


Pipe Class Selection

CO₂ Capture Facility

Kårstø, Norway

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1. **NUMBERING/CLASSIFICATION SYSTEM**

The numbering/classification system to be used to define pipe and valve classes consists of a three-character code. The first character indicates the type of material; the second character, the pressure class or pressure-temperature rating; the third character, the code to which the piping is designed. The numbering/classification system is based on the Engineering Department Procedure No. 3DP-G003-044 Standard Component Identification.

1st Character	Material Type
1	Cast Iron – High Silicon
2	Carbon Steel – Cement Lined
3	Polyvinyl Chloride (PVC)
4	Alloy Steel (1-1/4 Cr)
5	As Specified
6	Alloy Steel (5 Cr)
7	Polyethylene
8	As Specified
9	Alloy Steel (9 Cr-1 Mo- V), P91
A	Aluminum
B	Copper/Copper Alloy
C	Carbon Steel
D	Ductile Iron
E	High Density Polyethylene (HDPE)
F	Fiberglass
G	Carbon Steel – Galvanized
H	Cast Iron – Cement Lined

1st Character	Material Type
I	Cast Iron
J	Ductile Iron – Cement Lined
K	Alloy Steel (2-1/4 Cr)
L	Carbon Steel – Low Temperature
M	Monel
N	Nickel Alloy
P	Chlorinated Polyvinyl Chloride (CPVC)
Q	Concrete
R	Carbon Steel – Rubber Lined
S	Stainless Steel
T	Titanium
U	Alloy 20
V	Vitrified Clay
W	Carbon Steel – Coal Tar Epoxy Lined
X	Carbon Steel – Copper Bearing
Y	Carbon Steel – Impact Tested
Z	Carbon Steel – Plastic Lined

2nd Character	Rating
1	Class 150
2	Class 250
3	Class 300
4	Class 400
5	Victaulic Rating
6	Class 600
7	Pressfit Rating
8	Class 800
9	Class 900
A	Class 25
B	Class 50
C	Class 75 (Mfr's Rating)
D	100 psi or 7 Bar(Mfr's Rating)
E	Class 125
F	175 psi or 12 Bar (UL Rating)
G	200 psi or 14 Bar (Mfr's Rating)
H	1000 psi or 69 Bar

2nd Character	Rating
I	(not used)
J	Class 1500
K	2000 psi or 138 Bar
L	Class 2500
M	3000 psi or 207 Bar
N	Class 4500
P	6000 psi or 413 Bar
Q	9000 psi or 620 Bar
R	10000 psi or 689 Bar
S	As Specified
T	As Specified
U	SMACNA – As Specified
V	As Specified
W	As Specified
X	As Specified
Y	As Specified
Z	Special Class 2500

3rd Character	Code
1	ASME B31.1 (Special Material/Rating)
2	ASME B31.1 (Special Material/Rating)
3	ASME B31.1 (Special Material/Rating)
4	ASME B31.1 (Special Material/Rating)
D	ASME B31.1, Power Piping Code
E	ASME B31.3, Process Piping Code
F	NFPA
G	ASME B31.8, Gas Trans/Dist. Code
H	ASME Section I, Power Boilers Code
J	AWWA
K	ASME B31.1, Power Piping Code, Seamless

3rd Character	Code
L	ASME B31.1, ASTM A691, Gr. 91, Class 42, Welded
M	ASME B31.1, Power Piping Code
N	NFPA 54, National Fuel Gas Code
P	ASME B31.4
Q	Applicable Plumbing Code (Project-Specific)
R	ASME B31.5
S	ASME B31.9, Build Services Piping Code
T	ASME B31.3
U	AASHTO
Z	SMACNA

2. Flanged joints are not recommended for use in high temperature steam service.
3. Materials specified in the Piping Class Sheets shall meet the requirements of the Applicable Code and the Applicable Technical Specification.
4. Field weld joint details and weld joint transition details for any specific class of pipe shall be in accordance with the drawings specified on that Piping Class Sheet.
5. Gasket materials to be used with stainless steel flanges shall contain a maximum of 200 ppm leachable chlorides.
6. To prevent galvanic corrosion between dissimilar metals, insulating flange kits shall be provided where shown on design drawings. The insulating flange kit shall consist of one (1) Linebacker Type E or equal for flat-faced gaskets or one (1) Linebacker Type F or equal for raised face gaskets (service gaskets are not used with Linebacker gaskets), one (1) 1/8" thick steel washer for each bolt, one (1) insulating washer for each bolt, and one (1) full length insulating sleeve for each bolt. Insulating flanges shall not be buried.
7. The weight of any piping specified with a minimum wall thickness shall not vary more than 10 percent over and 5 percent under the weight of the piping at the specified nominal wall thickness.
8. Threaded joints, where specified, shall be in accordance with the applicable code and ASME B1.20.1.
9. The use of short radius elbows and returns conforming to ASME B16.28, Wrought Steel butt welding Short Radius Elbows and Returns, are neither prohibited nor recommended; however, when used, the minimum thickness in the crotch region shall be 20 percent greater than the minimum thickness required for the straight pipe.
10. NPS 2-1/2 and larger stainless steel piping to be butt welded shall be at least Schedule 10S.
11. Nonmetallic piping may be used where permitted by the construction code and within the recommendations and limitations of the pipe manufacturer.
12. The design pressure and design temperature of a piping system shall not exceed the pressure-temperature rating of the weakest element in the piping system.
13. Where steel pipe is threaded for steam service above 250 psig or 17 Bar, and water service above 100 psig or 9 Bar with water temperature above 220 °F or 104 °C, the pipe shall be seamless steel pipe having the minimum ultimate tensile strength of 48,000 psi and a weight at least equal to Schedule 80.
14. The pipe for valve bypasses shall be at least Schedule 80 and seamless.
15. For blowoff and blowdown piping classified as the Boiler External Piping (BEP) with design pressure greater than 100 psig or 9 Barg, the pipe and fittings shall be steel and, as a minimum, Schedule 80, and may be heavier to meet code requirements.
16. The selection of socket-welding fittings shall be in accordance with the following criteria:
 - a. For Schedule 80 and lighter weight pipe, use Class 3000 socket-welding fittings.
 - b. For Schedule 100 through Schedule 160 pipe, use Class 6000 socket-welding fittings.
 - c. For XXS or XXH pipe, use Class 9000 socket-welding fittings.
 - d. For pipe heavier than XXS or XXH, use socket-welding fittings having a design rating equal to or greater than the pipe design rating.
17. Valves shall be as specified in INSPEC Valve List and in accordance with Standard Engineering Instruction, Identification of Valves, 3DI-P72G-00001, Rev. 005.
18. When steel valves are to be used for isolation during hydrostatic testing, unless consent is obtained from the manufacturer, valves shall not be subjected to a test pressure higher than 1.1 times the 100 °F rated pressure for the valve.
19. Weld NDE for pressure welds and welds to pressure retaining components shall conform to the requirements of the applicable code (i.e., ASME B31.3, NFPA, etc.) and Bechtel Form 167, Shop Welding and NDE Matrix.

