMPERATURE ALLOWED ONLY WITH ENGINEERING APPROVAL OF DESIGNATED MAKE/MODEL.
8. VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE.
9. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL STAINLESS STEEL, 304L
RATING ASME B16.5, CLASS 150, M.G. 2.3
 230 PSIG @ 100° F
 160 PSIG @ 400° F
 0.030" CORR. ALLOW.

GES 2-3-0
 VCM
AFU
 REVISION 3
 DATE: 04/05/22

DocuSigned by: MAINT. APPROVAL <i>Matthew J. Martin</i>	DocuSigned by: HSE APPROVAL <i>Ryan Estevens</i>	DocuSigned by: OPER. APPROVAL <i>[Signature]</i>	DocuSigned by: ENG. APPROVAL <i>Jeff Carkuff</i>
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BRANCH CONNECTIONS:

BRANCH

30	T																	
24	RT	T																
20	F	RT	T															
18	F	P	RT	T														
16	F	P	P	RT	T													
14	F	P	P	P	RT	T												
12	F	P	P	P	P	RT	T											
10	W	P	P	P	P	P	RT	T										
8	W	W	W	W	W	W	W	RT	T									
6	W	W	W	W	W	W	W	W	RT	T								
4	W	W	W	W	W	W	W	W	W	RT	T							
3	W	W	W	W	W	W	W	W	W	W	(1)	T						
2	W	W	W	W	W	W	W	W	W	W	(1)	(1)	T					
1½	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T					
1	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T				
¾	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T			
½	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	(1)	T		
	30	24	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

- F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)
 - O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)
 - P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)
 - RT – REDUCING TEE
 - T – TEE
 - W – WELDOLET
- (1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.

**MATERIAL**

STAINLESS STEEL, 316L

RATING
 ASME B16.5, CLASS 150, M.G. 2.3
 230 PSIG @ 100° F
 150 PSIG @ 500° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

AH

 REVISION 5
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPERATION APPROVAL

[Signature]

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ENGR. APPROVAL

Jeff Carkuff

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SERVICES

DEMINERALIZED WATER, LUBE OIL, WASTE WATER

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1 1/2"	SCH 40S, A-312 TP-316L, SMLS, PE	1, 2
	2" - 6"	SCH 40S, A-312 TP-316L, SMLS, BE	1, 2
	8" - 12"	SCH 10S, A-312 TP-316L, SMLS OR EFW, BE	1, 2
FITTINGS	1/2" - 1 1/2"	3000#, A-182, GR. F316L, SW, ASME B16.11	1, 2
	2" - 12"	SCH TO MATCH PIPE, A-403, WP-316L, BW, ASME B16.9	1, 2, 3
	1/2" - 8"	SCH/CLASS TO MATCH PIPE/FITTINGS, A-182, GR. F316L, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2
FLANGES	1/2" - 1 1/2"	150#, A-182, GR. F316L, SCH 40S, RF SW, ASME B16.5	1, 2, 4, 5, 6
	2" - 12"	150#, A-105, LAP JOINT, ASME B16.5	1, 2, 4, 5, 6
	1/2" - 12"	150#, A-182, GR. F316L, RF BLIND, ASME B16.5	4
	2" - 12"	300#, A-182, GR. F316L, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	
UNIONS	NONE	USE FLANGES	
BOLTING	SS FLG	A-193 GR. B8 CL. 2 STUD BOLTS A-194 GR. 8 HVY. NUTS	
	LAP JOINT	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND OR EQ.	4, 6
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-167	1/2" - 1 1/2"	GATE, EXTENDED BODY, 316L SS, 800#, MSWxFNPT, TRIM #10	7
VGA-122 VGA-130	1/2" - 1 1/2"	GATE, 316L SS, 800#, SW, TRIM #10	
	2" - 12"	GATE, 316 SS, 150#, RF FLG, TRIM #10	
VGL-237 VGL-237G	1/2" - 8"	GLOBE, 316L SS, 150#, RF FLG, TRIM #10	
	10" - 12"	GLOBE, 316L SS, 150#, RF FLG, TRIM #10, GO	
VPL-504 VPL-504G	1/2" - 4"	PLUG, 316 SS BODY/PLUG, 150#, RF FLG, PTFE SLEEVE,	8, 9
	6" - 12"	PLUG, 316 SS BODY/PLUG, 150#, RF FLG, PTFE SLEEVE, GO	8, 9
VCH-340	1/2" - 12"	CHECK, SWING, 316 SS, 150#, RF FLG, TRIM #10	10
TEMPORARY STRAINERS	ALL	150#, CONICAL, 150% OPEN AREA, 304/316 SS SCREEN/PLATE	
"Y" STRAINERS	1/2" - 1 1/2" 2" - 12"	600#, SW, A351, GR. CF3M, 0.020" PERF. SS SCREEN 150#, RF FLG, A351, GR. CF8M, 0.020" PERF. SS SCREEN	

**MATERIAL**

STAINLESS STEEL, 316L

RATING

ASME B16.5, CLASS 150, M.G. 2.3
 230 PSIG @ 100° F
 150 PSIG @ 500° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

AH

REVISION 5
 DATE: 04/05/22

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Jeff Carlucci

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NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 350 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. STUB ENDS SHALL BE USED FOR FLANGED CONNECTIONS. THEY SHALL BE SHORT PATTERN PER ASME B16.9.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
7. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. ¾" SIZE IS THE DEFAULT SIZE, BUT ½" AND 1" MAY BE USED AS REQUIRED.
8. PLUG VALVES SHALL BE LIMITED TO 400°F. HIGHER TEMPERATURE ALLOWED ONLY WITH ENGINEERING APPROVAL OF DESIGNATED MAKE/MODEL.
9. VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE.
10. INSTALL IN HORIZONTAL POSITION WITH COVER UP, OR IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL

STAINLESS STEEL, 316L

RATING

ASME B16.5, CLASS 150, M.G. 2.3
 230 PSIG @ 100° F
 150 PSIG @ 500° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

AH

REVISION 5
 DATE: 04/05/22

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 MATH APPROVAL

Matthew J. Martin

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Ryan Estevens

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 ENG. APPROVAL

Jeff Carlucci

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BRANCH CONNECTIONS:

BRANCH

12	T											
10	RT	T										
8	W	RT	T									
6	W	W	RT	T								
4	W	W	W	RT	T							
3	W	W	W	W	(1)	T						
2	W	W	W	W	(1)	(1)	T					
1½	O	O	O	O	O	(1)	(1)	T				
1	O	O	O	O	O	O	(1)	(1)	T			
¾	O	O	O	O	O	O	(1)	(1)	(1)	T		
½	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T	
	12	10	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS
 PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED
 BY PIPING DIMENSIONS.

**MATERIAL**

DUPLEX STAINLESS STEEL 2205

RATING
 LIMITED BY VBA-662
 230 PSIG @ 100° F
 180 PSIG @ 400° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AHD
 REVISION 7
 DATE: 04/05/22
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Jeff Carlucci

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CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

CATHOLYTE, CAUSTIC (20% - 32%), CAUSTIC SODA (TO 50%)

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1" - 8"	SCH 40S, ASTM A-790 UNS. NO. 31803, SEAMLESS, PE	
FITTINGS	1" - 8" 1" - 6"	SCH 40S, ASTM A-815 GR. WPS31803, BW, ASME B16.9 SCH 40S, ASTM A-182 S31803, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	3
FLANGES	1" - 8" 1" - 8"	150#, A-105, LAP JOINT, ASME B16.5 150#, A-182 S31803, RF BLIND, ASME B16.5	5, 6, 7 5
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B-7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. RING TYPE, EXPANDED PTFE WITH FULLY ENCAPSULATED CORRUGATED, C276 INSERT OR EQ.	5, 7
THRD. LUBE	PIPE BOLTS	TFE TAPE ($\leq 400^{\circ}\text{F}$), MOLYCOTE G OR EQ ($> 400^{\circ}\text{F}$) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VCH-323	1" - 6"	CHECK, SWING, HORIZ OR VERT, CAST STEEL, 150# FLGD, TFE OR PFA LINER	8
VPL-506	1" - 4"	PLUG, DUCTILE IRON BODY/PLUG, 150# RF FLG, PTFE/PFA LINER	4
VPL-506G	6" - 8"	PLUG, DUCTILE IRON BODY/PLUG, 150# RF FLG, PTFE/PFA LINER, GO	
VBA-662	1" - 6"	BALL, DUCTILE IRON BODY, ALLOY BALL, 150# RF FLG, PFA LINER, FULL PORT	8
TEMPORARY STRAINERS	ALL	150#, CONICAL, 150% OPEN AREA, ASTM A240 UNS. NO. S31803 SCREEN/PLATE	

NOTES:

- RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARAGRAPH 341.4.1.
- HYDROSTATIC TESTING SHALL BE PERFORMED AT 345 PSIG. HYDROTEST PRESSURE DETERMINED BY ASME B31.3, PARA. 2.6. DRAIN AND BLOW DRY.



MATERIAL DUPLEX STAINLESS STEEL 2205
RATING LIMITED BY VBA-662
 230 PSIG @ 100° F
 180 PSIG @ 400° F
 1/16" CORR. ALLOW.

GES 2-3-0
 VCM
AHD
 REVISION 7
 DATE: 04/05/22

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3. STUB ENDS SHALL BE USED FOR FLANGED CONNECTIONS. THEY SHALL BE SHORT PATTERN PER ASME B16.9.
4. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 1" SIZE IS THE STANDARD SIZE.
5. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
6. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
7. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
8. VCH-323 AND VBA-662 LIMITED TO 300°F. HIGHER TEMPERATURE ALLOWED ONLY WITH ENGINEERING APPROVAL OF DESIGNATED MAKE/MODEL.
9. THREADED COMPONENTS SHALL NOT BE USED.

BRANCH CONNECTIONS:

BRANCH

8	T							
6	W	T						
4	W	W	T					
3	W	W	(1)	T				
2	W	W	(1)	(1)	T			
1½	W	W	W	W	(1)	T		
1	W	W	W	W	(1)	(1)	T	
	8	6	4	3	2	1½	1	

SYMBOLS

T – TEE

W – WELDOLET

B – BRANCH WELD

(1) – USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS



MATERIAL HDPE
RATING LIMITED BY HDPE PIPE/FITTINGS
 150 PSIG @ 140° F
 0" CORR. ALLOW.

GES 2-3-0
 VCM
 AI

REVISION 0
 DATE: 11/29/17

MAINT. APPROVAL

Jason Pelt

HSE APPROVAL

R. Meyer

OPER. APPROVAL

John Cull

ENG. APPROVAL

ASG

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

ABOVE GROUND CHILLED WATER

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	2" – 8"	DR 7, HDPE, SMLS, EXTRUDED, PE, ASTM F714 GR. PE4710, ASTM D3350 CELL CLASSIFICATION 445574C (GR. PE47)	1
FITTINGS	2" – 8"	DR 7, HDPE, SMLS, FABRICATED OR MOLDED, BUTT FUSION ENDS, ASTM F714 GR. PE4710, ASTM D3350 CELL CLASSIFICATION 445574C (GR. PE47), ASTM D3261	1
	2" – 8"	FLANGE ADAPTER, DR 7, HDPE, SMLS, MOLDED, BUTT FUSION ENDS, SERRATED SEALING SURFACE, ASTM F714 GR. PE4710, ASTM D3350 CELL CLASSIFICATION 445574C (GR. PE47), ASTM D3261	1, 4
FLANGES	2" – 8"	DUCTILE IRON, LAP JOINT BACK-UP RING, ASME B16.5 150# DRILLING, GALVANIZED	1, 2, 3, 4
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED, WITH FLAT SS WASHERS BETWEEN NUTS AND BACK-UP RING	
GASKETS	2" – 8"	150#, 1/8" THK. FF, COMPRESSED NON-ASBESTOS WITH SBR BINDER, GARLOCK 3200 OR EQ, ASME B16.5, ASME B16.21	3, 4
THRD. LUBE	BOLTS	NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VBF-902 VBF-902G	2" – 4" 6" – 8"	B-FLY, DI, 150#, THD LUG, DI DISC, BUNA-N SEATS/SEAL B-FLY, DI, 150#, THD LUG, DI DISC, BUNA-N SEATS/SEAL, GO	
TEMPORARY STRAINERS	ALL	150# FF, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	
"Y" STRAINERS	2" – 12"	150#, FF FLG, DI, 0.020" PERF. SS SCREEN	

NOTES:

1. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1.5 TIMES SYSTEM DESIGN PRESSURE.
2. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
3. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.



MATERIAL

HDPE

RATING

LIMITED BY HDPE PIPE/FITTINGS
150 PSIG @ 140° F
0" CORR. ALLOW.

GES 2-3-0

VCM

AI

REVISION 0

DATE: 11/29/17

MAINT. APPROVAL

HSE APPROVAL

OPER. APPROVAL

ENG. APPROVAL

4. FLANGE ADAPTER WITH BACKING RING AND NON-ASBESTOS GASKET SHALL BE USED TO MATE HDPE TO VALVES AND OTHER PIPING SYSTEMS.

BRANCH CONNECTIONS:

BRANCH

8	T					
6	RT	T				
4	S	S	T			
3	S	S	S	T		
2	RT	RT	RT	RT	T	
	8	6	4	3	2	

SYMBOLS

RT – BUTT TEE W/ BUTT REDUCER(S)

T – BUTT TEE

S – BUTT SADDLE

**MATERIAL**

CARBON STEEL AND CAST IRON

RATING

MSS SP-70, CLASS 125
 150 PSIG @ 100° F
 125 PSIG @ 250° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AJ

REVISION 3
 DATE: 04/05/22

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Ryan Estevens

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Jeff Carlucci


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SERVICES

WASTEWATER ABOVE/BELOW GROUND

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" – 1 1/2"	SCH 80, A-106 GR. B, SMLS, PE	1, 2
	2" – 24"	STD. WT., A-106 GR. B, SMLS, BE	1, 2
	30 – 36"	STD WT., A-53 GR. B, EFW, BE	1, 2
FITTINGS	1/2" – 1 1/2"	3000#, A-105, SW, ASME B16.11	1, 2
	1/2" – 36"	STD. WT., A-234, GR. WPB, SMLS OR WX, BE, ASME B16.9	1, 2
	1/2" – 10"	SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2
FLANGES	1/2" – 1 1/2"	150#, A-105, SCH 80, FF SW, ASME B16.5	1, 2, 5, 6
	2" – 24"	150#, A-105, STD WT, FF SO, ASME B16.5	1, 2, 5, 6, 7
	30" – 36"	150#, A-105, STD WT, FF SO, ASME B16.47 SER. A	1, 2, 5, 6, 7
	1/2" – 24"	150#, A-105, FF BLIND, ASME B16.5	
	2" – 24"	300#, A-105, SCH TO MATCH PIPE, FF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. RING TYPE, EXPANDED PTFE WITH FULLY ENCAPSULATED CORRUGATED, C276 INSERT OR EQ.	5
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-120	1/2" – 1 1/2"	GATE, EXTENDED BODY, CS, 800#, MSWxFNPT, TRIM #8	7
VGA-112	1/2" – 1 1/2"	GATE, CS, 800#, SW, TRIM #8	
VGA-114	1/2" – 12"	GATE, A-126 CL. B CAST IRON, 125#, FF FLG	
VGA-114G	14" – 24"	GATE, A-126 CL. B CAST IRON, 125#, FF FLG, GO	
VGA-114GA	30" – 36"	GATE, A-126 CL. B CAST IRON, 125#, FF FLG, ASME B16.47 SER. A, GO	8
VGL-215	1/2" – 1 1/2"	GLOBE, CS, 800#, SW, TRIM #8	
VGL-217	2" – 10"	GLOBE, A-126 CL. B CAST IRON, 125#, FF FLG	
VCH-312	1/2" – 1 1/2"	CHECK, BALL, CS, 800#, SW, TRIM #8	9
VCH-311	2" – 24"	CHECK, WAFER, A-126 CL. B CAST IRON, 125#	9
VCH-311	30" – 36"	CHECK, WAFER, A-126 CL. B CAST IRON, 125#	8, 9
TEMPORARY STRAINERS	ALL	150#, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	

	MATERIAL	CARBON STEEL AND CAST IRON	GES 2-3-0 VCM AJ REVISION 3 DATE: 04/05/22
	RATING	MSS SP-70, CLASS 125 150 PSIG @ 100° F 125 PSIG @ 250° F 1/16" CORR. ALLOW.	

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"Y" STRAINERS	1/2" – 1 1/2" 2" – 12"	600#, SW, A-216, 0.020" PERF. SS SCREEN 150#, FF FLG, A-216, 0.020" PERF. SS SCREEN	
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NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 225 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. ALL BURIED PIPING SHALL BE COATED AND WRAPPED IN ACCORDANCE WITH GES 2-2-1.
4. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
5. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
6. SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
7. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
8. VALVES SHALL BE LIMITED TO 150°F.
9. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL

CARBON STEEL AND CAST IRON

RATING

MSS SP-70, CLASS 125
 150 PSIG @ 100° F
 125 PSIG @ 250° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

AJ

REVISION 3
 DATE: 04/05/22

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BRANCH CONNECTIONS:

BRANCH

36	T																		
30	RT	T																	
24	F	RT	T																
20	F	F	RT	T															
18	F	F	P	RT	T														
16	F	F	P	P	RT	T													
14	F	F	P	P	P	RT	T												
12	F	F	P	P	P	P	RT	T											
10	W	W	P	P	P	P	P	RT	T										
8	W	W	W	W	W	W	W	W	RT	T									
6	W	W	W	W	W	W	W	W	W	RT	T								
4	W	W	W	W	W	W	W	W	W	W	RT	T							
3	W	W	W	W	W	W	W	W	W	W	W	(1)	T						
2	W	W	W	W	W	W	W	W	W	W	W	(1)	(1)	T					
1½	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T					
1	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	T					
¾	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T				
½	O	O	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T			
	36	30	24	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.



MATERIAL

PTFE TUBING

RATING

LIMITED BY 3/4" TUBING
SEE RATING TABLE ON PAGE 2
NOTE 5
0" CORR. ALLOW.

