

Table 1 Material Specification List: Applicable ASTM Specification

GROUP 1 MATERIALS											
Material Group No.	Nominal Designation	Forgings		Castings		Plates		Bars		Tubular	
		Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade
1.1	C-Si C-Mn-Si 3 ¹ / ₂ Ni C-Mn-Si-V	A 105 A 350 A 350 A 350	LF2 LF3 LF6 Cl. 1	A 216	WCB	A 515 A 516 A 537	70 70 Cl. 1	A 105 A 350 A 696 A 350 A 350	LF2 C LF3 LF6 Cl. 1	A 672 A 672	C 70 B 70
1.2	C-Si 2 ¹ / ₂ Ni 3 ¹ / ₂ Ni C-Mn-Si C-Mn-Si-V	 A 350	 LF6 Cl. 2	A 352 A 352 A 216 A 352	LC2 LC3 WCC LCC	A 203 A 203	B E	 A 350	 LF6 Cl. 2	A 106	C
1.3	C C-Si 2 ¹ / ₂ Ni 3 ¹ / ₂ Ni C-Mn-Si C- ¹ / ₂ Mo	 	 	A 352 A 217 A 352	LCB WC1 LC1	A 515 A 203 A 203 A 516	65 A D 65	A 675	70	A 672 A 672	B 65 C 65
1.4	C C-Si C-Mn-Si	 A 350	 LF1	 	 	A 515 A 516	60 60	A 675 A 675 A 350 A 696	60 65 LF1 B	A 106 A 672 A 672	B B 60 C 60
1.5	C- ¹ / ₂ Mo	A 182	F1	 	 	A 204 A 204	A B	A 182	F1	A 691	CM-70
1.6	¹ / ₂ Cr- ¹ / ₂ Mo	 	 	 	 	A 387 A 387	2 Cl. 1 2 Cl. 2	 	 	A 691	¹ / ₂ CR
1.7	C- ¹ / ₂ Mo ¹ / ₂ Cr- ¹ / ₂ Mo Ni- ¹ / ₂ Cr- ¹ / ₂ Mo ³ / ₄ Ni-Mo- ³ / ₄ Cr	A 182	F2	A 217 A 217	WC4 WC5	 	 	A 182	F2	A 691	CM-75
1.8	1Cr- ¹ / ₂ Mo ¹ / ₄ Cr- ¹ / ₂ Mo-Si ² / ₄ Cr-1Mo	 	 	 	 	A 387 A 387 A 387	12 Cl. 2 11 Cl. 1 22 Cl. 1	 	 	A 691 A 691 A 335 A 369	¹ / ₄ CR ² / ₄ CR P22 FP22
1.9	¹ / ₄ Cr- ¹ / ₂ Mo-Si ¹ / ₄ Cr- ¹ / ₂ Mo	A 182	F11 Cl. 2	A 217	WC6	A 387	11 Cl. 2	A 182 A 739	F11 Cl. 2 B11	 	
1.10	² / ₄ Cr-1Mo	A 182	F22 Cl. 3	A 217	WC9	A 387	22 Cl. 2	A 182 A 739	F22 Cl. 3 B22	 	
1.11	3Cr-1Mo Mn- ¹ / ₂ Mo Mn- ¹ / ₂ Mo- ¹ / ₂ Ni Mn- ¹ / ₂ Mo- ³ / ₄ Ni C-Mn-Si C- ¹ / ₂ Mo	A 182	F21	 	 	A 387 A 302 A 302 A 302 A 537 A 204	21 Cl. 2 A & B C D CL2 C	A 182	F21	 	
1.12	5Cr- ¹ / ₂ Mo 5Cr- ¹ / ₂ Mo-Si	 	 	 	 	A 387 A 387	5 Cl. 1 5 Cl. 2	 	 	A 691 A 335 A 369 A 335	5CR P5 FP5 P5b



Table 1 Material Specification List: Applicable ASTM Specification (Cont'd)

GROUP 1 MATERIALS (CONT'D)											
Material Group No.	Nominal Designation	Forgings		Castings		Plates		Bars		Tubular	
		Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade
1.13	5Cr- $\frac{1}{2}$ Mo	A 182	F5a	A 217	C5			A 182	F5a		
1.14	9Cr-1Mo	A 182	F9	A 217	C12			A 182	F9		
1.15	9Cr-1Mo-V	A 182	F91	A 217	C12A	A 387	91 Cl. 2	A 182	F91	A 335	P91
1.16	C- $\frac{1}{2}$ Mo 1Cr- $\frac{1}{2}$ Mo 1 $\frac{1}{4}$ Cr- $\frac{1}{2}$ Mo-Si					A 387	12 Cl. 1			A 335 A 369 A 691 A 335 A 369 A 335 A 369	P1 FP1 1CR P12 FP12 P11 FP11
1.17	1Cr- $\frac{1}{2}$ Mo 5Cr- $\frac{1}{2}$ Mo	A 182 A 182	F12 Cl. 2 F5					A 182 A 182	F12 Cl. 2 F5		
1.18	9Cr-2W-V	A 182	F92					A 182	F92	A 335 A 369	P92 FP92
GROUP 2 MATERIALS											
2.1	18Cr-8Ni	A 182 A 182	F304 F304H	A 351 A 351	CF8 CF10	A 240 A 240	304 304H	A 182 A 182 A 479 A 479	F304 F304H 304 304H	A 312 A 312 A 358 A 376 A 376 A 430 A 430	TP304 TP304H 304 TP304 TP304H FP304 FP304H
2.2	16Cr-12Ni-2Mo 18Cr-8Ni 18Cr-13Ni-3Mo 19Cr-10Ni-3Mo	A 182 A 182 A 182 A 182	F316 F316H F317 F317H	A 351 A 351 A 351 A 351 A 351 A 351	CF8M CF10M CF3A CF8A CG8M CG3M	A 240 A 240 A 240 A 240	316 316H 317 317H	A 182 A 182 A 479 A 479	F316 F316H 316 316H	A 312 A 312 A 358 A 376 A 376 A 430 A 430	TP316 TP316H 316 TP316 TP316H FP316 FP316H TP317 TP317H
2.3	18Cr-8Ni 16Cr-12Ni-2Mo 18Cr-13Ni-3Mo	A 182 A 182 A182	F304L F316L F317L	A 351 A 351	CF3 CF3M	A 240 A 240	304L 316L	A 182 A 479 A 182 A 479 A 182	F304L 304L F316L 316L F317L	A 312 A 312	TP304L TP316L
2.4	18Cr-10Ni-Ti	A 182 A 182	F321 F321H			A 240 A 240	321 321H	A 182 A 479 A 182 A 479	F321 321 F321H 321H	A 312 A 312 A 358 A 376 A 376 A 430 A 430	TP321 TP321H 321 TP321 TP321H FP321 FP321H



Table 1 Material Specification List: Applicable ASTM Specification (Cont'd)

GROUP 2 MATERIALS (CONT'D)																							
Material Group No.	Nominal Designation	Forgings		Castings		Plates		Bars		Tubular													
		Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade												
2.5	18Cr-10Ni-Cb	A 182	F347	A 351	CF8C	A 240	347	A 182	F347	A 312	TP347												
		A 182	F347H				A 240		347H		A 182	F347H	A 312	TP347H									
		A 182	F348				A 240		348		A 182	F348	A 312	TP348									
		A 182	F348H				A 240		348H		A 182	F348H	A 312	TP348H									
A 479	347	A 358	TP347	A 479	347H	A 376	TP347H	A 479	348	A 376	TP348												
												A 479	348H	A 376	TP348H								
																A 479	348H	A 376	TP348H				
												A 479	348H	A 376	TP348H								
																				A 479	348H	A 376	TP348H
												A 479	348H	A 376	TP348H								
A 479	348H	A 376	TP348H																				
A 430	FP347	A 430	FP347H																				
				A 430	FP347H																		
2.6	23Cr-12Ni					A 240	309H			A 312	TP309H												
										A 358	309H												
2.7	25Cr-20Ni	A 182	F310H			A 240	310H	A 182	F310H	A 312	TP310H												
								A 479	310H	A 358	310H												
2.8	20Cr-18Ni-6Mo	A 182	F44	A 351	CK3MCuN	A 240	S31254	A 182	F44	A 312	S31254												
	22Cr-5Ni-3Mo-N	A 182	F51	A 351	CD3MN	A 240	S31803	A 479	S31254	A 358	S31254												
	25Cr-7Ni-4Mo-N	A 182	F53			A 240	S32750	A 479	F51	A 789	S31803												
	24Cr-10Ni-4Mo-V			A 351	CE8MN			A 182	S31803	A 790	S31803												
	25Cr-5Ni-2Mo-3Cu			A 995	CD4MCuN			A 479	F53	A 789	S32750												
	25Cr-7Ni-3.5Mo-W-Cb			A 995	CD3MWCuN			A 479	S32750	A 790	S32750												
	25Cr-7.5Ni-3.5Mo-N-Cu-W	A 182	F55		6A	A 240	S32760	A 479	S32760	A 789	S32760												
A 790	S32760	A 790	S32760																				
2.9	23Cr-12Ni					A 240	309S																
	25Cr-20Ni					A 240	310S	A 479	310S														
2.10	25Cr-12Ni			A 351	CH8																		
				A 351	CH20																		
2.11	18Cr-10Ni-Cb			A 351	CF8C																		
		2.12	25Cr-20Ni			A 351	CK20																
GROUP 3 MATERIALS																							
3.1	35Ni-35Fe-20Cr-Cb	B 462	N08020			B 463	N08020	B 462	N08020	B 464	N08020												
								B 473	N08020			B 468	N08020										
3.2	99Ni	B 564	N02200			B 162	N02200	B 160	N02200	B 161	N02200												
										B 163	N02200												
3.3	99Ni-Low C					B 162	N02201	B 160	N02201														
3.4	67Ni-30Cu	B 564	N04400			B 127	N04400	B 164	N04400	B 165	N04400												
	67Ni-30Cu-S			A 494	M-35-1					B 163	N04400												
				A 494	M-35-1			B 164	N04405														
3.5	72Ni-15Cr-8Fe	B 564	N06600			B 168	N06600	B 166	N06600														
										B 163	N06600												
3.6	33Ni-42Fe-21Cr	B 564	N08800			B 409	N08800	B 408	N08800	B 163	N08800												
3.7	65Ni-28Mo-2Fe	B 462	N10665			B 333	N10665	B 335	N10665	B 622	N10665												
								B 462	N10665														
				B 564	N10665																		
				B 462	N10675																		
	64Ni-29.5Mo-2Cr-2Fe-Mn-W					B 333	N10675	B 335	N10675	B 622	N10675												
		B 564	N10675					B 462	N10675														



Table 1 Material Specification List: Applicable ASTM Specification (Cont'd)

GROUP 3 MATERIALS (CONT'D)											
Material Group No.	Nominal Designation	Forgings		Castings		Plates		Bars		Tubular	
		Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade	Spec. No.	Grade
3.8	54Ni-16Mo-15Cr	B 462	N10276			B 575	N10276	B 462	N10276	B 622	N10276
		B 564	N10276					B 574	N10276		
	60Ni-22Cr-9Mo-3.5Cb	B 564	N06625			B 443	N06625	B 446	N06625		
	62Ni-28Mo-5Fe					B 333	N10001	B 335	N10001	B 622	N10001
	70Ni-16Mo-7Cr-5Fe					B 434	N10003	B 573	N10003		
	61Ni-16Mo-16Cr					B 575	N06455	B 574	N06455	B 622	N06455
	42Ni-21.5Cr-3Mo-2.3Cu	B 564	N08825			B 424	N08825	B 425	N08825	B 423	N08825
	55Ni-21Cr-13.5Mo	B 462	N06022			B 575	N06022	B 462	N06022	B 622	N06022
		B 564	N06022					B 574	N06022		
3.9	55Ni-23Cr-16Mo-1.6Cu	B 462	N06200			B 575	N06200	B 574	N06200	B 622	N06200
		B 564	N06200								
3.9	47Ni-22Cr-9Mo-18Fe					B 435	N06002	B 572	N06002	B 622	N06002
	21Ni-30Fe-22Cr-18Co-3Mo-3W					B 435	R30556	B 572	R30556	B 622	R30556
3.10	25Ni-47Fe-21Cr-5Mo					B 599	N08700	B 672	N08700		
3.11	44Fe-25Ni-21Cr-Mo					B 625	N08904	B 649	N08904	B 677	N08904
3.12	26Ni-43Fe-22Cr-5Mo					B 620	N08320	B 621	N08320	B 622	N08320
	47Ni-22Cr-20Fe-7Mo					B 582	N06985	B 581	N06985	B 622	N06985
	46Fe-24Ni-21Cr-6Mo-Cu-N	B 462	N08367	A 351	CN3MN	B 688	N08367	B 462	N08367		
								B 691	N08367		
3.13	58Ni-33Cr-8Mo	B 462	N06035			B 575	N06035	B 462	N06035	B 622	N06035
		B 564	N06035					B 574	B06035		
3.13	49Ni-25Cr-18Fe-6Mo					B 582	N06975	B 581	N06975	B 622	N06975
	Ni-Fe-Cr-Mo-Cu-Low C	B 564	N08031			B 625	N08031	B 649	N08031	B 622	N08031
3.14	47Ni-22Cr-19Fe-6Mo					B 582	N06007	B 581	N06007	B 622	N06007
	40Ni-29Cr-15Fe-5Mo	B 462	N06030			B 582	N06030	B 462	N06030	B 622	N06030
3.15								B 581	N06030		
	42Ni-2Fe-21Cr	B 564	N08810			B 409	N08810	B 408	N08810	B 407	N08810
3.16	Ni-Mo			A 494	N-12MV						
	Ni-Mo-Cr			A 494	CW-12MW						
3.16	35Ni-19Cr-1 $\frac{1}{4}$ Si					B 536	N08330	B 511	N08330	B 535	N08330
3.17	29Ni-20 $\frac{1}{2}$ Cr-3 $\frac{1}{2}$ Cu-2 $\frac{1}{2}$ Mo			A 351	CN7M						
3.18	72Ni-15Cr-8Fe									B 167	N06600
3.19	57Ni-22Cr-14W-2Mo-La	B 564	N06230			B 435	N06230	B 572	N06230	B 622	N06230

GROUP 4 MATERIALS

Bolting Materials [Note (1)]					
Specification Number	Grade	Notes	Specification Number	Grade	Notes
A 193		(2)(3)	B 164		(10)(11)(12)
A 307B		(4)(5)	B 166		(10)(11)
A 320		(2)(3)(6)	B 335	N10665	(10)
A 354			B 335	N10675	(10)
A 449		(7)(8)	B 408		(10)(11)(12)
A 453	651 and 660	(9)	B 473		(10)
A 540			B 574	N10276	(10)
A 564	630	(7)	B 574	N06022	(10)
			B 637	N07718	(10)



Table 1 Material Specification List: Applicable ASTM Specification (Cont'd)

GENERAL NOTES:

- (a) The user is responsible for assuring that bolting material is not used beyond limits specified in governing codes or regulations.
- (b) ASME Boiler and Pressure Vessel Code Section II materials that also meet the requirements of the listed ASTM specification may also be used.
- (c) Material limitations, restrictions, and special requirements are shown on the pressure–temperature tables, Table 2.

NOTES FOR GROUP 4 MATERIALS:

- (1) Repair welding of bolting material is not permitted.
- (2) Where austenitic bolting materials have been carbide solution treated but not strain hardened, they are designated Class 1 or Class 1A in ASTM A 193. ASTM A 194 nuts of corresponding material are recommended.
- (3) Where austenitic bolting materials have been carbide solution treated and strain hardened, they are designated Class 2, 2B, or 2C in ASTM A 193. ASTM A 194 nuts of corresponding material are recommended.
- (4) For limitations of usage and strength level, see para. 5.1.2.
- (5) Bolts with drilled or undersize heads shall not be used.
- (6) For ferritic bolting materials intended for service at low temperature, ASTM A 194 Grade 7 nuts are recommended.
- (7) Acceptable nuts for use with quenched and tempered steel bolts are ASTM A 194 Grade 2 and 2H.
- (8) Mechanical property requirements for studs shall be the same as for bolts.
- (9) Bolting materials suitable for high-temperature service with austenitic stainless steel valve materials.
- (10) Nuts may be of the same material or may be of compatible grade of ASTM A 194.
- (11) Forging quality not permitted unless the producer last heating or working these parts tests them as required for other permitted conditions in the same specification and certifies their final tensile, yield, and elongation properties to equal or exceed the requirements for one of the other permitted conditions.
- (12) Maximum operating temperature is arbitrarily set at 260°C (500°F), unless material has been annealed, solution annealed, or hot finished, because hard temper adversely affects design stress in the creep-rupture temper range.



Table 2-1.1 Ratings for Group 1.1 Materials

A 105 (1)(2)	A 515 Gr. 70 (1)	A 696 Gr. C (5)	A 672 Gr. B70 (1)
A 216 GR. WCB (1)	A 516 Gr. 70 (1)(3)	A 350 Gr. LF6 Cl. 1 (4)	A 672 Gr. C70 (1)
A 350 Gr. LF2 (1)	A 537 Cl. 1 (5)	A 350 Gr. LF3 (6)	

NOTES:

- (1) Upon prolonged exposure to temperatures above 425°C, the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged usage above 425°C.
- (2) Only killed steel shall be used above 455°C.
- (3) Not to be used over 455°C.
- (4) Not to be used over 260°C.
- (5) Not to be used over 370°C.
- (6) Not to be used over 345°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.6	51.1	102.1	153.2	255.3	425.5	765.9
50	19.2	50.1	100.2	150.4	250.6	417.7	751.9
100	17.7	46.6	93.2	139.8	233.0	388.3	699.0
150	15.8	45.1	90.2	135.2	225.4	375.6	676.1
200	13.8	43.8	87.6	131.4	219.0	365.0	657.0
250	12.1	41.9	83.9	125.8	209.7	349.5	629.1
300	10.2	39.8	79.6	119.5	199.1	331.8	597.3
325	9.3	38.7	77.4	116.1	193.6	322.6	580.7
350	8.4	37.6	75.1	112.7	187.8	313.0	563.5
375	7.4	36.4	72.7	109.1	181.8	303.1	545.5
400	6.5	34.7	69.4	104.2	173.6	289.3	520.8
425	5.5	28.8	57.5	86.3	143.8	239.7	431.5
450	4.6	23.0	46.0	69.0	115.0	191.7	345.1
475	3.7	17.4	34.9	52.3	87.2	145.3	261.5
500	2.8	11.8	23.5	35.3	58.8	97.9	176.3
538	1.4	5.9	11.8	17.7	29.5	49.2	88.6

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.8	51.7	103.4	155.1	258.6	430.9	775.7
100	19.8	51.6	103.3	154.9	258.2	430.3	774.5
150	19.6	51.0	102.1	153.1	255.2	425.3	765.5
200	19.4	50.6	101.1	151.7	252.9	421.4	758.6
250	19.4	50.5	101.1	151.6	252.6	421.1	757.9
300	19.4	50.5	101.1	151.6	252.6	421.1	757.9
325	19.2	50.1	100.2	150.3	250.6	417.6	751.7
350	18.7	48.9	97.8	146.7	244.6	407.6	733.7
375	18.1	47.1	94.2	141.3	235.5	392.5	706.5
400	16.6	43.4	86.8	130.2	217.0	361.7	651.0
425	13.8	36.0	71.9	107.9	179.8	299.6	539.3
450	11.0	28.8	57.5	86.3	143.8	239.6	431.4
475	8.4	21.8	43.6	65.4	109.0	181.6	326.9
500	5.6	14.7	29.4	44.1	73.5	122.4	220.4
538	2.8	7.4	14.8	22.2	36.9	61.6	110.8



Table 2-1.2 Ratings for Group 1.2 Materials

A 106 Gr. C (1)	A 203 Gr. B (2)	A 350 Gr. LF6 Cl. 2 (3)	A 352 Gr. LC3 (4)
A 203 Gr. B (2)	A 216 Gr. WCC (2)	A 352 Gr. LC2 (4)	A 352 Gr. LCC (4)

NOTES:

