Preheat Temperatures for Metal and Alloys

METAL GROUP	METAL DESIGNATION	APPROXIMATE COMPOSITION — PERCENT								METAL DESIGNATION	RECOMMENDED PREHEAT
		C.	Mn.	Si.	Cr.	Ni.	Mo.	Cu.			
PLAIN CARBON STEELS	PLAIN CARBON STEEL	BELOW .20								PLAIN CARBON STEEL	UP TO 200°F
	PLAIN CARBON STEEL	.20-.30								PLAIN CARBON STEEL	200°F-300°F
	PLAIN CARBON STEEL	.30-.45								PLAIN CARBON STEEL	300°F-500°F
	PLAIN CARBON STEEL	.45-.80								PLAIN CARBON STEEL	500°F-800°F
CARBON MOLY STEELS	CARBON MOLY STEEL	.10-.20					.50			CARBON MOLY STEEL	300°F-500°F
	CARBON MOLY STEEL	.20-.30					.50			CARBON MOLY STEEL	400°F-600°F
	CARBON MOLY STEEL	.30-.35					.50			CARBON MOLY STEEL	500°F-800°F
MANGANESE STEELS	SILICON STRUCTURAL STEEL	.35	.80	.25						SILICON STRUCTURAL STEEL	300°F-500°F
	MEDIUM MANGANESE STEEL	.20-.25	1.0-1.75							MEDIUM MANGANESE STEEL	300°F-500°F
	SAE T 1330 STEEL	.30	1.75							SAE T 1330 STEEL	400°F-600°F
	SAE T 1340 STEEL	.40	1.75							SAE T 1340 STEEL	500°F-800°F
	SAE T 1350 STEEL	.50	1.75							SAE T 1350 STEEL	600°F-900°F
	12% MANGANESE STEEL	1.25	12.0							12% MANGANESE STEEL	USUALLY NOT REQUIRED
HIGH TENSILE STEELS (SEE ALSO STEELS BELOW)	MANGANESE MOLY STEEL	.20	1.65	.20			.35			MANGANESE MOLY STEEL	300°F-500°F
	JALTEN STEEL	.35 MAX.	1.50	.30				.40		JALTEN STEEL	400°F-600°F
	MANTEN STEEL	.30 MAX.	1.35	.30				.20		MANTEN STEEL	400°F-600°F
	ARMCO HIGH TENSILE STEEL	.12 MAX				.50 MIN.	.05 MIN.	.35 MIN.		ARMCO HIGH TENSILE STEEL	UP TO 200°F
	DOUBLE STRENGTH #1 STEEL	.12 MAX.	.75			.50-1.25	.10 MIN.	.50-1.50		DOUBLE STRENGTH #1 STEEL	300°F-600°F
	DOUBLE STRENGTH #1A STEEL	.30 MAX.	.75			.50-1.25	.10 MIN.	.50-1.50		DOUBLE STRENGTH #1A STEEL	400°F-700°F
	MAYARI R STEEL	.12 MAX.	.75	.35	.2-1.0	.25-.75		.60		MAYARI R STEEL	UP TO 300°F
	OTISCOLOY STEEL	.12 MAX.	1.25	.10 MAX.	.10 MAX.			.50 MAX.		OTISCOLOY STEEL	200°F-400°F
	NAX HIGH TENSILE STEEL	.15-.25		.75	.60	.17	.15 MAX.	.25 MAX.	Zr. .12	NAX HIGH TENSILE STEEL	UP TO 300°F
	CROMANSIL STEEL	.14 MAX.	1.25	.75	.50					CROMANSIL STEEL	300°F-400°F
	A. W. DYN-EL STEEL	.11-.14						.40		A. W. DYN-EL STEEL	UP TO 300°F
	CORTEN STEEL	.12 MAX.		.25-1.0	.5-1.5	.55 MAX.		.40		CORTEN STEEL	200°F-400°F
	CHROME COPPER NICKEL STEEL	.12 MAX.	.75		.75	.75		.55		CHROME COPPER NICKEL STEEL	200°F-400°F
	CHROME MANGANESE STEEL	.40	.90		.40					CHROME MANGANESE STEEL	400°F-600°F
	YOLOY STEEL	.05-.35	.3-1.0			1.75		1.0		YOLOY STEEL	200°F-600°F
	HI-STEEL	.12 MAX.	.6	.3 MAX.		.55		.9-1.25		HI-STEEL	200°F-500°F
NICKEL STEELS	SAE 2015 STEEL	.10-.20				.50				SAE 2015 STEEL	UP TO 300°F
	SAE 2115 STEEL	.10-.20				1.50				SAE 2115 STEEL	200°F-300°F
	2½% NICKEL STEEL	.10-.20				2.50				2½% NICKEL STEEL	200°F-400°F
	SAE 2315 STEEL	.15				3.50				SAE 2315 STEEL	200°F-500°F
