

METALS PREHEATING CHART

METAL GROUP	METAL DESIGNATION	APPROXIMATE PERCENT CARBON	RECOM-MENDED PREHEAT	METAL GROUP	METAL DESIGNATION	APPROXIMATE PERCENT CARBON	RECOM-MENDED PREHEAT
PLAIN CARBON STEELS	PLAIN CARBON STEEL	BELOW .20	UP TO 200°F	MEDIUM NICKEL CHROMIUM STEELS	SAE 3115 STEEL	.15	200°F - 400°F
	PLAIN CARBON STEEL	.20 - .30	200°F - 300°F		SAE 3125 STEEL	.25	300°F - 500°F
	PLAIN CARBON STEEL	.30 - .45	300°F - 500°F		SAE 3130 STEEL	.30	400°F - 700°F
	PLAIN CARBON STEEL	.45 - .80	500°F - 800°F		SAE 3140 STEEL	.40	500°F - 800°F
CARBON MOLY STEELS	CARBON MOLY STEEL	.10 - .20	300°F - 500°F		SAE 3150 STEEL	.50	600°F - 900°F
	CARBON MOLY STEEL	.20 - .30	400°F - 600°F		SAE 3215 STEEL	.15	300°F - 500°F
	CARBON MOLY STEEL	.30 - .35	500°F - 800°F		SAE 3230 STEEL	.30	500°F - 700°F
MANGANESE STEELS	SILICON STRUCTURAL STEEL	.35	300°F - 500°F		SAE 3240 STEEL	.40	700°F - 1000°F
	MEDIUM MANGANESE STEEL	.20 - .25	300°F - 500°F		SAE 3250 STEEL	.50	900°F - 1100°F
	SAE T 1330 STEEL	.30	400°F - 600°F		SAE 3315 STEEL	.15	500°F - 700°F
	SAE T 1340 STEEL	.40	500°F - 800°F		SAE 3325 STEEL	.25	900°F - 1100°F
	SAE 1350 STEEL	.50	600°F - 900°F		SAE 3435 STEEL	.35	900°F - 1100°F
HIGH TENSILE STEELS (SEE ALSO STEELS BELOW)	12% MANGANESE STEEL	1.25	USUALLY NOT REQUIRED		SAE 3450 STEEL	.50	900°F - 1100°F
	MANGANESE MOLY STEEL	.20	300°F - 500°F		SAE 4140 STEEL	.40	600°F - 800°F
	JALTEEN STEEL	.35 MAX.	400°F - 600°F		SAE 4340 STEEL	.40	700°F - 900°F
	MANTEN STEEL	.30 MAX.	400°F - 600°F		SAE 4615 STEEL	.15	400°F - 600°F
	ARMCO HIGH TENSILE STEEL	.12 MAX.	UP TO 200°F		SAE 4630 STEEL	.30	500°F - 700°F
	DOUBLE STRENGTH #1 STEEL	.12 MAX.	300°F - 600°F		SAE 4640 STEEL	.40	600°F - 800°F
	DOUBLE STRENGTH #1A STEEL	.30 MAX.	400°F - 700°F		SAE 4820 STEEL	.20	600°F - 800°F
	MAYARI R STEEL	.12 MAX.	UP TO 300°F	2% Cr. - 1/2% Mo. STEEL	UP TO .15	400°F - 600°F	
	OTISCOLOY STEEL	.12 MAX.	200°F - 400°F	2% Cr. - 1/2% Mo. STEEL	.15 - .25	500°F - 800°F	
	NAX HIGH TENSILE STEEL	.15 - .25	UP TO 300°F	2% Cr. - 1% Mo. STEEL	UP TO .15	500°F - 800°F	
	CROMANSIL STEEL	.14 MAX.	300°F - 400°F	2% Cr. - 1% Mo. STEEL	.15 - .25	600°F - 800°F	
	A.W. DYN-EL STEEL	.11 - .14	UP TO 300°F	5% Cr. - 1/2% Mo. STEEL	UP TO .15	500°F - 800°F	
	CORTEN STEEL	.12 MAX.	200°F - 400°F	5% Cr. - 1/2% Mo. STEEL	.15 - .25	600°F - 900°F	
	CHROME COPPER NICKEL STEEL	.12 MAX.	200°F - 400°F	8% Cr. - 1% Mo. STEEL	.15 MAX.	600°F - 900°F	
	CHROME MANGANESE STEEL	.40	400°F - 600°F	12 - 14% Cr. TYPE 410	.10	300°F - 500°F	
	YOLOY STEEL	.05 - .35	200°F - 600°F	16 - 18% Cr. TYPE 430	.10	300°F - 500°F	
	HI-STEEL	.12 MAX.	200°F - 500°F	23 - 30% Cr. TYPE 446	.10	300°F - 500°F	
NICKEL STEELS	SAE 2015 STEEL	.10 - .20	UP TO 300°F	18% Cr. 8% Ni. TYPE 304	.07	USUALLY DO NOT REQUIRE PREHEAT BUT IT MAY BE DESIRABLE TO REMOVE CHILL	
	SAE 2115 STEEL	.10 - .20	200°F - 300°F	25-12 TYPE 309	.07		
	2 1/2# NICKEL STEEL	.10 - .20	200°F - 400°F	25 - 50 TYPE 310	.10		
	SAE 2315 STEEL	.15	200°F - 500°F	18 - 8 Cb. TYPE 347	.07		
	SAE 2320 STEEL	.20	200°F - 500°F	18 - 8 Mo. TYPE 316	.07		
	SAE 2330 STEEL	.30	300°F - 600°F	18 - 8 Mo. TYPE 317	.07		