- (1) Not to be used over 425°C.
- (2) Upon prolonged exposure to temperatures above 425°C, the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged usage above 425°C.
- (3) Not to be used over 260°C.
- (4) Not to be used over 345°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.2	100.3	150.5	250.8	418.1	752.6
200	13.8	48.6	97.2	145.8	243.2	405.4	729.7
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.0	80.0	120.1	200.1	333.5	600.3
375	7.4	37.8	75.7	113.5	189.2	315.3	567.5
400	6.5	34.7	69.4	104.2	173.6	289.3	520.8
425	5.5	28.8	57.5	86.3	143.8	239.7	431.5
450	4.6	23.0	46.0	69.0	115.0	191.7	345.1
475	3.7	17.1	34.2	51.3	85.4	142.4	256.3
500	2.8	11.6	23.2	34.7	57.9	96.5	173.7
538	1.4	5.9	11.8	17.7	29.5	49.2	88.6

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	20.0	51.7	103.4	155.1	258.6	430.9	775.7
300	20.0	51.7	103.4	155.1	258.6	430.9	775.7
325	20.0	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.1	102.2	153.3	255.5	425.8	766.4
375	19.3	48.4	96.7	145.1	241.9	403.1	725.6
400	19.3	43.4	86.8	130.2	217.0	361.7	651.0
425	18.0	36.0	71.9	107.9	179.8	299.6	539.3
450	14.4	28.8	57.5	86.3	143.8	239.6	431.4
475	10.7	21.4	42.7	64.1	106.8	178.0	320.4
500	7.2	14.5	29.0	43.4	72.4	120.7	217.2
538	3.7	7.4	14.8	22.2	36.9	61.6	110.8



Table 2-1.3 Ratings for Group 1.3 Materials

A 203 Gr. A (1)	A 352 Gr. LCB (4)	A 516 Gr. 65 (1)(5)	A 672 Gr. B65 (1)
A 203 Gr. D (1)	A 352 Gr. LC1 (4)	A 675 Gr. 70 (1)(6)(7)	A 672 Gr. C65 (1)
A 217 Gr. WC1 (2)(3)(8)	A 515 Gr. 65 (1)		

NOTES:

- (1) Upon prolonged exposure to temperatures above 425°C, the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged usage above 425°C.
- (2) Upon prolonged exposure to temperatures above 470°C, the carbide phase of steel of carbon-molybdenum steel may be converted to graphite. Permissible, but not recommended for prolonged usage above 470°C.
- (3) Use normalized and tempered material only.
- (4) Not to be used over 345°C.
- (5) Not to be used over 455°C.
- (6) Leaded grades shall not be used where welded or in any application above 260°C.
- (7) For service temperatures above 455°C, it is recommended that killed steels containing not less than 0.10% residual silicon be used.
- (8) The deliberate addition of any element not listed in ASTM A 217, Table 1 is prohibited, except that Ca and Mg may be added for deoxidation.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	18.4	48.0	96.0	144.1	240.1	400.1	720.3
50	18.2	47.5	94.9	142.4	237.3	395.6	712.0
100	17.4	45.3	90.7	136.0	226.7	377.8	680.1
150	15.8	43.9	87.9	131.8	219.7	366.1	659.1
200	13.8	42.5	85.1	127.6	212.7	354.4	638.0
250	12.1	40.8	81.6	122.3	203.9	339.8	611.7
300	10.2	38.7	77.4	116.1	193.4	322.4	580.3
325	9.3	37.6	75.2	112.7	187.9	313.1	563.7
350	8.4	36.4	72.8	109.2	182.0	303.3	545.9
375	7.4	35.0	69.9	104.9	174.9	291.4	524.6
400	6.5	32.6	65.2	97.9	163.1	271.9	489.3
425	5.5	27.3	54.6	81.9	136.5	227.5	409.5
450	4.6	21.6	43.2	64.8	107.9	179.9	323.8
475	3.7	15.7	31.3	47.0	78.3	130.6	235.0
500	2.8	11.1	22.1	33.2	55.4	92.3	166.1
538	1.4	5.9	11.8	17.7	29.5	49.2	88.6

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	48.0	96.0	144.1	240.1	400.1	720.3
50	20.0	48.0	96.0	144.1	240.1	400.1	720.3
100	20.0	48.0	96.0	144.1	240.1	400.1	720.3
150	20.0	48.0	96.0	144.1	240.1	400.1	720.3
200	20.0	48.0	96.0	144.1	240.1	400.1	720.3
250	20.0	48.0	96.0	144.1	240.1	400.1	720.3
300	20.0	48.0	96.0	144.1	240.1	400.1	720.3
325	20.0	48.0	95.9	143.9	239.8	399.6	719.3
350	19.8	47.3	94.6	141.9	236.5	394.1	709.4
375	19.3	44.9	89.9	134.8	224.7	374.6	674.2
400	19.3	40.8	81.6	122.3	203.9	339.8	611.7
425	17.1	34.1	68.3	102.4	170.6	284.4	511.9
450	13.5	27.0	54.0	81.0	134.9	224.9	404.8
475	9.8	19.6	39.2	58.8	97.9	163.2	293.8
500	6.9	13.8	27.7	41.5	69.2	115.3	207.6
538	3.7	7.4	14.8	22.2	36.9	61.6	110.8



Table 2-1.4 Ratings for Group 1.4 Materials

A 106 Gr. B (1)	A 515 Gr. 60 (1)(2)	A 675 Gr. 60 (1)(2)(3)	A 672 Gr. B60 (1)
A 350 Gr. LF1 Cl. 1 (1)	A 516 Gr. 60 (1)(2)	A 675 Gr. 65 (1)(3)(4)	A 672 Gr. C60 (1)
			A 696 Gr. B (5)

NOTES:

- (1) Upon prolonged exposure to temperatures above 425°C, the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged usage above 425°C.
- (2) Not to be used over 455°C.
- (3) Lead grades shall not be used where welded or in any application above 260°C.
- (4) For service temperatures above 455°C, it is recommended that killed steels containing not less than 0.10% residual silicon be used.
- (5) Not to be used over 370°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	16.3	42.6	85.1	127.7	212.8	354.6	638.3
50	16.0	41.8	83.5	125.3	208.9	348.1	626.6
100	14.9	38.8	77.7	116.5	194.2	323.6	582.5
150	14.4	37.6	75.1	112.7	187.8	313.0	563.4
200	13.8	36.4	72.8	109.2	182.1	303.4	546.2
250	12.1	34.9	69.8	104.7	174.6	291.0	523.7
300	10.2	33.2	66.4	99.5	165.9	276.5	497.7
325	9.3	32.2	64.5	96.7	161.2	268.6	483.5
350	8.4	31.2	62.5	93.7	156.2	260.4	468.7
375	7.4	30.4	60.7	91.1	151.8	253.0	455.3
400	6.5	29.3	58.7	88.0	146.7	244.5	440.1
425	5.5	25.8	51.5	77.3	128.8	214.7	386.5
450	4.6	21.4	42.7	64.1	106.8	178.0	320.4
475	3.7	14.1	28.2	42.3	70.5	117.4	211.4
500	2.8	10.3	20.6	30.9	51.5	85.9	154.6
538	1.4	5.9	11.8	17.7	29.5	49.2	88.6

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	17.0	44.3	88.6	133.0	221.6	369.4	664.9
50	17.0	44.3	88.6	133.0	221.6	369.4	664.9
100	17.0	44.3	88.6	133.0	221.6	369.4	664.9
150	17.0	44.3	88.6	133.0	221.6	369.4	664.9
200	17.0	44.3	88.6	133.0	221.6	369.4	664.9
250	17.0	44.3	88.6	133.0	221.6	369.4	664.9
300	16.5	43.0	86.0	129.0	215.0	358.3	644.9
325	16.1	42.0	83.9	125.9	209.9	349.8	629.6
350	15.6	40.7	81.4	122.1	203.4	339.1	610.3
375	15.2	39.5	79.1	118.6	197.6	329.4	592.9
400	14.6	38.2	76.3	114.5	190.8	317.9	572.3
425	12.4	32.3	64.6	96.9	161.5	269.2	484.5
450	10.2	26.7	53.4	80.1	133.5	222.5	400.5
475	6.8	17.6	35.2	52.9	88.1	146.8	264.3
500	4.9	12.9	25.8	38.7	64.4	107.4	193.3
538	2.8	7.4	14.8	22.2	36.9	61.6	110.8



Table 2-1.5 Ratings for Group 1.5 Materials

A 182 Gr. F1 (1) A 204 Gr. B (1) A 691 Gr. CM-70 (1)
 A 204 Gr. A (1)

NOTE:

(1) Upon prolonged exposure to temperatures above 470°C, the carbide phase of steel of carbon-molybdenum steel may be converted to graphite. Permissible, but not recommended for prolonged usage above 470°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	18.4	48.0	96.0	144.1	240.1	400.1	720.3
50	18.4	48.0	96.0	144.1	240.1	400.1	720.3
100	17.7	47.9	95.9	143.8	239.7	399.5	719.1
150	15.8	47.3	94.7	142.0	236.7	394.5	710.1
200	13.8	45.8	91.6	137.4	229.0	381.7	687.1
250	12.1	44.5	89.0	133.5	222.5	370.9	667.6
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	24.1	48.1	72.2	120.3	200.5	361.0
538	1.4	11.3	22.7	34.0	56.7	94.6	170.2

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	18.4	48.0	96.0	144.1	240.1	400.1	720.3
50	18.4	48.0	96.0	144.1	240.1	400.1	720.3
100	18.4	48.0	96.0	144.1	240.1	400.1	720.3
150	18.4	48.0	96.0	144.1	240.1	400.1	720.3
200	18.4	48.0	96.0	144.1	240.1	400.1	720.3
250	18.4	48.0	96.0	144.1	240.1	400.1	720.3
300	18.4	48.0	96.0	144.1	240.1	400.1	720.3
325	18.4	48.0	96.0	144.1	240.1	400.1	720.3
350	18.4	48.0	96.0	144.1	240.1	400.1	720.3
375	18.4	48.0	96.0	144.1	240.1	400.1	720.3
400	18.4	48.0	96.0	144.1	240.1	400.1	720.3
425	18.4	48.0	96.0	144.1	240.1	400.1	720.3
450	18.1	47.3	94.4	141.4	235.8	393.1	707.6
475	16.4	42.8	85.5	128.2	213.7	356.3	641.3
500	11.5	30.1	60.2	90.2	150.4	250.7	451.2
538	5.4	14.2	28.4	42.6	70.9	118.2	212.8



Table 2-1.6 Ratings for Group 1.6 Materials

A 387 Gr. 2 Cl. 1	A 387 Gr. 2 Cl. 2		A 691 Gr. 1/2CR				
A – Standard Class							
Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	15.6	40.6	81.3	121.9	203.1	338.6	609.4
50	15.6	40.6	81.3	121.9	203.1	338.6	609.4
100	15.6	40.6	81.3	121.9	203.1	338.6	609.4
150	15.6	40.6	81.3	121.9	203.1	338.6	609.4
200	13.8	40.6	81.3	121.9	203.1	338.6	609.4
250	12.1	39.8	79.5	119.3	198.8	331.4	596.4
300	10.2	38.7	77.3	116.0	193.3	322.1	579.8
325	9.3	38.1	76.1	114.2	190.3	317.1	570.8
350	8.4	37.4	74.8	112.2	187.1	311.8	561.2
375	7.4	36.8	73.5	110.3	183.8	306.3	551.4
400	6.5	36.0	72.0	108.0	179.9	299.9	539.8
425	5.5	35.1	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	25.7	51.3	77.0	128.3	213.9	384.9
538	1.4	13.9	27.9	41.8	69.7	116.2	209.2
B – Special Class							
Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	15.6	40.6	81.3	121.9	203.1	338.6	609.4
50	15.6	40.6	81.3	121.9	203.1	338.6	609.4
100	15.6	40.6	81.3	121.9	203.1	338.6	609.4
150	15.6	40.6	81.3	121.9	203.1	338.6	609.4
200	15.6	40.6	81.3	121.9	203.1	338.6	609.4
250	15.6	40.6	81.3	121.9	203.1	338.6	609.4
300	15.6	40.6	81.3	121.9	203.1	338.6	609.4
325	15.6	40.6	81.3	121.9	203.1	338.6	609.4
350	15.6	40.6	81.3	121.9	203.1	338.6	609.4
375	15.6	40.6	81.3	121.9	203.1	338.6	609.4
400	15.6	40.6	81.3	121.9	203.1	338.6	609.4
425	15.6	40.6	81.3	121.9	203.1	338.6	609.4
450	15.6	40.6	81.3	121.9	203.1	338.6	609.4
475	15.6	40.6	81.3	121.9	203.1	338.6	609.4
500	12.3	32.0	64.1	96.1	160.1	266.9	480.4
538	6.7	17.4	34.9	52.3	87.2	145.3	261.5



Table 2-1.7 Ratings for Group 1.7 Materials

A 691 Gr. CM-75	A 182 Gr. F2 (1)	A 217 Gr. WC4 (1)(2)(3)	A 217 Gr. WC5 (2)
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NOTES:

- (1) Not to be used over 538°C.
 (2) Use normalized and tempered material only.
 (3) The deliberate addition of any element not listed in ASTM A 217, Table 1 is prohibited, except that Ca and Mg may be added for deoxidation.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	26.7	53.4	80.1	133.4	222.4	400.3
538	1.4	13.9	27.9	41.8	69.7	116.2	209.2
550	1.4(a)	12.6	25.2	37.8	63.0	105.0	188.9
575	1.4(a)	7.2	14.4	21.5	35.9	59.8	107.7

GENERAL NOTE:

- (a) For welding-end valves only. Class 150 flanged-end valves terminate at 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.8	51.7	103.4	155.1	258.6	430.9	775.7
100	19.8	51.7	103.4	155.1	258.6	430.9	775.7
150	19.8	51.7	103.4	155.1	258.6	430.9	775.7
200	19.8	51.7	103.4	155.1	258.6	430.9	775.7
250	19.8	51.7	103.4	155.1	258.6	430.9	775.7
300	19.8	51.7	103.4	155.1	258.6	430.9	775.7
325	19.8	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.5	102.8	154.3	257.1	428.6	771.4
375	19.3	50.6	101.0	151.5	252.5	420.9	757.4
400	19.3	50.3	100.6	150.6	251.2	418.3	753.2
425	19.0	49.6	99.3	148.9	248.2	413.7	744.6
450	18.1	47.3	94.4	141.4	235.8	393.1	707.6
475	16.4	42.8	85.5	128.2	213.7	356.3	641.3
500	12.8	33.4	66.7	100.1	166.8	278.0	500.3
538	6.7	17.4	34.9	52.3	87.2	145.3	261.5
550	6.0	15.7	31.5	47.2	78.7	131.2	236.2
575	3.4	9.0	17.9	26.9	44.9	74.8	134.6



Table 2-1.8 Ratings for Group 1.8 Materials

A 335 Gr. P22 (1)	A 387 Gr. 11 Cl. 1 (1)	A 387 Gr. 12 Cl. 2 (1)	A 691 Gr. 1 $\frac{1}{4}$ CR (1)
A 369 Gr. FP 22 (1)	A 387 Gr. 22 Cl. 1 (1)	A 691 Gr. 2 $\frac{1}{4}$ CR (1)	

NOTE:

(1) Permissible, but not recommended for prolonged use above 595°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	16.3	42.6	85.1	127.7	212.8	354.6	638.3
50	16.1	41.9	83.9	125.8	209.6	349.4	628.9
100	15.2	39.6	79.2	118.7	197.9	329.8	593.7
150	14.8	38.6	77.1	115.7	192.9	321.4	578.6
200	13.8	38.2	76.4	114.6	190.9	318.2	572.8
250	12.1	38.2	76.3	114.5	190.8	317.9	572.3
300	10.2	38.2	76.3	114.5	190.8	317.9	572.3
325	9.3	38.2	76.3	114.5	190.8	317.9	572.3
350	8.4	38.0	76.0	114.0	189.9	316.5	569.8
375	7.4	37.3	74.7	112.0	186.7	311.2	560.2
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	25.6	51.3	76.9	128.2	213.7	384.7
538	1.4	14.9	29.8	44.7	74.5	124.1	223.4
550	1.4(a)	12.7	25.4	38.1	63.5	105.9	190.6
575	1.4(a)	8.8	17.6	26.4	44.0	73.4	132.0
600	1.4(a)	6.1	12.1	18.2	30.3	50.4	90.8
625	1.4(a)	4.0	8.0	12.1	20.1	33.5	60.4
650	1.0(a)	2.6	5.2	7.8	13.0	21.7	39.0

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	17.0	44.3	88.6	133.0	221.6	369.4	664.9
50	17.0	44.3	88.6	132.9	221.5	369.2	664.6
100	16.9	44.1	88.2	132.3	220.5	367.5	661.5
150	16.5	43.0	86.0	129.0	215.0	358.3	644.9
200	16.5	43.0	86.0	129.0	215.0	358.3	644.9
250	16.5	43.0	86.0	129.0	215.0	358.3	644.9
300	16.5	43.0	86.0	129.0	215.0	358.3	644.9
325	16.5	43.0	86.0	129.0	215.0	358.3	644.9
350	16.5	43.0	86.0	129.0	215.0	358.3	644.9
375	16.5	43.0	86.0	129.0	215.0	358.3	644.9
400	16.5	43.0	86.0	129.0	215.0	358.3	644.9
425	16.5	43.0	86.0	129.0	215.0	358.3	644.9
450	16.5	43.0	86.0	129.0	215.0	358.3	644.9
475	15.7	40.9	81.8	122.7	204.6	341.0	613.7
500	12.3	32.1	64.1	96.2	160.3	267.1	480.8
538	7.1	18.6	37.2	55.8	93.1	155.1	279.2
550	6.1	15.9	31.8	47.7	79.4	132.4	238.3
575	4.2	11.0	22.0	33.0	55.0	91.7	165.1
600	2.9	7.6	15.1	22.7	37.8	63.0	113.5
625	1.9	5.0	10.1	15.1	25.1	41.9	75.4
650	1.2	3.3	6.5	9.8	16.3	27.1	48.8



Table 2-1.9 Ratings for Group 1.9 Materials

A 182 Gr. F11 Cl. 2 (1)(2)	A 217 Gr. WC6 (1)(3)(4)	A 387 Gr. 11 Cl. 2 (2)	A 739 Gr. B11 (2)
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NOTES:

- (1) Use normalized and tempered material only.
- (2) Permissible, but not recommended for prolonged use above 595°C.
- (3) Not to be used over 595°C.
- (4) The deliberate addition of any element not listed in ASTM A 217, Table 1 is prohibited, except that Ca and Mg may be added for deoxidation.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.4	257.4	429.0	772.2
150	15.8	49.7	99.5	149.2	248.7	414.5	746.2
200	13.8	48.0	95.9	143.9	239.8	399.6	719.4
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	25.7	51.5	77.2	128.6	214.4	385.9
538	1.4	14.9	29.8	44.7	74.5	124.1	223.4
550	1.4(a)	12.7	25.4	38.1	63.5	105.9	190.6
575	1.4(a)	8.8	17.6	26.4	44.0	73.4	132.0
600	1.4(a)	6.1	12.2	18.3	30.5	50.9	91.6
625	1.4(a)	4.3	8.5	12.8	21.3	35.5	63.9
650	1.1(a)	2.8	5.7	8.5	14.2	23.6	42.6

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.8	51.7	103.4	155.1	258.6	430.9	775.7
100	19.8	51.7	103.4	155.1	258.6	430.9	775.7
150	19.8	51.7	103.4	155.1	258.6	430.9	775.7
200	19.8	51.7	103.4	155.1	258.6	430.9	775.7
250	19.8	51.7	103.4	155.1	258.6	430.9	775.7
300	19.8	51.7	103.4	155.1	258.6	430.9	775.7
325	19.8	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.5	102.8	154.3	257.1	428.6	771.4
375	19.3	50.6	101.0	151.5	252.5	420.9	757.4
400	19.3	50.3	100.6	150.6	251.2	418.3	753.2
425	19.0	49.6	99.3	148.9	248.2	413.7	744.6
450	18.1	47.3	94.4	141.4	235.8	393.1	707.6
475	16.4	42.8	85.5	128.2	213.7	356.3	641.3
500	12.3	32.2	64.3	96.5	160.8	268.0	482.4
538	7.1	18.6	37.2	55.8	93.1	155.1	279.2
550	6.1	15.9	31.8	47.7	79.4	132.4	238.3
575	4.2	11.0	22.0	33.0	55.0	91.7	165.1
600	2.9	7.6	15.3	22.9	38.2	63.6	114.5
625	2.0	5.3	10.6	16.0	26.6	44.4	79.9
650	1.4	3.5	7.1	10.6	17.7	29.5	53.2



