Pipe Wall Thickness Calculation followed ASME B31.8

Pipe Information

Position	:	Inside Factory, Inlet Line					
Fluid	:	Natural Gas					
Operating Pressure: Min./Nor./Max.	:	530 / 740 / 890	Psig				
Design Pressure	:	1,250	Psig				
Design Temperature	:	60-120	^{o}F	;	< 250	^{o}F	
Corrosion Allowance	:	None					
Design Location Class	:	Class 4					
Design Factor for Class 4	:	0.4					
Pipe Material	:	*API 5L GR. X-42*	*Sch. 40*				
Pipe Diameter	:	*6*	inch				
Outside Diameter	:	6.625	inch				
Wall Thickness	:	#N/A	inch				
Specify Min. Yield Strength	:	42,000	Psig				

Calculation

Calculation will be considered, design pressure for Pipe API 5L GR. X-42 Sch. 40
The nominal wall thickness is determined by the following formula from ASME B31.8, para 841.1.

$$P = \frac{2\ St\ FET}{D} \qquad \text{(ASME B 31.8)}$$

When ;

D = nominal outside diameter of pipe, in.

E = longitudinal joint factor; Ref. ASME B31.8, table 841.115A

F = design factor; Ref. ASME B31.8, table 841.114B

P = design pressure, Psig.

S = specified minimum yield strength, Psi ; Ref. ASME B31.8, Appendix D, Table D1

T = temperature de rating factor; Ref. ASME B31.8, table 841.116A

t = nominal wall thickness, inch.

Then;

$$t_{design} = \frac{PD}{2SFET}$$

When;

S	=	42,000	Psig	; API 5L GR. X-42	
F	=	0.4		; Class 4	
E	=	1			
T	=	1		< 250 ^{o}F	
D	=	6.625	inch		
P_{design}	=	1,250	Psig		

$$t_{design} = \frac{1,250 \times 6.625}{2 \times 42,000 \times 0.4 \times 1 \times 1}$$

$$t_{design} = 0.246 \text{ inch} \quad ; \ (t_{select} \quad \#N/A \quad \text{inches} > t_{design} \ 0.246 \text{ inches})$$

#N/A

FITTING Wall Thickness Calculation (ELBOW, TEE REDUCER) ตาม ASME B31.8

Pipe Information

Position	:	Inside Factory, Inlet Line	
Fluid	:	Natural Gas	
Operating Pressure: Min./Nor./Max.	:	530 / 740 / 890	Psig
Design Pressure	:	1,250	Psig
Design Temperature	:	60-120	°F ; < 250 °F
Corrosion Allowance	:	None	
Design Location Class	:	Class 4	
Design Factor for Class 4	:	0.4	
Fitting Material	:	*ASTM A860 WPHY42 Sch. 40*	
Pipe Diameter	:	**6**	inch
Outside Diameter	:	6.625	inch
Wall Thickness	:	#N/A	inch
Specify Min. Yield Strength	:	42,000	Psig

Calculation

Calculation will be considered, design pressure for fittings ASTM A860 WPHY42 Sch. 40

The nominal wall thickness is determined by the following formula from ASME B31.8, para 841.1.

$$P = \frac{2\,St\,FET}{D}$$
(ASME B 31.8)

When ;

D = nominal outside diameter of pipe, in.

E = longitudinal joint factor; Ref. ASME B31.8, table 841.115A

F = design factor; Ref. ASME B31.8, table 841.114B

P = design pressure, Psig.

S = specified minimum yield strength, Psi ; Ref. ASME B31.8, Appendix D, Table D1

T = temperature de rating factor; Ref. ASME B31.8, table 841.116A

t = nominal wall thickness, inch.

Then;

$$t_{design} = \frac{PD}{2SFET}$$

When;

S	=	42,000	Psig ; ASTM A860 WPHY42
F	=	0.4	; Class 4
E	=	1	
T	=	1	< 250 °F
D	=	6.625	inch
P_{design}	=	1,250	Psig

$$t_{design} = \frac{1,250 \times 6.625}{2 \times 42,000 \times 0.4 \times 1 \times 1}$$

$$t_{design} = 0.246 \text{ inch} \quad ; \; (t_{select} \quad \#N/A \quad \text{inches} > t_{design} \; 0.246 \text{ inches})$$

PASS

Pipe Size (inch)	OD (Inch)	5S	10S	10	20	30	STI	40S	60	XS	80S	80	100
1/8	0.405		0.049					0.068				0.095	
1/4	0.540		0.065					0.088				0.119	
3/8	0.675		0.065					0.091				0.126	
1/2	0.840	0.065	0.083					0.109				0.147	
3/4	1.050	0.065	0.083					0.113				0.154	
1	1.315	0.065	0.109					0.133				0.179	
1 1/4	1.660	0.065	0.109					0.140				0.191	
1 1/2	1.900	0.065	0.109					0.145				0.200	
2	2.375	0.065	0.109					0.154				0.218	
2 1/2	2.875	0.083	0.120					0.203				0.276	
3	3.500	0.083	0.120					0.216				0.300	
3 1/2	4.000	0.083	0.120					0.226				0.318	
4	4.500	0.083	0.120					0.237				0.337	
5	5.563	0.109	0.134					0.258				0.375	
6	6.625	0.109	0.134					0.280				0.432	
8	8.625	0.109	0.148		0.250	0.277		0.322				0.500	
10	10.750	0.134	0.165		0.250	0.307		0.365				0.594	
12	12.750	0.156	0.180		0.250	0.330		0.375				0.688	
14	14.000	0.156	0.188	0.250	0.312	0.375						0.750	
16	16.000	0.165	0.188	0.250	0.312	0.375						0.844	
18	18.000	0.165	0.188	0.250	0.312	0.438						0.938	
20	20.000	0.188	0.218	0.250	0.375	0.500						1.031	
22	22.000	0.188	0.218	0.250	0.375	0.500						1.125	
24	24.000	0.218	0.250	0.250	0.375	0.562						1.219	
26	26.000			0.312	0.500								
28	28.000			0.312	0.500	0.625							
30	30.000	0.250	0.312	0.312	0.500	0.625							
32	32.000			0.312	0.500	0.625							
34	34.000			0.312	0.500	0.625							
36	36.000			0.312	0.500	0.625							
38	38.000												
40	40.000												
42	42.000												
44	44.000												
46	46.000												
48	48.000												

Location Class
Class 1, 0.80
Class 1, 0.72
Class 2 0.60
Class 3 0.50
Class 4 0.40

Location Class 1, Division 1 0.80
Location Class 1, Division 2 0.72
Location Class 2 0.60
Location Class 3 0.50
Location Class 4 0.40