GES 2-3-0

VCM

APT

REVISION 1

DATE: 10/21/19

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HSE APPROVAL

OPER. APPROVAL

ENG. APPROVAL

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SERVICES

ETHYLENE DICHLORIDE, HYDROCHLORIC ACID, CAUSTIC

ITEM	SIZE	DESCRIPTION	NOTES
TUBING	1/4" - 1"	0.062" WALL, PTFE OR PFA TUBING, PE	1, 2, 4, 6
FITTINGS	1/4" - 1"	PTFE OR PFA COMPRESSION TYPE FITTINGS	1, 2, 4, 5
FLANGES	NONE		
UNIONS	NONE		
BOLTING	NONE		
GASKETS	NONE		
THRD. LUBE	NONE		
VALVES			
VCH-463	1/4" - 3/4"	CHECK, POPPET, PFA, 100 PSIG, COMPRESSION ENDS	3, 4
VNE-06	1/4" - 1/2"	NEEDLE, PFA BODY/STEM, 110 PSIG, COMPRESSION ENDS	3, 4
TEMPORARY STRAINERS	NONE		
"Y" STRAINERS	NONE		
BRANCH CONNECTIONS	1/4" - 1"	USE COMPRESSION FITTINGS AS NECESSARY	

NOTES:

1. WELDING NOT ALLOWED FOR THIS PIPING SPECIFICATION.
2. CHECK VALVES SHALL BE LIMITED TO 200°F.
3. VERIFY PRESSURE RATING OF TUBING, FITTINGS, AND VALVES AT INTERMEDIATE SYSTEM DESIGN TEMPERATURES.
4. IF TUBE FITTINGS ARE REQUIRED, VERIFY PRESSURE/TEMPERATURE RATINGS WITH MANUFACTURER. THESE FITTINGS MAY LIMIT THE SYSTEM DESIGN PRESSURE/TEMPERATURE.
5. TUBE PRESSURE RATINGS AND DE-RATING FACTORS SHOWN BELOW ARE BASED ON PARKER SERIES 101 HEAVY WALL (0.062") PTFE TUBING. VERIFY TUBING RATING WITH MANUFACTURER FOR APPLICATION BEFORE PURCHASE.



MATERIAL

PTFE TUBING

RATING

LIMITED BY 3/4" TUBING
SEE RATING TABLE ON PAGE 2
NOTE 5
0" CORR. ALLOW.

GES 2-3-0

VCM

APT

REVISION 1

DATE: 10/21/19

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TUBING RATING TABLE

NOMINAL TUBE SIZE (IN.)		1/4	3/8	1/2	5/8	3/4	1
Design Temp. (°F)	DE-RATING FACTOR	Design Pressure (PSIG)					
73	1	290	180	130	100	80	100
100	0.85	246	153	110	85	68	85
150	0.70	203	126	91	70	56	70
200	0.55	159	99	71	55	44	55
250	0.40	116	72	52	40	32	40
300	0.30	87	54	39	30	24	30



Piping Specification
Specification No: **GES-230-VCM-AQ**

Revision No: 5
Rev Date: 06/20/2023

Title: **VCM Spec AQ**

Geismar, LA
Page 1 of 2

GENERAL							
MATERIAL	TEFLON LINED CARBON STEEL						
RATING	ASME B16.42, CLASS 150 150 PSIG @ 100°F 150 PSIG @ 250°F 0" CORROSION ALLOWANCE						
SERVICES	HYDROCHLORIC ACID TO 37%, HYDROGEN CHLORIDE, REACTOR EFFLUENT, CONDENSED REACTOR EFFLUENT, RECYCLE VENT GAS, VENT GAS						
ITEM	SIZE	DESCRIPTION					NOTES
PIPE	1" – 18"	PTFE LINED FLANGED SPOOLS PER ASTM F1545, FABRICATED FROM PTFE LINED A53 GR B (ERW) OR A106 GR B CARBON STEEL PIPE WITH ANSI CL 150 A395 DUCTILE IRON OR A105 CARBON STEEL LAPPED FLANGED PER ASME B16.5 (CS) OR B16.42 (DI), SCH 40 (1" – 10") / SCH 20 (12" – 14") / STD WT (16" – 18") MINIMUM SCHEDULE, WELDED FLANGES ALLOWED W/ ENGINEERING APPROVAL; RESISTOFLEX / 3P / AEGIS OR EQ					2, 3, 4, 5, 6
FITTINGS	1" – 18"	CL 150, PTFE LINED FLANGED FITTING PER ASTM F1545, HOUSING TO BE A216 CAST STEEL, A234 WROUGHT STEEL, A395 DUCTILE IRON, OR FABRICATED CARBON STEEL, FLANGES TO BE A395 DUCTILE IRON OR A105 CARBON STEEL, INTEGRAL OR LAPPED JOINT, FLANGES PER ASME B16.5 (CS) OR B16.42 (DI), FABRICATED CS BODY AS SUPPLIED BY MANUFACTURER TO MEET B31.3 COMPLIANCE; RESISTOFLEX / 3P / AEGIS OR EQ					2, 3, 4, 5, 6
INSTRUMENT TEE	1" – 18"	LINE SIZE X 1 INCH BRANCH CONNECTION, PTFE LINED CS HOUSING, CL 150 FLANGES A105, SUPPLIED BY MANUFACTURER TO MEET B31.3 COMPLIANCE, RESISTOFLEX / 3P / AEGIS OR EQ					2, 3, 4, 5, 6
SPACER	1" – 18"	ARMORED PTFE SPACER, TAPER BORE TO MATCH ID OF BUTTERFLY VALVE AND LINED PIPE. USE ONLY WHEN NEEDED TO PREVENT INTERFERENCE BETWEEN DISC AND LINED PIPE; RESISTOFLEX / 3P / AEGIS OR EQ					2, 3, 4, 5
FLANGES	1" – 18" 1" – 18"	TO BE SUPPLIED WITH FITTINGS AND PIPE SPOOLS BLIND, CL 150, A105, PTFE LINED, ASME B16.5; RESISTOFLEX / 3P / AEGIS OR EQ					3, 5 3, 5
BOLTING	ALL	A193 B7 STUD BOLTS, TEFLON COATED A194 2H HEAVY NUTS, TEFLON COATED					
GASKETS	ALL	CL 150, 1/8" THK, RING TYPE, 100% EXPANDED PTFE, ASME B16.21; GORE UPG STYLE 800 OR EQ					8
THREAD LUBE	BOLTS	NONE					
VALVES							
BALL	BUTTERFLY	CHECK	GATE	GLOBE	PLUG	OTHER	NOTES
VBA-609 VBA-662	VBF-903	VCH-323			VPL-506		7



Piping Specification
Specification No: **GES-230-VCM-AQ**

Revision No: 5
Rev Date: 06/20/2023

Title: **VCM Spec AQ**

Geismar, LA
Page 2 of 2

NOTES

1. WELDING IS NOT PERMITTED ON LINED PIPING COMPONENTS
2. REQUIREMENTS FOR DESIGN, FABRICATION, WELDING, NON-DESTRUCTIVE EVALUATION, INSTALLATION, DOCUMENTATION, ETC. IN WESTLAKE STANDARD [GES-230 "PIPING SPECIFICATIONS"](#) MUST BE FOLLOWED. HYDROSTATIC TESTING SHALL BE PERFORMED AT 425 PSIG PER ASTM F1545.
3. PIPING TO BE PURCHASED AS FLANGED SPOOLS PER DESCRIPTION.
4. MANUFACTURER'S GUIDELINES FOR ALLOWABLE PIPE SPAN DISTANCES SHOULD BE FOLLOWED.
5. ALL LINED ASSEMBLIES SHALL HAVE THE LINER/GASKET FACE PROTECTED BY AN END PLATE (E.G. PLYWOOD / PLASTIC CAP) UNTIL FINAL INSTALLATION.
6. LINED PIPE AND FITTINGS MAY CONTAIN VENT HOLES IN THE METALLIC HOUSINGS. PLUGGING OF THESE HOLES BY PAINT OF OTHER SUBSTANCE SHALL NOT BE ALLOWED.
7. VCH-323 CAN BE INSTALLED IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.
8. FOR USE WITH LINED PIPE CONNECTIONS TO BARE METAL OR OLD-TO-NEW LINED PIPE CONNECTIONS.

BRANCH CONNECTIONS

- BRANCHES SHOULD BE MADE USING TEES, REDUCING TEES, OR FOLLOWING MANUFACTURER RECOMMENDATION



MATERIAL

MONEL 400

RATING

ASME B16.34, CLASS 150, M.G. 3.4
230 PSIG @ 100° F
170 PSIG @ 500° F
0.030" CORR. ALLOW.

GES 2-3-0

VCM

AR

REVISION 8
DATE: 08/09/21

MAINT. APPROVAL

HSE APPROVAL

OPER. APPROVAL

ENG. APPROVAL

*****CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.*****

SERVICES

FURNACE EXIT GAS, QUENCH LIQUID, INTERMEDIATE FEED STOCK

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 3/4" 1" - 16" 1" - 16"	SCH 40S, B-165 (UNS N04400), ANNEALED, SMLS, THD SCH 10S, B-165 (UNS N04400), ANNEALED, SMLS, BE SCH 40, B-165 (UNS N04400), ANNEALED, SMLS, BE	2 1, 2 1, 2, 11
FITTINGS	1/2" - 3/4" 1" - 16" 1/2" - 8"	2000#, B-366 OR B-564 (UNS N04400), ANNEALED, SMLS, THD, ASME B16.11 SCH/CLASS TO MATCH PIPE/FITTINGS, B-366 (UNS N04400) GR. WPNC, ANNEALED, SMLS, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, B-564 (UNS N04400), ANNEALED, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	2 1, 2, 3, 11 1, 2
FLANGES	1/2" - 3/4" 1" - 16" 1/2" - 16" 2" - 16"	150#, B-564 (UNS N04400), SCH 40S, RF THD, ASME B16.5 150#, A-105, LAP JOINT, ASME B16.5 150#, B-564 (UNS N04400), RF BLIND, ASME B16.5 300#, B-564 (UNS N04400), SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" THD TAPS	2, 4, 5, 6 2, 4, 5, 6 4, 7
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. SPIRAL WOUND, MONEL 400 INNER RING AND WINDINGS WITH GRAPHITE FILLER, 304SS OUTER RING, ASME B16.5, ASME B16.20, FLEXITALLIC CGI OR EQ.	4, 6
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤ 400°F), MOLYCOTE G OR EQ (> 400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-102	1/2" - 3/4"	GATE, A494 GR. M35-1 MONEL, 150#/200#, THD, TRIM #9	
VGA-104	1" - 8"	GATE, A494 GR. M35-1 MONEL, 150#, RF FLG, TRIM #9	
VCH-316	1/2" - 12"	CHECK, SWING, A494 GR. M35-1 MONEL, 150#, RF FLG, TRIM #9	9
VPL-541	1/2" - 3/4"	PLUG, MONEL BODY/PLUG, TUFFLINE-600 SLEEVE, 150#, THD	8, 10
VPL-582	1" - 4"	PLUG, MONEL BODY/PLUG, TUFFLINE-600 SLEEVE, 150#, RF FLG	10
VBA-703	1" - 4"	BALL, MONEL BODY/BALL/SEATS, 150#, RF FLG, FULL PORT	10



MATERIAL

MONEL 400

RATING

ASME B16.34, CLASS 150, M.G. 3.4
230 PSIG @ 100° F
170 PSIG @ 500° F
0.030" CORR. ALLOW.

GES 2-3-0

VCM

AR

REVISION 8
DATE: 08/09/21

MAINT. APPROVAL

HSE APPROVAL

OPER. APPROVAL

ENG. APPROVAL

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 350 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. STUB ENDS SHALL BE USED FOR FLANGED CONNECTIONS. THEY SHALL BE SHORT PATTERN PER ASME B16.9.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
7. BLIND FLANGES SHALL BE MONEL AS LISTED, OR MAY BE EQUIVALENT 150# C.S. BLIND FLANGES WITH 1/4" MONEL PLATE LINER.
8. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
9. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.
10. VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE AND FURNISHED WITH A LOCKING DEVICE.
11. RE-EVALUATE PIPE SUPPORTS WHEN REPLACING SCH 10S WITH SCH 40 PIPE AND FITTINGS.



MATERIAL

MONEL 400

RATING

ASME B16.34, CLASS 150, M.G. 3.4
 230 PSIG @ 100° F
 170 PSIG @ 500° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

AR

REVISION 8
 DATE: 08/09/21

MAINT. APPROVAL

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BRANCH CONNECTIONS:

BRANCH

16	T														
14	RT	T													
12	W	RT	T												
10	W	W	RT	T											
8	W	W	W	RT	T										
6	W	W	W	W	RT	T									
4	W	W	W	W	W	RT	T								
3	W	W	W	W	W	W	(1)	T							
2	W	W	W	W	W	W	(1)	(1)	T						
1½	O	O	O	O	O	O	O	(1)	(1)	T					
1	O	O	O	O	O	O	O	O	(1)	(1)	T				
¾	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T			
½	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T		
	16	14	12	10	8	6	4	3	2	1½	1	¾	½		

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS, PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS



MATERIAL INCONEL 600
RATING ASME B16.34, CLASS 150, M.G. 3.4
 230 PSIG @ 100° F
 180 PSIG @ 400° F
 1/32" CORR. ALLOW.

GES 2-3-0
 VCM
ARA

REVISION 3
 DATE: 12/20/16

MAINT. APPROVAL

Jason Polk

HSE APPROVAL

R. Mey

OPER. APPROVAL

Jeff Campbell

ENG. APPROVAL

Colin Stone

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

HCl, O2

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 3/4" 1" - 12"	SCH 40, B-167 INCONEL 600, ANNEALED, SMLS, THD SCH 10S, B-167 INCONEL 600, ANNEALED, SMLS, BE	
FITTINGS	1/2" - 3/4" 1" - 12"	3000#, B-564 INCONEL 600, ANNEALED, THD, ASME B16.11 SCH 10S, B-366, WPNCI-S, INCONEL 600, ANNEALED, SMLS, BW, ASME B16.9	3
FLANGES	1" - 12"	150#, A-105, LAP JOINT, ASME B16.5	4, 5
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B-7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	1" - 6"	150#, 1/8" THK. SPIRAL WOUND, INCONEL 600 WINDINGS AND OUTER RING WITH GRAPHITE FILLER, NO INNER RING, ASME B16.20, FLEXITALLIC CG OR EQ.	4
	8" - 12"	150#, 1/8" THK. SPIRAL WOUND, INCONEL 600 WINDINGS AND INNER/OUTER RING WITH GRAPHITE FILLER, ASME B16.20, FLEXITALLIC CGI OR EQ.	4
THRD. LUBE	PIPE BOLTS	TFE TAPE NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-102	1/2" - 3/4"	GATE, A494 GR. M35 MONEL, 150#, THD, MONEL TRIM	
VGA-104	1" - 12"	GATE, A494 GR. M35 MONEL, 150#, RF, MONEL TRIM	
VCH-316	1/2" - 12"	CHECK, SWING, A494 GR. M35 MONEL, 150#, RF, MONEL TRIM	
VPL-541	1/2" - 3/4"	PLUG, A494 GR. M35 MONEL BODY/PLUG, PTFE SLEEVE, 150#, THD	6, 7
VPL-506	1" - 4"	PLUG, PFA LINED A395 DUCTILE IRON BODY/PLUG, 150#, RF FLG, SHORT	7
VPL-506G	6"	PLUG, PFA LINED A395 DUCTILE IRON BODY/PLUG, 150#, RF FLG, SHORT, GO	7



MATERIAL INCONEL 600
RATING ASME B16.34, CLASS 150, M.G. 3.4
 230 PSIG @ 100° F
 180 PSIG @ 400° F
 1/32" CORR. ALLOW.

GES 2-3-0
 VCM
ARA
 REVISION 3
 DATE: 12/20/16

MAINT. APPROVAL

Jason Beck

HSE APPROVAL

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OPER. APPROVAL

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ENG. APPROVAL

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NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 350 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. STUB ENDS SHALL BE USED FOR FLANGED CONNECTIONS. THEY SHALL BE SHORT PATTERN PER ASME B16.9.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
7. CHEMPLUG VALVES SHALL NOT BE USED.

BRANCH CONNECTIONS:

BRANCH

12	T											
10	W	T										
8	W	W	T									
6	W	W	W	T								
4	W	W	W	W	T							
3	W	W	W	W	FR	T						
2	W	W	W	W	FR	FR	T					
1½	O	O	O	O	O	O	O	T				
1	O	O	O	O	O	O	O	RT	T			
¾	O	O	O	O	O	O	O	RT	RT	T		
½	O	O	O	O	O	O	O	RT	RT	RT	T	
	12	10	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

FR – FULL SIZE TEE WITH REDUCER (REDUCING TEE ALLOWED IF REQUIRED BY PIPING DIMENSIONS)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

RT – REDUCING TEE

T – TEE

W – WELDOLET

**MATERIAL**

NICKEL 200

RATING
 LIMITED BY NICKEL 200 VALVES
 166 PSIG @ 100°F
 156 PSIG @ 500°F
 0.03" CORR. ALLOW.