PROJECT NAME: CO₂ Kårstø—Gassnova
JOB NO: 25474

MATERIAL: COPPER/COPPER ALLOY
RATING: CLASS 125
CODE: APPLICABLE PLUMBING CODE

CLASS: BEQ

ITEM	MATERIAL SPECIFICATION	SIZE	REMARKS
PIPE:	ASTM B88, TEMPER H55, LIGHT DRAWN, SEAMLESS TUBE	4" & SMALLER	TYPE K, CERTIFICATION AND MARKING PER NSF 61 FOR POTABLE WATER SERVICE
FITTINGS:	ASTM B62, UNS C83600, CAST BRONZE	4" & SMALLER	SOLDER JOINT FITTINGS PER ASME B16.18 (NOTE 1), CERTIFICATION AND MARKING PER NSF 61 FOR POTABLE WATER SERVICE
	ASTM B584, UNS C84400 (NOTE 2)	4" & SMALLER	SOLDER JOINT FITTINGS PER ASME B16.18 (NOTE 1), CERTIFICATION AND MARKING PER NSF 61 FOR POTABLE WATER SERVICE
	ASTM B75, UNS C12200, WROUGHT COPPER	4" & SMALLER	SOLDER JOINT FITTINGS PER ASME B16.22 (NOTE 1), CERTIFICATION AND MARKING PER NSF 61 FOR POTABLE WATER SERVICE
FLANGES:	ASTM B61, CAST BRONZE	4" & SMALLER	CLASS 150, BRAZED JOINT, FF, F&D, (MSS SP-106) (NOTE 1), CERTIFICATION AND MARKING PER NSF 61 FOR POTABLE WATER SERVICE
PLATE:	N/A	-	-
BOLTING:	ASTM B98, UNS C65100, TEMPER H06 (NOTE 3)	-	ASME B18.2.1 HEAVY HEXAGON HEAD BOLTS ASME B18.2.2 HEAVY HEXAGON NUTS
GASKETS:	NEOPRENE	ALL SIZES	1/16" THICK, FULL FACED, BOLT HOLES PUNCHED
JOINTS:	SOLDERED		
BRANCH CONNECTIONS:	SOLDER JOINT FITTINGS (NOTE 1)		

- NOTES:**
1. ALL THREADLESS JOINTS SHALL BE SOLDERED USING A LEAD-FREE SOLDERING ALLOY. FLUX USED SHOULD BE THAT RECOMMENDED BY THE SOLDERING ALLOY MANUFACTURER.
 2. FITTINGS SHALL MEET THE CHEMICAL AND TENSILE REQUIREMENTS OF ASTM B584 AND, IN ALL OTHER RESPECTS, SHALL COMPLY WITH THE REQUIREMENTS OF ASTM B62.
 3. ASTM A193 B7 STUDS AND ASTM A194 2H NUTS MAY BE SUBSTITUTED FOR THE SPECIFIED COPPER ALLOY BOLTING. USE INSULATING SLEEVES AND WASHERS IF A193 B7 AND A194 2H ARE USED AND BOLTING COATINGS – INSULATED PIPE – MANUFACTURER'S STANDARD FINISH; UNINSULATED PIPE – BOLTS, STUDS AND NUTS TO BE: HOT DIP GALVANIZED PER ASTM A153 OR MECHANICALLY GALVANIZED PER ASTM B695

PROJECT NAME: CO₂ Kårstø—Gassnova
 JOB NO: 25474

MATERIAL: CARBON STEEL CLASS C1E
 RATING: CLASS 150
 CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
<u>PIPE:</u>	ASTM A106, GR. B, SEAMLESS	½ - 2	SCH. XS (NOTE 7)
		2½ - 24	STD. WT.
	API 5L, GR. B	26 - 36	STD. WT.
		40 - 42	SCH. XS
<u>FITTINGS:</u>	ASTM A105	½ - 2	CLASS 3000, SOCKET WELDING (ASME B16.11)
	ASTM A234, GR. WPB, SEAMLESS	1 & 1 ¼	CLASS 3000, THREADED, HALF COUPLING (ASME B16.11) (NOTE 1)
	ASTM A234, GR. WPBW, SEAM WELDED	2 ½ - 24	BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE
		26 - 42	BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE
<u>FLANGES:</u>	ASTM A105	½ - 2	CLASS 150, SOCKET WELDING, RF, F&D (ASME B16.5)
		2 ½ - 24	CLASS 150, SLIP-ON, RF, F&D (ASME B16.5)
		2 ½ - 24	CLASS 150, SLIP-ON, FF, F&D (ASME B16.5) (NOTE 2)
		2 ½ - 24	CLASS 150, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5) (NOTE 3)
		2 ½ - 24	CLASS 150, WELD NECK, FF, F&D, BORED TO MATCH PIPE (ASME B16.5) (NOTES 2 & 3)
		2 ½ - 24	CLASS 300, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5) (NOTES 3 & 4)
		26 - 42	CLASS 150, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.47, SERIES A)
<u>PLATE:</u>	ASTM A515, GR. 70	-	-
<u>BOLTING:</u>	ASTM A193, GR. B7 (NOTE 8)	-	STUD BOLTS, THREADED FULL LENGTH
	ASTM A194, GR. 2H (NOTE 8)	-	ASME B18.2.2 HEAVY HEXAGON NUTS
<u>GASKETS:</u>	COMPRESSED NON-ASBESTOS WITH SBR BINDER GARLOCK	ALL	1/16 INCH THICK, FLAT FULL-FACE, BOLT HOLES PUNCHED (NOTE 2)
	BLUE-GARD STYLE 3200 OR APPROVED EQUAL ASBESTOS-FREE, SPIRAL WOUND	ALL	(NOTE 5)
<u>JOINTS:</u>	WELDED, EXCEPT AT FLANGED CONNECTIONS FIELD WELD END PREPARATION AND TRANSITION DETAIL: 3DS-P72G-00004		
<u>BRANCH CONNECTIONS:</u>	BRANCH CONNECTION DETAILS: 3DS-P72G-00006		