Table 2-1.10 Ratings for Group 1.10 Materials

A 182 Gr. F22 Cl. 3 (1)	A 217 Gr. WC9 (2)(3)(4)	A 387 Gr. 22 Cl. 2 (1)	A 739 Gr. B22 (2)
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NOTES:

- (1) Permissible, but not recommended for prolonged use above 595°C.
- (2) Use normalized and tempered material only.
- (3) Not to be used over 595°C.
- (4) The deliberate addition of any element not listed in ASTM A 217, Table 1 is prohibited, except that Ca and Mg may be added for deoxidation.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	18.4	36.9	55.3	92.2	153.7	276.6
550	1.4(a)	15.6	31.3	46.9	78.2	130.3	234.5
575	1.4(a)	10.5	21.1	31.6	52.6	87.7	157.9
600	1.4(a)	6.9	13.8	20.7	34.4	57.4	103.3
625	1.4(a)	4.5	8.9	13.4	22.3	37.2	66.9
650	1.1(a)	2.8	5.7	8.5	14.2	23.6	42.6

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.8	51.7	103.4	155.1	258.6	430.9	775.7
100	19.8	51.6	103.2	154.9	258.1	430.2	774.3
150	19.5	51.0	101.9	152.9	254.8	424.6	764.3
200	19.3	50.2	100.4	150.7	251.1	418.5	753.4
250	19.2	50.0	100.0	149.9	249.9	416.5	749.7
300	19.1	49.8	99.6	149.3	248.9	414.8	746.7
325	19.0	49.6	99.2	148.8	248.0	413.3	743.9
350	18.9	49.2	98.4	147.6	246.0	410.0	738.1
375	18.7	48.8	97.5	146.3	243.8	406.3	731.3
400	18.7	48.8	97.5	146.3	243.8	406.3	731.3
425	18.7	48.8	97.5	146.3	243.8	406.3	731.3
450	18.1	47.3	94.4	141.4	235.8	393.1	707.6
475	16.4	42.8	85.5	128.2	213.7	356.3	641.3
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	8.8	23.0	46.1	69.1	115.2	192.1	345.7
550	7.5	19.5	39.1	58.6	97.7	162.8	293.1
575	5.0	13.2	26.3	39.5	65.8	109.7	197.4
600	3.3	8.6	17.2	25.8	43.0	71.7	129.1
625	2.1	5.6	11.2	16.7	27.9	46.5	83.7
650	1.4	3.5	7.1	10.6	17.7	29.5	53.2



Table 2-1.11 Ratings for Group 1.11 Materials

A 182 Gr. F21 (1)	A 302 Gr. B (2)	A 302 Gr. D (2)	A 537 Cl. 2 (3)
A 204 Gr. C (4)	A 302 Gr. C (2)	A 387 Gr. 21 Cl. 2 (1)	
A 302 Gr. A (2)			

NOTES:

- (1) Permissible, but not recommended for prolonged use above 595°C.
- (2) Upon prolonged exposure to temperatures above 470°C, the carbide phase of carbon-molybdenum steel may be converted to graphite. Permissible, but not recommended for prolonged use above 470°C.
- (3) Not to be used over 370°C.
- (4) Upon prolonged exposure to temperatures above 470°C, the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged usage above 470°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	23.6	47.1	70.7	117.8	196.3	353.3
538	1.4	11.3	22.7	34.0	56.7	94.6	170.2
550	1.4(a)	11.3	22.7	34.0	56.7	94.6	170.2
575	1.4(a)	10.1	20.1	30.2	50.3	83.8	150.9
600	1.4(a)	7.1	14.2	21.3	35.6	59.3	106.7
625	1.4(a)	5.3	10.6	15.9	26.5	44.2	79.6
650	1.2(a)	3.1	6.1	9.2	15.4	25.6	46.1

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.



Table 2-1.11 Ratings for Group 1.11 Materials (Cont'd)

A 182 Gr. F21 (1)	A 302 Gr. B (2)	A 302 Gr. D (2)	A 537 Cl. 2 (3)
A 204 Gr. C (4)	A 302 Gr. C (2)	A 387 Gr. 21 Cl. 2 (1)	
A 302 Gr. A (2)			

NOTES:

- (1) Permissible, but not recommended for prolonged use above 595°C.
- (2) Upon prolonged exposure to temperatures above 470°C, the carbide phase of carbon-molybdenum steel may be converted to graphite. Permissible, but not recommended for prolonged use above 470°C.
- (3) Not to be used over 370°C.
- (4) Upon prolonged exposure to temperatures above 470°C, the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged usage above 470°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	20.0	51.7	103.4	155.1	258.6	430.9	775.7
300	20.0	51.7	103.4	155.1	258.6	430.9	775.7
325	20.0	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.5	102.8	154.3	257.1	428.6	771.4
375	19.3	50.6	101.0	151.5	252.5	420.9	757.4
400	19.3	50.3	100.6	150.6	251.2	418.3	753.2
425	19.0	49.6	99.3	148.9	248.2	413.7	744.6
450	18.1	47.3	94.4	141.4	235.8	393.1	707.6
475	16.1	42.1	84.2	126.3	210.5	350.9	631.6
500	11.3	29.4	58.9	88.3	147.2	245.4	441.6
538	5.4	14.2	28.4	42.6	70.9	118.2	212.8
550	5.4	14.2	28.4	42.6	70.9	118.2	212.8
575	4.9	12.8	25.5	38.3	63.9	106.4	191.6
600	3.4	8.9	17.8	26.7	44.4	74.1	133.3
625	2.5	6.6	13.3	19.9	33.2	55.3	99.6
650	1.5	3.8	7.7	11.5	19.2	32.0	57.6



Table 2-1.12 Ratings for Group 1.12 Materials

	A 335 Gr. P5 A 335 Gr. P5b	A 369 Gr. FP5 A 387 Gr. 5 Cl. 1	A 387 Gr. 5 Cl. 2	A 691 Gr. 5CR			
A – Standard Class							
	Working Pressures by Class, bar						
Temperature, °C	150	300	600	900	1500	2500	4500
-29 to 38	16.3	42.6	85.1	127.7	212.8	354.6	638.3
50	16.0	41.6	83.3	124.9	208.2	347.0	624.7
100	14.7	38.3	76.5	114.8	191.3	318.9	574.0
150	14.2	37.0	74.0	111.0	185.1	308.4	555.2
200	13.8	36.6	73.3	109.9	183.1	305.2	549.4
250	12.1	36.4	72.7	109.1	181.8	303.0	545.4
300	10.2	35.9	71.8	107.7	179.5	299.2	538.5
325	9.3	35.6	71.2	106.8	178.0	296.6	534.0
350	8.4	35.2	70.4	105.5	175.9	293.2	527.7
375	7.4	34.6	69.3	103.9	173.2	288.6	519.5
400	6.5	33.9	67.7	101.6	169.3	282.1	507.8
425	5.5	32.8	65.7	98.5	164.2	273.6	492.5
450	4.6	31.7	63.4	95.1	158.5	264.1	475.4
475	3.7	27.3	54.5	81.8	136.3	227.1	408.8
500	2.8	21.4	42.8	64.1	106.9	178.2	320.7
538	1.4	13.7	27.4	41.1	68.6	114.3	205.7
550	1.4(a)	12.0	24.1	36.1	60.2	100.4	180.7
575	1.4(a)	8.9	17.8	26.7	44.4	74.0	133.3
600	1.4(a)	6.2	12.5	18.7	31.2	51.9	93.5
625	1.4(a)	4.0	8.0	12.0	20.0	33.3	59.9
650	0.9(a)	2.4	4.7	7.1	11.8	19.7	35.5

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

	Working Pressures by Class, bar						
Temperature, °C	150	300	600	900	1500	2500	4500
-29 to 38	17.0	44.3	88.6	133.0	221.6	369.4	664.9
50	17.0	44.3	88.6	132.9	221.5	369.2	664.6
100	16.9	44.1	88.2	132.3	220.5	367.4	661.4
150	16.5	42.9	85.8	128.7	214.6	357.6	643.7
200	16.3	42.6	85.3	127.9	213.2	355.4	639.7
250	16.3	42.5	85.0	127.5	212.5	354.2	637.5
300	16.1	42.1	84.1	126.2	210.3	350.4	630.8
325	16.0	41.7	83.3	125.0	208.3	347.2	624.9
350	15.7	41.0	82.0	123.0	205.0	341.7	615.1
375	15.5	40.3	80.7	121.0	201.7	336.1	605.0
400	15.5	40.3	80.7	121.0	201.7	336.1	605.0
425	15.5	40.3	80.7	121.0	201.7	336.1	605.0
450	15.5	40.3	80.7	121.0	201.7	336.1	605.0
475	13.2	34.3	68.6	103.0	171.6	286.0	514.8
500	10.2	26.7	53.4	80.2	133.6	222.7	400.9
538	6.6	17.1	34.3	51.4	85.7	142.8	257.1
550	5.8	15.1	30.1	45.2	75.3	125.5	225.9
575	4.3	11.1	22.2	33.3	55.5	92.5	166.6
600	3.0	7.8	15.6	23.4	38.9	64.9	116.8
625	1.9	5.0	10.0	15.0	24.9	41.6	74.8
650	1.1	3.0	5.9	8.9	14.8	24.6	44.3



Table 2-1.13 Ratings for Group 1.13 Materials

A 182 Gr. F5a		A 217 Gr. C5 (1)(2)					
NOTES:							
(1) Use normalized and tempered material only.							
(2) The deliberate addition of any element not listed in ASTM A 217, Table 1 is prohibited, except that Ca and Mg may be added for deoxidation.							
A – Standard Class							
Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	27.9	55.7	83.6	139.3	232.1	417.8
500	2.8	21.4	42.8	64.1	106.9	178.2	320.7
538	1.4	13.7	27.4	41.1	68.6	114.3	205.7
550	1.4(a)	12.0	24.1	36.1	60.2	100.4	180.7
575	1.4(a)	8.9	17.8	26.7	44.4	74.0	133.3
600	1.4(a)	6.2	12.5	18.7	31.2	51.9	93.5
625	1.4(a)	4.0	8.0	12.0	20.0	33.3	59.9
650	0.9(a)	2.4	4.7	7.1	11.8	19.7	35.5

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	20.0	51.7	103.4	155.1	258.6	430.9	775.7
300	20.0	51.7	103.4	155.1	258.6	430.9	775.7
325	20.0	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.5	102.8	154.3	257.1	428.6	771.4
375	19.3	50.6	101.0	151.5	252.5	420.9	757.4
400	19.3	50.3	100.6	150.6	251.2	418.3	753.2
425	19.0	49.6	99.3	148.9	248.2	413.7	744.6
450	18.1	45.2	90.3	135.5	225.9	376.5	677.6
475	16.4	34.8	69.6	104.5	174.1	290.2	522.3
500	13.4	26.7	53.4	80.2	133.6	222.7	400.9
538	8.6	17.1	34.3	51.4	85.7	142.8	257.1
550	7.5	15.1	30.1	45.2	75.3	125.5	225.9
575	5.6	11.1	22.2	33.3	55.5	92.5	166.6
600	3.9	7.8	15.6	23.4	38.9	64.9	116.8
625	2.5	5.0	10.0	15.0	24.9	41.6	74.8
650	1.5	3.0	5.9	8.9	14.8	24.6	44.3



Table 2-1.14 Ratings for Group 1.14 Materials

A 182 Gr. F9

A 217 Gr. C12 (1)(2)

NOTES:

- (1) Use normalized and tempered material only.
 (2) The deliberate addition of any element not listed in ASTM A 217, Table 1 is prohibited, except that Ca and Mg may be added for deoxidation.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	17.5	35.0	52.5	87.5	145.8	262.4
550	1.4(a)	15.0	30.0	45.0	75.0	125.0	225.0
575	1.4(a)	10.5	20.9	31.4	52.3	87.1	156.8
600	1.4(a)	7.2	14.4	21.5	35.9	59.8	107.7
625	1.4(a)	5.0	9.9	14.9	24.8	41.4	74.5
650	1.4(a)	3.5	7.1	10.6	17.7	29.5	53.2

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	20.0	51.7	103.4	155.1	258.6	430.9	775.7
300	20.0	51.7	103.4	155.1	258.6	430.9	775.7
325	20.0	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.5	102.8	154.3	257.1	428.6	771.4
375	19.3	50.6	101.0	151.5	252.5	420.9	757.4
400	19.3	50.3	100.6	150.6	251.2	418.3	753.2
425	19.0	49.6	99.3	148.9	248.2	413.7	744.6
450	18.1	47.3	94.4	141.4	235.8	393.1	707.6
475	16.4	42.8	85.5	128.2	213.7	356.3	641.3
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	8.4	21.9	43.7	65.6	109.3	182.2	328.0
550	7.2	18.7	37.5	56.2	93.7	156.2	281.2
575	5.0	13.1	26.1	39.2	65.3	108.9	196.0
600	3.4	9.0	17.9	26.9	44.9	74.8	134.6
625	2.4	6.2	12.4	18.6	31.1	51.8	93.2
650	1.7	4.4	8.9	13.3	22.2	36.9	66.5



Table 2-1.15 Ratings for Group 1.15 Materials

A 182 Gr. F91	A 217 Gr. C12A (1)	A 387 Gr. 91 Cl. 2	A 335 Gr. P91
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NOTE:

- (1) The deliberate addition of any element not listed in ASTM A 217, Table 1 is prohibited, except that Ca and Mg may be added for deoxidation.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	19.5	39.0	58.5	97.5	162.5	292.5
625	1.4(a)	14.6	29.2	43.8	73.0	121.7	219.1
650	1.4(a)	9.9	19.9	29.8	49.6	82.7	148.9

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	20.0	51.7	103.4	155.1	258.6	430.9	775.7
300	20.0	51.7	103.4	155.1	258.6	430.9	775.7
325	20.0	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.5	102.8	154.3	257.1	428.6	771.4
375	19.3	50.6	101.0	151.5	252.5	420.9	757.4
400	19.3	50.3	100.6	150.6	251.2	418.3	753.2
425	19.0	49.6	99.3	148.9	248.2	413.7	744.6
450	18.1	47.3	94.4	141.4	235.8	393.1	707.6
475	16.4	42.8	85.5	128.2	213.7	356.3	641.3
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	9.3	24.4	48.7	73.1	121.9	203.1	365.6
625	7.0	18.3	36.5	54.8	91.3	152.1	273.8
650	4.8	12.4	24.8	37.2	62.1	103.4	186.2



Table 2-1.16 Ratings for Group 1.16 Materials

A 335 Gr. P1 (1)(2)	A 335 Gr. P12 (3)	A 369 Gr. FP11(3)	A 387 Gr. 12 Cl. 1 (3)
A 335 Gr. P11 (3)	A 369 Gr. FP1 (1)(2)	A 369 Gr. FP12 (3)	A 691 Gr. 1CR (3)(4)

NOTES:

- (1) Upon prolonged exposure to temperatures above 470°C, the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged usage above 470°C.
- (2) Not to be used over 538°C.
- (3) Permissible, but not recommended for prolonged use above 595°C.
- (4) Use normalized and tempered material only.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	15.6	40.6	81.3	121.9	203.1	338.6	609.4
50	15.5	40.3	80.7	121.0	201.7	336.1	605.0
100	15.0	39.1	78.1	117.2	195.3	325.4	585.8
150	14.3	37.3	74.5	111.8	186.4	310.6	559.1
200	13.8	36.0	72.0	108.0	180.0	300.0	540.0
250	12.1	34.8	69.7	104.5	174.2	290.3	522.6
300	10.2	33.7	67.4	101.1	168.4	280.7	505.3
325	9.3	33.1	66.3	99.4	165.7	276.2	497.1
350	8.4	32.6	65.2	97.8	163.0	271.6	488.9
375	7.4	32.0	64.0	95.9	159.9	266.5	479.6
400	6.5	31.5	62.9	94.4	157.3	262.1	471.8
425	5.5	30.7	61.4	92.1	153.4	255.7	460.3
450	4.6	29.9	59.8	89.8	149.6	249.3	448.8
475	3.7	29.2	58.3	87.5	145.8	243.0	437.3
500	2.8	22.8	45.6	68.5	114.1	190.2	342.3
538	1.4	11.3	22.7	34.0	56.7	94.6	170.2
550	1.4(a)	10.7	21.4	32.2	53.6	89.4	160.8
575	1.4(a)	8.8	17.6	26.4	44.0	73.4	132.0
600	1.4(a)	6.1	12.1	18.2	30.3	50.4	90.8
625	1.4(a)	4.0	8.0	12.1	20.1	33.5	60.4
650	1.0(a)	2.6	5.2	7.8	13.0	21.7	39.0

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.



Table 2-1.16 Ratings for Group 1.16 Materials (Cont'd)

A 335 Gr. P1 (1)(2)	A 335 Gr. P12 (3)	A 369 Gr. FP11(3)	A 387 Gr. 12 Cl. 1 (3)
A 335 Gr. P11 (2)	A 369 Gr. FP1 (1)(2)	A 369 Gr. FP12 (3)	A 691 Gr. 1CR (3)(4)

NOTES:

- (1) Upon prolonged exposure to temperatures above 470°C, the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged usage above 470°C.
- (2) Not to be used over 538°C.
- (3) Permissible, but not recommended for prolonged use above 595°C.
- (4) Use normalized and tempered material only.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	15.6	40.6	81.3	121.9	203.1	338.6	609.4
50	15.5	40.5	80.9	121.4	202.3	337.2	607.0
100	15.3	39.8	79.6	119.4	199.0	331.6	596.9
150	15.0	39.1	78.2	117.2	195.4	325.7	586.2
200	15.0	39.1	78.2	117.2	195.4	325.7	586.2
250	15.0	39.1	78.2	117.2	195.4	325.7	586.2
300	15.0	39.1	78.2	117.2	195.4	325.7	586.2
325	15.0	39.1	78.2	117.2	195.4	325.7	586.2
350	15.0	39.1	78.2	117.2	195.4	325.7	586.2
375	15.0	39.1	78.2	117.2	195.4	325.7	586.2
400	15.0	39.1	78.2	117.2	195.4	325.7	586.2
425	15.0	39.1	78.2	117.2	195.4	325.7	586.2
450	15.0	39.1	78.2	117.2	195.4	325.7	586.2
475	14.8	38.7	77.4	116.2	193.6	322.7	580.8
500	11.3	29.4	58.8	88.2	147.0	245.0	441.0
538	5.4	14.2	28.4	42.6	70.9	118.2	212.8
550	5.3	13.8	27.6	41.4	69.0	114.9	206.9
575	4.4	11.6	23.2	34.8	57.9	96.6	173.8
600	2.9	7.6	15.1	22.7	37.8	63.0	113.5
625	1.9	5.0	10.1	15.1	25.1	41.9	75.4
650	1.2	3.3	6.5	9.8	16.3	27.1	48.8



Table 2-1.17 Ratings for Group 1.17 Materials

A 182 Gr. F12 Cl. 2 (1)(2)

A 182 Gr. F5

NOTES:

- (1) Use normalized and tempered material only.
 (2) Permissible, but not recommended for prolonged use above 595°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.5	103.0	154.5	257.5	429.2	772.5
100	17.7	50.4	100.9	151.3	252.2	420.4	756.7
150	15.8	48.2	96.4	144.5	240.9	401.5	722.7
200	13.8	46.3	92.5	138.8	231.3	385.6	694.0
250	12.1	44.8	89.6	134.5	224.1	373.5	672.3
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	27.9	55.7	83.6	139.3	232.1	417.8
500	2.8	21.4	42.8	64.1	106.9	178.2	320.7
538	1.4	13.7	27.4	41.1	68.6	114.3	205.7
550	1.4(a)	12.0	24.1	36.1	60.2	100.4	180.7
575	1.4(a)	8.8	17.6	26.4	44.0	73.4	132.0
600	1.4(a)	6.1	12.1	18.2	30.3	50.4	90.8
625	1.4(a)	4.0	8.0	12.0	20.0	33.3	59.9
650	0.9(a)	2.4	4.7	7.1	11.8	19.7	35.5