GES 2-3-0

VCM

AS

 REVISION 8
 DATE: 04/05/22
DocuSigned by:
MAIN: APPROVAL

Matthew J. Martin

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DocuSigned by:
HSE APPROVAL

Ryan Estevens

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DocuSigned by:
OPER. APPROVAL

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DocuSigned by:
ENG. APPROVAL

Jeff Carkeuff

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CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

CAUSTIC 32% TO 50%, REACTOR EFFLUENT

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 3/4" 1" - 8" 10" - 12" 14"	SCH 40S, B-161 (UNS N02200), ANNEALED, SMLS, THD SCH 10S, B-161 (UNS N02200), ANNEALED, SMLS, BE SCH 20, B-161 (UNS N02200), ANNEALED, SMLS, BE SCH 10, B-161 (UNS N02200), ANNEALED, SMLS, BE	2 1, 2 1, 2 1, 2
FITTINGS	1/2" - 3/4" 1" - 14" 1/2" - 12"	2000#, B-366 OR B-564 (UNS N02200), ANNEALED, SMLS, THD, ASME B16.11 SCH TO MATCH PIPE, B-366 (UNS N02200) GR. WPN, SMLS, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, B-564 (UNS N04400), ANNEALED, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	2 1, 2, 3 1, 2
FLANGES	1/2" - 3/4" 1" - 14" 1/2" - 14" 2" - 14"	150#, B-564 (UNS N02200), SCH 40S, RF THD, ASME B16.5 150#, A-105, LAP JOINT, ASME B16.5 150#, B-564 (UNS N02200), RF BLIND, ASME B16.5 300#, B-564 (UNS N02200), SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" THD TAPS	4, 6 2, 4, 5, 6 4
UNIONS	NONE	USE FLANGES	
BOLTING	NICKEL LAP JOINT	A-193 GR. B8 CL. 2 STUD BOLTS A-194 GR. 8 HVY. NUTS A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	150#, 1/8" THK. NICKEL 200 SPIRAL WOUND, NICKEL 200 INNER RING AND WINDINGS WITH GRAPHITE FILLER, 304SS OUTER RING, ASME B16.5, ASME B16.20, FLEXITALLIC CGI OR EQ.	4, 6, 8
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤ 400°F), MOLYCOTE G OR EQ (> 400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VGA-103 VGA-105 VGA-105G VCH-317 VPL-506	1/2" - 3/4" 1/2" - 12" 14" 1/2" - 14" 1/2" - 1"	GATE, A494-CZ100 (NICKEL 200) BODY/TRIM, 150#/200#, THD GATE, A494-CZ100 (NICKEL 200) BODY/TRIM, 150#, RF FLG GATE, A494-CZ100 (NICKEL 200) BODY/TRIM, 150#, RF FLG, GO CHECK, SWING, A494-CZ100 (NICKEL 200) BODY/TRIM, 150#, RF FLG PLUG, PFA LINED A395 DUCTILE IRON BODY/PLUG, 150#, RF FLG	9 12 10, 11

NOTES:

**MATERIAL**

NICKEL 200

RATING

LIMITED BY NICKEL 200 VALVES
 166 PSIG @ 100°F
 156 PSIG @ 500°F
 0.03" CORR. ALLOW.

GES 2-3-0

VCM

AS

REVISION 8
 DATE: 04/05/22

DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

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DocuSigned by:
ENG. APPROVAL

Jeff Carlucci

444C5CDEA51D49D...

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 280 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B31.3, PARA. 345.4.2.
3. STUB ENDS SHALL BE USED FOR FLANGED CONNECTIONS. THEY SHALL BE SHORT PATTERN PER ASME B16.9.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. 300# FLANGES AND GASKETS MAY BE USED FOR MATING TO EQUIPMENT AS NECESSARY.
7. USE THIS GASKET FOR CAUSTIC SERVICE ONLY.
8. USE THIS GASKET FOR REACTOR EFFLUENT SERVICE ONLY.
9. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
10. VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE.
11. VALVES LIMITED TO A MAXIMUM TEMPERATURE OF 400°F.
12. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL NICKEL 200
RATING LIMITED BY NICKEL 200 VALVES
 166 PSIG @ 100°F
 156 PSIG @ 500°F
 0.03" CORR. ALLOW.

GES 2-3-0
 VCM
AS

REVISION 8
 DATE: 04/05/22

DocuSigned by:
 MAINT. APPROVAL
 Matthew J. Martin

DocuSigned by:
 HSE APPROVAL
 Ryan Estevens

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 OPER. APPROVAL
 [Signature]

DocuSigned by:
 ENG. APPROVAL
 Jeff Carlucci

BRANCH CONNECTIONS:

BRANCH

14	T														
12	W	T													
10	W	W	T												
8	W	W	W	T											
6	W	W	W	W	T										
4	W	W	W	W	W	T									
3	W	W	W	W	W	(1)	T								
2	W	W	W	W	W	(1)	(1)	T							
1½	W	W	W	W	W	W	(1)	(1)	T						
1	W	W	W	W	W	W	W	(1)	(1)	T					
¾	O	O	O	O	O	O	O	(1)	(1)	(1)	T				
½	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T			
	14	12	10	8	6	4	3	2	1½	1	¾	½			

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS, PAD WIDTH EQUALS ½ BRANCH O.D.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) – USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS



MATERIAL PVC

RATING 150 PSIG @ 73 °F
33 PSIG @ 140 °F
0" CORR. ALLOW.

GES 2-3-0
VCM
AT

REVISION 3
DATE: 12/20/16

MAINT. APPROVAL

Jason Polk

HSE APPROVAL

R. Mey

OPER. APPROVAL

Jeff Campbell

ENG. APPROVAL

Carl Stone

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

POTABLE WATER –UNDERGROUND, UNCONTAMINATED WASTEWATER – UNDERGROUND (6)

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" – 6"	SCH 80, PVC, TYPE 1, GR 1 (12454-B), PVC 1120 PER ASTM D1785, SMLS, PE	
FITTINGS	1/2" – 6"	SCH 80, PVC PER ASTM D2467 (12454), SOCKET ENDS, ASTM D1784	
FLANGES	1/2" – 6"	150#, PVC PER ASTM D2467, SOCKET WELD, SCH 80, FF	
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED ASTM F436 WASHERS	3, 4
GASKETS	ALL	1/8" THICK, WHITE NEOPRENE, FULL FACE GASKET, ASME B16.21	
JOINT CEMENT	ALL	PVC SOLVENT CEMENT, ASTM D2564, (USE MANUFACTURERS RECOMMENDED FORMULATION FOR THE SERVICE)	
VALVES			
VCH-434	1/2" – 2"	CHECK, BALL, PVC BODY/BALL, 150#, SW, FKM O-RINGS	
VBA-658	1/2" – 1 1/2"	BALL, PVC BODY/BALL, 150#, SW, PTFE SEATS, FULL PORT	
VBA-659	3" – 4"	BALL, PVC BODY/BALL, 150#, FLGD, PTFE SEATS, FULL PORT	
BRANCHES	1/2" – 6"	ALL BRANCH CONNECTIONS SHALL BE MADE USING FULL OR REDUCING TEES	

NOTES:

1. PRESSURE LIMITED BY FLANGES AND VALVES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED PER ASME B31.3, SECTION A345.4. SEE THE TABLE BELOW.
3. WASHERS SHALL BE USED ON BACKSIDE OF FLANGES.
4. BOLTS SHALL BE TORQUED TO MANUFACTURERS SPECIFICATIONS, AND RE-CHECKED AFTER START-UP.



MATERIAL PVC

RATING 150 PSIG @ 73 °F
33 PSIG @ 140 °F
0" CORR. ALLOW.

GES 2-3-0
VCM
AT

REVISION 3
DATE: 12/20/16

MAINT. APPROVAL

Jason Polk

HSE APPROVAL

R. May

OPER. APPROVAL

Jeff Carluff

ENG. APPROVAL

Chris Moore

5. MANUFACTURERS INSTRUCTIONS ON JOINT ASSEMBLY AND SUPPORT REQUIREMENTS SHALL BE PROVIDED WITH PIPE AND FITTINGS AND SHALL BE STRICTLY FOLLOWED.
6. DO NOT USE IN AIR OR GAS SERVICE.

PIPE SPECIFICATION RATING TABLE

Design Temperature (°F)	De-Rating Factor	Design Pressure (PSIG)
73	1.00	150
80	0.88	132
90	0.75	112
100	0.62	93
110	0.51	76
120	0.40	60
130	0.31	46
140	0.22	33

HYDROTEST PRESSURE TABLE

Hydrostatic Test Temperature - F	Hydrostatic Test Pressure - PSIG
73°F	225
80°F	198
90°F	169
100°F	140
110°F	115
120°F	90
130°F	70
140°F	50

GENERAL							
MATERIAL	CPVC						
RATING	LIMITED BY VALVES/FLANGES SEE RATING TABLE 0" CORROSION ALLOWANCE						
SERVICES	SULFURIC ACID [H2SO4]						
ITEM	SIZE	DESCRIPTION					NOTES
PIPE	½" – 2"	SCH 80, CPVC, TYPE IV, GR 1, ASTM D1784, CELL CLASSIFICATION 23447, CPVC 4120, ASTM F441, SMLS, TE					1, 2, 11
	½" – 6"	SCH 80, CPVC, TYPE IV, GR 1, ASTM D1784, CELL CLASSIFICATION 23447, CPVC 4120, ASTM F441, SMLS, PE					1, 2, 11
FITTINGS	½" – 2"	SCH 80, CPVC, ASTM D1784, CELL CLASSIFICATION 23447, CPVC 4120, ASTM F439, THREADED ENDS					2, 11
	½" – 6"	SCH 80, CPVC, ASTM D1784, CELL CLASSIFICATION 23447, CPVC 4120, ASTM F439, SOCKET ENDS					2, 11
FLANGES	½" – 2"	CL 150, FF, SCH 80, THREADED TYPE, CPVC, ASTM D1784, CELL CLASSIFICATION 23447, CPVC 4120, ASTM F1970					2, 11
	½" – 6"	CL 150, FF, SCH 80, SOCKET TYPE, CPVC, ASTM D1784, CELL CLASSIFICATION 23447, CPVC 4120, ASTM F1970					2, 11
	½" – 6"	CL 150, FF, BLIND, CPVC, ASTM D1784, CELL CLASSIFICATION 23447, CPVC 4120, ASTM F1970					11
UNIONS	½" – 2"	SCH 80, CPVC, ASTM D1784, CELL CLASSIFICATION 23447, CPVC 4120, ASTM F439, SOCKET OR THREADED ENDS					
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED ASTM F436 WASHERS					
GASKETS	ALL	CL 150, 1/8" THICK, GORE STRESS SAVER CL 150, 1/8" THICK, FULL FACE, EPDM RUBBER, ASME B16.21					
JOINT CEMENT	ALL	CPVC SOLVENT CEMENT, ASTM F493, (USE SAME MANUFACTURER AS PIPE AND FITTINGS. FOLLOW MANUFACTURERS RECOMMENDED FORMULATION FOR THE SERVICE)					
BRANCHES	½" – 6"	ALL BRANCH CONNECTIONS SHALL BE MADE USING FULL OR REDUCING TEES OR REDUCING TEES WITH REDUCER BUSHINGS					
VALVES							
BALL	BUTTERFLY	CHECK	GATE	GLOBE	PLUG	OTHER	NOTES
VBA-621		VCH-406				VDI-808	
NOTES							
<ol style="list-style-type: none"> ALL PIPING SHALL BE FURNISHED WITH A PAINTED RING OR OTHER ACCEPTABLE MARKING SUITABLE FOR DETERMINING WHETHER OR NOT THE PIPE HAS BEEN PROPERLY INSERTED INTO THE COUPLING. EACH PIPE SHALL BE CLEARLY MARKED WITH THE PIPE TYPE, GRADE, NOMINAL DIAMETER, SCHEDULE, CLASS PRESSURE RATING, MANUFACTURER'S NAME, AND IDENTIFICATION CODE HYDROSTATIC TESTING SHALL BE PERFORMED PER ASME B31.3, SECTION A345.4. SEE THE TABLE ON PAGE 3. WASHERS SHALL BE USED ON BACKSIDE OF FLANGES. BOLTS SHALL BE TORQUED TO MANUFACTURERS SPECIFICATIONS, AND RE-CHECKED AFTER START-UP. 							

5. MANUFACTURERS INSTRUCTIONS ON JOINT ASSEMBLY AND SUPPORT REQUIREMENTS SHALL BE PROVIDED WITH PIPE AND FITTINGS AND SHALL BE STRICTLY FOLLOWED.
6. DO NOT USE IN AIR OR GAS SERVICE.
7. FLEXIBILTY MUST BE IMPLEMENTED IN PIPING DESIGN AND/OR FLEXIBLE CONNECTIONS TO EQUIPMENT FLANGES SHALL BE USED.
8. PVC AND CPVC CEMENT MUST BE RESISTANT TO SODIUM HYPOCHLORITE, SODIUM HYDROXIDE, AND HYPOCHLORIC ACID. USE IPS WELD-ON 724 OR EQ.
9. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.
10. VENT, DRAIN, AND INSTRUMENT VALVE. ¾" SIZE IS THE DEFAULT SIZE, BUT ½" AND 1" MAY BE USED IF REQUIRED.
11. ALL CPVC PIPE, FITTINGS, AND FLANGES ARE RATED PER CHEMTROL THERMOPLASTIC PIPING TECHNICAL MANUAL, 2014 EDITION.
12. CL 150 IN THIS SPEC PERTAINS TO BOLTING COMPATIBILITY WITH ASME B16.5 CL 150 METAL FLANGES PER CHEMTROL THERMOPLASTIC PIPING TECHNICAL MANUAL, 2014.
13. PREFERRED GASKET IS THE STRESS SAVER GASKET.
14. BACKWELDS ARE REQUIRED FOR HCL SERVICE. BACKWELD TO OCCUR 24 HOURS AFTER CEMENT IS APPLIED.
15. REQUIREMENTS FOR DESIGN, FABRICATION, NDE, ETC. FOUND IN [GES-230 PIPING SPECIFICATIONS](#) MUST BE FOLLOWED.
16. BRANCH CONNECTIONS WILL FOLLOW MANUFACTURER’S RECOMMENDATIONS.

PIPE SPECIFICATION RATING TABLE		
Design Temp (°F)	De-Rating Factor	Design Pressure (PSIG)
73	1.00	150
80	0.96	150
90	0.92	150
100	0.85	150
110	0.77	140
120	0.70	130
130	0.62	120
140	0.55	110

HYDROTEST PRESSURE TABLE	
Hydrostatic Test Temp (°F)	Hydrostatic Test Pressure (PSIG)
73°F	225
80°F	225
90°F	225
100°F	225

MAXIMUM NON-SHOCK OPERATING CONDITIONS PER CHEMTROL THERMOPLASTIC PIPING TECHNICAL MANUAL, 2014.

**MATERIAL**FIBERGLASS REINFORCED PLASTIC
(FRP)/PVDF**RATING**LIMITED BY VBA-603/CENTRICAST PIPE
150 PSIG @ 100° F
120 PSIG @ 175° F
0" CORR. ALLOW.

GES 2-3-0

VCM

AV

REVISION 4
DATE: 04/05/22DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

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DocuSigned by:
HSE APPROVAL

Ryan Estevens

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DocuSigned by:
OPER. APPROVAL

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DocuSigned by:
ENG. APPROVAL

Jeff Carlucci

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CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

INCINERATOR VENT GAS

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1"	SCH 80, ASTM D3222 TP. 1 GR. 2, RED CHEMTROL PVDF, PE MFR STD SCH, ASTM D2997, CENTRICAST CL-2030 VINYL ESTER RESIN, PE	1, 2
	1 1/2" - 12"		2
FITTINGS	1/2" - 1"	SCH 80, ASTM D3222 TP. 1 GR. 2, RED CHEMTROL PVDF, SOCKET ENDS MFR STD SCH, ASTM D5685, CENTRICAST CL-2030 VINYL ESTER, SOCKET ENDS	1, 2
	1 1/2" - 12"		2
FLANGES	1/2" - 1"	150#, SCH 80, ASTM D3222 TP. 1 GR. 2, RED CHEMTROL PVDF, SOCKET FLANGE	1, 2
	1/2" - 1"	150#, SCH 80, ASTM D3222 TP. 1 GR. 2, RED CHEMTROL PVDF, BLIND FLANGE	1, 2
	1 1/2" - 12"	150#, MFR STD SCH, ASTM D4024, CENTRICAST CL-2030 VINYL ESTER, FF SOCKET ENDS	2
	1 1/2" - 12"	150#, ASTM D4024, CENTRICAST CL-2030 VINYL ESTER, FF BLIND	2
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B8 CL. 2 STUD BOLTS	
		A-194 GR. 8 HVY. NUTS	
GASKETS	1/2" - 12"	1/8" THK. FULL FACE VITON, 70 DUROMETER HARDNESS, GARLOCK STYLE 9938 OR EQ	
THRD. LUBE	BOLTS	NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
SOCKET JOINT ADHESIVE	1/2" - 1"	SOCKET HEAT FUSION REQUIRED, SOLVENT CEMENTS NOT ALLOWED WELDFAST CL-200, VINYL ESTER ADHESIVE	
	1 1/2" - 12"		
VALVES			
VBF-903	4" - 6"	B-FLY, DI BODY, 150#, THD LUG, PTFE LINER/TRIM	
VBF-903G	8" - 12"	B-FLY, DI BODY, 150#, THD LUG, PTFE LINER/TRIM, GO	
VCH-301	1 1/2" - 8"	CHECK, BALL, DI BODY, 150# RF FLG, PFA LINED, SOLID PTFE BALL	
VBA-603	1/2" - 1"	BALL, PVDF BODY, RED KYNAR BALL/TRIM, PTFE SEATS W/ VITON O-RINGS, SCH 80, SW, FULL PORT	2
VBA-609	1 1/2" - 6"	BALL, DI BODY, ALLOY BALL/PTFE SEATS, 150# RF FLG, PFA LINER, REDUCED PORT	

**MATERIAL**FIBERGLASS REINFORCED PLASTIC
(FRP)/PVDF**RATING**LIMITED BY VBA-603/CENTRICAST PIPE
150 PSIG @ 100° F
120 PSIG @ 175° F
0" CORR. ALLOW.

GES 2-3-0

VCM

AV

REVISION 4
DATE: 04/05/22DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

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DocuSigned by:
OPER. APPROVAL

[Signature]

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DocuSigned by:
ENG. APPROVAL

Jeff Carlucci

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NOTES:

1. MAXIMUM PRESSURE FOR FLANGED PVDF PIPING SHALL NOT EXCEED 150 PSIG. AT ELEVATED TEMPERATURES THE PRESSURE RATING OF FLANGED PVDF PIPING IS AS FOLLOWS:

OPERATING TEMPERATURE - °F	MAX OPERATING PRESSURE - PSIG
100 – 140	150
150	140
160	133
170	125
175	120

2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 225 PSIG. DRAIN AND BLOW DRY.
3. PVDF PIPING TO BE USED FOR PRESSURE GAGES, DRAINS, AND SAMPLING CONNECTIONS.
4. UNDERGROUND PIPING SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S LATEST "PIPE BURIAL SPECIFICATIONS".
5. USE HARD GASKET MATERIAL TO FILL THE VOID SPACE BEYOND THE RING FACE OF A RAISED FACE FLANGE AND USE FULL FACE GASKET FOR SEALING.
6. MANUFACTURERS INSTRUCTIONS ON JOINT ASSEMBLY AND SUPPORT REQUIREMENTS SHALL BE PROVIDED WITH PIPE AND FITTINGS AND SHALL BE STRICTLY FOLLOWED.
7. BRANCH CONNECTIONS SHALL USE FULL SIZE TEES AND REDUCERS. FLANGES SHALL BE USED FOR MATING DIFFERENT MATERIALS.