PROJECT NAME: CO₂ Kårstø—Gassnova

JOB NO: 25474

MATERIAL: CARBON STEEL

CLASS C1E

RATING: CLASS 150

CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
<u>NOTES:</u>			
	1.		USE FOR "T" THERMOWELL INSTALLATION ON NPS 4 AND LARGER PIPE WITH NOMINAL WALL THICKNESS OF 3/4" OR LESS. ALSO REFER TO ENGINEERING DESIGN STANDARD 3DS-P72G-00009, "THERMOWELL INSTALLATION AND FABRICATION DETAILS".
	2.		FLAT FACE FLANGES AND FULL FACE GASKETS SHALL BE USED WHEN MATING TO FLAT FACE CAST IRON FLANGES AT VALVES AND/OR EQUIPMENT.
	3.		WELD NECK FLANGES ARE INTENDED FOR USE IMMEDIATELY NEXT TO BUTT WELDED FITTINGS AND ANYWHERE ELSE WHERE THERE IS A SPECIFIC NEED TO MEET THE LAYOUT DESIGN REQUIREMENTS.
	4.		CLASS 300 FLANGES SHALL BE USED ONLY WHERE ABSOLUTELY REQUIRED AND AT EQUIPMENT AND/OR OTHER INTERFACE POINTS.
	5.		FLEXITALLIC STYLE CG WITH FLEXICARB FILLER MATERIAL OR EQUAL WITH 1/8" THICK CARBON STEEL CENTERING RING. METAL STRIP USED SHALL BE STAINLESS STEEL TP304.
	6.		MINIMUM AS-FABRICATED WALL THICKNESS FOR ALL PIPE SIZES IN THIS PIPE CLASS IS 87 1/2% OF THE SPECIFIED NOMINAL PIPE WALL THICKNESS.
	7.		FIELD FABRICATED NPS 2 AND SMALLER PIPING MAY UTILIZE THREE DIAMETER (3D) OR LARGER RADIUS BENDS IN LIEU OF SOCKET WELDING FITTINGS IN ACCORDANCE WITH THE REQUIREMENTS OF ASME B31.3.
	8.		BOLTING COATINGS – INSULATED PIPE – MANUFACTURER'S STANDARD FINISH; UNINSULATED PIPE – BOLTS, STUDS AND NUTS TO BE HOT DIP GALVANIZED PER ASTM A153 OR MECHANICALLY GALVANIZED PER ASTM B695

PROJECT NAME: CO₂ Kårstø—Gassnova
 JOB NO: 25474

MATERIAL: CARBON STEEL CLASS C3E
 RATING: CLASS 300
 CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
PIPE:	ASTM A106, GR. B, SEAMLESS	½ – 2	SCH. XS (NOTE 4)
		2½ – 18	STD. WT.
	API 5L, GR. B, EFW	20 – 22	SCH. XS
		24	SCH 30
		26	0.625" NOMINAL WALL THICKNESS
		28	0.688" NOMINAL WALL THICKNESS
		30-32	0.750" NOMINAL WALL THICKNESS
		34	0.812" NOMINAL WALL THICKNESS
		36	0.875" NOMINAL WALL THICKNESS
FITTINGS:	ASTM A105	½ - 2	CLASS 3000, SOCKET WELDING (ASME B16.11)
		1 & 1 ¼	CLASS 3000, THREADED, HALF COUPLING (ASME B16.11) (NOTE 1)
	ASTM A234, GR. WPB, SEAMLESS	2 ½ – 24	BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE
	ASTM A234, GR. WPBW, SEAM WELDED	26 - 36	BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE
FLANGES:	ASTM A105	½ – 2	CLASS 300, SOCKET WELDING, RF, F&D (ASME B16.5)
		2 ½ – 24	CLASS 300, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5)
		26 - 36	CLASS 300, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.47, SERIES A)
PLATE:	ASTM A515, GR. 70	-	-
BOLTING:	ASTM A193, GR. B7 (NOTE 5)	-	STUD BOLTS, THREADED FULL LENGTH
	ASTM A194, GR. 2H (NOTE 5)	-	ASME B18.2.2 HEAVY HEXAGON NUTS
GASKETS:	ASBESTOS-FREE, SPIRAL WOUND	ALL	(NOTE 2)
JOINTS:	WELDED, EXCEPT AT FLANGED CONNECTIONS		
	FIELD WELD END PREPARATION AND TRANSITION DETAIL: 3DS-P72G-00004		
BRANCH CONNECTIONS:	BRANCH CONNECTION DETAILS: 3DS-P72G-00006		

PROJECT NAME: CO₂ Kårstø—Gassnova

JOB NO: 25474

MATERIAL: CARBON STEEL

CLASS C3E

RATING: CLASS 300

CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
NOTES:			
1.	USE FOR "T" THERMOWELL INSTALLATION ON NPS 4 AND LARGER PIPE WITH NOMINAL WALL THICKNESS OF 3/4" OR LESS. ALSO REFER TO ENGINEERING DESIGN STANDARD 3DS-P72G-00009, "THERMOWELL INSTALLATION AND FABRICATION DETAILS".		
2.	FLEXITALLIC STYLE CGI WITH FLEXICARB FILLER MATERIAL OR EQUAL WITH 1/8" THICK CARBON STEEL CENTERING RING AND 1/8" STAINLESS STEEL INNER RING. METAL STRIP USED SHALL BE STAINLESS STEEL TP304.		
3.	MINIMUM AS-FABRICATED WALL THICKNESS FOR ALL PIPE SIZES IN THIS PIPE CLASS IS 87 1/2% OF THE SPECIFIED NOMINAL PIPE WALL THICKNESS.		
4.	FIELD FABRICATED NPS 2 AND SMALLER PIPING MAY UTILIZE THREE DIAMETER (3D) OR LARGER RADIUS BENDS IN LIEU OF SOCKET WELDING FITTINGS IN ACCORDANCE WITH THE REQUIREMENTS OF ASME B31.3.		
5.	BOLTING COATINGS – INSULATED PIPE – MANUFACTURER'S STANDARD FINISH; UNINSULATED PIPE – BOLTS, STUDS AND NUTS TO BE: HOT DIP GALVANIZED PER ASTM A153 OR MECHANICALLY GALVANIZED PER ASTM B695.		