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.7	51.5	103.0	154.5	257.5	429.2	772.5
100	19.4	50.6	101.3	151.9	253.1	421.9	759.4
150	19.1	49.7	99.4	149.1	248.6	414.3	745.7
200	19.1	49.7	99.4	149.1	248.6	414.3	745.7
250	19.0	49.6	99.2	148.8	248.0	413.3	743.9
300	18.8	49.0	98.1	147.1	245.2	408.6	735.5
325	18.6	48.6	97.2	145.7	242.9	404.8	728.7
350	18.3	47.8	95.7	143.5	239.2	398.7	717.6
375	18.0	47.1	94.1	141.2	235.3	392.1	705.9
400	18.0	47.1	94.1	141.2	235.3	392.1	705.9
425	18.0	47.1	94.1	141.2	235.3	392.1	705.9
450	16.5	43.0	86.0	129.1	215.1	358.5	645.3
475	13.3	34.8	69.6	104.5	174.1	290.2	522.3
500	10.2	26.7	53.4	80.2	133.6	222.7	400.9
538	6.6	17.1	34.3	51.4	85.7	142.8	257.1
550	5.8	15.1	30.1	45.2	75.3	125.5	225.9
575	4.2	11.0	22.0	33.0	55.0	91.7	165.1
600	2.9	7.6	15.1	22.7	37.8	63.0	113.5
625	1.9	5.0	10.0	15.0	24.9	41.6	74.8
650	1.1	3.0	5.9	8.9	14.8	24.6	44.3



Table 2-1.18 Ratings for Group 1.18 Materials

	A 182 Gr. F92 (1)	A 335 Gr. P92 (1)	A 369 Gr. FP92 (1)				
NOTE:							
(1) Application above 620°C is limited to tubing of maximum outside diameter of 88.9 mm.							
A – Standard Class							
Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	21.6	42.9	64.2	107.0	178.5	321.4
625	1.4(a)	18.3	36.6	54.9	91.2	152.0	273.8
650	1.4(a)	13.2	26.5	39.7	66.2	110.3	198.6

GENERAL NOTE:

(a) For welding-end valves only. Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	20.0	51.7	103.4	155.1	258.6	430.9	775.7
300	20.0	51.7	103.4	155.1	258.6	430.9	775.7
325	20.0	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.5	102.8	154.3	257.1	428.6	771.4
375	19.3	50.6	101.0	151.5	252.5	420.9	757.4
400	19.3	50.3	100.6	150.6	251.2	418.3	753.2
425	19.0	49.6	99.3	148.9	248.2	413.7	744.6
450	18.1	47.3	94.4	141.4	235.8	393.1	707.6
475	16.4	42.8	85.5	128.2	213.7	356.3	641.3
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	10.3	26.9	53.5	80.4	134.0	223.4	401.9
625	8.7	23.0	45.7	68.6	114.3	190.6	342.8
650	6.3	16.5	33.1	49.6	82.7	137.9	248.2



Table 2-2.1 Ratings for Group 2.1 Materials

A 182 Gr. F304 (1)	A 312 Gr. TP304 (1)	A 358 Gr. 304 (1)	A 430 Gr. FP304H
A 182 Gr. F304H	A 312 Gr. TP304H	A 376 Gr. TP304 (1)	A 479 Gr. 304 (1)
A 240 Gr. 304 (1)	A 351 Gr. CF10	A 376 Gr. TP304H	A 479 Gr. 304H
A 240 Gr. 304H	A 351 Gr. CF8 (1)	A 430 Gr. FP304 (1)	

NOTE:

(1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.3	47.8	95.6	143.5	239.1	398.5	717.3
100	15.7	40.9	81.7	122.6	204.3	340.4	612.8
150	14.2	37.0	74.0	111.0	185.0	308.4	555.1
200	13.2	34.5	69.0	103.4	172.4	287.3	517.2
250	12.1	32.5	65.0	97.5	162.4	270.7	487.3
300	10.2	30.9	61.8	92.7	154.6	257.6	463.7
325	9.3	30.2	60.4	90.7	151.1	251.9	453.3
350	8.4	29.6	59.3	88.9	148.1	246.9	444.4
375	7.4	29.0	58.1	87.1	145.2	241.9	435.5
400	6.5	28.4	56.9	85.3	142.2	237.0	426.6
425	5.5	28.0	56.0	84.0	140.0	233.3	419.9
450	4.6	27.4	54.8	82.2	137.0	228.4	411.1
475	3.7	26.9	53.9	80.8	134.7	224.5	404.0
500	2.8	26.5	53.0	79.5	132.4	220.7	397.3
538	1.4	24.4	48.9	73.3	122.1	203.6	366.4
550	1.4(a)	23.6	47.1	70.7	117.8	196.3	353.4
575	1.4(a)	20.8	41.7	62.5	104.2	173.7	312.7
600	1.4(a)	16.9	33.8	50.6	84.4	140.7	253.2
625	1.4(a)	13.8	27.6	41.4	68.9	114.9	206.8
650	1.4(a)	11.3	22.5	33.8	56.3	93.8	168.9
675	1.4(a)	9.3	18.7	28.0	46.7	77.9	140.2
700	1.4(a)	8.0	16.1	24.1	40.1	66.9	120.4
725	1.4(a)	6.8	13.5	20.3	33.8	56.3	101.3
750	1.4(a)	5.8	11.6	17.3	28.9	48.1	86.7
775	1.4(a)	4.6	9.0	13.7	22.8	38.0	68.4
800	1.2(a)	3.5	7.0	10.5	17.4	29.2	52.6
816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.



Table 2-2.1 Ratings for Group 2.1 Materials (Cont'd)

A 182 Gr. F304 (1)	A 312 Gr. TP304 (1)	A 358 Gr. 304 (1)	A 430 Gr. FP304H
A 182 Gr. F304H	A 312 Gr. TP304H	A 376 Gr. TP304 (1)	A 479 Gr. 304 (1)
A 240 Gr. 304 (1)	A 351 Gr. CF10	A 376 Gr. TP304H	A 479 Gr. 304H
A 240 Gr. 304H	A 351 Gr. CF8 (1)	A 430 Gr. FP304 (1)	

NOTE:

(1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.4	50.5	101.0	151.5	252.5	420.8	757.4
100	17.5	45.6	91.2	136.8	228.0	380.0	683.9
150	15.8	41.3	82.6	123.9	206.5	344.2	619.6
200	14.8	38.5	77.0	115.4	192.4	320.7	577.2
250	13.9	36.3	72.5	108.8	181.3	302.2	543.9
300	13.2	34.5	69.0	103.5	172.5	287.5	517.5
325	12.9	33.7	67.5	101.2	168.7	281.1	506.0
350	12.7	33.1	66.1	99.2	165.3	275.5	496.0
375	12.4	32.4	64.8	97.2	162.0	270.0	486.0
400	12.2	31.7	63.5	95.2	158.7	264.5	476.1
425	12.0	31.2	62.5	93.7	156.2	260.4	468.7
450	11.7	30.6	61.2	91.8	153.0	254.9	458.9
475	11.5	30.1	60.1	90.2	150.3	250.5	450.9
500	11.3	29.6	59.1	88.7	147.8	246.4	443.5
538	11.0	28.6	57.3	85.9	143.1	238.5	429.4
550	10.9	28.4	56.8	85.1	141.9	236.5	425.7
575	10.0	26.1	52.1	78.2	130.3	217.2	390.9
600	8.1	21.1	42.2	63.3	105.5	175.8	316.5
625	6.6	17.2	34.5	51.7	86.2	143.6	258.5
650	5.4	14.1	28.2	42.2	70.4	117.3	211.2
675	4.5	11.7	23.4	35.1	58.4	97.4	175.3
700	4.1	10.7	21.3	32.0	53.3	88.9	160.0
725	3.5	9.2	18.5	27.7	46.2	77.0	138.6
750	2.8	7.4	14.8	22.1	36.7	61.2	110.3
775	2.2	5.8	11.4	17.2	28.5	47.6	85.6
800	1.8	4.4	8.8	13.2	22.0	36.6	65.6
816	1.4	3.4	7.2	10.7	17.9	29.6	53.1



Table 2-2.2 Ratings for Group 2.2 Materials

A 182 Gr. F316 (1)	A 312 Gr. TP316 (1)	A 351 Gr. CF8A (2)	A 430 Gr. FP316 (1)
A 182 Gr. F316H	A 312 Gr. TP316H	A 351 Gr. CF8M (1)	A 430 Gr. FP316H
A 182 Gr. F317 (1)	A 312 Gr. TP317 (1)	A 358 Gr. 316 (1)	A 479 Gr. 316 (1)
A 240 Gr. 316 (1)	A 351 Gr. CF3A (2)	A 376 Gr. TP316 (1)	A 479 Gr. 316H
A 240 Gr. 316H	A 351 Gr. CF10M	A 376 Gr. TP316H	A 351 Gr. CG8M (4)
A 240 Gr. 317 (1)	A 351 Gr. CG3M (3)		

NOTES:

- (1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.
 (2) Not to be used over 345°C.
 (3) Not to be used over 455°C.
 (4) Not to be used over 538°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.4	48.1	96.2	144.3	240.6	400.9	721.7
100	16.2	42.2	84.4	126.6	211.0	351.6	632.9
150	14.8	38.5	77.0	115.5	192.5	320.8	577.4
200	13.7	35.7	71.3	107.0	178.3	297.2	534.9
250	12.1	33.4	66.8	100.1	166.9	278.1	500.6
300	10.2	31.6	63.2	94.9	158.1	263.5	474.3
325	9.3	30.9	61.8	92.7	154.4	257.4	463.3
350	8.4	30.3	60.7	91.0	151.6	252.7	454.9
375	7.4	29.9	59.8	89.6	149.4	249.0	448.2
400	6.5	29.4	58.9	88.3	147.2	245.3	441.6
425	5.5	29.1	58.3	87.4	145.7	242.9	437.1
450	4.6	28.8	57.7	86.5	144.2	240.4	432.7
475	3.7	28.7	57.3	86.0	143.4	238.9	430.1
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	19.9	39.8	59.7	99.5	165.9	298.6
625	1.4(a)	15.8	31.6	47.4	79.1	131.8	237.2
650	1.4(a)	12.7	25.3	38.0	63.3	105.5	189.9
675	1.4(a)	10.3	20.6	31.0	51.6	86.0	154.8
700	1.4(a)	8.4	16.8	25.1	41.9	69.8	125.7
725	1.4(a)	7.0	14.0	21.0	34.9	58.2	104.8
750	1.4(a)	5.9	11.7	17.6	29.3	48.9	87.9
775	1.4(a)	4.6	9.0	13.7	22.8	38.0	68.4
800	1.2(a)	3.5	7.0	10.5	17.4	29.2	52.6
816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.



Table 2-2.2 Ratings for Group 2.2 Materials (Cont'd)

A 182 Gr. F316 (1)	A 312 Gr. TP316 (1)	A 351 Gr. CF8A (2)	A 430 Gr. FP316 (1)
A 182 Gr. F316H	A 312 Gr. TP316H	A 351 Gr. CF8M (1)	A 430 Gr. FP316H
A 182 Gr. F317 (1)	A 312 Gr. TP317 (1)	A 358 Gr. 316 (1)	A 479 Gr. 316 (1)
A 240 Gr. 316 (1)	A 351 Gr. CF3A (2)	A 376 Gr. TP316 (1)	A 479 Gr. 316H
A 240 Gr. 316H	A 351 Gr. CF10M	A 376 Gr. TP316H	A 351 Gr. CG8M (4)
A 240 Gr. 317 (1)	A 351 Gr. CG3M (3)		

NOTES:

- (1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.
 (2) Not to be used over 345°C.
 (3) Not to be used over 538°C.
 (4) Not to be used over 455°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	50.8	101.6	152.5	254.1	423.5	762.3
100	18.1	47.1	94.2	141.3	235.5	392.4	706.4
150	16.5	43.0	85.9	128.9	214.8	358.0	644.4
200	15.3	39.8	79.6	119.4	199.0	331.7	597.0
250	14.3	37.3	74.5	111.8	186.3	310.4	558.8
300	13.5	35.3	70.6	105.9	176.4	294.1	529.3
325	13.2	34.5	68.9	103.4	172.3	287.2	517.0
350	13.0	33.8	67.7	101.5	169.2	282.1	507.7
375	12.8	33.3	66.7	100.0	166.7	277.9	500.2
400	12.6	32.9	65.7	98.6	164.3	273.8	492.9
425	12.5	32.5	65.1	97.6	162.6	271.1	487.9
450	12.3	32.2	64.4	96.6	161.0	268.3	482.9
475	12.3	32.0	64.0	96.0	160.0	266.6	480.0
500	12.2	31.7	63.4	95.1	158.6	264.3	475.7
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	9.5	24.9	49.8	74.6	124.4	207.3	373.2
625	7.6	19.8	39.5	59.3	98.8	164.7	296.5
650	6.1	15.8	31.7	47.5	79.1	131.9	237.4
675	4.9	12.9	25.8	38.7	64.5	107.5	193.5
700	4.4	11.4	22.8	34.3	57.1	95.2	171.3
725	3.7	9.5	19.1	28.6	47.7	79.5	143.0
750	2.8	7.4	14.8	22.1	36.7	61.2	110.3
775	2.2	5.8	11.4	17.2	28.5	47.6	85.6
800	1.8	4.4	8.8	13.2	22.0	36.6	65.6
816	1.4	3.4	7.2	10.7	17.9	29.6	53.1



Table 2-2.3 Ratings for Group 2.3 Material

A 182 Gr. F304L (1)	A 240 Gr. 304L (1)	A 312 Gr. TP316L	A 479 Gr. 304L (1)
A 182 Gr. F316L	A 240 Gr. 316L	A 351 Gr. CF3 (1)	A 479 Gr. 316L
A 182 Gr. F317L	A 312 Gr. TP304L (1)	A 351 Gr. CF3M (1)	

NOTE:

(1) Not to be used over 425°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	15.9	41.4	82.7	124.1	206.8	344.7	620.5
50	15.3	40.0	80.0	120.1	200.1	333.5	600.3
100	13.3	34.8	69.6	104.4	173.9	289.9	521.8
150	12.0	31.4	62.8	94.2	157.0	261.6	470.9
200	11.2	29.2	58.3	87.5	145.8	243.0	437.3
250	10.5	27.5	54.9	82.4	137.3	228.9	412.0
300	10.0	26.1	52.1	78.2	130.3	217.2	391.0
325	9.3	25.5	51.0	76.4	127.4	212.3	382.2
350	8.4	25.1	50.1	75.2	125.4	208.9	376.1
375	7.4	24.8	49.5	74.3	123.8	206.3	371.3
400	6.5	24.3	48.6	72.9	121.5	202.5	364.6
425	5.5	23.9	47.7	71.6	119.3	198.8	357.9
450	4.6	23.4	46.8	70.2	117.1	195.1	351.2

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	17.7	46.2	92.3	138.5	230.9	384.8	692.6
50	17.1	44.7	89.3	134.0	223.3	372.2	670.0
100	14.9	38.8	77.7	116.5	194.1	323.6	582.4
150	13.4	35.0	70.1	105.1	175.2	291.9	525.5
200	12.5	32.5	65.1	97.6	162.7	271.2	488.1
250	11.8	30.7	61.3	92.0	153.3	255.4	459.8
300	11.2	29.1	58.2	87.3	145.5	242.4	436.4
325	10.9	28.4	56.9	85.3	142.2	237.0	426.6
350	10.7	28.0	56.0	83.9	139.9	233.2	419.7
375	10.6	27.6	55.2	82.9	138.1	230.2	414.4
400	10.4	27.1	54.3	81.4	135.6	226.0	406.9
425	10.2	26.6	53.3	79.9	133.1	221.9	399.4
450	10.0	26.1	52.3	78.4	130.6	217.7	391.9



Table 2-2.4 Ratings for Group 2.4 Materials

A 182 Gr. F321 (1)	A 312 Gr. TP321 (1)	A 376 Gr. TP321 (1)	A 430 Gr. FP321H
A 182 Gr. F321H (2)	A 312 Gr. TP321H	A 376 Gr. TP321H	A 479 Gr. 321 (1)
A 240 Gr. 321 (1)	A 358 Gr. 321 (1)	A 430 Gr. FP321 (1)	A 479 Gr. 321H
A 240 Gr. 321H (2)			

NOTES:

- (1) Not to be used over 538°C.
(2) At temperatures above 538°C, use only if the material is heat treated by heating to a minimum temperature of 1 095°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.6	48.6	97.1	145.7	242.8	404.6	728.3
100	17.0	44.2	88.5	132.7	221.2	368.7	663.6
150	15.7	41.0	82.0	122.9	204.9	341.5	614.7
200	13.8	38.3	76.6	114.9	191.5	319.1	574.5
250	12.1	36.0	72.0	108.1	180.1	300.2	540.4
300	10.2	34.1	68.3	102.4	170.7	284.6	512.2
325	9.3	33.3	66.6	99.9	166.5	277.6	499.6
350	8.4	32.6	65.2	97.8	163.0	271.7	489.1
375	7.4	32.0	64.1	96.1	160.2	266.9	480.5
400	6.5	31.6	63.2	94.8	157.9	263.2	473.8
425	5.5	31.1	62.3	93.4	155.7	259.5	467.1
450	4.6	30.8	61.7	92.5	154.2	256.9	462.5
475	3.7	30.5	61.1	91.6	152.7	254.4	458.0
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	20.3	40.5	60.8	101.3	168.9	304.0
625	1.4(a)	15.8	31.6	47.4	79.1	131.8	237.2
650	1.4(a)	12.6	25.3	37.9	63.2	105.4	189.6
675	1.4(a)	9.9	19.8	29.6	49.4	82.3	148.1
700	1.4(a)	7.9	15.8	23.7	39.5	65.9	118.6
725	1.4(a)	6.3	12.7	19.0	31.7	52.8	95.1
750	1.4(a)	5.0	10.0	15.0	25.0	41.7	75.0
775	1.4(a)	4.0	8.0	11.9	19.9	33.2	59.7
800	1.2(a)	3.1	6.3	9.4	15.6	26.1	46.9
816	1.0(a)	2.6	5.2	7.8	13.0	21.7	39.0

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.



Table 2-2.4 Ratings for Group 2.4 Materials (Cont'd)

A 182 Gr. F321 (1)	A 312 Gr. TP321 (1)	A 376 Gr. TP321 (1)	A 430 Gr. FP321H
A 182 Gr. F321H (2)	A 312 Gr. TP321H	A 376 Gr. TP321H	A 479 Gr. 321 (1)
A 240 Gr. 321 (1)	A 358 Gr. 321 (1)	A 430 Gr. FP321 (1)	A 479 Gr. 321H
A 240 Gr. 321H (2)			

NOTES:

(1) Not to be used over 538°C.

(2) At temperatures above 538°C, use only if the material is heat treated by heating to a minimum temperature of 1 095°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.6	51.1	102.3	153.4	255.6	426.0	766.9
100	18.7	48.7	97.3	146.0	243.3	405.5	729.9
150	17.5	45.7	91.5	137.2	228.7	381.1	686.0
200	16.4	42.7	85.5	128.2	213.7	356.2	641.1
250	15.4	40.2	80.4	120.6	201.0	335.0	603.1
300	14.6	38.1	76.2	114.3	190.6	317.6	571.7
325	14.3	37.2	74.4	111.5	185.9	309.8	557.6
350	13.9	36.4	72.8	109.2	181.9	303.2	545.8
375	13.7	35.8	71.5	107.3	178.8	297.9	536.3
400	13.5	35.3	70.5	105.8	176.3	293.8	528.8
425	13.3	34.8	69.5	104.3	173.8	289.6	521.3
450	13.2	34.4	68.8	103.2	172.0	286.7	516.1
475	13.1	34.1	68.2	102.2	170.4	284.0	511.2
500	12.9	33.7	67.5	101.2	168.7	281.2	506.2
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	9.7	25.3	50.7	76.0	126.6	211.1	379.9
625	7.6	19.8	39.5	59.3	98.8	164.7	296.5
650	6.1	15.8	31.6	47.4	79.0	131.7	237.0
675	4.7	12.3	24.7	37.0	61.7	102.9	185.2
700	4.2	10.8	21.7	32.5	54.2	90.3	162.5
725	3.4	8.9	17.7	26.6	44.3	73.8	132.9
750	2.6	6.7	13.4	20.0	33.4	55.7	100.2
775	1.9	5.0	10.0	15.0	25.1	41.8	75.2
800	1.7	4.4	8.8	13.2	22.0	36.6	65.6
816	1.2	3.3	6.5	9.8	16.3	27.1	48.8



Table 2-2.5 Ratings for Group 2.5 Materials

A 182 Gr. F347 (1)	A 240 Gr. 348 (1)	A 351 Gr. CF8C (3)	A 430 Gr. FP347 (1)
A 182 Gr. F347H (2)	A 240 Gr. 348H (2)	A 358 Gr. 347 (1)	A 430 Gr. FP347H
A 182 Gr. F348 (1)	A 312 Gr. TP347 (1)	A 376 Gr. TP347 (1)	A 479 Gr. 347 (1)
A 182 Gr. F348H (2)	A 312 Gr. TP347H	A 376 Gr. TP347H	A 479 Gr. 347H
A 240 Gr. 347 (1)	A 312 Gr. TP348 (1)	A 376 Gr. TP348 (1)	A 479 Gr. 348 (1)
A 240 Gr. 347H (2)	A 312 Gr. TP348H	A 376 Gr. TP348H (1)	A 479 Gr. 348H

NOTES:

(1) Not to be used over 538°C.

