

## B.24

## GENERIC DESIGN CONSIDERATIONS

**TABLE B2.1** A Partial Listing of Materials Used for ASME B16.5 Flange Construction

Material group	Nominal designation	Applicable ASTM specifications		
		Forgings	Castings	Plates
1.1	C-Si C-Mn-Si	A 105 A 350 Gr. LF2	A 216 Gr. WCB	A 515 Gr. 70 A 516 Gr. 70 A 537 Cl. 1
1.2	C-Mn-Si 2½Ni 3½Ni	A 350 Gr. LF3	A 216 Gr. WCC A 352 Gr. LCC A 352 Gr. LC2 A 352 Gr. LC3	A 203 Gr. B A 203 Gr. E
1.3	C-Si C-Mn-Si 2½Ni 3½Ni		A 352 Gr. LCB	A 515 Gr. 65 A 516 Gr. 65 A 203 Gr. A A 203 Gr. D
1.4	C-Si C-Mn-Si	A 350 Gr. LF1 Cl. 1		A 515 Gr. 60 A 516 Gr. 60
1.5	C-½Mo	A 182 Gr. F1	A 217 Gr. WC1 A 352 Gr. LC1	A 204 Gr. A A 204 Gr. B
1.7	C-½Mo ½Cr-½Mo Ni-½Cr-½Mo ¾Ni-¾Cr-1Mo	A 182 Gr. F2	A 217 Gr. WC4 A 217 Gr. WC5	A 204 Gr. C
1.9	1Cr-½Mo 1¼Cr-½Mo 1¼Cr-½Mo-Si	A 182 Gr. F12 Cl. 2 A 182 Gr. F11 Cl. 2	A 217 Gr. WC6	A 387 Gr. 11 Cl. 2
1.10	2¼Cr-1Mo	A 182 Gr. F22 Cl. 3	A 217 Gr. WC9	A 387 Gr. 22 Cl. 2
1.13	5Cr-½Mo	A 182 Gr. F5 A 182 Gr. F5a	A 217 Gr. C5	
1.14	9Cr-1Mo	A 182 Gr. F9I	A 217 Gr. C12	
2.1	18Cr-8Ni	A 182 Gr. F304 A 182 Gr. F304H	A 351 Gr. CF3 A 351 Gr. CF8	A 240 Gr. 304 A 240 Gr. 304H
2.2	16Cr-12Ni-2Mo  18Cr-13Ni-3Mo 19Cr-10Ni-3Mo	A 182 Gr. F316 A 182 Gr. F316H	A 351 Gr. CF3M A 351 Gr. CF8M  A 351 Gr. CG8M	A 240 Gr. 316 A 240 Gr. 316H A 240 Gr. 317
2.3	18Cr-8Ni 16Cr-12Ni-2Mo	A 182 Gr. F304L A 182 Gr. F316L		A 240 Gr. 304L A 240 Gr. 316L
2.4	18Cr-10Ni-Ti	A 182 Gr. F321 A 182 Gr. F321H		A 240 Gr. 321 A 240 Gr. 321H

**Source:** Adapted from ASME B16.5, *Pipe Flanges and Flanged Fittings*, American Society of Mechanical Engineers, New York, 1996, Table 1A, p. 10.

**TABLE B2.3** Pressure-Temperature Ratings for ASME B16.5 Flanges Made from Material Group 1.1 Materials

Working pressure by classes, psig†							
Class temps., °F	150	300	400	600	900	1500	2500
-20 to 100	285	740	990	1480	2220	3705	6170
200	260	675	900	1350	2025	3375	5625
300	230	655	875	1315	1970	3280	5470
400	200	635	845	1270	1900	3170	5280
500	170	600	800	1200	1795	2995	4990
600	140	550	730	1095	1640	2735	4560
650	125	535	715	1075	1610	2685	4475
700*	110	535	710	1065	1600	2665	4440
750*	95	505	670	1010	1510	2520	4200
800*	80	410	550	825	1235	2060	3430
850*	65	270	355	535	805	1340	2230
900*	50	170	230	345	515	860	1430
950*	35	105	140	205	310	515	860
1000*	20	50	70	105	155	260	430

\* For notes concerning the use of carbon-steel materials covered by this table at temperatures over 700°F (371°C), see ASME B16.5, Table 2-1.1.

† To convert pressures to kPa gage, multiply tabular value by 6.9.

**Source:** Adapted from ASME B16.5, *Pipe Flanges and Flanged Fittings*, American Society of Mechanical Engineers, New York, 1996, Table 2-1.1, p. 15.