PROJECT NAME: CO₂ Kårstø—Gassnova
 JOB NO: 25474

MATERIAL: CARBON STEEL CLASS: CEE
 RATING: CLASS 125
 CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
<u>PIPE:</u>	ASTM A53, GR. B	½ - 2	SCH. XS (NOTES 4 & 7)
		2½ - 24	STD. WT. (NOTE 6)
	API 5L, GR. B	26 - 36	STD. WT.
<u>FITTINGS:</u>	ASTM A105	½ - 2	CLASS 3000, SOCKET WELDING (ASME B16.11)
		1 & 1 ½	CLASS 3000, THREADED, HALF COUPLING (ASME B16.11) (NOTE 1)
	ASTM A234, GR. WPBW, SEAM WELDED	2 ½ - 36	BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE
<u>FLANGES:</u>	ASTM A105	½ - 2	CLASS 150, SOCKET WELDING, RF, F&D (ASME B16.5)
		½ - 2	CLASS 150, SOCKET WELDING, FF, F&D (ASME B16.5) (NOTE 2)
		2 ½ - 24	CLASS 150, SLIP-ON, RF, F&D (ASME B16.5)
		2 ½ - 24	CLASS 150, SLIP-ON, FF, F&D (ASME B16.5) (NOTE 2)
		2 ½ - 24	CLASS 150, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5) (NOTE 3)
		2 ½ - 24	CLASS 150, WELD NECK, FF, F&D, BORED TO MATCH PIPE (ASME B16.5) (NOTES 2 & 3)
		26 - 36	CLASS 150, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.47, SERIES A)
<u>PLATE:</u>	ASTM A515, GR. 70	-	-
<u>BOLTING:</u>	ASTM A193, GR. B7 (NOTE 8)	-	STUD BOLTS, THREADED FULL LENGTH
	ASTM A194, GR. 2H (NOTE 8)	-	ASME B18.2.2 HEAVY HEXAGON NUTS
<u>GASKETS:</u>	COMPRESSED NON-ASBESTOS WITH SBR BINDER GARLOCK BLUE-GARD STYLE 3200 OR EQUAL	ALL	1/16 INCH THICK, FLAT, RING
	COMPRESSED NON-ASBESTOS WITH SBR BINDER GARLOCK BLUE-GARD STYLE 3200 OR EQUAL	½ - 24	1/16 INCH THICK, FLAT FULL-FACE, BOLT HOLES PUNCHED (NOTE 2)
	EPDM, MFR'S STANDARD FOR GROOVED PIPING. (FOR VICTAULIC STYLE 07 COUPLING OR EQUAL COUPLING)	2 ½ - 12	O-RING, C-SHAPED (NOTE 6)
	EPDM, MFR'S STANDARD FOR GROOVED PIPING. (FOR VICTAULIC STYLE W07 COUPLING)	14 - 24	O-RING, C-SHAPED (NOTE 6)
<u>JOINTS:</u>	WELDED, EXCEPT AT FLANGED EQUIPMENT CONNECTIONS OR GROOVED EQUIPMENT CONNECTIONS AND FIELD JOINTS (NOTES 4 & 7). FIELD JOINTS MAY BE GROOVED AT PROJECT'S DISCRETION. GROOVED FIELD JOINTS SHALL BE USED WHERE INDICATED ON THE ISOMETRIC DESIGN DRAWINGS. SEE NOTE 7.		
	FIELD WELD END PREPARATION AND TRANSITION DETAIL: 3DS-P72G-00004		

PROJECT NAME: CO₂ Kårstø—Gassnova
JOB NO: 25474

MATERIAL: FIBERGLASS-REINFORCED THERMOSETTING RESIN (FRTR) **CLASS:** FSE (NOTES 3, 6 & 7)
RATING: 174 PSIG or 12 BAR G @ 129 °F or 54 °C - (NOTE 2)
CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE	REMARKS
<u>PIPE:</u>	ASTM D2996, GR. RTRP-11FE GLASS FIBER REINFORCED EPOXY RESIN PIPE WITH RESIN RICH LINER	1 – 16	BONDSTRAND SERIES 2000 OR EQUAL, WALL THICKNESS AS REQUIRED TO MEET THE DESIGN PRESSURE RATING, PLAIN END X PLAIN END (NOTE 1)
	ASTM D3517-2-1-2-C100-C, GLASS FIBER REINFORCED THERMOSETTING POLYESTER RESIN PIPE	18 – 60	CLASS 100, WITH PLAIN ENDS FOR BUTT AND WRAP JOINTS
<u>FITTINGS:</u>	ASTM D5685, GR. RTRP-11FE GLASS FIBER REINFORCED EPOXY RESIN FITTINGS WITH RESIN RICH LINER; GLASS, RESIN TYPE, THERMAL PROPERTIES AND CHEMICAL PROPERTIES SAME AS PIPE	1 – 16	FILAMENT WOUND, SOCKET TYPE ENDS. MITERED ELBOWS ARE NOT ACCEPTABLE. (NOTE 4)
		1 - 8	MOLDED; SOCKET TYPE ENDS (NOTES 1 & 4)
	GLASS FIBER REINFORCED THERMOSETTING POLYESTER RESIN SAME AS PIPE	18-60	FILAMENT WOUND, WITH PLAIN ENDS FOR BUTT AND WRAP JOINTS, FABRICATED OR MITERED, WITH INSIDE DIAMETER AND PRESSURE RATING SAME AS PIPE
<u>FLANGES</u>	ASTM D4024, GR. RTRP-11FE GLASS FIBER REINFORCED EPOXY RESIN FITTINGS WITH RESIN RICH LINER; GLASS, RESIN TYPE, THERMAL PROPERTIES AND CHEMICAL PROPERTIES SAME AS PIPE	1 – 16	FLAT FACE, DIMENSIONS TO MATCH ASME B16.5, CLASS 150 FLANGES. FILAMENT WOUND, PRESSURE RATING TO MATCH PIPE RATING, SOCKET TYPE ENDS (NOTE 1 & 4)
<u>PLATE:</u>	N/A		
<u>BOLTING:</u>	ASTM A193, GR. B7	1 – 16	STUD BOLT, THREADED FULL LENGTH (NOTES 5 & 7)
	ASTM A194, GR. 2H	1 - 16	ASME B18.2.2 HEAVY HEXAGON NUTS (NOTES 5 & 7)
<u>GASKETS:</u>	MICROCELLULAR PTFE	1 - 16	1/16" THICK, FULL FACE, BOLT HOLES PUNCHED, GARLOCK GYLON STYLE 3545 OR EQUAL
<u>JOINTS:</u>	FOR NPS 16 AND SMALLER USE TAPERED SOCKET TYPE JOINTS, UTILIZING ADHESIVE CEMENT FOR JOINING AND BONDING.		
	FOR NPS 18 AND LARGER USE BUTT AND WRAPPED JOINTS, WITH MINIMUM STRENGTH OF COMPLETED JOINT EQUAL TO THE MINIMUM PIPE WALL STRENGTH.		
	FLANGED CONNECTIONS SHALL BE USED AT FLANGED EQUIPMENT AND ONLY WHERE ABSOLUTELY NECESSARY, FLANGED JOINTS SHALL BE MINIMIZED. ALL INTERFACE/TIE-IN POINT CONNECTIONS BETWEEN FRTR PIPING AND METALLIC PIPING SHALL BE FLANGED.		
<u>BRANCH CONNECTIONS:</u>	USE MANUFACTURER'S STANDARD FITTINGS HAVING THE SAME OR HIGHER RATING AS PIPE		