(2) At temperatures above 538°C, use only if the material is heat treated by heating to a minimum temperature of 1 095°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.7	48.8	97.5	146.3	243.8	406.4	731.5
100	17.4	45.3	90.6	135.9	226.5	377.4	679.4
150	15.8	42.5	84.9	127.4	212.4	353.9	637.1
200	13.8	39.9	79.9	119.8	199.7	332.8	599.1
250	12.1	37.8	75.6	113.4	189.1	315.1	567.2
300	10.2	36.1	72.2	108.3	180.4	300.7	541.3
325	9.3	35.4	70.7	106.1	176.8	294.6	530.3
350	8.4	34.8	69.5	104.3	173.8	289.6	521.3
375	7.4	34.2	68.4	102.6	171.0	285.1	513.1
400	6.5	33.9	67.8	101.7	169.5	282.6	508.6
425	5.5	33.6	67.2	100.8	168.1	280.1	504.2
450	4.6	33.5	66.9	100.4	167.3	278.8	501.8
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	21.6	42.9	64.2	107.0	178.5	321.4
625	1.4(a)	18.3	36.6	54.9	91.2	152.0	273.8
650	1.4(a)	14.1	28.1	42.5	70.7	117.7	211.7
675	1.4(a)	12.4	25.2	37.6	62.7	104.5	187.9
700	1.4(a)	10.1	20.0	29.8	49.7	83.0	149.4
725	1.4(a)	7.9	15.4	23.2	38.6	64.4	115.8
750	1.4(a)	5.9	11.7	17.6	29.6	49.1	88.2
775	1.4(a)	4.6	9.0	13.7	22.8	38.0	68.4
800	1.2(a)	3.5	7.0	10.5	17.4	29.2	52.6
816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.



Table 2-2.5 Ratings for Group 2.5 Materials (Cont'd)

A 182 Gr. F347 (1)	A 240 Gr. 348 (1)	A 351 Gr. CF8C (3)	A 430 Gr. FP347 (1)
A 182 Gr. F347H (2)	A 240 Gr. 348H (2)	A 358 Gr. 347 (1)	A 430 Gr. FP347H
A 182 Gr. F348 (1)	A 312 Gr. TP347 (1)	A 376 Gr. TP347 (1)	A 479 Gr. 347 (1)
A 182 Gr. F348H (2)	A 312 Gr. TP347H	A 376 Gr. TP347H	A 479 Gr. 347H
A 240 Gr. 347 (1)	A 312 Gr. TP348 (1)	A 376 Gr. TP348 (1)	A 479 Gr. 348 (1)
A 240 Gr. 347H (2)	A 312 Gr. TP348H	A 376 Gr. TP348H (1)	A 479 Gr. 348H

NOTES:

(1) Not to be used over 538°C.

(2) At temperatures above 538°C, use only if the material is heat treated by heating to a minimum temperature of 1 095°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	19.4	50.6	101.1	151.7	252.8	421.3	758.3
150	18.2	47.4	94.8	142.2	237.0	395.0	711.0
200	17.1	44.6	89.1	133.7	222.9	371.5	668.6
250	16.2	42.2	84.4	126.6	211.0	351.7	633.0
300	15.4	40.3	80.6	120.8	201.4	335.6	604.1
325	15.1	39.5	78.9	118.4	197.3	328.8	591.8
350	14.9	38.8	77.6	116.4	194.0	323.3	581.9
375	14.6	38.2	76.4	114.5	190.9	318.1	572.7
400	14.5	37.8	75.7	113.5	189.2	315.4	567.7
425	14.4	37.5	75.0	112.5	187.6	312.6	562.7
450	14.3	37.3	74.7	112.0	186.7	311.1	560.0
475	14.3	37.3	74.6	111.9	186.5	310.9	559.6
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	10.3	26.9	53.5	80.4	134.0	223.4	401.9
625	8.7	23.0	45.7	68.6	114.3	190.6	342.8
650	6.9	17.9	35.5	53.1	88.6	147.9	266.1
675	6.2	16.0	31.6	47.3	78.9	131.7	237.0
700	4.8	12.4	25.0	37.3	62.3	103.7	186.5
725	3.7	9.7	19.5	28.9	48.3	80.2	144.5
750	2.8	7.4	14.8	22.1	36.7	61.2	110.3
775	2.2	5.8	11.4	17.2	28.5	47.6	85.6
800	1.8	4.4	8.8	13.2	22.0	36.6	65.6
816	1.4	3.4	7.2	10.7	17.9	29.6	53.1



Table 2-2.6 Ratings for Group 2.6 Materials

A 312 Gr. TP309H	A 240 Gr. 309H					A 358 Gr. 309H	
A – Standard Class							
Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.5	48.3	96.6	144.9	241.5	402.5	724.4
100	16.5	43.1	86.2	129.3	215.5	359.2	646.5
150	15.3	40.0	80.0	120.0	200.0	333.3	599.9
200	13.8	37.8	75.5	113.3	188.8	314.7	566.4
250	12.1	36.1	72.1	108.2	180.4	300.6	541.1
300	10.2	34.8	69.6	104.4	173.9	289.9	521.8
325	9.3	34.2	68.5	102.7	171.2	285.4	513.7
350	8.4	33.8	67.6	101.4	169.0	281.7	507.0
375	7.4	33.4	66.8	100.1	166.9	278.2	500.7
400	6.5	33.1	66.1	99.2	165.4	275.6	496.1
425	5.5	32.6	65.3	97.9	163.1	271.9	489.4
450	4.6	32.2	64.4	96.5	160.9	268.2	482.7
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	22.2	44.4	66.5	110.9	184.8	332.7
600	1.4(a)	16.8	33.5	50.3	83.9	139.8	251.6
625	1.4(a)	12.5	25.0	37.5	62.5	104.2	187.6
650	1.4(a)	9.4	18.7	28.1	46.8	78.0	140.4
675	1.4(a)	7.2	14.5	21.7	36.2	60.3	108.5
700	1.4(a)	5.5	11.0	16.5	27.5	45.9	82.5
725	1.4(a)	4.3	8.7	13.0	21.6	36.0	64.9
750	1.3(a)	3.4	6.8	10.2	17.1	28.4	51.2
775	1.0(a)	2.7	5.4	8.1	13.5	22.4	40.4
800	0.8(a)	2.1	4.2	6.3	10.5	17.5	31.6
816	0.7(a)	1.8	3.5	5.3	8.9	14.8	26.6

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.



Table 2-2.6 Ratings for Group 2.6 Materials (Cont'd)

A 312 Gr. TP309H		A 240 Gr. 309H		A 358 Gr. 309H			
B – Special Class							
Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	18.4	48.1	96.2	144.3	240.5	400.9	721.6
150	17.1	44.6	89.3	133.9	223.2	372.0	669.6
200	16.2	42.1	84.3	126.4	210.7	351.2	632.2
250	15.4	40.3	80.5	120.8	201.3	335.5	603.9
300	14.9	38.8	77.7	116.5	194.1	323.6	582.4
325	14.7	38.2	76.5	114.7	191.1	318.5	573.4
350	14.5	37.7	75.5	113.2	188.6	314.4	565.9
375	14.3	37.3	74.5	111.8	186.3	310.4	558.8
400	14.2	36.9	73.8	110.7	184.6	307.6	553.7
425	14.0	36.4	72.8	109.2	182.1	303.5	546.2
450	13.8	35.9	71.8	107.8	179.6	299.3	538.8
475	13.6	35.4	70.8	106.3	177.1	295.2	531.3
500	13.4	34.9	69.8	104.8	174.6	291.0	523.8
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.6	27.7	55.4	83.2	138.6	231.0	415.8
600	8.0	21.0	41.9	62.9	104.8	174.7	314.5
625	6.0	15.6	31.3	46.9	78.2	130.3	234.5
650	4.5	11.7	23.4	35.1	58.5	97.5	175.5
675	3.5	9.0	18.1	27.1	45.2	75.3	135.6
700	3.0	7.7	15.4	23.2	38.6	64.4	115.9
725	2.3	6.1	12.1	18.2	30.4	50.6	91.1
750	1.7	4.6	9.1	13.7	22.8	37.9	68.3
775	1.3	3.4	6.8	10.2	16.9	28.2	50.8
800	1.1	3.0	5.9	8.9	14.8	24.7	44.5
816	0.8	2.2	4.4	6.6	11.1	18.5	33.2



Table 2-2.7 Ratings for Group 2.7 Materials

A 182 Gr. F310 A 240 Gr. 310H		A 312 Gr. TP310H A 479 Gr. 310H		A 358 Gr. 310H			
A – Standard Class							
Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.5	48.4	96.7	145.1	241.8	403.1	725.5
100	16.6	43.4	86.8	130.2	217.0	361.6	650.9
150	15.3	40.0	80.0	120.0	200.0	333.3	599.9
200	13.8	37.6	75.2	112.8	188.0	313.4	564.1
250	12.1	35.8	71.5	107.3	178.8	298.1	536.5
300	10.2	34.5	68.9	103.4	172.3	287.2	516.9
325	9.3	33.9	67.7	101.6	169.3	282.2	507.9
350	8.4	33.3	66.6	99.9	166.5	277.6	499.6
375	7.4	32.9	65.7	98.6	164.3	273.8	492.9
400	6.5	32.4	64.8	97.3	162.1	270.2	486.3
425	5.5	32.1	64.2	96.4	160.6	267.7	481.8
450	4.6	31.7	63.4	95.1	158.4	264.0	475.3
475	3.7	31.2	62.5	93.7	156.2	260.3	468.6
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	22.2	44.4	66.5	110.9	184.8	332.7
600	1.4(a)	16.8	33.5	50.3	83.9	139.8	251.6
625	1.4(a)	12.5	25.0	37.5	62.5	104.2	187.6
650	1.4(a)	9.4	18.7	28.1	46.8	78.0	140.4
675	1.4(a)	7.2	14.5	21.7	36.2	60.3	108.5
700	1.4(a)	5.5	11.0	16.5	27.5	45.9	82.5
725	1.4(a)	4.3	8.7	13.0	21.6	36.0	64.9
750	1.3(a)	3.4	6.8	10.2	17.1	28.4	51.2
775	1.0(a)	2.7	5.3	8.0	13.3	22.1	39.8
800	0.8(a)	2.1	4.1	6.2	10.3	17.2	31.0
816	0.7(a)	1.8	3.5	5.3	8.9	14.8	26.6

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.



Table 2-2.7 Ratings for Group 2.7 Materials (Cont'd)

		A 182 Gr. F310 A 240 Gr. 310H		A 312 Gr. TP310H A 479 Gr. 310H		A 358 Gr. 310H	
B – Special Class							
Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	18.6	48.4	96.9	145.3	242.2	403.6	726.5
150	17.1	44.6	89.3	133.9	223.2	371.9	669.5
200	16.1	42.0	83.9	125.9	209.9	349.8	629.6
250	15.3	39.9	79.8	119.8	199.6	332.7	598.8
300	14.7	38.5	76.9	115.4	192.3	320.5	576.9
325	14.5	37.8	75.6	113.4	189.0	314.9	566.9
350	14.2	37.2	74.3	111.5	185.9	309.8	557.6
375	14.1	36.7	73.3	110.0	183.4	305.6	550.1
400	13.9	36.2	72.4	108.5	180.9	301.5	542.7
425	13.7	35.9	71.7	107.6	179.3	298.8	537.8
450	13.6	35.4	70.7	106.1	176.8	294.7	530.4
475	13.4	34.9	69.7	104.6	174.3	290.5	523.0
500	13.2	34.4	68.7	103.1	171.8	286.4	515.5
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.6	27.7	55.4	83.2	138.6	231.0	415.8
600	8.0	21.0	41.9	62.9	104.8	174.7	314.5
625	6.0	15.6	31.3	46.9	78.2	130.3	234.5
650	4.5	11.7	23.4	35.1	58.5	97.5	175.5
675	3.5	9.0	18.1	27.1	45.2	75.3	135.6
700	3.0	7.7	15.4	23.2	38.6	64.4	115.9
725	2.3	6.1	12.1	18.2	30.4	50.6	91.1
750	1.7	4.6	9.1	13.7	22.8	37.9	68.3
775	1.3	3.3	6.7	10.0	16.7	27.9	50.1
800	1.1	2.9	5.8	8.6	14.4	24.0	43.2
816	0.8	2.2	4.4	6.6	11.1	18.5	33.2



Table 2-2.8 Ratings for Group 2.8 Materials

A 182 Gr. F44	A 240 Gr. S32760 (1)	A 479 Gr. S32750 (1)	A 790 Gr. S31803 (1)
A 182 Gr. F51 (1)	A 240 Gr. S31254	A 479 Gr. S32760 (1)	A 790 Gr. S32760 (1)
A 182 Gr. F55	A 240 Gr. S32750 (1)	A 789 Gr. S32750 (1)	A 351 Gr. CE8MN (1)
A 182 Gr. F53 (1)	A 351 Gr. CK3MCuN	A 789 Gr. S32760 (1)	A 995 Gr. 1B
A 312 Gr. S31254	A 479 Gr. S31803 (1)	A 789 Gr. S31803 (1)	A 995 Gr. CD3MWCuN
A 358 Gr. S31254	A 479 Gr. S31254	A 790 Gr. S32750 (1)	A 995 Gr. 6A
A 240 Gr. S31803 (1)			

NOTES:

(1) This steel may become brittle after service at moderately elevated temperatures. Not to be used over 315°C.

(2) Not to be used over 149°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	50.7	101.3	152.0	253.3	422.2	759.9
150	15.8	45.9	91.9	137.8	229.6	382.7	688.9
200	13.8	42.7	85.3	128.0	213.3	355.4	639.8
250	12.1	40.5	80.9	121.4	202.3	337.2	606.9
300	10.2	38.9	77.7	116.6	194.3	323.8	582.8
325	9.3	38.2	76.3	114.5	190.8	318.0	572.5
350	8.4	37.6	75.3	112.9	188.2	313.7	564.7
375	7.4	37.4	74.7	112.1	186.8	311.3	560.3
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	19.6	51.3	102.5	153.8	256.3	427.2	768.9
200	18.2	47.6	95.2	142.8	238.0	396.7	714.1
250	17.3	45.2	90.3	135.5	225.8	376.3	677.4
300	16.6	43.4	86.7	130.1	216.8	361.4	650.4
325	16.3	42.6	85.2	127.8	213.0	355.0	638.9
350	16.1	42.0	84.0	126.1	210.1	350.2	630.3
375	16.0	41.7	83.4	125.1	208.4	347.4	625.3
400	15.2	39.7	79.4	119.1	198.6	330.9	595.7



Table 2-2.9 Ratings for Group 2.9 Materials

A 240 Gr. 309S (1)(2)(3)	A 240 Gr. 310S (1)(2)(3)	A 479 Gr. 310S (1)(2)(3)
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NOTES:

- (1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.
- (2) For temperatures above 538°C, use only if the material is solution heat treated to the minimum temperature specified in the material specification but not lower than 1 040°C and quenching in water or rapidly cooling by other means.
- (3) This material should be used for service temperatures 515°C and above only when assurance is provided that grain size is not finer than ASTM 6.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.5	48.3	96.6	144.9	241.5	402.5	724.4
100	16.5	43.1	86.2	129.3	215.5	359.2	646.5
150	15.3	40.0	80.0	120.0	200.0	333.3	599.9
200	13.8	37.6	75.2	112.8	188.0	313.4	564.1
250	12.1	35.8	71.5	107.3	178.8	298.1	536.5
300	10.2	34.5	68.9	103.4	172.3	287.2	516.9
325	9.3	33.9	67.7	101.6	169.3	282.2	507.9
350	8.4	33.3	66.6	99.9	166.5	277.6	499.6
375	7.4	32.9	65.7	98.6	164.3	273.8	492.9
400	6.5	32.4	64.8	97.3	162.1	270.2	486.3
425	5.5	32.1	64.2	96.4	160.6	267.7	481.8
450	4.6	31.7	63.4	95.1	158.4	264.0	475.3
475	3.7	31.2	62.5	93.7	156.2	260.3	468.6
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	23.4	46.8	70.2	117.0	195.0	351.0
550	1.4(a)	20.5	41.0	61.5	102.5	170.8	307.4
575	1.4(a)	15.1	30.2	45.3	75.5	125.8	226.4
600	1.4(a)	11.0	22.1	33.1	55.1	91.9	165.4
625	1.4(a)	8.1	16.3	24.4	40.7	67.9	122.2
650	1.4(a)	5.8	11.6	17.4	29.1	48.5	87.2
675	1.4(a)	3.7	7.4	11.1	18.4	30.7	55.3
700	0.8(a)	2.2	4.3	6.5	10.8	18.0	32.3
725	0.5(a)	1.4	2.7	4.1	6.8	11.4	20.5
750	0.4(a)	1.0	2.1	3.1	5.2	8.6	15.5
775	0.3(a)	0.8	1.6	2.5	4.1	6.8	12.3
800	0.2(a)	0.6	1.2	1.8	3.0	5.0	9.1
816	0.2(a)	0.5	0.9	1.4	2.4	3.9	7.1

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.



Table 2-2.9 Ratings for Group 2.9 Materials (Cont'd)

A 240 Gr. 309S (1)(2)(3)	A 240 Gr. 310S (1)(2)(3)	A 479 Gr. 310S (1)(2)(3)
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NOTES:

- (1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.
- (2) For temperatures above 538°C, use only if the material is solution heat treated to the minimum temperature specified in the material specification but not lower than 1 040°C and quenching in water or rapidly cooling by other means.
- (3) This material should be used for service temperatures 515°C and above only when assurance is provided that grain size is not finer than ASTM 6.