MATERIAL

PTFE LINED COMPOSITE

RATING

8" DURCOR® PIPE/FITTINGS
 150 PSIG @ -40°F – 100°F
 100 PSIG @ 300°F
 0" CORR. ALLOW.

GES 2-3-0

VCM

AW

REVISION 0
 DATE: 09/04/18

MAINT. APPROVAL

Jason Polk

HSE APPROVAL

RJM

OPER. APPROVAL

John Conroy

ENG. APPROVAL

MS

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVDCOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

INCINERATOR VENT GAS

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1" – 8"	PTFE LINED FLANGED COMPOSITE PIPE SPOOLS PER ASTM F1545, LINER TO BE SINGLE PIECE VIRGIN PTFE, COMPOSITE PIPE WITH ASME B16.5 CLASS CL150 LAPPED FLANGES, RATED FOR FULL VACUUM. NO WELDS ALLOWED IN LINER. VIRGIN PTFE LINERS TO BE SUITABLE FOR FOOD CONTACT. PIPE HOUSING TO EXHIBIT MINIMUM 43,500 PSI AXIAL TENSILE STRENGTH, MAX THERMAL EXPANSION OF 6.7 X 10 ⁻⁶ IN/IN/°F, COMPOSITE TO BE EPOXY VINYL ESTER RESIN WITH SURFACING VEIL ON ID/OD AND CONTAIN UV INHIBITORS, GLASS REINFORCEMENTS TO BE ECR GRADE GLASS, VENT HOLES INCLUDED IN PIPE SPOOLS, PUREFLEX® DURCOR®	1 – 6, 9 – 13
FITTINGS	1" – 8"	PTFE LINED FLANGED TRANSFER MOLDED COMPOSITE FITTINGS PER ASTM F1545, COMPOSITE HOUSING TO BE PREMIUM VINYL ESTER RESIN WITH ECR GLASS REINFORCEMENTS, NEITHER CONTACT MOLDED, NOR GLUED FITTINGS ALLOWED, RATED FOR FULL VACUUM, ASME B16.5 CLASS CL150 FLANGES, PUREFLEX® DURCOR®	1, 2, 5, 6, 9 – 13
INSTRUMENT TEE	1" – 8"	LINE SIZE X 1 INCH BRANCH CONNECTION, PTFE LINED COMPOSITE HOUSING, FIT BETWEEN CLASS 150 DURCOR® FLANGES, SUPPLIED BY MANUFACTURER TO MEET ASME B31.3 COMPLIANCE, PUREFLEX® DURCOR®	1, 2, 5, 6, 9 – 13
SPACER	1" – 8"	ARMORED PTFE SPACER, TAPER BORE TO MATCH ID OF BUTTERFLY VALVE AND LINED PIPE. USE ONLY WHEN NEEDED TO PREVENT INTERFERENCE BETWEEN VALVE DISC AND LINED PIPE., PUREFLEX® DURCOR® OR EQ.	5, 6
FLANGES	1" – 8"	TO BE SUPPLIED WITH FITTINGS AND PIPE SPOOLS, VINYL ESTER FIBERGLASS COMPOSITE, CL150, ASME B16.5, GUSSETED LAP JOINT FLANGES FOR PIPING SPOOLS, FIXED, INTEGRAL, GUSSETED FLANGES FOR FITTINGS, FLANGE MATERIAL MUST EXHIBIT A MINIMUM OF 50,000 PSI TENSILE STRENGTH, PUREFLEX® DURCOR®	1, 2, 3, 5, 9 – 14
	1" – 8"	BLIND, CLASS 150, VINYL ESTER FIBERGLASS COMPOSITE, PTFE LINED, ASME B16.5, PUREFLEX® DURCOR®	3, 5, 9 – 14
UNIONS	NONE		



MATERIAL

PTFE LINED COMPOSITE

RATING

8" DURCOR® PIPE/FITTINGS
 150 PSIG @ -40°F – 100°F
 100 PSIG @ 300°F
 0" CORR. ALLOW.

GES 2-3-0

VCM

AW

REVISION 0
 DATE: 09/04/18

MAINT. APPROVAL

Jason Polk

HSE APPROVAL

R. Mey

OPER. APPROVAL

Off Campbell

ENG. APPROVAL

M. G. Bell

BOLTING	ALL	ASTM A193 GR. B7 STUD BOLTS, LUBRICATED OR PTFE-COATED ASTM A194 GR. 2H HVY. NUTS, LUBRICATED OR PTFE-COATED USE NAS1149 WASHERS, OR ANY OPTION, WHICH DOES NOT EXCEED THE POINT-POINT OF HEAVY HEX NUTS. FINISH NUTS REQUIRED ONLY FOR 1" 45 DEGREE ELBOW FITTING	14 14
GASKETS	ALL	150#, 1/8" THK. RING TYPE, 100% EXPANDED PTFE, ASME B16.21, GORE UPG STYLE 800 OR EQ.	8
THRD. LUBE	BOLTS	NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VCH-323	1" – 6"	CHECK, PISTON, CS BODY, 150#, RF FLG, PFA LINED, PFA/PTFE DISC/SEAT	7
VBF-903	2" – 6"	B-FLY, DI BODY, 150#, LUG, PTFE LINER/TRIM	
VBF-903G	8"	B-FLY, DI BODY, 150#, LUG, PTFE LINER/TRIM, GO	
VBF-936	2" – 6"	B-FLY, FRP DURCOR® BODY, 150#, THD LUG, PTFE LINER, PFA LINED DISC	16
VBF-936G	8"	B-FLY, FRP DURCOR® BODY, 150#, THD LUG, PTFE LINER, PFA LINED DISC, GO	16
VPL-506	1" – 4"	PLUG, DI BODY, 150#, PFA LINED BODY/PLUG, FLG	
VPL-506G	6" – 8"	PLUG, DI BODY, 150#, PFA LINED BODY/PLUG, FLG, GO	
VBA-609	1" – 6"	BALL, DUCTILE IRON BODY, ALLOY BALL, 150# RF FLG, PFA LINER, REDUCED PORT, SHORT PATTERN	
VBA-609G	8"	BALL, DUCTILE IRON BODY, ALLOY BALL, 150# RF FLG, PFA LINER, REDUCED PORT, SHORT PATTERN, GO	
VBA-662	1" – 4"	BALL, DUCTILE IRON BODY, ALLOY BALL, 150# RF FLG, PFA LINER, FULL PORT, SHORT PATTERN	
VBA-662G	6"	BALL, DUCTILE IRON BODY, ALLOY BALL, 150# RF FLG, PFA LINER, FULL PORT, SHORT PATTERN, GO	
VBA-662G	8"	BALL, DUCTILE IRON BODY, ALLOY BALL, 150# RF FLG, PFA LINER, FULL PORT, LONG PATTERN, GO	

NOTES:

1. WELDING IS NOT PERMITTED ON LINED PIPING COMPONENTS.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1.5X MAWP FOR ALL PIPE AND FITTINGS PRIOR TO SHIPMENT FROM MANUFACTURER.
3. PIPING TO BE PURCHASED AS FLANGED SPOOLS PER DESCRIPTION.



MATERIAL PTFE LINED COMPOSITE
RATING 8" DURCOR® PIPE/FITTINGS
150 PSIG @ -40°F – 100°F
100 PSIG @ 300°F
0" CORR. ALLOW.

GES 2-3-0
VCM
AW

REVISION 0
DATE: 09/04/18

MAINT. APPROVAL

Jason Polk

HSE APPROVAL

R. May

OPER. APPROVAL

Jeff C. C. C.

ENG. APPROVAL

M. K. K.

4. MANUFACTURER'S GUIDELINES FOR ALLOWABLE PIPE SPAN DISTANCES SHOULD BE FOLLOWED.
5. ALL LINED ASSEMBLIES SHALL HAVE THE LINER/GASKET FACE PROTECTED BY AN END PLATE (E.G. PLYWOOD / PLASTIC CAP) UNTIL FINAL INSTALLATION.
6. LINED PIPE AND FITTING MAY CONTAIN VENT HOLES IN THE METALLIC HOUSINGS. PLUGGING OF THESE HOLES BY PAINT OR OTHER SUBSTANCE SHALL NOT BE ALLOWED.
7. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.
8. FOR USE WITH LINED PIPE CONNECTIONS TO BARE METAL.
9. APPROVED MANUFACTURERS MUST MAINTAIN A QUALITY SYSTEM IN COMPLIANCE TO CURRENT ISO 9001-WITH DESIGN REQUIREMENTS. APPROVED MANUFACTURERS AND PRODUCT LINES FOR THIS SPECIFICATION ARE: ANDRONACO INDUSTRIES PUREFLEX® DURCOR® PIPE AND FITTINGS
10. PIPE AND PIPING COMPONENTS CONSTRUCTED PER THIS PIPING SPECIFICATION SHALL BE RATED FOR FULL VACUUM SERVICE FROM -40°F TO 300°F. 10KV SPARK TESTING OF ALL PTFE LINERS ON ALL SIZES REQUIRED. ALL PTFE-LINED PIPE AND FITTINGS TO MEET THE QUALIFICATION REQUIREMENTS OF ASTM F1545 AS APPLICABLE TO THE PTFE LINERS. ALL PIPE AND FITTINGS SHALL BE TESTED AND QUALIFIED TO ASSURE A 4X SAFETY FACTOR.
11. PAINTING REQUIREMENTS: NONE
12. PIPE MAY BE INSULATED, VENT COUPLINGS OF A LENGTH GREATER THAN INSULATION THICKNESS RECOMMENDED AT PIPE VENT HOLES. DO NOT INSULATE ANY FLANGED CONNECTIONS IF INTERNAL FLUID TEMPERATURE EXCEEDS 250°F.
13. PIPE MAY BE HEAT TRACED, REFER TO MANUFACTURERS LITERATURE FOR GUIDELINES. MAXIMUM TRACING TEMPERATURE NOT EXCEED 250°F.



MATERIAL PTFE LINED COMPOSITE
RATING 8" DURCOR® PIPE/FITTINGS
 150 PSIG @ -40°F – 100°F
 100 PSIG @ 300°F
 0" CORR. ALLOW.

GES 2-3-0
 VCM
AW

REVISION 0
 DATE: 09/04/18

MAINT. APPROVAL

Jason Polk

HSE APPROVAL

R. Meyer

OPER. APPROVAL

Jeff Curbell

ENG. APPROVAL

M. Angelle

14. FLANGES SHOULD BE TORQUED TO THE FINAL VALUES IN THE FOLLOWING TABLE TAKING NOTE IF THE BOLTS ARE COATED, IN THREE INCREMENTS IN A CRISS-CROSS PATTERN UNTIL ATTAINING FULL TORQUE. BOLTS SHALL BE CHECKED AND RE-TORQUED AFTER 24 HOURS OR ONE THERMAL CYCLE:

Size (in)	Lubricated ASTM A193 Gr. B7 (ft-lb)	PTFE-coated ASTM A193 Gr. B7 (ft-lb)
1	10 – 15	5 – 10
1-1/2	20 – 25	10 – 15
2	35 – 45	20 – 25
3	40 – 50	25 – 30
4	30 – 40	20 – 25
6	50 – 60	30 – 35
8	80 – 90	50 – 55

15. FOR APPLICATIONS REQUIRING EXTERNAL STATIC DISSIPATION, SPECIFICATION TO REQUIRE EXTERNALLY CONDUCTIVE PIPE HOUSINGS.

16. VBF-936 SHALL BE LIMITED TO 250°F.

BRANCH CONNECTIONS:

BRANCH

8	T								
6	RT	T							
4	RT	RT	T						
3	RT	RT	RT	T					
2	RT	RT	RT	RT	T				
1½	RT	RT	RT	RT	RT	T			
1	RT	RT	RT	RT	RT	RT	T		
	8	6	4	3	2	1½	1		

SYMBOLS

RT – REDUCING TEE OR TEE WITH REDUCER(S)

T – TEE



MATERIAL

FIBERGLASS REINFORCED VINYL ESTER

RATING

100 PSIG @ 100° F
 100 PSIG @ 200° F
 0" CORR. ALLOW.

GES 2-3-0
 VCM
AX

REVISION 4
 DATE: 11/29/17

MAINT. APPROVAL

Jason Polk

HSE APPROVAL

[Signature]

OPER. APPROVAL

[Signature]

ENG. APPROVAL

[Signature]

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SERVICES

WASTE WATER, INCINERATOR VENT GAS

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1" - 2½"	SCH 50, ASTM D2996, FIBERGLASS REINFORCED VINYL ESTER RESIN PIPE, 470 NOVOLAC AS MANUFACTURED BY CONLEY COMPOSITES, PE	1, 4
	3" - 12"	SCH 40, ASTM D2996, FIBERGLASS REINFORCED VINYL ESTER RESIN PIPE, 470 NOVOLAC AS MANUFACTURED BY CONLEY COMPOSITES, PE	1, 4
FITTINGS	1" - 12"	150#, FF, SCH TO MATCH PIPE, ASTM D2996, FIBERGLASS REINFORCED VINYL ESTER RESIN FLANGED FITTINGS, 470 NOVOLAC AS MANUFACTURED BY CONLEY COMPOSITES	1, 2, 3
FLANGES	1" - 12"	150#, FF, SCH TO MATCH PIPE/FITTINGS, ASTM D4024, FIBERGLASS REINFORCED VINYL ESTER, CEMENT TYPE, AS MANUFACTURED BY CONLEY COMPOSITES	1
	1" - 12"	150#, FF BLIND, SCH 40, ASTM D4024, FIBERGLASS REINFORCED VINYL ESTER	1
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A307 GR. B HEAVY HEX HEAD MACHINE BOLTS A563 GR. A HEAVY HEX NUTS WITH 2 EACH ASME B18.21.1 TYPE A PLAIN WASHERS	
GASKETS	1" - 12"	150#, 3/16" THK. FULL FACE VITON, 70 DUROMETER HARDNESS, GARLOCK 9518 OR EQ	
THRD. LUBE	BOLTS	NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
SOCKET JOINT ADHESIVE	1" - 12"	CONLEY ESTERWELD	
VALVES			
VBF-903	2" - 3"	B-FLY, DI BODY, 150#, THD LUG, PTFE LINER/TRIM	
VBF-907	4" - 6"	B-FLY, DI BODY, 150#, WAFER, TITANIUM DISC/STEM, PTFE LINER	
VBF-907G	8" - 12"	B-FLY, DI BODY, 150#, WAFER, TITANIUM DISC/STEM, PTFE LINER, GO	
VCH-301	1" - 3"	CHECK, BALL, DI BODY, 150# RF FLG, PFA LINED, SOLID PTFE BALL	
VCH-322	4" - 12"	CHECK, WAFER SWING, DI BODY, 150#, PFA LINED	
VPL-506	1" - 4"	PLUG, PFA LINED DI BODY/PLUG, 150#, RF FLG	
VPL-506G	6" - 8"	PLUG, PFA LINED DI BODY/PLUG, 150#, RF FLG, GO	



MATERIAL FIBERGLASS REINFORCED VINYL ESTER

RATING 100 PSIG @ 100° F
100 PSIG @ 200° F
0" CORR. ALLOW.

GES 2-3-0
VCM
AX
REVISION 4
DATE: 11/29/17

MAINT. APPROVAL <i>Jason Pelk</i>	HSE APPROVAL <i>[Signature]</i>	OPER. APPROVAL <i>[Signature]</i>	ENG. APPROVAL <i>[Signature]</i>
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VBA-609	1" - 6"	BALL, PFA LINED DI BODY, PFA LINED BALL, PTFE SEATS, 150# RF FLG, REDUCED PORT, SHORT PATTERN	8
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NOTES:

1. HYDROSTATIC TESTING SHALL BE PERFORMED AT 150 PSIG. DRAIN AND BLOW DRY.
2. USE PTFE LINED INSTRUMENT TEES FOR SAMPLE AND INSTRUMENT CONNECTIONS.
3. SOCKET TYPE FITTINGS ARE NOT ALLOWED.
4. WHEN MATING TO EXISTING PIPING, VERIFY WALL THICKNESS WITH NEW PIPING.
5. USE HARD GASKET MATERIAL TO FILL THE VOID SPACE BEYOND THE RING FACE OF A RAISED FACE FLANGE AND USE FULL FACE GASKET FOR SEALING.
6. MANUFACTURERS INSTRUCTIONS ON JOINT ASSEMBLY AND SUPPORT REQUIREMENTS SHALL BE PROVIDED WITH PIPE AND FITTINGS AND SHALL BE STRICTLY FOLLOWED.
7. BRANCH CONNECTIONS SHALL USE FULL SIZE TEES AND REDUCERS. FLANGES SHALL BE USED FOR MATING DIFFERENT MATERIALS.
8. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 1" IS THE DEFAULT SIZED TO BE USED.

**MATERIAL**

CARBON STEEL

RATING
 ASME B16.5, CLASS 300, M.G. 1.1
 740 PSIG @ 100° F
 605 PSIG @ 500° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

B
 REVISION 7
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1637AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

230EFCB4FF5247D...