PROJECT NAME: CO₂ Kårstø—Gassnova
JOB NO: 25474
MATERIAL: FIBERGLASS-REINFORCED THERMOSETTING RESIN (FRTR) **CLASS:** FSE (NOTES 3, 6 & 7)
RATING: 174 PSIG or 12 BAR G @ 129 °F or 54 °C - (NOTE 2)
CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE	REMARKS
<u>NOTES:</u>	<ol style="list-style-type: none"> 1. BONDSTRAND 2000 OR EQUAL PIPE AND FITTINGS, NPS 1 THROUGH 16, ARE SPECIFIED FOR USE. AS AN ALTERNATE, BONDSTRAND 4000 OR EQUAL PIPE AND FITTINGS, NPS 2 THROUGH 16, MAY BE USED. 2. PIPE NPS 16 AND SMALLER SHALL BE LIMITED FOR APPLICATIONS WITH A DESIGN TEMPERATURE NOT EXCEEDING 129 °F or 54° C AND/OR A DESIGN PRESSURE NOT EXCEEDING 174 PSIG or 12 BARG. PIPE NPS 18 AND LARGER SHALL BE LIMITED FOR APPLICATIONS WITH A DESIGN TEMPERATURE NOT EXCEEDING 30 C AND A DESIGN PRESSURE NOT EXCEEDING 5 BARG 3. TRENCHING, BEDDING, AND BACKFILLING SHALL BE STRICTLY IN ACCORDANCE WITH MANUFACTURER’S RECOMMENDATIONS AND THE REQUIREMENTS OF AWWA C950 AND AWWA M45. 4. THE FITTINGS AND FLANGES SHALL BE FULL-PRESSURE RATED TO MATCH THE PIPE PRESSURE RATING. 5. ONE TYPE A, SIZE N, STEEL PLAIN WASHER IN ACCORDANCE WITH ASME B18.22.3, TYPE 1A SHALL BE USED UNDER EACH NUT.. 6. THE SUPPLIER SHALL SUBMIT THE PIPING MINIMUM WALL THICKNESS CALCULATIONS FOR ENGINEERING’S REVIEW AND PERMISSION TO PROCEED PRIOR TO PIPING MANUFACTURE. PIPING SHALL BE DESIGNED FOR FULL VACUUM AS WELL AS THE SPECIFIED PRESSURE. 7. BOLTING COATINGS – BOLTS, STUDS, WASHERS AND NUTS TO BE; HOT DIP GALVANIZED PER ASTM A153 OR MECHANICALLY GALVANIZED PER ASTM B695. 		

PROJECT NAME: CO₂ Kårstø—Gassnova
 JOB NO: 25474

MATERIAL: STAINLESS STEEL CLASS S1E
 RATING: CLASS 150 (NOTE 1)
 CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
<u>PIPE:</u>	ASTM A312 GR. TP304/TP304L, EFW (NOTE 7)	½ - 2 SCH. 40S 2½ - 24 SCH. 10 26 - 30 SCH. 10 32 - 36 STD WT 40 - 48. SCH XS	
<u>FITTINGS:</u>	ASTM A182, GR. F304/F304L (NOTE 7)	½ - 2 CLASS 3000, SOCKET WELDING (ASME B16.11) 1 & 1 ¼ CLASS 3000, THREADED, HALF COUPLING (ASME B16.11) (NOTE 2)	
	ASTM A403, GR. WP304/WP304L, WELDED (NOTE 7)	2 ½ - 24 BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE 26 - 48 BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE	
<u>FLANGES:</u>	ASTM A182, GR. F304/F304L (NOTE 7)	½ - 2 CLASS 150, SOCKET WELDING, RF, F&D (ASME B16.5) 2 ½ - 24 CLASS 150, SLIP ON, RF, F&D (ASME B16.5) 2 ½ - 24 CLASS 150, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5) (NOTE 3) 2 ½ - 24 CLASS 300, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5) (NOTE 4) 26 - 48 CLASS 150, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.47, SERIES A)	
<u>PLATE:</u>	ASTM A240, GR. 304L	-	-
<u>BOLTING:</u>	ASTM A193, GR. B8M CLASS 2	-	STUD BOLTS, THREADED FULL LENGTH
	ASTM A194, GR. 8M	-	ASME B18.2.2 HEAVY HEXAGON NUTS
<u>GASKETS:</u>	ASBESTOS-FREE, SPIRAL WOUND	ALL	(NOTE 5)
<u>JOINTS:</u>	WELDED, EXCEPT AT FLANGED CONNECTIONS.		
	FIELD WELD END PREPARATION AND TRANSITION DETAIL: 3DS-P72G-00004		
<u>BRANCH CONNECTIONS:</u>	BRANCH CONNECTION DETAILS: 3DS-P72G-00006		

PROJECT NAME: CO₂ Kårstø—Gassnova

JOB NO: 25474

MATERIAL: STAINLESS STEEL

CLASS S1E

RATING: CLASS 150 (NOTE 1)

CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
NOTES:			
1.	THIS PIPING SHALL NOT BE USED WHERE THE DESIGN TEMPERATURE EXCEEDS 800 F.		
2.	USE FOR "T" THERMOWELL INSTALLATION ON NPS 4 AND LARGER PIPE WITH NOMINAL WALL THICKNESS OF 3/4" OR LESS. ALSO REFER TO ENGINEERING DESIGN STANDARD 3DS-P72G-00009, "THERMOWELL INSTALLATION AND FABRICATION DETAILS".		
3.	WELD NECK FLANGES ARE INTENDED FOR USE IMMEDIATELY NEXT TO BUTT WELDED FITTINGS AND ANYWHERE ELSE WHERE THERE IS A SPECIFIC NEED TO MEET THE LAYOUT DESIGN REQUIREMENTS.		
4.	CLASS 300 FLANGES SHALL BE USED ONLY WHERE ABSOLUTELY REQUIRED AND AT EQUIPMENT AND/OR OTHER INTERFACE POINTS.		
5.	FLEXITALLIC STYLE CG WITH FLEXICARB FILLER MATERIAL OR EQUAL WITH 1/8" THICK STAINLESS STEEL CENTERING RING. METAL STRIP USED SHALL BE STAINLESS STEEL TP304.		
6.	MINIMUM AS-FABRICATED WALL THICKNESS FOR ALL PIPE SIZES IN THIS PIPE CLASS IS 87 1/2% OF THE SPECIFIED NOMINAL PIPE WALL THICKNESS.		
7.	PIPE DESIGN IS BASED ON TP 304 MATERIAL. USE DUAL GRADE TP 304/TP 304L STAMPED OR TP304 MATERIAL. DO NOT SUBSTITUTE TP 304L IN LIEU OF DUAL GRADE TP 304/TP 304L MATERIAL.		

PROJECT NAME: CO₂ Kårstø—Gassnova
 JOB NO: 25474

MATERIAL: STAINLESS STEEL CLASS S3E
 RATING: CLASS 300 (NOTE 1)
 CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
<u>PIPE:</u>	ASTM A312 GR. TP304/TP304L, EFW (NOTE 5)	½ - 2	SCH. 40S
		2½ - 4	SCH. 10S
		6	SCH. 40
		8	SCH. 20
		10-12	SCH. 30
		14	SCH. 40S
		16 - 18	SCH. 80S
		20	SCH. 40
		22	SCH. 60
		24	SCH. 40
		26	0.688" NOMINAL WALL THICKNESS
		28	0.750" NOMINAL WALL THICKNESS
30	0.812" NOMINAL WALL THICKNESS		
<u>FITTINGS:</u>	ASTM A182, GR. F304/F304L (NOTE 5)	½ - 2	CLASS 3000, SOCKET WELDING (ASME B16.11)
		1 & 1 ¼	CLASS 3000, THREADED, HALF COUPLING (ASME B16.11) (NOTE 2)
	ASTM A403, GR. WP304/WP304L, WELDED (NOTE 5)	2 ½ - 24	BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE
		30	BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE
<u>FLANGES:</u>	ASTM A182, GR. F304/F304L (NOTE 5)	½ - 2	CLASS 300, SOCKET WELDING, RF, F&D (ASME B16.5)
		2 ½ - 24	CLASS 300, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5)
		26-30	CLASS 300, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.47, SERIES A)
<u>PLATE:</u>	ASTM A240, GR. 304L	-	-
<u>BOLTING:</u>	ASTM A193, GR. B8M CLASS 2	-	STUD BOLTS, THREADED FULL LENGTH
	ASTM A194, GR. 8M	-	ASME B18.2.2 HEAVY HEXAGON NUTS
<u>GASKETS:</u>	ASBESTOS-FREE, SPIRAL WOUND	ALL	(NOTE 3)
<u>JOINTS:</u>	WELDED, EXCEPT AT FLANGED CONNECTIONS. FIELD WELD END PREPARATION AND TRANSITION DETAIL: 3DS-P72G-00004		
<u>BRANCH CONNECTIONS:</u>	BRANCH CONNECTION DETAILS: 3DS-P72G-00006		

PROJECT NAME: CO₂ Kårstø—Gassnova

JOB NO: 25474

MATERIAL: STAINLESS STEEL

CLASS S3E

RATING: CLASS 300 (NOTE 1)

CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
NOTES:			
1.	THIS PIPING SHALL NOT BE USED WHERE THE DESIGN TEMPERATURE EXCEEDS 800 F.		
2.	USE FOR "T" THERMOWELL INSTALLATION ON NPS 4 AND LARGER PIPE WITH NOMINAL WALL THICKNESS OF ¼" OR LESS. ALSO REFER TO ENGINEERING DESIGN STANDARD 3DS-P72G-00009, "THERMOWELL INSTALLATION AND FABRICATION DETAILS".		
3.	FLEXITALLIC STYLE CGI WITH FLEXICARB FILLER MATERIAL OR EQUAL WITH 1/8" THICK STAINLESS STEEL CENTERING RING AND 1/8" THICK STAINLESS STEEL INNER RING. METAL STRIP USED SHALL BE STAINLESS STEEL TP304.		
4.	MINIMUM AS-FABRICATED WALL THICKNESS FOR ALL PIPE SIZES IN THIS PIPE CLASS IS 87 ½% OF THE SPECIFIED NOMINAL PIPE WALL THICKNESS.		
5.	PIPE DESIGN IS BASED ON TP 304 MATERIAL. USE DUAL GRADE TP 304/TP 304L STAMPED OR TP304 MATERIAL. DO NOT SUBSTITUTE TP 304L IN LIEU OF DUAL GRADE TP 304/TP 304L MATERIAL.		