B – Special Class

Temperature °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	18.4	48.1	96.2	144.3	240.5	400.9	721.6
150	17.1	44.6	89.3	133.9	223.2	371.9	669.5
200	16.1	42.0	83.9	125.9	209.9	349.8	629.6
250	15.3	39.9	79.8	119.8	199.6	332.7	598.8
300	14.7	38.5	76.9	115.4	192.3	320.5	576.9
325	14.5	37.8	75.6	113.4	189.0	314.9	566.9
350	14.2	37.2	74.3	111.5	185.9	309.8	557.6
375	14.1	36.7	73.3	110.0	183.4	305.6	550.1
400	13.9	36.2	72.4	108.5	180.9	301.5	542.7
425	13.7	35.9	71.7	107.6	179.3	298.8	537.8
450	13.6	35.4	70.7	106.1	176.8	294.7	530.4
475	13.4	34.9	69.7	104.6	174.3	290.5	523.0
500	13.2	34.4	68.7	103.1	171.8	286.4	515.5
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	9.8	25.6	51.2	76.8	128.1	213.4	384.2
575	7.2	18.9	37.7	56.6	94.3	157.2	283.0
600	5.3	13.8	27.6	41.3	68.9	114.8	206.7
625	3.9	10.2	20.4	30.5	50.9	84.9	152.7
650	2.8	7.3	14.5	21.8	36.3	60.6	109.0
675	1.8	4.6	9.2	13.8	23.0	38.4	69.1
700	1.3	3.4	6.9	10.3	17.2	28.6	51.5
725	0.8	2.1	4.2	6.3	10.5	17.6	31.6
750	0.5	1.4	2.7	4.1	6.8	11.3	20.4
775	0.4	1.0	2.1	3.1	5.2	8.6	15.5
800	0.3	0.9	1.8	2.7	4.5	7.4	13.4
816	0.2	0.6	1.2	1.8	3.0	4.9	8.9



Table 2-2.10 Ratings for Group 2.10 Materials

A 351 Gr. CH8 (1)

A 351 Gr. CH20 (1)

NOTE:

(1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	17.8	46.3	92.7	139.0	231.7	386.1	695.0
50	17.0	44.5	89.0	133.4	222.4	370.6	667.1
100	14.4	37.5	75.1	112.6	187.7	312.8	563.0
150	13.4	34.9	69.8	104.7	174.4	290.7	523.3
200	12.9	33.5	67.1	100.6	167.7	279.5	503.2
250	12.1	32.6	65.2	97.8	163.1	271.8	489.2
300	10.2	31.7	63.4	95.2	158.6	264.3	475.8
325	9.3	31.2	62.4	93.6	156.1	260.1	468.2
350	8.4	30.6	61.2	91.7	152.9	254.8	458.7
375	7.4	29.8	59.7	89.5	149.2	248.6	447.5
400	6.5	29.1	58.2	87.3	145.5	242.4	436.4
425	5.5	28.3	56.7	85.0	141.7	236.2	425.2
450	4.6	27.6	55.2	82.8	138.0	230.0	414.0
475	3.7	26.7	53.5	80.2	133.7	222.8	401.0
500	2.8	25.8	51.7	77.5	129.2	215.3	387.6
538	1.4	23.3	46.6	70.0	116.6	194.4	349.9
550	1.4(a)	21.9	43.8	65.7	109.5	182.5	328.5
575	1.4(a)	18.5	37.0	55.5	92.4	154.0	277.3
600	1.4(a)	14.5	29.0	43.5	72.6	121.0	217.7
625	1.4(a)	11.4	22.8	34.3	57.1	95.2	171.3
650	1.4(a)	8.9	17.8	26.7	44.5	74.1	133.5
675	1.4(a)	7.0	14.0	20.9	34.9	58.2	104.7
700	1.4(a)	5.7	11.3	17.0	28.3	47.2	85.0
725	1.4(a)	4.6	9.1	13.7	22.8	38.0	68.4
750	1.3(a)	3.5	7.0	10.5	17.5	29.2	52.5
775	1.0(a)	2.6	5.1	7.7	12.8	21.4	38.4
800	0.8(a)	2.0	4.0	6.1	10.1	16.9	30.4
816	0.7(a)	1.9	3.8	5.7	9.5	15.8	28.4

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.



Table 2-2.10 Ratings for Group 2.10 Materials (Cont'd)

A 351 Gr. CH8 (1)	A 351 Gr. CH20 (1)
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NOTE:

(1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	18.4	48.0	96.0	144.1	240.1	400.1	720.3
50	17.9	46.8	93.5	140.3	233.8	389.6	701.4
100	16.1	41.9	83.8	125.7	209.5	349.1	628.4
150	14.9	38.9	77.9	116.8	194.7	324.5	584.0
200	14.4	37.4	74.9	112.3	187.2	312.0	561.6
250	14.0	36.4	72.8	109.2	182.0	303.3	546.0
300	13.6	35.4	70.8	106.2	177.0	295.0	531.0
325	13.4	34.8	69.7	104.5	174.2	290.3	522.6
350	13.1	34.1	68.3	102.4	170.6	284.4	511.9
375	12.8	33.3	66.6	99.9	166.5	277.5	499.5
400	12.4	32.5	64.9	97.4	162.3	270.6	487.0
425	12.1	31.6	63.3	94.9	158.2	263.6	474.5
450	11.8	30.8	61.6	92.4	154.0	256.7	462.1
475	11.4	29.8	59.7	89.5	149.2	248.6	447.6
500	11.1	28.8	57.7	86.5	144.2	240.3	432.6
538	10.5	27.3	54.7	82.0	136.7	227.8	410.0
550	10.1	26.4	52.7	79.1	131.8	219.6	395.4
575	8.9	23.1	46.2	69.3	115.5	192.6	346.6
600	7.0	18.1	36.3	54.4	90.7	151.2	272.1
625	5.5	14.3	28.6	42.8	71.4	119.0	214.2
650	4.3	11.1	22.2	33.4	55.6	92.7	166.8
675	3.3	8.7	17.5	26.2	43.6	72.7	130.9
700	3.0	7.7	15.4	23.1	38.6	64.3	115.7
725	2.4	6.4	12.7	19.1	31.8	53.1	95.5
750	1.8	4.7	9.5	14.2	23.6	39.4	70.9
775	1.2	3.2	6.5	9.7	16.2	27.0	48.6
800	1.0	2.7	5.3	8.0	13.3	22.2	40.0
816	0.9	2.4	4.7	7.1	11.8	19.7	35.5



Table 2-2.11 Ratings for Group 2.11 Materials

A 351 Gr. CF8C (1)

NOTE:

(1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.7	48.8	97.5	146.3	243.8	406.4	731.5
100	17.4	45.3	90.6	135.9	226.5	377.4	679.4
150	15.8	42.5	84.9	127.4	212.4	353.9	637.1
200	13.8	39.9	79.9	119.8	199.7	332.8	599.1
250	12.1	37.8	75.6	113.4	189.1	315.1	567.2
300	10.2	36.1	72.2	108.3	180.4	300.7	541.3
325	9.3	35.4	70.7	106.1	176.8	294.6	530.3
350	8.4	34.8	69.5	104.3	173.8	289.6	521.3
375	7.4	34.2	68.4	102.6	171.0	285.1	513.1
400	6.5	33.9	67.8	101.7	169.5	282.6	508.6
425	5.5	33.6	67.2	100.8	168.1	280.1	504.2
450	4.6	33.5	66.9	100.4	167.3	278.8	501.8
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	19.8	39.6	59.4	99.0	165.1	297.1
625	1.4(a)	13.9	27.7	41.6	69.3	115.5	207.9
650	1.4(a)	10.3	20.6	30.9	51.5	85.8	154.5
675	1.4(a)	8.0	15.9	23.9	39.8	66.3	119.4
700	1.4(a)	5.6	11.2	16.8	28.1	46.8	84.2
725	1.4(a)	4.0	8.0	11.9	19.9	33.1	59.6
750	1.2(a)	3.1	6.2	9.3	15.5	25.8	46.4
775	0.9(a)	2.5	4.9	7.4	12.3	20.4	36.8
800	0.8(a)	2.0	4.0	6.1	10.1	16.9	30.4
816	0.7(a)	1.9	3.8	5.7	9.5	15.8	28.4

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.



Table 2-2.11 Ratings for Group 2.11 Materials (Cont'd)

A 351 Gr. CF8C (1)

NOTE:

(1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.6	51.2	102.4	153.6	256.0	426.7	768.1
100	18.8	48.9	97.9	146.8	244.7	407.8	734.1
150	17.4	45.4	90.8	136.1	226.9	378.2	680.7
200	16.5	43.1	86.1	129.2	215.3	358.8	645.8
250	16.0	41.6	83.3	124.9	208.2	347.0	624.5
300	15.4	40.2	80.3	120.5	200.9	334.8	602.6
325	15.1	39.5	78.9	118.4	197.3	328.8	591.8
350	14.9	38.8	77.6	116.4	194.0	323.3	581.9
375	14.6	38.2	76.4	114.5	190.9	318.1	572.7
400	14.5	37.8	75.7	113.5	189.2	315.4	567.7
425	14.4	37.5	75.0	112.5	187.6	312.6	562.7
450	14.3	37.3	74.7	112.0	186.7	311.1	560.0
475	14.3	37.3	74.6	111.9	186.5	310.9	559.6
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	9.5	24.8	49.5	74.3	123.8	206.4	371.4
625	6.6	17.3	34.6	52.0	86.6	144.3	259.8
650	4.9	12.9	25.7	38.6	64.4	107.3	193.1
675	3.8	9.9	19.9	29.8	49.7	82.9	149.2
700	3.1	8.2	16.4	24.5	40.9	68.2	122.7
725	2.3	5.9	11.8	17.7	29.5	49.2	88.5
750	1.6	4.1	8.2	12.2	20.4	34.0	61.2
775	1.2	3.1	6.2	9.3	15.5	25.8	46.4
800	1.0	2.7	5.3	8.0	13.3	22.2	40.0
816	0.9	2.4	4.7	7.1	11.8	19.7	35.5



Table 2-2.12 Ratings for Group 2.12 Materials

A 351 Gr. CK20 (1)

NOTE:

(1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	17.8	46.3	92.7	139.0	231.7	386.1	695.0
50	17.0	44.5	89.0	133.4	222.4	370.6	667.1
100	14.4	37.5	75.1	112.6	187.7	312.8	563.0
150	13.4	34.9	69.8	104.7	174.4	290.7	523.3
200	12.9	33.5	67.1	100.6	167.7	279.5	503.2
250	12.1	32.6	65.2	97.8	163.1	271.8	489.2
300	10.2	31.7	63.4	95.2	158.6	264.3	475.8
325	9.3	31.2	62.4	93.6	156.1	260.1	468.2
350	8.4	30.6	61.2	91.7	152.9	254.8	458.7
375	7.4	29.8	59.7	89.5	149.2	248.6	447.5
400	6.5	29.1	58.2	87.3	145.5	242.4	436.4
425	5.5	28.3	56.7	85.0	141.7	236.2	425.2
450	4.6	27.6	55.2	82.8	138.0	230.0	414.0
475	3.7	26.7	53.5	80.2	133.7	222.8	401.0
500	2.8	25.8	51.7	77.5	129.2	215.3	387.6
538	1.4	23.3	46.6	70.0	116.6	194.4	349.9
550	1.4(a)	22.9	45.9	68.8	114.7	191.2	344.1
575	1.4(a)	21.7	43.3	65.0	108.3	180.4	324.8
600	1.4(a)	19.4	38.8	58.2	97.1	161.8	291.2
625	1.4(a)	16.8	33.7	50.5	84.1	140.2	252.4
650	1.4(a)	14.1	28.1	42.2	70.4	117.3	211.1
675	1.4(a)	11.5	23.0	34.6	57.6	96.0	172.8
700	1.4(a)	8.8	17.5	26.3	43.8	73.0	131.5
725	1.4(a)	6.3	12.7	19.0	31.7	52.9	95.2
750	1.4(a)	4.5	8.9	13.4	22.3	37.2	66.9
775	1.2(a)	3.1	6.3	9.4	15.7	26.2	47.2
800	0.9(a)	2.3	4.6	6.9	11.4	19.1	34.3
816	0.7(a)	1.9	3.8	5.7	9.5	15.8	28.4

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.



Table 2-2.12 Ratings for Group 2.12 Materials (Cont'd)

A 351 Gr. CK20 (1)

NOTE:

(1) At temperatures above 538°C, use only when the carbon content is 0.04% or higher.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	18.4	48.0	96.0	144.1	240.1	400.1	720.3
50	17.9	46.8	93.5	140.3	233.8	389.6	701.4
100	16.1	41.9	83.8	125.7	209.5	349.1	628.4
150	14.9	38.9	77.9	116.8	194.7	324.5	584.0
200	14.4	37.4	74.9	112.3	187.2	312.0	561.6
250	14.0	36.4	72.8	109.2	182.0	303.3	546.0
300	13.6	35.4	70.8	106.2	177.0	295.0	531.0
325	13.4	34.8	69.7	104.5	174.2	290.3	522.6
350	13.1	34.1	68.3	102.4	170.6	284.4	511.9
375	12.8	33.3	66.6	99.9	166.5	277.5	499.5
400	12.4	32.5	64.9	97.4	162.3	270.6	487.0
425	12.1	31.6	63.3	94.9	158.2	263.6	474.5
450	11.8	30.8	61.6	92.4	154.0	256.7	462.1
475	11.4	29.8	59.7	89.5	149.2	248.6	447.6
500	11.1	28.8	57.7	86.5	144.2	240.3	432.6
538	10.5	27.3	54.7	82.0	136.7	227.8	410.0
550	10.5	27.3	54.7	82.0	136.7	227.8	410.0
575	10.4	27.1	54.1	81.2	135.3	225.6	406.0
600	9.3	24.3	48.5	72.8	121.3	202.2	364.0
625	8.1	21.0	42.1	63.1	105.2	175.3	315.5
650	6.7	17.6	35.2	52.8	87.9	146.6	263.8
675	5.5	14.4	28.8	43.2	72.0	120.0	215.9
700	4.7	12.3	24.7	37.0	61.6	102.7	184.9
725	3.6	9.4	18.8	28.2	47.0	78.4	141.0
750	2.4	6.1	12.3	18.4	30.7	51.2	92.2
775	1.5	4.0	7.9	11.9	19.9	33.1	59.6
800	1.3	3.3	6.5	9.8	16.3	27.2	49.0
816	0.9	2.4	4.7	7.1	11.8	19.7	35.5



Table 2-3.1 Ratings for Group 3.1 Materials

B 462 Gr. N08020 (1)	B 464 Gr. N08020 (1)	B 473 Gr. N08020 (1)
B 463 Gr. N08020 (1)	B 468 Gr. N08020 (1)	

NOTE:

(1) Use annealed material only.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	50.9	101.7	152.6	254.4	423.9	763.1
150	15.8	48.9	97.9	146.8	244.7	407.8	734.1
200	13.8	47.2	94.3	141.5	235.8	392.9	707.3
250	12.1	45.5	91.0	136.5	227.5	379.2	682.5
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	19.5	50.8	101.6	152.4	253.9	423.2	761.8
300	18.9	49.4	98.7	148.1	246.8	411.3	740.3
325	18.7	48.8	97.5	146.3	243.8	406.3	731.3
350	18.5	48.3	96.6	144.9	241.5	402.5	724.5
375	18.4	48.0	95.9	143.9	239.8	399.7	719.5
400	18.2	47.6	95.2	142.8	238.0	396.7	714.1
425	17.9	46.6	93.2	139.8	233.0	388.4	699.1



Table 2-3.2 Ratings for Group 3.2 Materials

B 160 Gr. N02200 (1)	B 162 Gr. N02200 (1)	B 163 Gr. N02200 (1)	B 564 Gr. N02200 (1)
B 161 Gr. N02200 (1)			

NOTE:

(1) Only use annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	12.7	33.1	66.2	99.3	165.5	275.8	496.4
50	12.7	33.1	66.2	99.3	165.5	275.8	496.4
100	12.7	33.1	66.2	99.3	165.5	275.8	496.4
150	12.7	33.1	66.2	99.3	165.5	275.8	496.4
200	12.7	33.1	66.2	99.3	165.5	275.8	496.4
250	12.1	31.6	63.2	94.8	158.0	263.4	474.0
300	10.2	29.2	58.5	87.7	146.2	243.7	438.7
325	7.2	18.8	37.6	56.4	93.9	156.5	281.8

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	14.2	36.9	73.9	110.8	184.7	307.8	554.0
50	14.2	36.9	73.9	110.8	184.7	307.8	554.0
100	14.2	36.9	73.9	110.8	184.7	307.8	554.0
150	14.2	36.9	73.9	110.8	184.7	307.8	554.0
200	14.2	36.9	73.9	110.8	184.7	307.8	554.0
250	13.5	35.3	70.5	105.8	176.4	293.9	529.1
300	12.5	32.6	65.3	97.9	163.2	272.0	489.7
325	8.0	21.0	41.9	62.9	104.8	174.7	314.5



Table 2-3.3 Ratings for Group 3.3 Materials

B 160 Gr. N02201 (1)

B 162 Gr. N02201 (1)

NOTE:

(1) Only use annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	6.3	16.5	33.1	49.6	82.7	137.9	248.2
50	6.3	16.4	32.8	49.2	82.0	136.7	246.0
100	6.1	15.8	31.7	47.5	79.2	132.0	237.7
150	6.0	15.6	31.1	46.7	77.8	129.6	233.3
200	6.0	15.6	31.1	46.7	77.8	129.6	233.3
250	6.0	15.6	31.1	46.7	77.8	129.6	233.3
300	6.0	15.6	31.1	46.7	77.8	129.6	233.3
325	5.9	15.5	31.0	46.5	77.5	129.2	232.5
350	5.9	15.4	30.8	46.2	76.9	128.2	230.8
375	5.9	15.4	30.7	46.1	76.8	128.0	230.5
400	5.8	15.2	30.4	45.6	76.1	126.8	228.2
425	5.5	14.9	29.8	44.7	74.6	124.3	223.7
450	4.6	14.6	29.2	43.8	73.1	121.8	219.2
475	3.7	14.3	28.6	43.0	71.6	119.3	214.8
500	2.8	13.8	27.6	41.4	69.0	115.1	207.1
538	1.4	13.1	26.1	39.2	65.4	108.9	196.1
550	1.4(a)	9.8	19.6	29.5	49.1	81.8	147.3
575	1.4(a)	5.4	10.7	16.1	26.8	44.6	80.3
600	1.4(a)	4.4	8.9	13.3	22.2	37.0	66.7
625	1.3(a)	3.4	6.9	10.3	17.2	28.7	51.7
650	1.1(a)	2.8	5.7	8.5	14.2	23.6	42.6

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	7.1	18.5	36.9	55.4	92.3	153.9	277.0
50	7.0	18.3	36.6	54.9	91.5	152.5	274.6
100	6.8	17.7	35.4	53.1	88.4	147.4	265.3
150	6.7	17.4	34.7	52.1	86.8	144.7	260.4
200	6.7	17.4	34.7	52.1	86.8	144.7	260.4
250	6.7	17.4	34.7	52.1	86.8	144.7	260.4
300	6.7	17.4	34.7	52.1	86.8	144.7	260.4
325	6.6	17.3	34.6	51.9	86.5	144.1	259.5
350	6.6	17.2	34.4	51.5	85.9	143.1	257.6
375	6.6	17.1	34.3	51.4	85.7	142.9	257.2
400	6.5	17.0	34.0	50.9	84.9	141.5	254.6
425	6.4	16.6	33.3	49.9	83.2	138.7	249.7
450	6.3	16.3	32.6	48.9	81.6	135.9	244.7
475	6.1	16.0	32.0	47.9	79.9	133.2	239.7
500	5.9	15.4	30.8	46.2	77.0	128.4	231.1
538	5.6	14.6	29.2	43.8	72.9	121.6	218.8
550	4.3	11.3	22.6	33.9	56.5	94.1	169.4
575	2.6	6.7	13.4	20.1	33.4	55.7	100.3
600	2.1	5.6	11.1	16.7	27.8	46.3	83.3
625	1.7	4.3	8.6	12.9	21.5	35.9	64.6
650	1.4	3.5	7.1	10.6	17.7	29.5	53.2



Table 2-3.4 Ratings for Group 3.4 Materials

B 127 Gr. N04400 (1)	B 164 Gr. N04400 (1)	B 165 Gr. N04400 (1)	A 494 Gr. M35-2 (1)
B 163 Gr. N04400 (1)	B 164 Gr. N04405 (1)	A 494 Gr. M35-1 (1)	B 564 Gr. N04400 (1)

NOTE:

(1) Only use annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	15.9	41.4	82.7	124.1	206.8	344.7	620.5
50	15.4	40.2	80.5	120.7	201.2	335.3	603.6
100	13.8	35.9	71.9	107.8	179.7	299.5	539.1
150	12.9	33.7	67.5	101.2	168.7	281.1	506.0
200	12.5	32.7	65.4	98.1	163.5	272.4	490.4
250	12.1	32.6	65.2	97.8	163.0	271.7	489.0
300	10.2	32.6	65.2	97.8	163.0	271.7	489.0
325	9.3	32.6	65.2	97.8	163.0	271.7	489.0
350	8.4	32.6	65.1	97.7	162.8	271.3	488.4
375	7.4	32.4	64.8	97.2	161.9	269.9	485.8
400	6.5	32.1	64.2	96.2	160.4	267.4	481.2
425	5.5	31.6	63.3	94.9	158.2	263.6	474.5
450	4.6	26.9	53.8	80.7	134.5	224.2	403.5
475	3.7	20.8	41.5	62.3	103.8	173.0	311.3

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	17.7	46.2	92.3	138.5	230.9	384.8	692.6
50	17.2	44.9	89.8	134.7	224.6	374.3	673.7
100	15.4	40.1	80.2	120.3	200.6	334.3	601.7
150	14.4	37.6	75.3	112.9	188.2	313.7	564.7
200	14.0	36.5	73.0	109.5	182.4	304.0	547.3
250	13.9	36.4	72.8	109.1	181.9	303.2	545.7
300	13.9	36.4	72.8	109.1	181.9	303.2	545.7
325	13.9	36.4	72.8	109.1	181.9	303.2	545.7
350	13.9	36.3	72.7	109.0	181.7	302.8	545.1
375	13.9	36.1	72.3	108.4	180.7	301.2	542.2
400	13.7	35.8	71.6	107.4	179.0	298.4	537.1
425	13.5	35.3	70.6	105.9	176.5	294.2	529.6
450	12.6	32.9	65.9	98.8	164.7	274.6	494.2
475	9.9	25.9	51.9	77.8	129.7	216.2	389.2



Table 2-3.5 Ratings for Group 3.5 Materials

B 163 Gr. N06600 (1)	B 166 Gr. N06600 (1)	B 168 Gr. N06600 (1)	B 564 Gr. N06600 (1)
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NOTE:

(1) Only use annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	16.5	33.1	49.6	82.7	137.9	248.2
550	1.4(a)	13.9	27.9	41.8	69.7	116.2	209.2
575	1.4(a)	9.4	18.9	28.3	47.2	78.6	141.5
600	1.4(a)	6.6	13.3	19.9	33.2	55.3	99.6
625	1.4(a)	5.1	10.3	15.4	25.7	42.8	77.0
650	1.4(a)	4.7	9.5	14.2	23.6	39.4	70.9

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	20.0	51.7	103.4	155.1	258.6	430.9	775.7
300	20.0	51.7	103.4	155.1	258.6	430.9	775.7
325	20.0	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.5	102.8	154.3	257.1	428.6	771.4
375	19.3	50.6	101.0	151.5	252.5	420.9	757.4
400	19.3	50.3	100.6	150.6	251.2	418.3	753.2
425	19.0	49.6	99.3	148.9	248.2	413.7	744.6
450	18.1	47.3	94.4	141.4	235.8	393.1	707.6
475	16.4	42.8	85.5	128.2	213.7	356.3	641.3
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	7.9	20.7	41.4	62.1	103.4	172.4	310.3
550	6.7	17.4	34.9	52.3	87.2	145.3	261.5
575	4.5	11.8	23.6	35.4	59.0	98.3	176.9
600	3.2	8.3	16.6	24.9	41.5	69.1	124.5
625	2.5	6.4	12.8	19.3	32.1	53.5	96.3
650	2.3	5.9	11.8	17.7	29.5	49.2	88.6



Table 2-3.6 Ratings for Group 3.6 Materials

B 163 Gr. N08800 (1)	B 408 Gr. N08800 (1)	B 409 Gr. N08800 (1)	B 564 Gr. N08800 (1)
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NOTE:

(1) Only use annealed material.