Dimensions of Standard Pipe Sizes

Nominal Pipe Size In.	Outside Diameter, In.	Nominal Wall Thickness For				
		Schedule 5	Schedule 10	Schedule 40	Schedule 80	Schedule 160
1/8	0.405	-	0.049	0.068	0.095	-
1/4	0.540	-	0.065	0.088	0.119	-
3/8	0.675	-	0.065	0.091	0.126	-
1/2	0.840	0.065	0.083	0.109	0.147	0.187
3/4	1.050	0.065	0.083	0.113	0.154	0.218
1	1.315	0.065	0.109	0.133	0.179	0.250
1-1/4	1.660	0.065	0.109	0.140	0.191	0.250
1-1/2	1.900	0.065	0.109	0.145	0.200	0.281
2	2.375	0.065	0.109	0.154	0.218	0.343
2-1/2	2.875	0.083	0.120	0.203	0.276	0.375
3	3.500	0.083	0.120	0.216	0.300	0.438
3-1/2	4.000	0.083	0.120	0.226	0.318	-
4	4.500	0.083	0.120	0.237	0.337	0.531
5	5.563	0.109	0.134	0.258	0.375	0.625
6	6.625	0.109	0.134	0.280	0.432	0.718
8	8.625	0.109	0.148	0.322	0.500	0.906
10	10.750	0.134	0.165	0.365	0.593	-
12	12.750	0.165	0.180	0.406	0.687	-

MELTING POINTS OF METALS

Metal or Alloy	Melting Point, °F
Aluminum, pure	1220
Brass and Bronze	1600 - 1660
Copper	1981
Iron, Cast & Malleable	2300
Lead, Pure	621
Magnesium	1202
Nickel	2647
Silver, Pure	1761
Steel, Hi-Carbon (0.40% to 0.70% Carbon)	2500
Steel, Medium Carbon (0.15% to 0.40% Carbon)	2600
Steel, Low Carbon (less than 0.15%)	2700
Stainless Steel, 18% Chromium, 8% Nickel	2590
Titanium	3035
Tungsten	6170
Zinc, Cast or Rolled	787

SYMBOLS OF THE ELEMENTS

Element	Symbol	Element	Symbol	Element	Symbol	Element	Symbol
Actinium	Ac	Einsteinium	Es	Mercury	Hg	Samarium	Sm
Aluminum	Al	Europium	Eu	Molybdenum	Mo	Scandium	Sc
Americium	Am	Fermium	Fm	Neodymium	Nd	Selenium	Se
Antimony	Sb	Fluorine	F	Neon	Ne	Silicon	Si
Argon	Ar	Francium	Fa	Nickel	Ni	Silver	Ag
Arsenic	As	Gadolinium	Gd	Niobium	Nb	Sodium	Na
Astatine	At	Gallium	Ga	Nitrogen	N	Strontium	Sr
Barium	Ba	Germanium	Ge	Nobelium	No	Sulfur	S
Berkelium	Bk	Gold	Au	Osmium	Os	Tantalum	Ta
Beryllium	Be	Hafnium	Hf	Oxygen	O	Technetium	Tc
Bismuth	Bi	Helium	He	Palladium	Pd	Tellurium	Te
Boron	B	Holmium	Ho	Phosphorus	P	Terbium	Tb
Bromine	Br	Hydrogen	H	Platinum	Pt	Thallium	Tl
Cadmium	Cd	Illium	Il	Plutonium	Pu	Thorium	Th
Calcium	Ca	Indium	In	Polonium	Po	Thulium	Tm
Californium	Cf	Iodine	I	Potassium	K	Tin	Sn
Carbon	C	Iridium	Ir	Praseodymium	Pr	Titanium	Ti
Cerium	Ce	Iron	Fe	Promethium	Pm	Uranium	U
Cesium	Cs	Krypton	Kr	Protoactinium	Pa	Vanadium	V
Chlorine	Cl	Lanthanum	La	Radium	Ra	Wolfram	W
Chromium	Cr	Lead	Pb	Radon	Rn	Xenon	Xe
Cobalt	Co	Lithium	Li	Rhenium	Re	Ytterbium	Yb
Copper	Cu	Lutecium	Lu	Rhodium	Rh	Yttrium	Y
Curium	Cm	Magnesium	Mg	Rubidium	Rb	Zinc	Zn
Dysprosium	Dy	Manganese	Mn	Ruthenium	Ru	Zirconium	Zr
Erbium	Er	Mendelevium	Md				