PROJECT NAME: CO₂ Kårstø—Gassnova
JOB NO: 25474

MATERIAL: STAINLESS STEEL **CLASS** S6E
RATING: CLASS 600 (NOTE 5)
CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
PIPE:	ASTM A312 GR. TP304/TP304L, EFW (NOTE 4)	½ - 2 2½ - 4 6 - 8 10 - 24	SCH. 40S SCH. 40S SCH. 80S SCH. 80
FITTINGS:	ASTM A182, GR. F304/F304L (NOTE 4) ASTM A403, GR. WP304/WP304L, WELDED (NOTE 4)	½ - 2 1 & 1 ¼ 2 ½ - 24	CLASS 3000, SOCKET WELDING (ASME B16.11) CLASS 3000, THREADED, HALF COUPLING (ASME B16.11) (NOTE 1) BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE
FLANGES:	ASTM A182, GR. F304/F304L (NOTE 4)	½ - 2 2 ½ - 24	CLASS 600, SOCKET WELDING, RF, F&D (ASME B16.5) CLASS 600, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5)
PLATE:	ASTM A240, GR. 304L	-	-
BOLTING:	ASTM A193, GR. B8M CLASS 2 ASTM A194, GR. 8M	-	STUD BOLTS, THREADED FULL LENGTH ASME B18.2.2 HEAVY HEXAGON NUTS
GASKETS:	ASBESTOS-FREE, SPIRAL WOUND	ALL	(NOTE 2)
JOINTS:	WELDED, EXCEPT AT FLANGED CONNECTIONS. FIELD WELD END PREPARATION AND TRANSITION DETAIL: 3DS-P72G-00004		
BRANCH CONNECTIONS:	BRANCH CONNECTION DETAILS: 3DS-P72G-00006		
NOTES:	<ol style="list-style-type: none"> USE FOR "T" THERMOWELL INSTALLATION ON NPS 4 AND LARGER PIPE WITH NOMINAL WALL THICKNESS OF ¾" OR LESS. ALSO REFER TO ENGINEERING DESIGN STANDARD 3DS-P72G-00009, "THERMOWELL INSTALLATION AND FABRICATION DETAILS". FLEXITALLIC STYLE CGI WITH FLEXICARB FILLER MATERIAL OR EQUAL WITH 1/8" THICK STAINLESS STEEL CENTERING RING AND 1/8" THICK STAINLESS STEEL INNER RING. METAL STRIP USED SHALL BE STAINLESS STEEL TP304. MINIMUM AS-FABRICATED WALL THICKNESS FOR ALL PIPE SIZES IN THIS PIPE CLASS IS 87 ½% OF THE SPECIFIED NOMINAL PIPE WALL THICKNESS. PIPE DESIGN IS BASED ON TP 304 MATERIAL. USE DUAL GRADE TP 304/TP 304L STAMPED OR TP304 MATERIAL. DO NOT SUBSTITUTE TP 304L IN LIEU OF DUAL GRADE TP 304/TP 304L MATERIAL. THIS PIPING SHALL NOT BE USED WHERE THE DESIGN TEMPERATURE EXCEEDS 800 F 		

PROJECT NAME: CO₂ Kårstø—Gassnova
JOB NO: 25474

MATERIAL: STAINLESS STEEL **CLASS** S9E
RATING: CLASS 900 (NOTE 5)
CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
PIPE:	ASTM A312 GR. TP304/TP304L, SEAMLESS (NOTE 4)	½ - 2 2½ - 3 4 - 6 8 - 24	SCH. 40S SCH. 40S SCH. 80S SCH. 100
FITTINGS:	ASTM A182, GR. F304/F304L (NOTE 4) ASTM A403, GR. WP304/WP304L, SEAMLESS (NOTE 4)	½ - 2 1 & 1 ¼ 2 ½ - 24	CLASS 3000, SOCKET WELDING (ASME B16.11) CLASS 3000, THREADED, HALF COUPLING (ASME B16.11) (NOTE 1) BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE
FLANGES:	ASTM A182, GR. F304/F304L (NOTE 4)	½ - 2 2 ½ - 2 3 - 24	CLASS 1500, SOCKET WELDING, RF, F&D (ASME B16.5) CLASS 1500, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5) CLASS 900, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5)
PLATE:	ASTM A240, GR. 304L	-	-
BOLTING:	ASTM A193, GR. B8M CLASS 2 ASTM A194, GR. 8M	-	STUD BOLTS, THREADED FULL LENGTH ASME B18.2.2 HEAVY HEXAGON NUTS
GASKETS:	ASBESTOS-FREE, SPIRAL WOUND	ALL	(NOTE 2)
JOINTS:	WELDED, EXCEPT AT FLANGED CONNECTIONS. FIELD WELD END PREPARATION AND TRANSITION DETAIL: 3DS-P72G-00004		
BRANCH CONNECTIONS:	BRANCH CONNECTION DETAILS: 3DS-P72G-00006		
NOTES:	<ol style="list-style-type: none"> USE FOR "T" THERMOWELL INSTALLATION ON NPS 4 AND LARGER PIPE WITH NOMINAL WALL THICKNESS OF ¾" OR LESS. ALSO REFER TO ENGINEERING DESIGN STANDARD 3DS-P72G-00009, "THERMOWELL INSTALLATION AND FABRICATION DETAILS". FLEXITALLIC STYLE CGI WITH FLEXICARB FILLER MATERIAL OR EQUAL WITH 1/8" THICK STAINLESS STEEL CENTERING RING AND 1/8" THICK STAINLESS STEEL INNER RING. METAL STRIP USED SHALL BE STAINLESS STEEL TP304. MINIMUM AS-FABRICATED WALL THICKNESS FOR ALL PIPE SIZES IN THIS PIPE CLASS IS 87 ½% OF THE SPECIFIED NOMINAL PIPE WALL THICKNESS. PIPE DESIGN IS BASED ON TP 304 MATERIAL. USE DUAL GRADE TP 304/TP 304L STAMPED OR TP304 MATERIAL. DO NOT SUBSTITUTE TP 304L IN LIEU OF DUAL GRADE TP 304/TP 304L MATERIAL. MINIMUM DESIGN TEMPERATURE -110 °C. 		