	SAE 2320 STEEL	.20				3.50				SAE 2320 STEEL	200°F-500°F
	SAE 2330 STEEL	.30				3.50				SAE 2330 STEEL	300°F-600°F
	SAE 2340 STEEL	.40				3.50				SAE 2340 STEEL	400°F-700°F
MEDIUM NICKEL CHROMIUM STEELS	SAE 3115 STEEL	.15			.60	1.25				SAE 3115 STEEL	200°F-400°F
	SAE 3125 STEEL	.25			.60	1.25				SAE 3125 STEEL	300°F-500°F
	SAE 3130 STEEL	.30			.60	1.25				SAE 3130 STEEL	400°F-700°F
	SAE 3140 STEEL	.40			.60	1.25				SAE 3140 STEEL	500°F-800°F
	SAE 3150 STEEL	.50			.60	1.25				SAE 3150 STEEL	600°F-900°F
	SAE 3215 STEEL	.15			1.00	1.75				SAE 3215 STEEL	300°F-500°F
	SAE 3230 STEEL	.30			1.00	1.75				SAE 3230 STEEL	500°F-700°F
	SAE 3240 STEEL	.40			1.00	1.75				SAE 3240 STEEL	700°F-1000°F
	SAE 3250 STEEL	.50			1.00	1.75				SAE 3250 STEEL	900°F-1100°F
	SAE 3315 STEEL	.15			1.50	3.50				SAE 3315 STEEL	500°F-700°F
	SAE 3325 STEEL	.25			1.50	3.50				SAE 3325 STEEL	900°F-1100°F
	SAE 3435 STEEL	.35			.75	3.00				SAE 3435 STEEL	900°F-1100°F
	SAE 3450 STEEL	.50			.75	3.00				SAE 3450 STEEL	900°F-1100°F
MOLY BEARING CHROMIUM AND CHROMIUM NICKEL STEELS	SAE 4140 STEEL	.40			.95		.20			SAE 4140 STEEL	600°F-800°F
	SAE 4340 STEEL	.40			.65	1.75	.35			SAE 4340 STEEL	700°F-900°F
	SAE 4615 STEEL	.15				1.80	.25			SAE 4615 STEEL	400°F-600°F
	SAE 4630 STEEL	.30				1.80	.25			SAE 4630 STEEL	500°F-700°F
	SAE 4640 STEEL	.40				1.80	.25			SAE 4640 STEEL	600°F-800°F
	SAE 4820 STEEL	.20				3.50	.25			SAE 4820 STEEL	600°F-800°F
LOW CHROME MOLY STEELS	2% Cr.-½% Mo. STEEL	UP TO .15			2.0		0.5			2% Cr.-½% Mo. STEEL	400°F-600°F
	2% Cr.-½% Mo. STEEL	.15-.25			2.0		0.5			2% Cr.-½% Mo. STEEL	500°F-800°F
	2% Cr.-1% Mo. STEEL	UP TO .15			2.0		1.0			2% Cr. 1% Mo. STEEL	500°F-700°F
	2% Cr.-1% Mo. STEEL	.15-.25			2.0		1.0			2% Cr. 1% Mo. STEEL	600°F-800°F
MEDIUM CHROME MOLY STEELS	5% Cr.-½% Mo. STEEL	UP TO .15			5.0		0.5			5% Cr.-½% Mo. STEEL	500°F-800°F
	5% Cr.-½% Mo. STEEL	.15-.25			5.0		0.5			5% Cr.-½% Mo. STEEL	600°F-900°F
	8% Cr.-1% Mo. STEEL	.15 MAX.			8.0		1.0			8% Cr.-1% Mo. STEEL	600°F-900°F
PLAIN HIGH CHROMIUM STEELS	12-14% Cr. TYPE 410	.10			13.0					12-14% Cr. TYPE 410	300°F-500°F
	16-18% Cr. TYPE 430	.10			17.0					16-18% Cr. TYPE 430	300°F-500°F
	23-30% Cr. TYPE 446	.10			26.0					23-30% Cr. TYPE 446	300°F-500°F
HIGH CHROME NICKEL STAINLESS STEELS	18% Cr. 8% Ni. TYPE 304	.07			18.0	8.0				18% Cr. 8% Ni. TYPE 304	USUALLY DO NOT REQUIRE PREHEAT BUT IT MAY BE DESIRABLE TO REMOVE CHILL
	25-12 TYPE 309	.07			25.0	12.0				25-12 TYPE 309	
	25-20 TYPE 310	.10			25.0	20.0				25-20 TYPE 310	
	18-8 Cb. TYPE 347	.07			18.0	8.0			Cb. 10XC	18-8 Cb. TYPE 347	
	18-8 Mo. TYPE 316	.07			18.0	8.0	2.5			18-8 Mo. TYPE 316	
	18-8 Mo. TYPE 317	.07			18.0	8.0	3.5			18-8 Mo. TYPE 317	

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