DocuSigned by:
ENG. APPROVAL


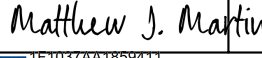
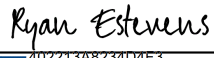
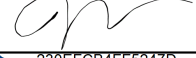

Jeff Cartkuff

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CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES
 BOILER BLOW DOWN, BOILER FEED WATER, NATURAL GAS, PLANT AIR, SEAL OIL (VCM-E), STEAM, STEAM
 CONDENSATE, VENT

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" – 1 1/2" 2" – 16" 18" – 24"	SCH 80, A-106 GR. B SMLS, PE SCH 40, A-106 GR. B SMLS, BE SCH 40, A-333 GR. 6 SMLS, BE	1, 2, 3 1, 2 1, 2
FITTINGS	1/2" – 1 1/2" 1/2" – 16" 18" – 24" 1/2" – 10"	3000#, A-105, SW, ASME B16.11 SCH TO MATCH PIPE, A-234 GR. WPB, BE, ASME B16.9 SCH 40, A-420 GR. WPL6, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2, 3 1, 2, 3 1, 2 1, 2
FLANGES	1/2" – 1 1/2" 1/2" – 6" 8" – 24" 1/2" – 24" 2" – 24"	300#, A-105, SCH 80, RF SW, ASME B16.5 300#, A-105, SCH 40, RF WN, ASME B16.5 300#, A-105, SCH 40, RF SO, ASME B16.5 300#, A-105, RF BLIND, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 4, 5 1, 2, 4, 5 1, 2, 4, 5, 6 4
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	300#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET OR EQ.	4, 13
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-112 VGA-106 VGA-106G	1/2" – 1 1/2" 1/2" – 8" 10" – 24"	GATE, CS, 800#, SW, TRIM #8 GATE, CS, 300#, RF FLG, TRIM #8 GATE, CS, 300#, RF FLG, TRIM #8, GO	7
VGL-318 VGL-208 VGL-208G	1/2" – 1 1/2" 2" – 6" 8" – 24"	GLOBE, CS, 300#, RF FLG, TRIM #8 GLOBE, CS, 300#, RF FLG, TRIM #8 GLOBE, CS, 300#, RF FLG, TRIM #8, GO	
VCH-425 VCH-306	1/2" – 1 1/2" 2" – 24"	CHECK, PISTON, CS, 300#, RF FLG, TRIM #8 CHECK, WAFER, CS, 300#, RF FLG, TRIM #10	8 8, 9, 10, 11, 12
VCH-307	2" – 24"	CHECK, SWING, CS, 300#, RF FLG, TRIM #8	8, 9
TEMPORARY STRAINERS	ALL	300# RF, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	

	MATERIAL	CARBON STEEL		GES 2-3-0 VCM B REVISION 7 DATE: 04/05/22
	RATING	ASME B16.5, CLASS 300, M.G. 1.1 740 PSIG @ 100° F 605 PSIG @ 500° F 1/16" CORR. ALLOW.		
<small>DocuSigned by:</small> <small>MAINT. APPROVAL</small>  <small>1F1037AA1859411...</small>	<small>DocuSigned by:</small> <small>HSE APPROVAL</small>  <small>402213A8234D4F3...</small>	<small>DocuSigned by:</small> <small>OPER. APPROVAL</small>  <small>230EFCB4FF5247D...</small>	<small>DocuSigned by:</small> <small>ENG. APPROVAL</small>  <small>444C5CDEA51D49D...</small>	
"Y" STRAINERS	$\frac{1}{2}$ " – $1\frac{1}{2}$ " 2" – 12"	600#, SW, A-216, 0.020" PERF. SS SCREEN 300#, RF FLG, A-216, 0.020" PERF. SS SCREEN		

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1125 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. IF $\frac{1}{2}$ " – $\frac{3}{4}$ " THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCHEDULE 160.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
7. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. $\frac{3}{4}$ " SIZE IS THE DEFAULT SIZE, BUT $\frac{1}{2}$ " AND 1" MAY BE USED AS REQUIRED.
8. INSTALL IN HORIZONTAL POSITION WITH COVER UP.
9. INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.
10. VCH-306 DIMENSIONS ARE NOT STANDARD. VALVES MUST BE SELECTED BEFORE DRAWING COMPLETION OR FABRICATION.
11. DOWNSTREAM CLEARANCE MUST BE CHECKED FOR VCH-306.
12. FOR UTILITY SERVICES ONLY. NOT TO BE USED IN NATURAL GAS OR SEAL OIL SERVICES.
13. THIS GASKET IS TO BE USED IN STEAM SERVICE ONLY.

**MATERIAL**

CARBON STEEL

RATING
 ASME B16.5, CLASS 300, M.G. 1.1
 740 PSIG @ 100° F
 505 PSIG @ 750° F
 1/8" CORR. ALLOW.

GES 2-3-0

VCM

BB
 REVISION 5
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

[Signature]

230EFCB4FF5247D...

DocuSigned by:
ENGR. APPROVAL

Jeff Carkuff

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CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

EDC LIQUID AND GAS

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 3/4" 1" - 2" 3" - 4" 6" - 12" 14" - 24"	SCH 160, A-106 GR. B, SMLS, PE SCH 80, A-106 GR. B, SMLS, PE SCH 40, A-53 GR. B, SMLS, BE SCH XS, A-53 GR. B, SMLS, BE SCH 40, A-53 GR. B, SMLS, BE	1, 2, 3 1, 2, 3 1, 2 1, 2 1, 2
FITTINGS	1/2" - 2" 1/2" - 24" 1/2" - 8"	6000#, A-105, SW, ASME B16.11 SCH TO MATCH PIPE, A-234, GR. WPB, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2, 3 1, 2, 3 1, 2
FLANGES	1/2" - 2" 1/2" - 6" 8" - 24" 1/2" - 24" 2" - 24"	300#, A-105, SCH TO MATCH PIPE, RF SW, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF WN, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF SO, ASME B16.5 300#, A-105, RF BLIND, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" THD TAPS	1, 2, 4, 5 1, 2, 4, 5 1, 2, 4, 5, 6 4
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	300#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET, 304SS WINDINGS WITH GRAPHITE FILLER, CS OUTER RING OR EQ.	4
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VGA-120 VGA-112 VGA-106 VGA-106G VGL-318 VGL-208 VGL-208G VCH-425 VCH-307	1/2" - 1 1/2" 1/2" - 1 1/2" 2" - 8" 10" - 24" 1/2" - 1 1/2" 2" - 6" 8" - 24" 1/2" - 1 1/2" 2" - 24"	GATE, EXTENDED BODY, CS, 800#, MSWxFNPT, TRIM #8 GATE, CS, 800#, SW, TRIM #8 GATE, CS, 300#, RF FLG, TRIM #8 GATE, CS, 300#, RF FLG, TRIM #8, GO GLOBE, CS, 300#, RF FLG, TRIM #8 GLOBE, CS, 300#, RF FLG, TRIM #8 GLOBE CS, 300#, RF FLG, TRIM #8, GO CHECK, PISTON, CS, 300#, RF FLG, TRIM #8 CHECK, SWING, CS, 300#, RF FLG, TRIM #8	7 8 8, 9
TEMPORARY STRAINERS	ALL	300# RF, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	
"Y" STRAINERS	1/2" - 2" 2" - 12"	600#, SW, A-216, 0.020" PERF. SS SCREEN 300#, RF FLG, A-216, 0.020" PERF. SS SCREEN	

**MATERIAL**

CARBON STEEL

RATING

ASME B16.5, CLASS 300, M.G. 1.1
 740 PSIG @ 100° F
 505 PSIG @ 750° F
 1/8" CORR. ALLOW.

GES 2-3-0

VCM

BB

REVISION 5
 DATE: 04/05/22

DocuSigned by
MAIN P. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by
OPER APPROVAL

230EFCB4FF5247D...

DocuSigned by
ENG. APPROVAL

Jeff Carakoff

444C5CDEA51D49D...

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1125 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. IF 1/2" – 3/4" THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCHEDULE XXS. IF 1" – 1 1/2" THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCHEDULE 160.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
7. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
8. INSTALL IN HORIZONTAL POSITION WITH COVER UP.
9. INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL CARBON STEEL

RATING ASME B16.5, CLASS 300, M.G. 1.1
740 PSIG @ 100° F
505 PSIG @ 750° F
1/8" C.A. (NPS≤3), 1/16" C.A. (NPS≥4)

GES 2-3-0
VCM
BBC
REVISION 6
DATE: 04/05/22

DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

CW

230EFCB4FF5247D...

DocuSigned by:
ENG. APPROVAL

Jeff Carlucci

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

BOILER BLOW DOWN, BOILER FEED WATER, STEAM, STEAM CONDENSATE
[FOR USE WITH NON-BOILER EXTERNAL PIPING ONLY, IN ACCORDANCE WITH ASME B31.3. NOT UNDER THE JURISDICTION OF ASME BPVC OR ASME B31.1.]

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 3/4" 1" - 1 1/2" 2" - 3" 4" - 24"	SCH 160, A-106 GR. B, SMLS, PE SCH 80, A-106 GR. B, SMLS, PE SCH 80, A-106 GR. B, SMLS, BE SCH 40, A-106 GR. B, SMLS, BE	1, 2, 3 1, 2, 3 1, 2 1, 2
FITTINGS	1/2" - 3/4" 1" - 1 1/2" 1/2" - 24" 1/2" - 8"	6000#, A-105, SW, ASME B16.11 3000#, A-105, SW, ASME B16.11 SCH TO MATCH PIPE, A-234, GR. WPB, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2 1, 2 1, 2 1, 2
FLANGES	1/2" - 1 1/2" 1/2" - 24" 1/2" - 24" 2" - 24"	300#, A-105, SCH TO MATCH PIPE, RF SW, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF WN, ASME B16.5 300#, A-105, RF BLIND, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 4, 5 1, 2, 4, 5 4
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	300#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET, 304SS WINDINGS WITH OXYGEN-INHIBITED FG FILLER, CS OUTER RING OR EQ.	4
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VGA-120 VGA-112 VGA-106 VGA-106G VGL-318 VGL-208 VGL-208G VGL-230 VCH-425 VCH-307	1/2" - 1 1/2" 1/2" - 1 1/2" 2" - 8" 10" - 24" 1/2" - 1 1/2" 2" - 6" 8" - 24" 3" - 10" 1/2" - 1 1/2" 2" - 24"	GATE, EXTENDED BODY, CS, 800#, MSWxFNPT, TRIM #8 GATE, CS, 800#, SW, TRIM #8 GATE, CS, 300#, RF FLG, TRIM #8 GATE, CS, 300#, RF FLG, TRIM #8, GO GLOBE, CS, 300#, RF FLG, TRIM #8 GLOBE, CS, 300#, RF FLG, TRIM #8 GLOBE, CS, 300#, RF FLG, TRIM #8, GO GLOBE, CS, STOP CHECK ANGLE, CS, 300#, RF FLG, TRIM #5 CHECK, PISTON, CS, 300#, RF FLG, TRIM #8 CHECK, SWING, CS, 300#, RF FLG, TRIM #8	6 7 7, 8
TEMPORARY	ALL	300#, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	



MATERIAL CARBON STEEL
RATING ASME B16.5, CLASS 300, M.G. 1.1
 740 PSIG @ 100° F
 505 PSIG @ 750° F
 1/8" C.A. (NPS≤3), 1/16" C.A. (NPS≥4)

GES 2-3-0
 VCM
BBC
 REVISION 6
 DATE: 04/05/22

DocuSigned by: MAINT. APPROVAL <i>Matthew J. Martin</i> 1F1037AA1859411...	DocuSigned by: HSE APPROVAL <i>Ryan Estevens</i> 402213A8234D4F3...	DocuSigned by: OPER. APPROVAL <i>[Signature]</i> 230EFCB4FF5247D...	DocuSigned by: ENG. APPROVAL <i>Jeff Carkuff</i> 444C5CDEA51D49D...
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STRAINERS			
"Y" STRAINERS	1/2" – 1 1/2" 2" – 12"	600#, SW, A-216, 0.020" PERF. SS SCREEN 300#, RF FLG, A-216, 0.020" PERF. SS SCREEN	

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1125 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. IF 1/2" – 3/4" THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCHEDULE XXS. IF 1" – 1 1/2" THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCHEDULE 160.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
7. INSTALL IN HORIZONTAL POSITION WITH COVER UP.
8. INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.

GENERAL							
MATERIAL	CARBON STEEL						
RATING	ASME B16.5, CLASS 300, M.G. 1.1 740 PSIG @ 100°F 655 PSIG @ 300°F 1/16" CORR. ALLOW.						
SERVICES	OXYGEN – [ALL COMPONENTS FOR OXYGEN SERVICE MUST BE CLEANED, DEGREASED, LUBRICATED, SHIPPED AND STORED IN ACCORDANCE WITH GES-242.]						
ITEM	SIZE	DESCRIPTION					NOTES
PIPE	½" – 1½"	SCH 80, A-106 GR. B, SMLS, PE					1, 2, 3
	2" – 12"	SCH 40, A-106 GR. B, SMLS, BE					1, 2
FITTINGS	½" – 1½"	SW, CL 3000, A105, ASME B16.11					1, 2
	½" – 12"	BW, SCH TO MATCH PIPE, A234 GR. WPB, ASME B16.9					1, 2
	PER CHART	OLET, SCH/CLASS TO MATCH PIPE/FITTINGS, A105, MSS SP-97					1, 2
FLANGES	½" – 1½"	RF SW, CL 300, A105, SCH 80, ASME B16.5					1, 2, 4, 5
	½" – 12"	RF WN, CL 300, A105, SCH TO MATCH PIPE, ASME B16.5					1, 2, 4, 5
	½" – 12"	RF BLIND, CL 300, A105, ASME B16.5					4
	2" – 12"	RF ORIFICE FLANGE, CL 300, A105, SCH 40, ASME B16.36, ½" SW TAPS					
UNIONS	NONE	USE FLANGES					
BOLTING	ALL	STUD BOLTS, A193 GR. B7, TEFLON COATED NUTS, A194 GR. 2H, TEFLON COATED					
GASKETS	ALL	EXPANDED PTFE W/ FULLY ENCAPSULATED CORRUGATED C276 INSERT, CL 300, 1/8" THK, RING TYPE; VSP PITA OR EQ.					4
THREAD LUBE	PIPE BOLTS	PTFE TAPE NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.					
TEMPORARY STRAINERS	ALL	CL 300, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE					
"Y" STRAINERS	½" – 1½"	CL 600, SW, A-216, 0.020" PERF. SS SCREEN					
	2" – 12"	CL 300, RF FLG, A-216, 0.020" PERF. SS SCREEN					
VALVES							
BALL	BUTTERFLY	CHECK	GATE	GLOBE	PLUG	OTHER	NOTES
		VCH-447 VCH-390	VGA-219 VGA-179 VGA-181	VGL-338 VGL-294			6, 7, 8
NOTES							
<ol style="list-style-type: none"> ALL REQUIREMENTS OF GES-230 "PIPING SPECIFICATIONS" MUST BE FOLLOWED. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 20% FOR OXYGEN SERVICE PER GES-230. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1125 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6. IF ½" – ¾" THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCHEDULE 160. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES. 							

5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. VGA-219 IS THE DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
7. CHECK VALVES TO BE INSTALLED IN HORIZONTAL POSITION WITH COVER UP.
8. SWING CHECK VALVE INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.

BRANCH CONNECTIONS

BRANCH

12	T																				
10	RT	T																			
8	W	RT	T																		
6	W	W	RT	T																	
4	W	W	W	RT	T																
3	W	W	W	W	(1)	T															
2	W	W	W	W	(1)	(1)	T														
1½	O	O	O	O	O	(1)	(1)	T													
1	O	O	O	O	O	O	(1)	(1)	T												
¾	O	O	O	O	O	O	(1)	(1)	(1)	T											
½	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T										
	12	10	8	6	4	3	2	1½	1	¾	½										

SYMBOLS

O – OLET

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) – USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.



MATERIAL

CARBON STEEL (LOW TEMP)

RATING

LIMITED BY VBA-630 & VCH-461
600 PSIG @ -50° F TO 100° F
490 PSIG @ 300° F
1/8" CORR. ALLOW.

GES 2-3-0

VCM

BCM

REVISION 5
DATE: 04/13/17

MAINT. APPROVAL

Jason Pelk

HSE APPROVAL

A. Meyer

OPER. APPROVAL

Jeff Carroll

ENG. APPROVAL

C. Pitme

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

DRY CL2

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 3/4" 1" - 10"	SCH 160, A-333 GR. 6, SMLS, BE SCH 80, A-333 GR. 6, SMLS, BE	1, 2, 5 1, 2, 5, 6
FITTINGS	1/2" - 3/4" 1" - 1 1/2" 2" - 10" 1/2" - 6"	SCH 160, A-350 GR. LF2 CL. 1, BE, ASME B16.9 SCH 80, A-350 GR. LF2 CL. 1, BE, ASME B16.9 SCH 80, A-420 GR. WPL6, BE, ASME B16.9 SCH TO MATCH PIPE/FITTINGS, A-350 GR. LF2 CL. 1, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2, 5, 6 1, 2, 5, 6 1, 2, 5, 6 1, 2, 5
FLANGES	1/2" - 10" 1/2" - 10"	300#, A-350 GR. LF2 CL. 1, SCH TO MATCH PIPE, RF WN, ASME B16.5 300#, A-350 GR. LF2 CL. 1, RF BLIND, ASME B16.5	1, 2, 5, 6 5
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-320 GR. L7 STUD BOLTS, GREEN TEFLON COATED A-194 GR. 4 HVY. NUTS, GREEN TEFLON COATED	
GASKETS	ALL	300#, 1/8" THK. RING TYPE, DURLON 9000 <u>DO NOT APPLY LUBRICANT TO THE FLANGE FACES OR GASKETS FOR CHLORINE SERVICE</u>	
THRD. LUBE	BOLTS	<u>NO THREAD LUBRICANT ALLOWED FOR CHLORINE SERVICE</u>	
<u>VALVES (8)</u>			
VGL-295	1/2" - 10"	GLOBE, LTCS, 300#, RF FLG, BELLOWS SEAL	5, 9
VCH-461	1/2" - 2"	CHECK, PISTON, B564 (MONEL), 300#, RF, API TRIM #9	5, 9, 12
VCH-319	3" - 10"	CHECK, SWING, A352-LCB, 300#, RF, API TRIM #9	5, 9, 12, 13
VPL-558	1/2" - 1"	PLUG, CS BODY/MONEL PLUG, 300#, RF FLG, PTFE SLEEVE	5, 9, 10, 11
VBA-630	1/2" - 6"	BALL, A494 GR. M35-1 (MONEL) ANNEALED BODY/TRIM, 300#, RF FLG, PARAFLOX SEATS (4"-6" LIMITED TO 250°F)	5, 9
VBF-933G	3" - 10"	BUTTERFLY, CS BODY/DISC, 300#, RF FLG, HF SEAT, MONEL+GRAPHITE SEAL RING, SHORT, GO	5, 9



MATERIAL

CARBON STEEL (LOW TEMP)

RATING

LIMITED BY VBA-630 & VCH-461
600 PSIG @ -50° F TO 100° F
490 PSIG @ 300° F
1/8" CORR. ALLOW.