A – Standard Class

Temperature °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.7	48.8	97.6	146.4	244.0	406.7	732.1
100	17.5	45.6	91.2	136.9	228.1	380.1	684.3
150	15.8	44.0	88.0	132.0	219.9	366.6	659.8
200	13.8	42.8	85.6	128.4	214.0	356.7	642.0
250	12.1	41.7	83.5	125.2	208.7	347.9	626.1
300	10.2	40.8	81.6	122.5	204.1	340.2	612.3
325	9.3	40.3	80.6	120.9	201.6	336.0	604.7
350	8.4	39.8	79.5	119.3	198.8	331.3	596.4
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	21.6	42.9	64.2	107.0	178.5	321.4
625	1.4(a)	18.3	36.6	54.9	91.2	152.0	273.8
650	1.4(a)	14.1	28.1	42.5	70.7	117.7	211.7
675	1.4(a)	10.3	20.5	30.8	51.3	85.6	154.0
700	1.4(a)	5.6	11.1	16.7	27.8	46.3	83.4
725	1.4(a)	4.0	8.1	12.1	20.1	33.6	60.4
750	1.2(a)	3.0	6.1	9.1	15.1	25.2	45.4
775	0.9(a)	2.5	4.9	7.4	12.4	20.6	37.1
800	0.8(a)	2.2	4.3	6.5	10.8	18.0	32.3
816	0.7(a)	1.9	3.8	5.7	9.5	15.8	28.4

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.



Table 2-3.6 Ratings for Group 3.6 Materials (Cont'd)

B 163 Gr. N08800 (1)	B 408 Gr. N08800 (1)	B 409 Gr. N08800 (1)	B 564 Gr. N08800 (1)
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NOTE:

(1) Only use annealed material.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	19.5	50.9	101.8	152.7	254.6	424.3	763.7
150	18.8	49.1	98.2	147.3	245.5	409.1	736.4
200	18.3	47.8	95.5	143.3	238.8	398.0	716.5
250	17.9	46.6	93.2	139.8	232.9	388.2	698.8
300	17.5	45.6	91.1	136.7	227.8	379.6	683.4
325	17.2	45.0	90.0	135.0	225.0	375.0	674.9
350	17.0	44.4	88.8	133.1	221.9	369.8	665.6
375	16.8	43.9	87.8	131.6	219.4	365.6	658.1
400	16.6	43.4	86.8	130.1	216.9	361.5	650.7
425	16.4	42.9	85.8	128.6	214.4	357.3	643.2
450	16.2	42.4	84.8	127.1	211.9	353.2	635.7
475	16.1	42.0	84.0	126.1	210.1	350.2	630.3
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	10.3	26.9	53.5	80.4	134.0	223.4	401.9
625	8.7	23.0	45.7	68.6	114.3	190.6	342.8
650	6.9	17.9	35.5	53.1	88.6	147.9	266.1
675	4.9	12.8	25.7	38.5	64.2	107.0	192.5
700	2.7	6.9	13.9	20.8	34.7	57.9	104.2
725	1.9	5.0	10.1	15.1	25.2	42.0	75.5
750	1.4	3.8	7.6	11.3	18.9	31.5	56.7
775	1.2	3.1	6.2	9.3	15.5	25.8	46.4
800	1.0	2.7	5.4	8.1	13.5	22.5	40.4
816	0.9	2.4	4.7	7.1	11.8	19.7	35.5



Table 2-3.7 Ratings for Group 3.7 Materials

B 333 Gr. N10665 (1)	B 335 Gr. N10675 (1)	B 564 Gr. N10665 (1)	B 622 Gr. N10675 (1)
B 333 Gr. N10675 (1)	B 462 Gr. N10665 (1)	B 564 Gr. N10675 (1)	
B 335 Gr. N10665 (1)	B 462 Gr. N10675 (1)	B 622 Gr. N10665 (1)	

NOTE:

(1) Only use solution annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	20.0	51.7	103.4	155.1	258.6	430.9	775.7
300	20.0	51.7	103.4	155.1	258.6	430.9	775.7
325	20.0	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.5	102.8	154.3	257.1	428.6	771.4
375	19.3	50.6	101.0	151.5	252.5	420.9	757.4
400	19.3	50.3	100.6	150.6	251.2	418.3	753.2
425	19.0	49.6	99.3	148.9	248.2	413.7	744.6



Table 2-3.8 Ratings for Group 3.8 Materials

B 333 Gr. N10001 (1)(2)	B 446 Gr. N06625 (3)(4)	B 564 Gr. N10276 (1)(5)	B 575 Gr. N06455 (1)(2)
B 335 Gr. N10001 (1)(2)	B 462 Gr. N06022 (1)(5)	B 573 Gr. N10003 (3)	B 575 Gr. N10276 (1)(5)
B 423 Gr. N08825 (3)(6)	B 462 Gr. N06200 (1)(2)	B 574 Gr. N06022 (1)(5)	B 622 Gr. N06022 (1)(5)
B 424 Gr. N08825 (3)(6)	B 462 Gr. N10276 (1)(5)	B 574 Gr. N06200 (1)(2)	B 622 Gr. N06200 (1)(2)
B 425 Gr. N08825 (3)(6)	B 564 Gr. N06022 (1)(5)	B 574 Gr. N06455 (1)(2)	B 622 Gr. N06455 (1)(2)
B 434 Gr. N10003 (3)	B 564 Gr. N06200 (1)(2)	B 574 Gr. N10276 (1)(5)	B 622 Gr. N10001 (2)(3)
B 443 Gr. N06625 (3)(4)	B 564 Gr. N06625 (3)(4)	B 575 Gr. N06022 (1)(5)	B 622 Gr. N10276 (1)(5)
	B 564 Gr. N08825 (3)(6)	B 575 Gr. N06200 (1)(2)	

NOTES:

- (1) Only use solution annealed material.
- (2) Not to be used over 425°C.
- (3) Only use annealed material.
- (4) Not to be used over 645°C. Alloy N06625 in the annealed condition is subject to severe loss of impact strength at room temperatures after exposure in the range of 538°C to 760°C.
- (5) Not to be used over 675°C.
- (6) Not to be used over 538°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.3	96.7	145.0	241.7	402.8	725.1
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	21.6	42.9	64.2	107.0	178.5	321.4
625	1.4(a)	18.3	36.6	54.9	91.2	152.0	273.8
650	1.4(a)	14.1	28.1	42.2	70.4	117.3	211.1
675	1.4(a)	11.5	23.0	34.6	57.6	96.0	172.8
700	1.4(a)	8.8	17.5	26.3	43.8	73.0	131.5

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.



Table 2-3.8 Ratings for Group 3.8 Materials (Cont'd)

B 333 Gr. N10001 (1)(2)	B 446 Gr. N06625 (3)(4)	B 564 Gr. N10276 (1)(5)	B 575 Gr. N06455 (1)(2)
B 335 Gr. N10001 (1)(2)	B 462 Gr. N06022 (1)(5)	B 573 Gr. N10003 (3)	B 575 Gr. N10276 (1)(5)
B 423 Gr. N08825 (3)(6)	B 462 Gr. N06200 (1)(2)	B 574 Gr. N06022 (1)(5)	B 622 Gr. N06022 (1)(5)
B 424 Gr. N08825 (3)(6)	B 462 Gr. N10276 (1)(5)	B 574 Gr. N06200 (1)(2)	B 622 Gr. N06200 (1)(2)
B 425 Gr. N08825 (3)(6)	B 564 Gr. N06022 (1)(5)	B 574 Gr. N06455 (1)(2)	B 622 Gr. N06455 (1)(2)
B 434 Gr. N10003 (3)	B 564 Gr. N06200 (1)(2)	B 574 Gr. N10276 (1)(5)	B 622 Gr. N10001 (2)(3)
B 443 Gr. N06625 (3)(4)	B 564 Gr. N06625 (3)(4)	B 575 Gr. N06022 (1)(5)	B 622 Gr. N10276 (1)(5)
	B 564 Gr. N08825 (3)(6)	B 575 Gr. N06200 (1)(2)	

NOTES:

- (1) Only use solution annealed material.
- (2) Not to be used over 425°C.
- (3) Only use annealed material.
- (4) Not to be used over 645°C. Alloy N06625 in the annealed condition is subject to severe loss of impact strength at room temperatures after exposure in the range of 538°C to 760°C.
- (5) Not to be used over 675°C.
- (6) Not to be used over 538°C.

B – Special Class

Temperature °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	19.8	51.7	103.4	155.1	258.6	430.9	775.7
300	19.1	49.9	99.8	149.6	249.4	415.7	748.2
325	18.8	49.1	98.1	147.2	245.3	408.8	735.9
350	18.6	48.4	96.9	145.3	242.2	403.7	726.6
375	18.4	47.9	95.9	143.8	239.7	399.5	719.1
400	18.2	47.5	94.9	142.4	237.3	395.5	711.8
425	18.1	47.3	94.6	141.9	236.4	394.1	709.3
450	17.9	46.8	93.6	140.4	234.1	390.1	702.2
475	16.4	42.8	85.5	128.2	213.7	356.3	641.3
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	10.3	26.9	53.5	80.4	134.0	223.4	401.9
625	8.7	23.0	45.7	68.6	114.3	190.6	342.8
650	6.7	17.6	35.2	52.8	87.9	146.6	263.8
675	5.5	14.4	28.8	43.2	72.0	120.0	215.9
700	4.2	11.0	21.9	32.9	54.8	91.3	164.4



Table 2-3.9 Ratings for Group 3.9 Materials

B 435 Gr. N06002 (1)	B 572 Gr. N06002 (1)	B 622 Gr. N06002 (1)	B 622 Gr. R30556 (1)
B 435 Gr. R30556 (1)	B 572 Gr. R30556 (1)		

NOTE:

(1) Only use solution annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	47.6	95.2	142.8	237.9	396.5	713.8
200	13.8	44.3	88.6	132.9	221.5	369.2	664.6
250	12.1	41.6	83.1	124.7	207.9	346.4	623.6
300	10.2	39.5	79.0	118.5	197.4	329.1	592.3
325	9.3	38.6	77.2	115.8	193.0	321.7	579.1
350	8.4	37.9	75.8	113.7	189.5	315.8	568.5
375	7.4	37.3	74.7	112.0	186.6	311.1	559.9
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	21.6	42.9	64.2	107.0	178.5	321.4
625	1.4(a)	18.3	36.6	54.9	91.2	152.0	273.8
650	1.4(a)	14.1	28.1	42.5	70.7	117.7	211.7
675	1.4(a)	12.4	25.2	37.6	62.7	104.5	187.9
700	1.4(a)	10.1	20.0	29.8	49.7	83.0	149.4
725	1.4(a)	7.9	15.4	23.2	38.6	64.4	115.8
750	1.4(a)	5.9	11.7	17.6	29.6	49.1	88.2
775	1.4(a)	4.6	9.0	13.7	22.8	38.0	68.4
800	1.2(a)	3.5	7.0	10.5	17.4	29.2	52.6
816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.



Table 2-3.9 Ratings for Group 3.9 Materials (Cont'd)

B 435 Gr. N06002 (1)	B 572 Gr. N06002 (1)	B 622 Gr. N06002 (1)	B 622 Gr. R30556 (1)
B 435 Gr. R30556 (1)	B 572 Gr. R30556 (1)		

NOTE:

(1) Only use solution annealed material.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	19.0	49.5	98.9	148.4	247.3	412.1	741.8
250	17.8	46.4	92.8	139.2	232.0	386.7	696.0
300	16.9	44.1	88.1	132.2	220.4	367.3	661.1
325	16.5	43.1	86.2	129.3	215.4	359.1	646.3
350	16.2	42.3	84.6	126.9	211.5	352.5	634.5
375	16.0	41.7	83.3	125.0	208.3	347.2	624.9
400	15.8	41.2	82.3	123.5	205.8	343.1	617.5
425	15.7	40.8	81.7	122.5	204.2	340.3	612.5
450	15.5	40.5	81.0	121.5	202.5	337.5	607.6
475	15.4	40.2	80.3	120.5	200.9	334.8	602.6
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	10.3	26.9	53.5	80.4	134.0	223.4	401.9
625	8.7	23.0	45.7	68.6	114.3	190.6	342.8
650	6.9	17.9	35.5	53.1	88.6	147.9	266.1
675	6.2	16.0	31.6	47.3	78.9	131.7	237.0
700	4.8	12.4	25.0	37.3	62.3	103.7	186.5
725	3.7	9.7	19.5	28.9	48.3	80.2	144.5
750	2.8	7.4	14.8	22.1	36.7	61.2	110.3
775	2.2	5.8	11.4	17.2	28.5	47.6	85.6
800	1.8	4.4	8.8	13.2	22.0	36.6	65.6
816	1.4	3.4	7.2	10.7	17.9	29.6	53.1



Table 2-3.10 Ratings for Group 3.10 Materials

B 599 Gr. N08700 (1)

B 672 Gr. N08700 (1)

NOTE:

(1) Only use solution annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	772.9
150	15.8	47.1	94.2	141.3	235.5	392.5	706.5
200	13.8	44.3	88.5	132.8	221.3	368.9	664.0
250	12.1	42.8	85.6	128.4	214.0	356.6	641.9
300	10.2	41.3	82.7	124.0	206.7	344.5	620.0
325	9.3	40.4	80.7	121.1	201.8	336.4	605.5
350	8.4	38.9	77.8	116.7	194.5	324.2	583.6

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	18.9	49.4	98.8	148.2	247.0	411.7	741.1
250	18.3	47.8	95.5	143.3	238.8	398.0	716.4
300	17.7	46.1	92.3	138.4	230.7	384.4	692.0
325	17.3	45.1	90.1	135.2	225.3	375.4	675.8
350	16.6	43.4	86.9	130.3	217.1	361.9	651.4



Table 2-3.11 Ratings for Group 3.11 Materials

B 625 Gr. N08904 (1)	B 649 Gr. N08904 (1)	B 677 Gr. N08904 (1)
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NOTE:

(1) Only use annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.7	51.3	102.6	153.9	256.5	427.5	769.5
50	18.8	49.1	98.3	147.4	245.7	409.6	737.2
100	15.7	41.1	82.1	123.2	205.3	342.1	615.9
150	14.4	37.5	75.0	112.5	187.5	312.5	562.5
200	13.3	34.7	69.3	104.0	173.4	288.9	520.1
250	12.1	32.0	64.0	95.9	159.9	266.5	479.6
300	10.2	30.0	60.0	90.0	150.1	250.1	450.2
325	9.3	29.2	58.5	87.7	146.1	243.6	438.4
350	8.4	28.7	57.3	86.0	143.4	238.9	430.1
375	7.4	28.2	56.5	84.7	141.2	235.4	423.7

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.6	51.1	102.2	153.3	255.5	425.9	766.6
100	17.6	45.8	91.6	137.5	229.1	381.9	687.3
150	16.0	41.9	83.7	125.6	209.3	348.8	627.8
200	14.8	38.7	77.4	116.1	193.5	322.5	580.4
250	13.7	35.7	71.4	107.1	178.4	297.4	535.3
300	12.8	33.5	67.0	100.5	167.5	279.1	502.4
325	12.5	32.6	65.2	97.9	163.1	271.9	489.3
350	12.3	32.0	64.0	96.0	160.0	266.7	480.0
375	12.1	31.5	63.1	94.6	157.6	262.7	472.9



Table 2-3.12 Ratings for Group 3.12 Materials

A 351 Gr. CN3MN (1)	B 574 Gr. N06035 (1)(2)	B 620 Gr. N08320 (1)	B 622 Gr. N08320 (1)
B 462 Gr. N06035 (1)(2)	B 575 Gr. N06035 (1)(2)	B 621 Gr. N08320 (1)	B 688 Gr. N08367 (1)
B 462 Gr. N08367 (1)	B 581 Gr. N06985 (1)	B 622 Gr. N06035 (1)(2)	B 691 Gr. N08367 (1)(2)
B 564 Gr. N06035 (1)(2)	B 582 Gr. N06985 (1)	B 622 Gr. N06985 (1)	

NOTES:

- (1) Only use solution annealed material.
 (2) Not to be used over 425°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	17.8	46.3	92.7	139.0	231.7	386.1	695.0
50	17.5	45.6	91.1	136.7	227.8	379.7	683.5
100	16.3	42.5	85.1	127.6	212.7	354.5	638.1
150	15.4	40.1	80.3	120.4	200.7	334.6	602.2
200	13.8	37.3	74.6	112.0	186.6	311.0	559.8
250	12.1	34.9	69.8	104.7	174.5	290.8	523.4
300	10.2	33.1	66.2	99.3	165.5	275.9	496.6
325	9.3	32.3	64.6	97.0	161.6	269.3	484.8
350	8.4	31.6	63.2	94.8	158.1	263.4	474.2
375	7.4	31.0	62.0	93.0	155.1	258.5	465.2
400	6.5	30.4	60.8	91.3	152.1	253.5	456.3
425	5.5	29.8	59.7	89.5	149.1	248.5	447.4

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	50.9	101.7	152.6	254.3	423.8	762.9
100	18.2	47.5	95.0	142.4	237.4	395.6	712.2
150	17.2	44.8	89.6	134.4	224.0	373.4	672.1
200	16.0	41.6	83.3	124.9	208.2	347.1	624.7
250	14.9	38.9	77.9	116.8	194.7	324.5	584.2
300	14.2	37.0	73.9	110.9	184.8	307.9	554.3
325	13.8	36.1	72.1	108.2	180.3	300.6	541.0
350	13.5	35.3	70.6	105.8	176.4	294.0	529.2
375	13.3	34.6	69.2	103.8	173.1	288.5	519.2
400	13.0	34.0	67.9	101.9	169.8	282.9	509.3
425	12.8	33.3	66.6	99.9	166.4	277.4	499.3