PROJECT NAME: CO₂ Kårstø—Gassnova
 JOB NO: 25474

MATERIAL: STAINLESS STEEL
 RATING: CLASS 1500 (NOTE 5)
 CODE: ASME B31.3, PROCESS PIPING CODE

CLASS SJE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
<u>PIPE:</u>	ASTM A312 GR. TP304/TP304L, SEAMLESS (NOTE 4)	½ – 1 SCH. 40S 1 ½ SCH. 80S 2 SCH. 160 2½ – 10 SCH. 160 12 1.323" NOMINAL WALL THICKNESS 14 1.452" NOMINAL WALL THICKNESS 16 1.660" NOMINAL WALL THICKNESS 18 1.867" NOMINAL WALL THICKNESS 20 2.075" NOMINAL WALL THICKNESS 22 2.282" NOMINAL WALL THICKNESS 24 2.489" NOMINAL WALL THICKNESS	
<u>FITTINGS:</u>	ASTM A182, GR. F304/F304L (NOTE 4)	½ - 1 ½ CLASS 3000, SOCKET WELDING (ASME B16.11) 2 CLASS 6000, SOCKET WELDING (ASME B16.11) 1 & 1 ¼ CLASS 3000, THREADED, HALF COUPLING (ASME B16.11) (NOTE 1)	
	ASTM A403, GR. WP304/WP304L, SEAMLESS (NOTE 4)	2 ½ – 24 BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE	
<u>FLANGES:</u>	ASTM A182, GR. F304/F304L (NOTE 4)	½ – 2 CLASS 1500, SOCKET WELDING, RF, F&D (ASME B16.5) 2 ½ – 24 CLASS 1500, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5)	
<u>PLATE:</u>	ASTM A240, GR. 304L	-	-
<u>BOLTING:</u>	ASTM A193, GR. B8M CLASS 2	-	STUD BOLTS, THREADED FULL LENGTH
	ASTM A194, GR. 8M	-	ASME B18.2.2 HEAVY HEXAGON NUTS
<u>GASKETS:</u>	ASBESTOS-FREE, SPIRAL WOUND	ALL	(NOTE 2)
<u>JOINTS:</u>	WELDED, EXCEPT AT FLANGED CONNECTIONS. FIELD WELD END PREPARATION AND TRANSITION DETAIL: 3DS-P72G-00004		
<u>BRANCH CONNECTIONS:</u>	BRANCH CONNECTION DETAILS: 3DS-P72G-00006		
<u>NOTES:</u>	<ol style="list-style-type: none"> USE FOR "T" THERMOWELL INSTALLATION ON NPS 4 AND LARGER PIPE WITH NOMINAL WALL THICKNESS OF ¾" OR LESS. ALSO REFER TO ENGINEERING DESIGN STANDARD 3DS-P72G-00009, "THERMOWELL INSTALLATION AND FABRICATION DETAILS". FLEXITALLIC STYLE CGI WITH FLEXICARB FILLER MATERIAL OR EQUAL WITH 1/8" THICK STAINLESS STEEL CENTERING RING AND 1/8" THICK STAINLESS STEEL INNER RING. METAL STRIP USED SHALL BE STAINLESS STEEL TP304. MINIMUM AS-FABRICATED WALL THICKNESS FOR ALL PIPE SIZES IN THIS PIPE CLASS IS 87 ½% OF THE SPECIFIED NOMINAL PIPE WALL THICKNESS. PIPE DESIGN IS BASED ON TP 304 MATERIAL. USE DUAL GRADE TP 304/TP 304L STAMPED OR TP304 MATERIAL. DO NOT SUBSTITUTE TP 304L IN LIEU OF DUAL GRADE TP 304/TP 304L MATERIAL. MINIMUM DESIGN TEMPERATURE -110 °C. 		

PROJECT NAME: CO₂ Kårstø—Gassnova
 JOB NO: 25474

MATERIAL: STAINLESS STEEL CLASS SLE
 RATING: 4931 PSIG @ 200 °F (NOTE 5)
 CODE: ASME B31.3, PROCESS PIPING CODE

ITEM	MATERIAL SPECIFICATION	SIZE (NPS)	REMARKS
PIPE:	ASTM A312 GR. TP304/TP304L, SEAMLESS (NOTE 4)	½ SCH. 40 ¾ - 1 SCH. 80S 1 ½ - 2 SCH. 160 2 ½ SCH. 160 3 - 6 SCH. XXS 8 1.106" NOMINAL WALL THICKNESS 10 1.379" NOMINAL WALL THICKNESS 12 1.635" NOMINAL WALL THICKNESS 14 1.795" NOMINAL WALL THICKNESS 16 2.052" NOMINAL WALL THICKNESS	
FITTINGS:	ASTM A182, GR. F304/F304L (NOTE 4)	½ - 1 CLASS 3000, SOCKET WELDING (ASME B16.11) 1 ½ - 2 CLASS 6000, SOCKET WELDING (ASME B16.11) 1 & 1 ¼ CLASS 6000, THREADED, HALF COUPLING (ASME B16.11) (NOTE 1)	
	ASTM A403, GR. WP304/WP304L, SEAMLESS (NOTE 4)	2 ½ - 16	BUTT WELDING (ASME B16.9), WALL THICKNESS TO MATCH PIPE
FLANGES:	ASTM A182, GR. F304/F304L (NOTE 4)	½ - 2 CLASS 2500, SOCKET WELDING, RF, F&D (ASME B16.5) 2 ½ - 12 CLASS 2500, WELD NECK, RF, F&D, BORED TO MATCH PIPE (ASME B16.5)	
PLATE:	ASTM A240, GR. 304L	-	-
BOLTING:	ASTM A193, GR. B8M CLASS 2	-	STUD BOLTS, THREADED FULL LENGTH
	ASTM A194, GR. 8M	-	ASME B18.2.2 HEAVY HEXAGON NUTS
GASKETS:	ASBESTOS-FREE, SPIRAL WOUND	ALL	(NOTE 2)
JOINTS:	WELDED, EXCEPT AT FLANGED CONNECTIONS. FIELD WELD END PREPARATION AND TRANSITION DETAIL: 3DS-P72G-00004		
BRANCH CONNECTIONS:	BRANCH CONNECTION DETAILS: 3DS-P72G-00006		
NOTES:	<ol style="list-style-type: none"> USE FOR "T" THERMOWELL INSTALLATION ON NPS 4 AND LARGER PIPE WITH NOMINAL WALL THICKNESS OF ¾" OR LESS. ALSO REFER TO ENGINEERING DESIGN STANDARD 3DS-P72G-00009, "THERMOWELL INSTALLATION AND FABRICATION DETAILS". FLEXITALLIC STYLE CGI WITH FLEXICARB FILLER MATERIAL OR EQUAL WITH 1/8" THICK STAINLESS STEEL CENTERING RING AND 1/8" THICK STAINLESS STEEL INNER RING. METAL STRIP USED SHALL BE STAINLESS STEEL TP304. MINIMUM AS-FABRICATED WALL THICKNESS FOR ALL PIPE SIZES IN THIS PIPE CLASS IS 87 ½% OF THE SPECIFIED NOMINAL PIPE WALL THICKNESS. PIPE DESIGN IS BASED ON TP 304 MATERIAL. USE DUAL GRADE TP 304/TP 304L STAMPED OR TP304 MATERIAL. DO NOT SUBSTITUTE TP 304L IN LIEU OF DUAL GRADE TP 304/TP 304L MATERIAL. MINIMUM DESIGN TEMPERATURE -110 °C. 		