GES 2-3-0

VCM

BCM

REVISION 5

DATE: 04/13/17

MAINT. APPROVAL

HSE APPROVAL

OPER. APPROVAL

ENG. APPROVAL

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. A MINIMUM OF 100% RADIOGRAPHIC EXAMINATION SHALL BE DONE PER ASME B31.3, PARA. 341.4.3 IF THE PIPING IS GRADED AS SEVERE CYCLIC.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1125 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6. DRAIN AND BLOW FREE OF LIQUID. WESTLAKE PERSONNEL TO DRY BY BLOWING WITH MINUS (-)40°F DEWPOINT AIR OR NITROGEN UNTIL DEWPOINT LEAVING IS SAME AS DEWPOINT ENTERING. BALL VALVES AND PLUG VALVES SHOULD BE HALF OPEN TO DRY THE BODY CAVITY.
3. PURGE GAS / DRYING GAS / INERTING GAS MUST BE **OIL FREE**.
4. WELDING SHALL BE PER ASME CODE SECTION IX, LATEST EDITION.
5. ALL PIPING AND VALVES MUST CONFORM TO CHLORINE INSTITUTE PAMPHLET #6.
6. FOR PIPING SYSTEMS 8 INCH AND LARGER, CONSULT THE CHLORINE INSTITUTE PAMPHLET #6 AND WESTLAKE ENGINEERING REPRESENTATIVE FOR APPROVAL.
7. FLANGED CONNECTIONS ARE PREFERRED FOR CHLORINE SERVICE INCLUDING VENTS AND DRAINS. THREADED CONNECTIONS ARE NOT PERMITTED.
8. SEVERAL VALVE MANUFACTURERS MAKE EQUIVALENT CHLORINE SERVICE VALVES. THESE "OR EQUAL" VALVES MAY BE USED IF CHECKED AND APPROVED BY A WESTLAKE ENGINEERING REPRESENTATIVE. (CHECK FACE TO FACE DIMENSIONS)
9. ALL VALVES AND INSTRUMENTS ARE TO BE PREPARED, DOUBLE BAGGED, AND TAGGED FOR CHLORINE SERVICE. VALVES SHALL BE CLEANED AND PACKAGED AS PER REQUIREMENTS OF CHLORINE INSTITUTE PAMPHLET #6.
10. TO BE USED ONLY WITH APPROVAL FROM OPERATIONS. VGL-295 IS THE PREFERRED VALVE.
11. TO BE USED ONLY IN THE CHLORINE LOADING RACK.
12. INSTALL IN HORIZONTAL POSITION WITH COVER UP.
13. INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.
14. USE OF WEAR PADS (DYNAGARD OR EQ.) ARE REQUIRED AT ALL STRUCTURAL STEEL/CONCRETE SUPPORT POINTS. IF BOLT-ON PIPE SHOES ARE NEEDED AS A SUBSTITUTE, THEY SHALL BE GALVANIZED AND BE PROVIDED WITH A BUILT-IN NON-METALLIC CONTACT PLATE BETWEEN THE PIPE AND THE SUPPORT.
15. WHEN CONNECTING OTHER PIPING SYSTEMS TO CL2 SPECIFIED PIPING, IT IS REQUIRED TO HAVE A PRIMARY ISOLATION VALVE, A BLEED VALVE, AND A SECONDARY ISOLATION VALVE. THE PRIMARY ISOLATION VALVE AND BLEED VALVE MUST BE OF THE AFFECTED CL2 PIPING SPECIFICATION. THE PIPE SPECIFICATION BREAK WILL BE AT THE SECONDARY ISOLATION VALVE.



MATERIAL

CARBON STEEL (LOW TEMP)

RATING

LIMITED BY VBA-630 & VCH-461
600 PSIG @ -50° F TO 100° F
490 PSIG @ 300° F
1/8" CORR. ALLOW.

GES 2-3-0

VCM

BCM

REVISION 5

DATE: 04/13/17

MAINT. APPROVAL

HSE APPROVAL

OPER. APPROVAL

ENG. APPROVAL

BRANCH CONNECTIONS:

BRANCH

10	T																				
8	RT	T																			
6	W	RT	T																		
4	W	W	RT	T																	
3	W	W	W	(1)	T																
2	W	W	W	(1)	(1)	T															
1½	W	W	W	W	(1)	(1)	T														
1	W	W	W	W	W	(1)	(1)	T													
¾	W	W	W	W	W	(1)	(1)	(1)	T												
½	W	W	W	W	W	(1)	(1)	(1)	(1)	T											
	10	8	6	4	3	2	1½	1	¾	½											

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS
PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED
BY PIPING DIMENSIONS.



MATERIAL

MONEL TUBING

RATING

LIMITED BY VBA-680
2300 PSIG @ 70°F
1000 PSIG @ 300°F
0" CORR. ALLOW.

GES 2-3-0

VCM

BCT

REVISION 2
DATE: 10/21/19

MAINT. APPROVAL

HSE APPROVAL

OPER. APPROVAL

ENG. APPROVAL

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

INJECTION WATER

ITEM	SIZE	DESCRIPTION	NOTES
TUBING	¼" – ½"	0.035" WALL, B-165 (UNS N04400) FULLY ANNEALED, 75 Rb MAX HARDNESS	
FITTINGS	NONE		
FLANGES	NONE		
UNIONS	NONE		
BOLTING	NONE		
GASKETS	NONE		
THRD. LUBE	NONE		
VALVES			
VBA-680	¼" – ½"	BALL, MONEL BODY/BALL/STEM, COMPRESSION FITTING ENDS, PTFE SEAT, 5000 PSIG	
VNE-04	¼" – ½"	NEEDLE, MONEL BODY/STEM, 1500#, COMPRESSION FITTING ENDS, PFA PACKING	
TEMPORARY STRAINERS	NONE		
"Y" STRAINERS	NONE		

NOTES:

1. WELDING NOT ALLOWED FOR THIS PIPING SPECIFICATION.
2. INSTRUMENTATION IMPULSE SENSE LINES.
3. NOT TO BE USED IN GAS/VAPOR SERVICE.

**MATERIAL**

CARBON STEEL

RATING
 ASME B16.5, CLASS 300, M.G. 2.2
 720 PSIG @ 100° F
 515 PSIG @ 400° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

BD
 REVISION 5
 DATE: 04/05/22
DocuSigned by:
MAIN APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

[Signature]

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DocuSigned by:
ENG. APPROVAL

Jeff Carlucci

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CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

LUBE OIL, SEAL OIL

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1" 1 1/2" 2" - 14" 16" - 20" 24"	SCH 80, A-106 GR. B, SMLS, PE SCH 40, A-106 GR. B, SMLS, PE STD. WT., A-106 GR. B, SMLS, BE SCH XS, A-106 GR. B, SMLS, BE SCH 40, A-106 GR. B, SMLS, BE	1, 2, 3 1, 2, 3 1, 2 1, 2 1, 2
FITTINGS	1/2" - 1 1/2" 1/2" - 24" 1/2" - 8"	3000#, A-105, SW, ASME B16.11 SCH TO MATCH PIPE, A-234, GR. WPB, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2, 3 1, 2, 3 1, 2
FLANGES	1/2" - 1 1/2" 1/2" - 8" 10" - 24" 1/2" - 24" 2" - 24"	300#, A-105, SCH TO MATCH PIPE, RF SW, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF WN, ASME B16.5 300#, A-105, RF SO, ASME B16.5 300#, A-105, RF BLIND, ASME B16.5 300#, A-105, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 4, 5 1, 2, 4, 5 1, 2, 4, 5, 6 4
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	300#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET, 304SS WINDINGS WITH OXYGEN- INHIBITED FG FILLER, CS OUTER RING OR EQ.	4
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-132	1/2" - 1 1/2"	GATE, 316 SS, 300#, RF FLG, TRIM #10	7
VGL-246 VGL-246G	1/2" - 6" 8" - 10"	GLOBE, 316 SS, 300#, RF FLG, TRIM #10 GLOBE, 316 SS, 300#, RF FLG, TRIM #10, GO	
VCH-345 VCH-330	1/2" - 1 1/2" 2" - 24"	CHECK, SWING, 316 SS, 300#, RF FLG, TRIM #10 CHECK, DUAL PLATE, 316 SS, 300#, WAFER, TRIM #10	9 9
VBA-676	1/2" - 1 1/2"	BALL, 316 SS BODY/BALL, 300#, RF FLG, XTREME SEATS, FULL PORT, SHORT	8
TEMPORARY STRAINERS	ALL	300#, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	
"Y" STRAINERS	1/2" - 1 1/2" 2" - 12"	600#, SW, A-216, 0.020" PERF. SS SCREEN 300#, RF FLG, A-216, 0.020" PERF. SS SCREEN	

**MATERIAL**

CARBON STEEL

RATING

ASME B16.5, CLASS 300, M.G. 2.2
 720 PSIG @ 100° F
 515 PSIG @ 400° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

BD

REVISION 5
 DATE: 04/05/22

DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

230EFCB4FF5247D...

DocuSigned by:
ENG. APPROVAL

Jeff Carkeuff

444C5CDEA51D49D...

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1100 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. IF 1/2" – 3/4" THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCHEDULE 160. IF 1" – 1 1/2" THREADED PIP/NIPPLES ARE USED, THEY SHALL BE SCHEDULE 80.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
7. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
8. VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE.
9. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.

**MATERIAL**

STAINLESS STEEL, 304L

RATING
 ASME B16.5, CLASS 300, M.G. 2.3
 600 PSIG @ 100° F
 370 PSIG @ 600° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

BF
 REVISION 5
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

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HSE APPROVAL

Ryan Estevens

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ENG. APPROVAL

Jeff Carlucci

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

LUBE OIL

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1 1/2" 2" - 12" 14" - 18"	SCH 10S, A-312 TP-304L, SMLS, PE SCH 40S, A-312 TP-304L, EFW, BE SCH 40, A-312 TP-304L, EFW, BE	1, 2, 3 1, 2 1, 2
FITTINGS	1/2" - 1 1/2" 2" - 18" 1/2" - 8"	3000#, A-182, GR. F304L, SW, ASME B16.11 SCH TO MATCH PIPE, A-403, WP-304L, BW, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-182, GR. F304L, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2 1, 2, 4 1, 2
FLANGES	1/2" - 1 1/2" 2" - 12" 14" - 18" 1/2" - 18" 2" - 18"	300#, A-182, GR. F304L, SCH 10S, RF SW, ASME B16.5 300#, A-105, LAP JOINT, ASME B16.5 300#, A-182, GR. F304L, RF SO, ASME B16.5 300#, A-182, GR. F304L, RF BLIND, ASME B16.5 300#, A-182, GR. F304L, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 5, 6 1, 2, 5, 6 1, 2, 5, 6, 7 5
UNIONS	NONE	USE FLANGES	
BOLTING	SS FLG LAP JOINT	A-193 GR. B8 CL. 2 STUD BOLTS A-194 GR. 8 HVY. NUTS A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	300#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET, 304SS WINDINGS WITH OXYGEN- INHIBITED FG FILLER, CS OUTER RING OR EQ.	5
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VGA-167 VGA-137 VGA-132 VGA-132G VGL-246 VGL-246G VCH-353	1/2" - 1 1/2" 1/2" - 1 1/2" 2" - 8" 10" - 14" 1/2" - 6" 8" 1/2" - 12"	GATE, EXTENDED BODY, 316L SS, 800#, MPExFNPT, TRIM #10 GATE, 316L SS, 300#, SW, TRIM #10 GATE, 316 SS, 300#, RF FLG, TRIM #10 GATE, 316 SS, 300#, RF FLG, TRIM #10, GO GLOBE, 316 SS, 300#, RF FLG, TRIM #10 GLOBE, 316 SS, 300#, RF FLG, TRIM #10, GO CHECK, SWING, 316 SS, 300#, RF FLG, TRIM #10	8 9
TEMPORARY STRAINERS	ALL	300#, CONICAL, 150% OPEN AREA, 304/316 SS SCREEN/PLATE	

**MATERIAL**

STAINLESS STEEL, 304L

RATING
 ASME B16.5, CLASS 300, M.G. 2.3
 600 PSIG @ 100° F
 370 PSIG @ 600° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

BF
 REVISION 5
 DATE: 04/05/22

DocuSigned by: MAINT. APPROVAL <i>Matthew J. Martin</i> 1F1037AA1859411...	DocuSigned by: HSE APPROVAL <i>Ryan Estevens</i> 402213A8234D4F3...	DocuSigned by: OPER. APPROVAL <i>[Signature]</i> 230EFCB4FF5247D...	DocuSigned by: ENG. APPROVAL <i>Jeff Carkuff</i> 444C5CDEA51D49D...
"Y" STRAINERS	1/2" – 1 1/2" 2" – 12"	600#, SW, A-351 GR. CF3, 0.020" PERF. SS SCREEN 300#, RF FLG, A-351 GR. CF8, 0.020" PERF. SS SCREEN	

NOTES:

- RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
- HYDROSTATIC TESTING SHALL BE PERFORMED AT 900 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
- IF THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCH. 80S MINIMUM.
- STUB ENDS SHALL BE USED FOR FLANGED CONNECTIONS. THEY SHALL BE SHORT PATTERN PER ASME B16.9.
- USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
- FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
- SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
- DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
- INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.

**MATERIAL**

STAINLESS STEEL, 304L

RATING

ASME B16.5, CLASS 300, M.G. 2.3
 600 PSIG @ 100° F
 370 PSIG @ 600° F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

BF

REVISION 5
 DATE: 04/05/22

DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

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DocuSigned by:
ENG. APPROVAL

Jeff Carkuff

444C5CDEA51D49D...

BRANCH CONNECTIONS:**BRANCH**

18	T																			
16	RT	T																		
14	P	RT	T																	
12	P	P	RT	T																
10	P	P	P	RT	T															
8	W	W	W	W	RT	T														
6	W	W	W	W	W	RT	T													
4	W	W	W	W	W	W	RT	T												
3	W	W	W	W	W	W	W	(1)	T											
2	W	W	W	W	W	W	W	(1)	(1)	T										
1½	O	O	O	O	O	O	O	O	(1)	(1)	T									
1	O	O	O	O	O	O	O	O	O	(1)	(1)	T								
¾	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T							
½	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T						
	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½						

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS
PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED
BY PIPING DIMENSIONS.

**MATERIAL**

STAINLESS STEEL, 316

RATING
 ASME B16.5, CLASS 300, M.G. 2.2
 720 PSIG @ 100°F
 305 PSIG @ 750°F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

BG
 REVISION 4
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

[Signature]

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DocuSigned by:
ENG. APPROVAL

Jeff Carkuff

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

LUBE OIL

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1 1/2" 2" - 8"	SCH 40S, A-312 TP-316, SMLS OR EFW, PE SCH 40S, A-312 TP-316, SMLS OR EFW, BE	1, 2, 3 1, 2
FITTINGS	1/2" - 1 1/2" 2" - 8" 1/2" - 8"	3000#, A-182, GR. F316, SW, ASME B16.11 SCH TO MATCH PIPE, A-403, WP-316, BW, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-182, GR. F316, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2 1, 2, 4 1, 2
FLANGES	1/2" - 1 1/2" 2" - 8" 1/2" - 8" 2" - 8"	300#, A-182, GR. F316, SCH 40S, RF SW, ASME B16.5 300#, A-105, LAP JOINT, ASME B16.5 300#, A-182, GR. F316, RF BLIND, ASME B16.5 300#, A-182, GR. F316, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 5 1, 2, 5
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	300#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET, 316SS WINDINGS WITH OXYGEN- INHIBITED FG FILLER, CS OUTER RING OR EQ.	
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VGA-167 VGA-135 VGA-132 VGL-244 VGL-246 VCH-346 VCH-345	1/2" - 1 1/2" 1/2" - 1 1/2" 2" - 8" 1/2" - 1 1/2" 2" - 8" 1/2" - 1 1/2" 2" - 8"	GATE, EXTENDED BODY, 316L SS, 800#, MSWxFNPT, TRIM #10 GATE, 316 SS, 300#, SW, TRIM #10 GATE, 316 SS, 300#, RF FLG, TRIM #10 GLOBE, 316 SS, 300#, SW, TRIM #10 GLOBE, 316 SS, 300#, RF FLG, TRIM #10 CHECK, SWING, 316 SS, 300#, SW, TRIM #10 CHECK, SWING, 316 SS, 300#, RF FLG, TRIM # 10	6 7 7
TEMPORARY STRAINERS	ALL	300#, CONICAL, 150% OPEN AREA, 316SS SCREEN/PLATE	
"Y" STRAINERS	NONE		

**MATERIAL**

STAINLESS STEEL, 316

RATING

ASME B16.5, CLASS 300, M.G. 2.2
 720 PSIG @ 100°F
 305 PSIG @ 750°F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

BG

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Matthew J. Martin

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Ryan Estevens

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OPER. APPROVAL

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DocuSigned by:
ENG. APPROVAL

Jeff Carkuff

444C5CDEA51D49D...

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1100 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. IF THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCH. 80S MINIMUM.
4. STUB ENDS SHALL BE USED FOR LAP JOINT FLANGED CONECTIONS. THEY SHALL BE SHORT PATTERN PER ASME B16.9.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
7. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL

STAINLESS STEEL, 316

RATING

ASME B16.5, CLASS 300, M.G. 2.2
 720 PSIG @ 100°F
 305 PSIG @ 750°F
 0.030" CORR. ALLOW.

GES 2-3-0

VCM

BG

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 ENG. APPROVAL

Jeff Carlucci

444C5CDEA51D49D...

BRANCH CONNECTIONS:

BRANCH

8	T									
6	RT	T								
4	W	RT	T							
3	W	W	(1)	T						
2	W	W	(1)	(1)	T					
1½	O	O	O	(1)	(1)	T				
1	O	O	O	O	(1)	(1)	T			
¾	O	O	O	O	(1)	(1)	(1)	T		
½	O	O	O	O	(1)	(1)	(1)	(1)	T	
	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS
 PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED
 BY PIPING DIMENSIONS.



MATERIAL 316 SS TUBING

RATING ASME B16.34, CLASS 300, M.G. 2.2
720 PSIG @ 100 ° F
560 PSIG @ 300 ° F
0.030" CORR. ALLOW.