Table 2-3.13 Ratings for Group 3.13 Materials

B 564 Gr. N08031 (1)	B 581 Gr. N06975 (2)	B 582 Gr. N06975 (2)	B 622 Gr. N06975 (2)
B 625 Gr. N08031 (1)	B 622 Gr. N08031 (1)	B 649 Gr. N08031 (1)	

NOTES:

- (1) Only use annealed material.
(2) Only use solution annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	48.2	96.3	144.5	240.8	401.4	722.5
150	15.8	45.8	91.6	137.4	228.9	381.6	686.8
200	13.8	43.6	87.1	130.7	217.8	362.9	653.3
250	12.1	41.5	82.9	124.4	207.3	345.5	621.8
300	10.2	39.4	78.7	118.1	196.8	328.1	590.5
325	9.3	38.4	76.9	115.3	192.2	320.3	576.6
350	8.4	37.7	75.5	113.2	188.7	314.5	566.0
375	7.4	37.2	74.3	111.5	185.8	309.7	557.4
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	19.6	51.1	102.2	153.3	255.5	425.8	766.5
200	18.6	48.6	97.2	145.8	243.0	405.1	729.1
250	17.7	46.3	92.5	138.8	231.3	385.6	694.0
300	16.8	43.9	87.9	131.8	219.7	366.2	659.1
325	16.4	42.9	85.8	128.7	214.5	357.5	643.5
350	16.1	42.1	84.2	126.3	210.6	351.0	631.7
375	15.9	41.5	83.0	124.4	207.4	345.6	622.1
400	15.7	41.0	82.0	123.0	204.9	341.5	614.8
425	15.6	40.7	81.3	122.0	203.3	338.8	609.8



Table 2-3.14 Ratings for Group 3.14 Materials

B 462 Gr. N06030 (1)(2)	B 581 Gr. N06030 (1)(2)	B 582 Gr. N06030 (1)(2)	B 622 Gr. N06030 (1)(2)
B 581 Gr. N06007 (1)	B 582 Gr. N06007 (1)	B 622 Gr. N06007 (1)	

NOTES:

- (1) Only use solution annealed material.
(2) Not to be used over 425°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.6	48.6	97.1	145.7	242.8	404.6	728.3
100	17.0	44.3	88.6	132.8	221.4	369.0	664.2
150	15.8	41.3	82.6	124.0	206.6	344.3	619.8
200	13.8	39.1	78.2	117.3	195.4	325.7	586.3
250	12.1	37.4	74.8	112.2	187.0	311.6	560.9
300	10.2	36.1	72.2	108.3	180.6	300.9	541.7
325	9.3	35.6	71.1	106.7	177.9	296.4	533.6
350	8.4	35.2	70.3	105.5	175.8	293.1	527.5
375	7.4	34.9	69.7	104.6	174.3	290.6	523.0
400	6.5	34.6	69.2	103.7	172.9	288.1	518.7
425	5.5	34.4	68.9	103.3	172.1	286.9	516.4
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	18.9	49.4	98.8	148.3	247.1	411.8	741.3
150	17.7	46.1	92.2	138.3	230.6	384.3	691.7
200	16.7	43.6	87.2	130.9	218.1	363.5	654.3
250	16.0	41.7	83.5	125.2	208.7	347.8	626.0
300	15.5	40.3	80.6	120.9	201.5	335.9	604.6
325	15.2	39.7	79.4	119.1	198.5	330.9	595.5
350	15.0	39.2	78.5	117.7	196.2	327.1	588.7
375	14.9	38.9	77.8	116.7	194.6	324.3	583.7
400	14.8	38.6	77.2	115.8	193.0	321.6	578.9
425	14.7	38.4	76.8	115.3	192.1	320.2	576.4
450	14.7	38.3	76.5	114.8	191.3	318.8	573.9
475	14.6	38.1	76.2	114.3	190.5	317.4	571.4
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1



Table 2-3.15 Ratings for Group 3.15 Materials

A 494 Gr. N-12MV (1)(2)	B 407 Gr. N08810 (1)	B 409 Gr. N08810 (1)	B 564 Gr. N08810 (1)
A 494 Gr. CW-12MW (1)(2)	B 408 Gr. N08810 (1)		

NOTES:

- (1) Only use solution annealed material.
(2) Not to be used over 538°C.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	15.9	41.4	82.7	124.1	206.8	344.7	620.5
50	15.6	40.6	81.3	121.9	203.2	338.7	609.6
100	14.5	37.8	75.6	113.4	189.0	315.0	567.0
150	13.7	35.9	71.7	107.6	179.3	298.9	538.0
200	13.0	33.9	67.9	101.8	169.6	282.7	508.9
250	12.1	32.3	64.5	96.8	161.3	268.9	484.0
300	10.2	30.7	61.5	92.2	153.7	256.2	461.2
325	9.3	30.1	60.1	90.2	150.3	250.5	450.9
350	8.4	29.4	58.8	88.3	147.1	245.2	441.3
375	7.4	28.7	57.4	86.2	143.6	239.4	430.8
400	6.5	28.3	56.5	84.8	141.3	235.6	424.0
425	5.5	27.7	55.3	83.0	138.4	230.6	415.1
450	4.6	27.2	54.4	81.7	136.1	226.8	408.3
475	3.7	26.8	53.5	80.3	133.9	223.1	401.6
500	2.8	26.3	52.6	79.0	131.6	219.4	394.9
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	21.6	42.9	64.2	107.0	178.5	321.4
625	1.4(a)	18.3	36.6	54.9	91.2	152.0	273.8
650	1.4(a)	14.1	28.1	42.5	70.7	117.7	211.7
675	1.4(a)	12.4	25.2	37.6	62.7	104.5	187.9
700	1.4(a)	10.1	20.0	29.8	49.7	83.0	149.4
725	1.4(a)	7.9	15.4	23.2	38.6	64.4	115.8
750	1.4(a)	5.9	11.7	17.6	29.6	49.1	88.2
775	1.4(a)	4.6	9.0	13.7	22.8	38.0	68.4
800	1.2(a)	3.5	7.0	10.5	17.4	29.2	52.6
816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7

GENERAL NOTE:

- (a) Flanged-end valve ratings terminate at 538°C.



Table 2-3.15 Ratings for Group 3.15 Materials (Cont'd)

A 494 Gr. N-12MV (1)(2)	B 407 Gr. N08810 (1)	B 409 Gr. N08810 (1)	B 564 Gr. N08810 (1)
A 494 Gr. CW-12MV (1)(2)	B 408 Gr. N08810 (1)		

NOTES:

- (1) Only use solution annealed material.
(2) Not to be used over 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	17.7	46.2	92.3	138.5	230.9	384.8	692.6
50	17.4	45.4	90.7	136.1	226.8	378.0	680.4
100	16.2	42.2	84.4	126.6	210.9	351.6	632.8
150	15.3	40.0	80.1	120.1	200.1	333.6	600.4
200	14.5	37.9	75.7	113.6	189.3	315.6	568.0
250	13.8	36.0	72.0	108.0	180.0	300.1	540.1
300	13.2	34.3	68.6	102.9	171.6	285.9	514.7
325	12.9	33.5	67.1	100.6	167.7	279.5	503.2
350	12.6	32.8	65.7	98.5	164.2	273.6	492.5
375	12.3	32.1	64.1	96.2	160.3	267.1	480.9
400	12.1	31.6	63.1	94.7	157.8	262.9	473.3
425	11.8	30.9	61.8	92.7	154.4	257.4	463.3
450	11.6	30.4	60.8	91.1	151.9	253.1	455.6
475	11.5	29.9	59.8	89.6	149.4	249.0	448.2
500	11.3	29.4	58.8	88.1	146.9	244.8	440.7
538	11.0	28.6	57.3	85.9	143.1	238.5	429.4
550	11.0	28.6	57.3	85.9	143.1	238.5	429.4
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	10.3	26.9	53.5	80.4	134.0	223.4	401.9
625	8.7	23.0	45.7	68.6	114.3	190.6	342.8
650	6.9	17.9	35.5	53.1	88.6	147.9	266.1
675	6.2	16.0	31.6	47.3	78.9	131.7	237.0
700	4.8	12.4	25.0	37.3	62.3	103.7	186.5
725	3.7	9.7	19.5	28.9	48.3	80.2	144.5
750	2.8	7.4	14.8	22.1	36.7	61.2	110.3
775	2.2	5.8	11.4	17.2	28.5	47.6	85.6
800	1.8	4.4	8.8	13.2	22.0	36.6	65.6
816	1.4	3.4	7.2	10.7	17.9	29.6	53.1



Table 2-3.16 Ratings for Group 3.16 Materials

B 511 Gr. N08330 (1)	B 535 Gr. N08330 (1)	B 536 Gr. N08330 (1)					
NOTE: (1) Only use solution annealed material.							
A – Standard Class							
Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.5	48.4	96.7	145.1	241.8	403.1	725.5
100	16.7	43.5	87.0	130.5	217.5	362.4	652.4
150	15.6	40.8	81.6	122.5	204.1	340.2	612.3
200	13.8	38.6	77.2	115.8	192.9	321.6	578.8
250	12.1	36.8	73.5	110.3	183.8	306.3	551.4
300	10.2	35.2	70.4	105.6	176.1	293.4	528.2
325	9.3	34.5	69.0	103.6	172.6	287.7	517.9
350	8.4	33.9	67.8	101.7	169.4	282.4	508.3
375	7.4	33.2	66.3	99.5	165.8	276.4	497.5
400	6.5	32.6	65.1	97.7	162.9	271.4	488.6
425	5.5	32.0	64.0	95.9	159.9	266.5	479.6
450	4.6	31.4	62.8	94.1	156.9	261.5	470.7
475	3.7	30.8	61.6	92.4	153.9	256.5	461.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	21.9	43.7	65.6	109.4	182.3	328.1
600	1.4(a)	17.4	34.8	52.3	87.1	145.1	261.3
625	1.4(a)	13.8	27.5	41.3	68.8	114.6	206.3
650	1.4(a)	11.0	22.1	33.1	55.1	91.9	165.4
675	1.4(a)	9.1	18.2	27.3	45.6	75.9	136.7
700	1.4(a)	7.6	15.2	22.8	38.0	63.3	113.9
725	1.4(a)	6.1	12.2	18.3	30.5	50.9	91.6
750	1.4(a)	4.8	9.5	14.3	23.8	39.7	71.5
775	1.4(a)	3.9	7.7	11.6	19.4	32.3	58.1
800	1.2(a)	3.1	6.3	9.4	15.6	26.1	46.9
816	1.0(a)	2.6	5.2	7.8	13.0	21.7	39.0

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.



Table 2-3.16 Ratings for Group 3.16 Materials (Cont'd)

B 511 Gr. N08330 (1)	B 535 Gr. N08330 (1)	B 536 Gr. N08330 (1)
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NOTE:

(1) Only use solution annealed material.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
–29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.6	51.1	102.2	153.3	255.5	425.8	766.5
100	18.6	48.5	97.1	145.6	242.7	404.5	728.1
150	17.5	45.6	91.1	136.7	227.8	379.7	683.4
200	16.5	43.1	86.1	129.2	215.3	358.9	646.0
250	15.7	41.0	82.1	123.1	205.1	341.9	615.4
300	15.1	39.3	78.6	117.9	196.5	327.5	589.5
325	14.8	38.5	77.1	115.6	192.7	321.1	578.0
350	14.5	37.8	75.6	113.5	189.1	315.2	567.3
375	14.2	37.0	74.0	111.1	185.1	308.5	555.3
400	13.9	36.4	72.7	109.1	181.8	302.9	545.3
425	13.7	35.7	71.4	107.1	178.4	297.4	535.3
450	13.4	35.0	70.0	105.1	175.1	291.9	525.3
475	13.2	34.4	68.7	103.1	171.8	286.3	515.4
500	13.0	33.8	67.6	101.4	169.1	281.8	507.2
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.5	27.3	54.7	82.0	136.7	227.8	410.1
600	8.3	21.8	43.5	65.3	108.9	181.4	326.6
625	6.6	17.2	34.4	51.6	86.0	143.3	257.9
650	5.3	13.8	27.6	41.3	68.9	114.8	206.7
675	4.4	11.4	22.8	34.2	56.9	94.9	170.8
700	3.6	9.5	19.0	28.5	47.5	79.1	142.4
725	2.9	7.6	15.3	22.9	38.1	63.6	114.4
750	2.3	6.0	11.9	17.9	29.8	49.6	89.4
775	1.9	4.8	9.7	14.5	24.2	40.3	72.6
800	1.5	3.9	7.8	11.7	19.6	32.6	58.7
816	1.2	3.3	6.5	9.8	16.3	27.1	48.8



Table 2-3.17 Ratings for Group 3.17 Materials

A 351 Gr. CN7M (1)

NOTE:

(1) Only use solution annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	15.9	41.4	82.7	124.1	206.8	344.7	620.5
50	15.4	40.1	80.3	120.4	200.7	334.4	602.0
100	13.5	35.3	70.6	105.9	176.5	294.2	529.6
150	12.3	32.0	64.1	96.1	160.2	267.0	480.6
200	11.3	29.4	58.7	88.1	146.8	244.7	440.4
250	10.4	27.2	54.4	81.7	136.1	226.9	408.4
300	9.7	25.4	50.8	76.1	126.9	211.5	380.7
325	9.3	24.4	48.8	73.3	122.1	203.5	366.4

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	17.6	45.8	91.6	137.4	229.0	381.7	687.0
50	17.0	44.2	88.5	132.7	221.2	368.7	663.6
100	14.7	38.3	76.6	114.9	191.5	319.1	574.4
150	13.5	35.2	70.4	105.5	175.9	293.2	527.7
200	12.5	32.7	65.4	98.2	163.6	272.7	490.8
250	11.6	30.4	60.8	91.2	151.9	253.2	455.8
300	10.9	28.3	56.6	85.0	141.6	236.0	424.8
325	10.5	27.3	54.5	81.8	136.3	227.2	408.9



Table 2-3.18 Ratings for Group 3.18 Materials

B 167 Gr. N06600 (1)

NOTE:

(1) Only use annealed material.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.8	49.1	98.3	147.4	245.7	409.4	737.0
100	17.7	47.1	94.2	141.3	235.4	392.4	706.3
150	15.8	45.3	90.6	135.9	226.5	377.5	679.5
200	14.0	43.5	87.0	130.5	217.6	362.6	652.7
250	12.1	42.0	84.0	126.0	210.0	350.0	630.0
300	10.2	40.6	81.3	121.9	203.1	338.6	609.4
325	9.1	40.0	80.0	120.0	199.9	333.2	599.8
350	8.4	39.4	78.8	118.2	196.9	328.2	590.8
375	7.4	38.8	77.6	116.4	194.0	323.4	582.1
400	6.5	36.6	73.2	109.8	182.9	304.9	548.8
425	5.6	35.1	70.2	105.3	175.5	292.5	526.4
450	4.7	33.8	67.6	101.4	169.0	281.7	507.1
475	3.7	31.7	63.3	95.0	158.3	263.8	474.8
500	2.8	28.2	56.4	84.6	141.0	235.1	423.1
538	1.4	16.5	33.1	49.6	82.7	137.9	248.2
550	1.4(a)	13.9	27.9	41.8	69.7	116.2	209.2
575	1.4(a)	9.4	18.9	28.3	47.2	78.6	141.5
600	1.4(a)	6.6	13.3	19.9	33.2	55.3	99.6
625	1.4(a)	5.1	10.3	15.4	25.7	42.8	77.0
650	1.4(a)	4.7	9.5	14.2	23.6	39.4	70.9

GENERAL NOTE:

(a) Flanged-end valve ratings terminate at 538°C.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.5	155.2	258.6	431.1	775.9
50	20.0	51.7	103.5	155.2	258.6	431.1	775.9
100	20.0	51.7	103.5	155.2	258.6	431.1	775.9
150	19.4	50.6	101.1	151.7	252.8	421.3	758.4
200	18.6	48.6	97.1	145.7	242.8	404.7	728.5
250	18.0	46.9	93.7	140.6	234.4	390.6	703.1
300	17.4	45.3	90.7	136.0	226.7	377.9	680.1
325	17.1	44.6	89.3	133.9	223.1	371.9	669.4
350	16.9	44.0	87.9	131.9	201.2	366.3	659.4
375	16.6	43.3	86.6	130.0	194.0	361.0	649.8
400	16.4	42.8	85.6	128.5	182.9	356.9	642.4
425	16.2	42.3	84.7	127.0	175.5	352.7	634.9
450	16.0	41.8	83.7	125.5	169.0	348.6	627.4
475	15.8	41.3	82.7	124.0	158.3	344.4	619.9
500	13.4	34.9	69.7	104.6	141.0	290.6	523.1
538	7.9	20.7	41.4	62.1	103.4	172.4	310.3
550	6.7	17.4	34.9	52.3	87.2	145.3	261.5
575	4.5	11.8	23.6	35.4	59.0	98.3	176.9
600	3.2	8.3	16.6	24.9	41.5	69.1	124.5
625	2.5	6.4	12.8	19.3	32.1	53.5	96.3
650	2.3	5.9	11.8	17.7	29.5	49.2	88.6



Table 2-3.19 Ratings for Group 3.19 Materials

B 435 Gr. N06230 B 564 Gr. N06230 B 572 Gr. N06230 B 622 Gr. N06230

GENERAL NOTE: Use annealed material only.

A – Standard Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4(a)	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	21.6	42.9	64.2	107.0	178.5	321.4
625	1.4(a)	18.3	36.6	54.9	91.2	152.0	273.8
650	1.4(a)	14.1	28.1	42.5	70.7	117.7	211.7
675	1.4(a)	12.4	25.2	37.6	62.7	104.5	187.9
700	1.4(a)	10.1	20.0	29.8	49.7	83.0	149.4
725	1.4(a)	7.9	15.4	23.2	38.6	64.4	115.8
750	1.4(a)	5.9	11.7	17.6	29.6	49.1	88.2
775	1.4(a)	4.6	9.0	13.7	22.8	38.0	68.4
800	1.2(a)	3.5	7.0	10.5	17.4	29.2	52.6
816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7

GENERAL NOTE:

(a) For welding-end valves only. Flanged-end valve ratings terminate at 538°C.



Table 2-3.19 Ratings for Group 3.19 Materials (Cont'd)

B 435 Gr. N06230 B 564 Gr. N06230 B 572 Gr. N06230 B 622 Gr. N06230

GENERAL NOTE: Use annealed material only.

B – Special Class

Temperature, °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	20.0	51.7	103.4	155.1	258.6	430.9	775.7
150	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	20.0	51.7	103.4	155.1	258.6	430.9	775.7
250	20.0	51.7	103.4	155.1	258.6	430.9	775.7
300	20.0	51.7	103.4	155.1	258.6	430.9	775.7
325	20.0	51.7	103.4	155.1	258.6	430.9	775.7
350	19.8	51.5	102.8	154.3	257.1	428.6	771.4
375	19.3	50.6	101.0	151.5	252.5	420.9	757.4
400	19.3	50.3	100.6	150.6	251.2	418.3	753.2
425	19.0	49.6	99.3	148.9	248.2	413.7	744.6
450	18.1	47.3	94.4	141.4	235.8	393.1	707.6
475	16.4	42.8	85.5	128.2	213.7	356.3	641.3
500	13.7	35.6	71.5	107.1	178.6	297.5	535.4
538	11.0	29.0	57.9	86.9	145.1	241.7	435.1
550	11.0	29.0	57.9	86.9	145.1	241.7	435.1
575	10.9	28.6	57.1	85.7	143.0	238.3	428.8
600	10.3	26.9	53.5	80.4	134.0	223.4	401.9
625	8.7	23.0	45.7	68.6	114.3	190.6	342.8
650	6.9	17.9	35.5	53.1	88.6	147.9	266.1
675	6.2	16.0	31.6	47.3	78.9	131.7	237.0
700	4.8	12.4	25.0	37.3	62.3	103.7	186.5
725	3.7	9.7	19.5	28.9	48.3	80.2	144.5
750	2.8	7.4	14.8	22.1	36.7	61.2	110.3
775	2.2	5.8	11.4	17.2	28.5	47.6	85.6
800	1.8	4.4	8.8	13.2	22.0	36.6	65.6
816	1.4	3.4	7.2	10.7	17.9	29.6	53.1