TABLE 2-150 CLASS 150 PRESSURE-TEMPERATURE RATINGS

Pressures are in pounds per square inch, gage (psig)

Mat'l Group	1.1	1.2	1.3	1.4	1.5	1.7	1.8	1.10	1.13	1.14	2.1	2.2	2.3	2.4	2.5	2.6	2.7	3.1	3.2	3.4	3.5	3.6	3.7	3.8	Temp. °F
Materials	Carbon				Cr-Mo %Mo	Cr-Mo Ni-Cr-Mo	1%Cr-Mo	2%Cr-Mo	3%Cr-Mo	4%Cr-Mo	Type 304	Type 316	Type 304L Type 316L	Type 321	Type 347 Type 348	Type 309	Type 310	Cr Fe Mo Cu 20Cb	Nickel Alloy 200	Ni Cu Alloy 400 405	Ni Cr Fe Alloy 800	Ni Fe Cr Alloy 800	Ni Mo Alloy B2	Ni-Cu Alloy Alloys	Temp. °F
-20 to 100	285	290	265	235	265		290				275	275	230	275	275	260		230	140	230	275	275	290		100
200	280	240	250	215			260				235	240	195	235	245	230		215	140	200	260	255	260		200
300	330	230	230	210			230				205	215	175	210	225	220		140	190	230	230	230			300
400							200				160	195	160	190		200		140	185						400
500							170				170	145				170		140			170				500
600							140				140	140				140		140			140				600
650							125				125	125				125					125				650
700							110				110	110				110					110				700
750							95				95	95				95					95				750
800							80				80	80				80					80				800
850							65				65	65				65					65				850
900							50				50	50				50					50				900
950							35				35	35				35					35				950
1000							20				20	20				20					20				1000

- NOTES:  
 1. Ratings shown apply to other material groups where column dividing lines have been omitted.  
 2. Provisions of Section 2 apply to all ratings.  
 3. See Temperature Notes for all Material Groups.

TABLE 2-300 CLASS 300 PRESSURE-TEMPERATURE RATINGS

Pressures are in pounds per square inch, gage (psig)

Mat'l Group	1.1	1.2	1.3	1.4	1.5	1.7	1.8	1.10	1.13	1.14	2.1	2.2	2.3	2.4	2.5	2.6	2.7	3.1	3.2	3.4	3.5	3.6	3.7	3.8	Temp. °F
Materials	Carbon				Cr-Mo %Mo	Cr-Mo Ni-Cr-Mo	1%Cr-Mo	2%Cr-Mo	3%Cr-Mo	4%Cr-Mo	Type 304	Type 316	Type 304L Type 316L	Type 321	Type 347 Type 348	Type 309	Type 310	Cr Fe Mo Cu 20Cb	Nickel Alloy 200	Ni Cu Alloy 400 405	Ni Cr Fe Alloy 800	Ni Fe Cr Alloy 800	Ni Mo Alloy B2	Ni-Cu Alloy Alloys	Temp. °F
-20 to 100	740	750	695	620	695	750	750	750	760		720	720	600	720	720	670		600	360	600	720	720	750		100
200	675	750	635	560	680	750	715	750			600	620	505	610	635	605		555	360	530	670	660	750		200
300	635	730	640	550	635	730	675	730			530	560	455	545	590	570		525	360	485	640	625	730		300
400	635	705	620	530	640	705	660	650	705		470	515	415	495	555	535				480	615	600	705		400
500	600	645	585	500	620	645	640	665			435	480	380	460	520	505				475	595	580	665		500
600	550	605	535	455			605				415	450	360	435	490	480				475	575	575	605		600
650	535	590	525	450			590				410	445	350	430	480	465				475	565	570	590		650
700	535	570	520	450			570				405	430	345	420	470	455				475	555	565	570		700
750	505	505	475	445			530				400	425	335	415	460	445				470	530	530	530		750
800	410	410	390	370			510	500	510		395	415	330	415	455	435				460	510	505	510		800
850		270					485	440	485		390	405	320	410	445	425									850
900		170					450	355	450		385	395		405	430	415									900
950		105			280	345	380	260	370		375	385		385	385	385									950
1000		80			165	215	225	170	190	290	325	365		355	365	335	350								1000
1050							140	200	140	180	310	360		345	360	290	335								1050
1100							95	115	105	115	260	325		300	325	225	290								1100
1150							50	105	70	75	195	275		235	275	170	245								1150
1200							35	55	45	50	155	205		180	170	130	205								1200
1250											110	180		140	125	100	160								1250
1300											85	140		105	95	80	120								1300
1350											60	105		80	70	60	80								1350
1400											50	75		60	50	45	55								1400
1450											35	60		50	40	30	40								1450
1500											25	40		40	35	25	25								1500

- NOTES:  
 1. Ratings shown apply to other material groups where column dividing lines are omitted.  
 2. Provisions of Section 2 apply to all ratings.  
 3. See Temperature Notes for all Material Groups.