GES 2-3-0
VCM
BHA

REVISION 3
DATE: 12/20/16

MAINT. APPROVAL

Jason Polk

HSE APPROVAL

R. Mey

OPER. APPROVAL

Jeff Curbell

ENG. APPROVAL

Chris Polk

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

COOLING WATER SUPPLY/RETURN, NITROGEN, EDC LIQUID AND GAS, HCL, HC, CAUSTIC, DECANter LIQUID

ITEM	SIZE	DESCRIPTION	NOTES
TUBING	1/4" - 1/2" 3/4" - 1"	0.049" WALL, A-269 TP-316, ANNEALED, BEND TUBING, SMLS OR WELDED, PE 0.065" WALL, A-269 TP-316, ANNEALED, BEND TUBING SMLS OR WELDED, PE	1
FITTINGS	1/4" - 1"	TYPE 316 SS, A-276 & A-182 COMPRESSION TYPE FITTINGS, SWAGELOK ENDS (Advanced-geometry back ferrule design)	
FLANGES	NONE		
UNIONS	NONE		
BOLTING	NONE		
GASKETS	NONE		
THRD. LUBE	NONE		
VALVES			
VCH-440	3/8" - 1/2"	CHECK, POPPET, 316 SS, 6000#, SWAGELOK ENDS	
VPL-568	1/2" - 1"	PLUG, 316 SS BODY/PLUG, PTFE SLEEVE, 300#, FNPT	
VBA-645	1/4" - 1"	BALL, 316 SS BODY/TRIM, REINFORCED PTFE SEATS, 2200#, SWAGELOK ENDS	
VNE-02	3/8" - 1/2"	NEEDLE, 316 SS, 6000#, SWAGELOK ENDS	
TEMPORARY STRAINERS	NONE		
"Y" STRAINERS	NONE		
BRANCH CONNECTIONS	1/4" - 1"	USE COMPRESSION FITTINGS AS NECESSARY	

NOTES:

1. WELDING NOT ALLOWED FOR THIS PIPING SPECIFICATION.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1100 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.



MATERIAL

HASTELLOY C-276 TUBING

RATING

SEE RATING TABLE ON PAGE 2
1500 PSIG @ 100°F
330 PSIG @ 400°F
0" CORR. ALLOW.

GES 2-3-0

VCM

BHT

REVISION 1

DATE: 10/21/19

MAINT. APPROVAL

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OPER. APPROVAL

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CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WWCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

HCL, EDC

ITEM	SIZE	DESCRIPTION	NOTES
TUBING	1/4" - 3/4"	0.035" WALL, B-622/626 UNS N10276, SOLUTION ANNEALED, TUBING, SMLS OR WELDED, PE	1, 2
FITTINGS	1/4" - 3/4"	HASTELLOY C276, B-574 & B-564 COMPRESSION TYPE FITTINGS, SWAGELOK ENDS (Advanced-geometry back ferrule design)	1, 2
FLANGES	NONE		
UNIONS	NONE		
BOLTING	NONE		
GASKETS	NONE		
THRD. LUBE	NONE		
VALVES			
VCH-462	1/4" - 3/4"	CHECK, POPPET, HASTELLOY C276, 3000#, SWAGELOK ENDS	3
VBA-701	1/4" - 3/4"	BALL, HASTELLOY C276 BODY/TRIM, REINFORCED PTFE SEATS, 2200#, SWAGELOK ENDS	
VNE-05	1/4" - 1/2"	NEEDLE, HASTELLOY C276 BODY/STEM, 6000#, SWAGELOK ENDS	
TEMPORARY STRAINERS	NONE		
"Y" STRAINERS	NONE		
BRANCH CONNECTIONS	1/4" - 3/4"	USE COMPRESSION FITTINGS AS NECESSARY	

NOTES:

1. WELDING NOT ALLOWED FOR THIS PIPING SPECIFICATION.
2. CHECK VALVES SHALL BE LIMITED TO 375°F. HIGHER TEMPERATURES ALLOWED WITH ENGINEERING APPROVAL OF DESIGNATED MAKE/MODEL.
3. VERIFY PRESSURE RATING OF TUBING AND VALVES AT INTERMEDIATE SYSTEM DESIGN TEMPERATURES.



MATERIAL

HASTELLOY C-276 TUBING

RATING

SEE RATING TABLE ON PAGE 2

1500 PSIG @ 100°F

330 PSIG @ 400°F

0" CORR. ALLOW.

GES 2-3-0

VCM

BHT

REVISION 1

DATE: 10/21/19

MAINT. APPROVAL

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OPER. APPROVAL

ENG. APPROVAL

PIPE SPECIFICATION RATING TABLE

Design Temperature (°F)	Design Pressure (PSIG)
-20 - 100	1500
200	1500
300	800
400	330

**MATERIAL**

CARBON STEEL (LOW TEMP)

RATING
 ASME B16.5, CLASS 300, M.G. 2.2
 720 PSIG @ -50° F
 515 PSIG @ 400° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

BJ

 REVISION 6
 DATE: 04/05/22
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MAINT. APPROVAL

Matthew J. Martin

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DocuSigned by:
HSE APPROVAL

Ryan Estevens

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230EFCB4FF5247D...

DocuSigned by:
ENG. APPROVAL

Jeff Carlucci

444C5CDEA51D49D...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

DRY HYDROGEN CHLORIDE, LOW TEMP PROPYLENE REFRIGERANT

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1 1/2" 2" - 12" 14" - 24"	SCH 80, A-333 GR. 6, SMLS, PE SCH 40, A-333 GR. 6, SMLS, BE SCH 30, A-333 GR. 6, SMLS, BE	1, 2, 3 1, 2 1, 2
FITTINGS	1/2" - 1 1/2" 2" - 24" 1/2" - 10"	3000#, A-350 GR. LF2 CL. 1, SW, ASME B16.11 SCH TO MATCH PIPE, A-420 GR. WPL6, BW, SMLS, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-350 GR. LF2 CL. 1, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2, 3 1, 2 1, 2
FLANGES	1/2" - 1 1/2" 2" - 24" 10" - 24" 1/2" - 24" 2" - 24"	300#, A-350 GR. LF2 CL. 1, SCH 80, RF SW, ASME B16.5 300#, A-350 GR. LF2 CL. 1, SCH 40, RF WN, ASME B16.5 300#, A-350 GR. LF2 CL. 1, RF SO, ASME B16.5 300#, A-350 GR. LF2 CL. 1, RF BLIND, ASME B16.5 300#, A-350 GR. LF2 CL. 1, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 4, 5 1, 2, 4, 5, 6 1, 2, 4, 5, 6, 7
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-320 GR. L7 STUD BOLTS, TEFLON COATED A-194 GR. 7 HEX NUTS, TEFLON COATED	
GASKETS	ALL	300#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET, 304SS WINDINGS WITH OXYGEN- INHIBITED FG FILLER, CS OUTER RING OR EQ.	4
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-232	1/2" - 1 1/2"	GATE, A-350 LF2 CL. 1, 300#, RF FLG, TRIM #12	8, 11
VGA-228	2" - 8"	GATE, A-352 GR. LCC, 300#, RF FLG, TRIM #12	11
VGA-228G	10" - 24"	GATE, A-352 GR. LCC, 300#, RF FLG, TRIM #12, GO	11
VGL-296	1/2" - 6"	GLOBE, A-352 GR. LCC, 300#, RF FLG, HAST TRIM/FULL HF	11
VGL-296G	8" - 12"	GLOBE, A-352 GR. LCC, 300#, RF FLG, HAST TRIM/FULL HF, GO	11
VCH-427	1/2" - 2"	CHECK, PISTON, A-350 LF2 CL. 1, 300#, RF FLG, TRIM #8	10, 11
VBA-641G	8" - 12"	BALL, 316 SS BODY/TRIM, 300#, RF FLG, XTREME SEATS, RED. PORT, SHORT, GO	9

**MATERIAL**

CARBON STEEL (LOW TEMP)

RATING

ASME B16.5, CLASS 300, M.G. 2.2
 720 PSIG @ -50° F
 515 PSIG @ 400° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

BJ

REVISION 6
 DATE: 04/05/22

DocuSigned by: MAINT. APPROVAL <i>Matthew J. Martin</i> 1F1037AA1859411...	DocuSigned by: HSE APPROVAL <i>Ryan Estevens</i> 402213A8234D4F3...	DocuSigned by: OPER. APPROVAL <i>[Signature]</i> 230EFCB4FF5247D...	DocuSigned by: ENG. APPROVAL <i>Jeff Carkuff</i> 444C5CDEA51D49D...
TEMPORARY STRAINERS	ALL	300# RF, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	
"Y" STRAINERS	1/2" – 1 1/2" 2" – 24"	600#, SW, A-351 GR. CF8M, 0.020" PERF. SS SCREEN 300#, RF FLG, A-351 GR. CF8M, 0.020" PERF. SS SCREEN	

NOTES:

- RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
- HYDROSTATIC TESTING SHALL BE PERFORMED AT 1125 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
- THREADED COMPONENTS ARE NOT ALLOWED.
- USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
- FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
- WELD NECK FLANGES ARE PREFERRED OVER SLIP-ON FLANGES. SLIP-ON FLANGES MAY BE USED, WHEN NEEDED, DUE TO SPACING/FIT CONCERNS.
- SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
- DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
- VALVES SHALL BE SPECIFIED AND PURCHASED AS FIRE SAFE.
- INSTALL IN HORIZONTAL POSITION WITH COVER UP.
- ENGINEERING, OPERATIONS, AND MAINTENANCE TO APPROVE SUBSTITUTION OF STAINLESS STEEL VALVES. VERIFY PRESSURE AND TEMPERATURE RATINGS OF VALVE MEET OR EXCEED SPEC RATINGS.



MATERIAL 304L STAINLESS STEEL
RATING ASME B16.5, CLASS 300, M.G. 2.3
 600 PSIG @ -100° F
 510 PSIG @ 200° F
 0.030" CORR. ALLOW.

GES 2-3-0
 VCM
BM

REVISION 2
 DATE: 12/20/16

MAINT. APPROVAL

James Polke

HSE APPROVAL

R. Mc...

OPER. APPROVAL

Jeff Cull

ENG. APPROVAL

Carla P...

CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES
 PROPYLENE

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 2"	SCH 40, A-312 TP-304L, SMLS, PE	1, 2, 3
	3" - 6"	SCH 40, A-312 TP-304L, SMLS, BE	1, 2
	8" - 16"	SCH 40, A-312 TP-304L, EFW, BE	1, 2
	18"	SCH 80, A-312 TP-304L, EFW, BE	1, 2
FITTINGS	1/2" - 2"	3000#, A-182 GR. 304L, SW, ASME B16.11	1, 2
	3" - 18"	SCH TO MATCH PIPE, A-403, WP-304L, BW, ASME B16.9	1, 2
	1/2" - 16"	SCH/CLASS TO MATCH PIPE/FITTINGS, A-182, GR. 304L, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2
FLANGES	1/2" - 2"	300#, A-182 GR. 304L, SCH 40S, RF SW, ASME B16.5	1, 2, 4, 5
	1/2" - 18"	300#, A-182 GR. 304L, SCH TO MATCH PIPE, RF WN, ASME B16.5	1, 2, 4, 5
	8" - 18"	300#, A-182 GR. 304L, RF SO, ASME B16.5	1, 2, 4, 5, 6
	1/2" - 18"	300#, A-182 GR. 304L, RF BLIND, ASME B16.5	4
	2" - 18"	300#, A-182 GR. 304L, SCH TO MATCH PIPE, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B8 CL. 2 STUD BOLTS, A-194 GR. 8F HVY. NUTS	
GASKETS	ALL	150#, 1/8" THK. RING TYPE, GARLOCK GYLON STYLE 3750 OR EQ	4
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES			
VGA-167	1/2" - 1 1/2"	GATE, EXTENDED BODY, 316L SS, 800#, MPExFNPT, TRIM #10	7
VGA-149	1/2" - 2"	GATE, CRYOGENIC, 316L SS, 300#, SW, TRIM #10	
VGA-150	3" - 10"	GATE, CRYOGENIC, 316L SS, 300#, BW, TRIM #10	
VGA-150G	12" - 18"	GATE, CRYOGENIC, 316L SS, 300#, BW, TRIM #10, GO	
VGL-317	2" - 6"	GLOBE, CRYOGENIC, 316 SS, 300#, RF FLG, TRIM #10 W/ PTFE	
VGL-317G	8" - 16"	GLOBE, CRYOGENIC, 316 SS, 300#, RF FLG, TRIM #10 W/ PTFE, GO	
VBF-924	3" - 4"	B-FLY, CRYOGENIC, 316 SS, 300#, THD LUG, SS DISC/SEAT	
VBF-924G	6" - 12"	B-FLY, CRYOGENIC, 316 SS, 300#, THD LUG, SS DISC/SEAT, GO	



MATERIAL 304L STAINLESS STEEL
RATING ASME B16.5, CLASS 300, M.G. 2.3
 600 PSIG @ -100° F
 510 PSIG @ 200° F
 0.030" CORR. ALLOW.

GES 2-3-0
 VCM
BM

REVISION 2
 DATE: 12/20/16

MAINT. APPROVAL <i>Jason Polk</i>	HSE APPROVAL <i>R. Meyer</i>	OPER. APPROVAL <i>Scott C. Smith</i>	ENG. APPROVAL <i>Chris P. Price</i>
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VCH-424	1/2" - 12"	CHECK, SWING, CRYOGENIC, 316 SS, 300#, RF FLG, TRIM #10 W/ PTFE	8
TEMPORARY STRAINERS	ALL	300#, CONICAL, 150% OPEN AREA, 304/316 SS SCREEN/PLATE	
"Y" STRAINERS	NONE	NONE	

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 900 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. IF THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCH. 80 MINIMUM.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
7. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
8. INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.



MATERIAL 304L STAINLESS STEEL
RATING ASME B16.5, CLASS 300, M.G. 2.3
 600 PSIG @ -100° F
 510 PSIG @ 200° F
 0.030" CORR. ALLOW.

GES 2-3-0
 VCM
BM

REVISION 2
 DATE: 12/20/16

MAINT. APPROVAL

Jason Polk

HSE APPROVAL

R. M. ...

OPER. APPROVAL

Jeff ...

ENG. APPROVAL

Carla ...

BRANCH CONNECTIONS:

BRANCH

18	T														
16	RT	T													
14	W	RT	T												
12	W	W	RT	T											
10	W	W	W	RT	T										
8	W	W	W	W	RT	T									
6	W	W	W	W	W	RT	T								
4	W	W	W	W	W	W	RT	T							
3	W	W	W	W	W	W	W	(1)	T						
2	W	W	W	W	W	W	W	(1)	(1)	T					
1½	O	O	O	O	O	O	O	O	(1)	(1)	T				
1	O	O	O	O	O	O	O	O	O	(1)	(1)	T			
¾	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	T		
½	O	O	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T	
	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

- F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)
 - O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)
 - P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)
 - RT – REDUCING TEE
 - T – TEE
 - W – WELDOLET
- (1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.

GENERAL							
MATERIAL	MONEL 400						
RATING	ASME B16.34, CLASS 300, MATERIAL GROUP 3.4 600 PSIG @ 100°F 460 PSIG @ 800°F 1/16" CORROSION ALLOWANCE						
SERVICES	QUENCH LIQUID						
ITEM	SIZE	DESCRIPTION					NOTES
PIPE	½" – ¾"	SCH 80S, B165 (UNS N04400), ANNEALED, SMLS, PE					1, 2, 3
	1" – 14"	SCH 80S, B165 (UNS N04400), ANNEALED, SMLS, BE					1, 2
FITTINGS	½" – ¾"	SW, CL 3000, B366 OR B564 (UNS N04400), ANNEALED, SMLS, ASME B16.11					1, 2
	1" – 14"	BE, SCH 80S, B366 (UNS N04400) GR. WPNC, ANNEALED, SMLS, ASME B16.9					1, 2, 4
	PER CHART	OLET, SCH/CLASS/TYPE TO MATCH PIPE/FITTINGS, B564 (UNS N04400), ANNEALED, MSS SP-97					1, 2
FLANGES	½" – ¾"	RF SW, CL 300, B564 (UNS N04400), SCH 80S, ASME B16.5					2, 5, 6
	1" – 14"	LAP JOINT, CL 300, A105, ASME B16.5					2, 3, 5, 6
	½" – 14"	RF BLIND, CL 300, B564 (UNS N04400), ASME B16.5					5, 7
	2" – 14"	RF ORIFICE FLANGE, CL 300, B564 (UNS N04400), SCH TO MATCH PIPE, ASME B16.36, ½" SW TAPS					
UNIONS	NONE	USE FLANGES					
BOLTING	ALL	STUD BOLTS, A193 GR. B7, PTFE COATED					
	ALL	HEAVY HEX NUTS, A194 GR. 2H, PTFE COATED					
GASKETS	ALL	SPIRAL WOUND, CL 300, 1/8" THK, MONEL 400 WINDINGS, PTFE FILLER, 304SS OUTER RING, ANTI-BUCKLING, ASME B16.20; VSP AB-326 OR APPROVED EQUAL					5
	ALL	SPIRAL WOUND, CL 300, 1/8" THK, MONEL 400 INNER RING AND WINDINGS, PTFE FILLER, 304SS OUTER RING, ASME B16.20; FLEXITALLIC CGI OR APPROVED EQUAL					5
THREAD LUBE	BOLTS	PTFE COATING					
VALVES							
BALL	BUTTERFLY	CHECK	GATE	GLOBE	PLUG	OTHER	NOTES
VBA-630		VCH-458	VGA-233	VGL-445			8, 9, 11
VBA-705		VCH-459	VGA-234	VGL-446			
NOTES							
<ol style="list-style-type: none"> RADIOGRAPHIC EXAMINATION SHALL BE DONE PER ASME B31.3, PARA. 341.4.1. SEE GES-230 PIPING SPECIFICATIONS FOR NDE REQUIREMENTS. HYDROSTATIC TESTING SHALL BE PERFORMED AT 900 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6. IF ½" - ¾" THREADED PIPE/NIPPLES ARE USED, THEY SHALL BE SCHEDULE 160. STUB ENDS SHALL BE USED FOR FLANGED CONNECTIONS. THEY SHALL BE SHORT PATTERN PER ASME B16.9. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES. 							

6. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
7. BLIND FLANGES SHALL BE MONEL AS LISTED, OR MAY BE EQUIVALENT 300# C.S. BLIND FLANGES WITH ¼" MONEL PLATE LINER.
8. VGA-233 IS THE DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. ¾" SIZE IS THE DEFAULT SIZE, BUT ½" AND 1" MAY BE USED AS REQUIRED.
9. CHECK VALVES TO BE INSTALLED IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.
10. ALL BRANCHES 1½" AND SMALLER MUST BE REINFORCED WITH TWO ¼" MONEL GUSSET PLATES.
11. **SOFT-SEATED BALL VALVES SHALL BE LIMITED TO 300°F. HIGHER TEMPERATURE ALLOWED ONLY WITH ENGINEERING APPROVAL OF DESIGNATED MAKE/MODEL.**

BRANCH CONNECTIONS

BRANCH

14	T												
12	RT	T											
10	RT	RT	T										
8	RT	RT	RT	T									
6	W	RT	RT	RT	T								
4	W	W	W	RT	RT	T							
3	W	W	W	W	RT	(1)	T						
2	W	W	W	W	W	(1)	(1)	T					
1½	W	W	W	W	W	W	(1)	(1)	T				
1	W	W	W	W	W	W	W	(1)	(1)	T			
¾	O	O	O	O	O	O	O	(1)	(1)	(1)	T		
½	O	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T	
	14	12	10	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

O – OLET

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) – FULL SIZE TEE AND REDUCER. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.

**MATERIAL**

CARBON STEEL

RATING
 ASME B16.5, CLASS 600, M.G. 1.1
 1480 PSIG @ 100° F
 1015 PSIG @ 750° F
 1/16" CORR. ALLOW.

GES 2-3-0

VCM

D

 REVISION 6
 DATE: 04/05/22
DocuSigned by:
MAINT. APPROVAL

Matthew J. Martin

1F1037AA1859411...

DocuSigned by:
HSE APPROVAL

Ryan Stevens

402213A8234D4F3...

DocuSigned by:
OPER. APPROVAL

[Signature]

230EFCB4FF5247D...

DocuSigned by:
ENG. APPROVAL

Jeff Carkuff

444C5CDEA51D49D...


CURRENT LIVE VERSION OF PIPE SPEC LOCATED ON WVCDOCS WEBSITE. PRINTED COPIES ARE UNCONTROLLED.

SERVICES

ETHYLENE, STEAM, STEAM CONDENSATE

 [FOR USE WITH NON-BOILER EXTERNAL PIPING ONLY, IN ACCORDANCE WITH ASME B31.3. NOT UNDER
 THE JURISDICTION OF ASME BPVC OR ASME B31.1.]

ITEM	SIZE	DESCRIPTION	NOTES
PIPE	1/2" - 1 1/2" 2" - 8" 10" - 12"	SCH 80, A-106 GR. B SMLS, PE SCH 80, A-106 GR. B SMLS, BE SCH 80, A-333 GR. 6, SMLS, BE	1, 2, 3 1, 2 1, 2, 10, 11
FITTINGS	1/2" - 1 1/2" 1/2" - 8" 10" - 12" 1/2" - 8"	3000#, A-105, SW, ASME B16.11 SCH 80, A-234, GR. WPB, BE, ASME B16.9 SCH 80, A-420, GR. WPL6, BE, ASME B16.9 SCH/CLASS TO MATCH PIPE/FITTINGS, A-105, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2, 3 1, 2 1, 2, 10, 11 1, 2
FLANGES	1/2" - 1 1/2" 1/2" - 12" 8" - 12" 1/2" - 12" 2" - 12"	600#, A-105, SCH 80, RF SW, ASME B16.5 600#, A-105, SCH 80, RF WN, ASME B16.5 600#, A-105, SCH 80, RF SO, ASME B16.5 600#, A-105, RF BLIND, ASME B16.5 600#, A-105, SCH 80, RF ORIFICE FLANGE, ASME B16.36, 1/2" SW TAPS	1, 2, 4, 5 1, 2, 4, 5, 10 1, 2, 4, 5, 6 4 10
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	A-193 GR. B-7 STUD BOLTS, TEFLON COATED A-194 GR. 2H HVY. NUTS, TEFLON COATED	
GASKETS	ALL	600#, 1/8" THK. VSP AB-326™ ANTI-BUCKLING LOW STRESS SPIRAL WOUND GASKET, 304SS WINDINGS WITH GRAPHITE FILLER, CS OUTER RING OR EQ.	4
THRD. LUBE	PIPE BOLTS	TFE TAPE (≤400°F), MOLYCOTE G OR EQ (>400°F) NEVER-SEEZ PURE NICKEL SPECIAL OR EQ.	
VALVES VGA-120 VGA-112 VGA-107 VGL-322 VGL-216 VGL-216G VCH-428 VCH-308	1/2" - 1 1/2" 1/2" - 1 1/2" 2" - 12" 1/2" - 1 1/2" 2" - 6" 8" - 12" 1/2" - 1 1/2" 2" - 12"	GATE, EXTENDED BODY, CS, 800#, MSWxFNPT, TRIM #8 GATE, CS, 800#, SW, TRIM #8 GATE, CS, 600#, RF FLG, TRIM #8 GLOBE, CS, 600#, RF FLG, TRIM #8 GLOBE, CS, 600#, RF FLG, TRIM #8 GLOBE, CS, 600#, RF FLG, TRIM #8, GO CHECK, PISTON, CS, 600#, RF FLG, TRIM #8 CHECK, WAFER, CS, 600#, RF, TRIM #10	7 8 8, 9, 12, 13
TEMPORARY STRAINERS	ALL	600#, CONICAL, 150% OPEN AREA, SS SCREEN/PLATE	

	MATERIAL	CARBON STEEL		GES 2-3-0 VCM D REVISION 6 DATE: 04/05/22
	RATING	ASME B16.5, CLASS 600, M.G. 1.1 1480 PSIG @ 100° F 1015 PSIG @ 750° F 1/16" CORR. ALLOW.		
DocuSigned by: MAINT. APPROVAL <i>Matthew J. Martin</i> 1F1037AA1859411...	DocuSigned by: HSE APPROVAL <i>Ryan Estevens</i> 402213A8234D4F3...	DocuSigned by: OPER. APPROVAL <i>[Signature]</i> 230EFCB4FF5247D...	DocuSigned by: ENG. APPROVAL <i>Jeff Carlucci</i> 444C5CDEA51D49D...	
"Y" STRAINERS	1/2" – 1 1/2" 2" – 12"	600#, SW, A-216, 0.020" PERF. SS SCREEN 600#, RF FLG, A-216, 0.020" PERF. SS SCREEN		

NOTES:

1. RADIOGRAPHIC EXAMINATION SHALL BE DONE AT A MINIMUM OF 5% FOR NORMAL FLUID SERVICE PER ASME B31.3, PARA. 341.4.1, OR A MINIMUM OF 20% FOR CATEGORY M FLUID SERVICE PER ASME B31.3, PARA. M341.4.1. ENGINEERING MAY REQUIRE HIGHER PERCENTAGES FOR SPECIAL SERVICES.
2. HYDROSTATIC TESTING SHALL BE PERFORMED AT 2225 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B16.5, PARA. 2.6.
3. IF THREADED PIPE/FITTINGS ARE USED, THEY SHALL BE SCHEDULE 160.
4. USE FLAT FACED FLANGES AGAINST EQUIPMENT WITH FLAT FACED FLANGES. FULL FACE GASKETS SHALL BE USED BETWEEN THESE FLANGES.
5. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
6. SLIP-ON FLANGES SHALL NOT BE USED DIRECTLY ON FITTINGS UNLESS SO INDICATED ON THE DESIGN DRAWINGS.
7. DEFAULT VENT, DRAIN, AND INSTRUMENT VALVE. 3/4" SIZE IS THE DEFAULT SIZE, BUT 1/2" AND 1" MAY BE USED AS REQUIRED.
8. INSTALL IN HORIZONTAL POSITION WITH COVER UP.
9. INSTALL ALSO ALLOWED IN VERTICAL POSITION WITH UPWARD FLOW.
10. POST WELD HEAT TREATMENT IS REQUIRED FOR PIPING AND COMPONENT WELDS WHERE WALL THICKNESS EXCEEDS 3/4". POST WELD HEAT TREATMENT SHALL BE PER ASME B31.3 PARA. 331.1.
11. IMPACT TESTED MATERIAL USED DUE TO WALL THICKNESS.
12. VCH-308 DIMENSIONS ARE NOT STANDARD. VALVES MUST BE SELECTED BEFORE DRAWING COMPLETION OR FABRICATION.
13. FOR UTILITY SERVICES ONLY. NOT TO BE USED IN ETHYLENE SERVICE.



MATERIAL CARBON STEEL
RATING ASME B16.5, CLASS 600, M.G. 1.1
 1480 PSIG @ 100° F
 1015 PSIG @ 750° F
 1/16" CORR. ALLOW.

GES 2-3-0
 VCM
D
 REVISION 6
 DATE: 04/05/22

DocuSigned by:
 MAINT. APPROVAL

Matthew J. Martin

1F1037AA1839411...

DocuSigned by:
 HSE APPROVAL

Ryan Estevens

402213A8234D4F3...

DocuSigned by:
 OPER. APPROVAL

[Signature]

230EFCB4FF5247D...

DocuSigned by:
 ENG. APPROVAL

Jeff Carlucci

444C5CDEA51D49D...

BRANCH CONNECTIONS:

BRANCH

12	T											
10	RT	T										
8	W	RT	T									
6	W	W	RT	T								
4	W	W	W	RT	T							
3	W	W	W	W	(1)	T						
2	W	W	W	W	(1)	(1)	T					
1½	O	O	O	O	O	(1)	(1)	T				
1	O	O	O	O	O	O	(1)	(1)	T			
¾	O	O	O	O	O	O	(1)	(1)	(1)	T		
½	O	O	O	O	O	O	(1)	(1)	(1)	(1)	T	
	12	10	8	6	4	3	2	1½	1	¾	½	

SYMBOLS

F – FULL ENCIRCLEMENT REINFORCEMENT (LENGTH EQUALS TWICE BRANCH PIPE OD)

O – OLET (MATCH END TYPE AND CLASS/SCHEDULE OF DESIGN PER PIPE SPEC)

P – BRANCH WELD WITH REINFORCING PAD (PAD THICKNESS EQUALS RUN PIPE THICKNESS PAD WIDTH EQUALS ½ BRANCH OD.)

RT – REDUCING TEE

T – TEE

W – WELDOLET

(1) USE FULL SIZE TEE AND REDUCER FOR BRANCH. USE REDUCING TEE ONLY IF REQUIRED BY PIPING DIMENSIONS.



Piping Specification
Specification No: **GES-230-VCM-EC**

Revision No: 1
Rev Date: 07/06/2023

Title: **VCM Spec EC**

Geismar, LA
Page 1 of 2

GENERAL

MATERIAL	347H STAINLESS STEEL		
RATING	750 PSIG @ 100°F 750 PSIG @ 1050°F 0" CORROSION ALLOWANCE		
SERVICES	FH-8801A SOUTH CRACKING FURNACE EFFLUENT		
ITEM	SIZE	DESCRIPTION	NOTES
PIPE	2"	SCH 80, A312-TP347H, EFW, BE, 100% R.T.	1, 2, 3
	3" – 16"	SCH 80, A312-TP347H, EFW, BE, 100% R.T.	1, 2, 3
FITTINGS	2"	SCH 80, A182-F347H, BE, ASME B16.9	1, 2, 3
	3" – 16"	SCH 80, A403-WP347H-WX, BE, ASME B16.9	1, 2, 3
	2" – 16"	SCH/CLASS TO MATCH PIPE/FITTINGS, A182-F347H, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97	1, 2, 3
FLANGES	2" – 16"	CL 900, A182-F347H, SCH 80, RF WN, ASME B16.5	2, 3, 4, 5
	2" – 16"	CL 900, A182-F347H, SCH 80, RING JOINT, ASME B16.5	2, 3, 4, 5
	2" – 16"	CL 900, A182-F347H, RF BLIND, ASME B16.5	2, 3, 4, 5
UNIONS	NONE	USE FLANGES	
BOLTING	ALL	ASTM B637 ALLOY 718 (UNS N07718) STUD BOLTS AND NUTS	6
GASKETS	ALL	CL 900, 1/8" THK, SPIRAL WOUND, 347 SS WINDINGS AND INNER RING, THERMICULITE 835 FILLER, CS OUTER RING, ASME B16.5, ASME B16.20, FLEXITALLIC CGI OR EQ W/ ENGINEERING APPROVAL	
THREAD LUBE	BOLTS	NEVER-SEEZ PURE NICKEL SPECIAL OR EQ	
TEMPORARY STRAINERS	NONE	NONE	
"Y" STRAINERS	NONE	NONE	

VALVES

BALL	BUTTERFLY	CHECK	GATE	GLOBE	PLUG	OTHER	NOTES
VBA-679							

NOTES

1. PROVIDE LIFTING LUG 3/8" THICK ON TOP OF SPOOLS.
2. BUTT, MITER GROOVE, AND BRANCH CONNECTION WELDS TO INCLUDE 100% RADIOGRAPHY. ALL OTHER WELDS TO INCLUDE 100% PT EXAMINATION.
3. HYDROSTATIC TESTING SHALL BE PERFORMED AT 1300 PSIG PER ASME B31.3. HYDROTEST PRESSURE DETERMINED BY ASME B31.3, PARA. 345.4.2. DRAIN AND BLOW DRY.
4. FLANGES SHALL BE USED FOR ALL PIPE TO EQUIPMENT AND VESSEL CONNECTIONS. SPOOL SECTIONS SHALL BE USED WHEN NECESSARY TO FACILITATE EQUIPMENT REMOVAL. DIRECT WELDING IS NOT PERMITTED.
5. FOR TEMPERATURES OVER 1000°F, USE ONLY IF MATERIAL IS HEAT TREATED BY HEATING TO A MINIMUM TEMPERATURE OF 2000°F PER ASME B16.5.



6. BELLEVILLE WASHERS REQUIRED FOR ALL BOLTED ASSEMBLIES – CONSULT BOLTING SUPPLIER W/ OPERATING CONDITIONS FOR SIZING REQUIREMENTS

BRANCH CONNECTIONS

BRANCH

16	T								
14	RT	T							
12	RT	RT	T						
10	RT	RT	RT	T					
8	RT	RT	RT	RT	T				
6	W	W	RT	RT	RT	T			
4	W	W	W	W	RT	RT	T		
3	W	W	W	W	W	RT	RT	T	
2	W	W	W	W	W	W	RT	RT	T
	16	14	12	10	8	6	4	3	2

SYMBOLS

RT – REDUCING TEE

T – TEE

W – WELDOLET

TORQUE TABLE

- 1/8" THK SPIRAL WOUND W/ INNER RING
- CL 900 FLANGES
- ASTM B637 ALLOY 718 BOLTS W/ NEVER-SEEZ

NPS	TORQUE (FT-LBS)		
	30%	70%	100%
2	60	140	200
3	85	200	285
4	160	380	540
6	180	420	600
8	285	670	955
10	275	640	915
12	320	750	1070
14	395	915	1310
16	490	1140	1630



Piping Specification
Specification No: **GES-230-VCM-ED**

Revision No: 1
Rev Date: 07/06/2023

Title: **VCM Spec ED**

Geismar, LA
Page 1 of 3

GENERAL							
MATERIAL	347H STAINLESS STEEL						
RATING	720 PSIG @ 100°F 310 PSIG @ 1100°F 0" CORROSION ALLOWANCE						
SERVICES	FH-7201B LOW PRESSURE FURNACE POST CRACKING COIL						
ITEM	SIZE	DESCRIPTION					NOTES
PIPE	½" – 6"	SCH 80, A312-TP347H, SMLS, BE					1, 2, 3
	8" – 16"	SCH 80, A312-TP347H, EFW, BE, 100% R.T					
FITTINGS	½" – 2"	3000#, A403-WP347H-WX or A182-F347H, BE, ASME B16.11					1, 2, 3
	½" – 16"	SCH 80, A403-WP347H-WX, BE, ASME B16.9					1, 2, 3
	½" – 2"	SCH 80, A182-F347H, BE, ASME B16.9					1, 2, 3
	½" – 16"	SCH/CLASS TO MATCH PIPE/FITTINGS, A182-F347H OR A403-WP347H-WX, INTEGRALLY REINFORCED OUTLET CONNECTIONS (O'LET), MSS SP-97					1, 2, 3
FLANGES	½" – 16"	CL 300, A182-F347H OR A351-CF8C, SCH XS, RF WN, ASME B16.5					
	½" – 16"	CL 300, A182-F347H OR A351-CF8C, SCH XS, RING JOINT, ASME B16.5					
	½" – 16"	CL 300, A182-F347H OR A351-CF8C, RF BLIND, ASME B16.5					
UNIONS	NONE	USE FLANGES					
BOLTING	ALL	ASTM B637 ALLOY 718 (UNS N07718) STUD BOLTS AND NUTS					6
GASKETS	ALL	CL 300, 0.175" THK., FLEXITALIC "CHANGE" SPIRAL WOUND GASKET, THERMICULITE 835 FILLER WITH INCONEL X-750 WINDINGS, CS OUTER RING, ASME B16.5, ASME B16.20					
	ALL	CL 300, 0.175" THK., AB-326 SPIRAL WOUND GASKET, TERMICA XHR FILLER WITH 347 SS WINDINGS, CS OUTER RING, ASME B16.5, ASME B16.20					
THREAD LUBE	BOLTS	NEVER-SEEZ PURE NICKEL SPECIAL OR EQ					
TEMPORARY STRAINERS	NONE	NONE					
"Y" STRAINERS	NONE	NONE					
VALVES							
BALL	BUTTERFLY	CHECK	GATE	GLOBE	PLUG	OTHER	NOTES
			VGA-236 VGA-237				



Piping Specification
Specification No: **GES-230-VCM-ED**

Revision No: 1
Rev Date: 07/06/2023

Title: **VCM Spec ED**

Geismar, LA
Page 3 of 3

TORQUE TABLE

- 1/8" THK "CHANGE" OR AB-326 GASKET
- CL 300 FLANGES
- ASTM B637 ALLOY 718 BOLTS W/ NEVER-SEEZ

NPS	TORQUE (FT-LBS)		
	30%	70%	100%
2	20	45	65
3	40	90	130
4	60	140	200
6	65	150	215
8	100	235	340
10	115	265	380
12	180	420	600
14	150	350	500
16	235	550	790