



Thank you for sparing your time for the newsletter of Goa Instruments ! I hope these newsletters are useful. In this edition we are providing a chart which will act as a guide for thermowell material selection. The list takes into consideration, the factors as contamination, electrolysis, catalytic reaction and other variables. Standard materials are recommended wherever possible. Service may vary, however, in industrial use as a result of temperature, pressure, concentration and impurities in the corrosive medium. While the recommendations cannot guarantee service, they will serve as an effective guide. We can provide consultation for special applications upon request. Thermowell materials for few average applications are listed in the below table.

Industry	Application	Conditions	Material
Cement and Lime	Kiln		
	hot end (clinker)	to 2600 °F	C30 Ceramic
	cool end (flue)	600-2000 °F	28% Chrome Iron - Inconel 601
	Clinker cooler	to 1200 °F	Cerampak - 28% Chrome Iron - Inconel 601
	Exit Flue		Inconel 601, 28% Chrome Iron - Silicon Carbide, Silicon Nitride
Ceramic	Dryers		Carbon Steel - Silicon Carbide - Silicon Nitride - Wrought Iron
	Kilns-Brick	1800-2200 °F	C30 Ceramic - Inconel 600 - Silicon Carbide - Silicon Nitride
	Vitreous enameling	1600-2000 °F	Inconel 600 - Firebrick - 28 % Chrome Iron - Silicon Carbide - Silicon Nitride
			Wrought Iron
	Grinding wheels	to 500 °F	C30 Ceramic
	Abrasive grits	to 2300 °F	C30 Ceramic
	Porcelain pottery	2000-2400 °F	
Food	Baking Ovens	400-900 °F	Wrought Iron - Bare Thermocouple
	Char Retort, Sugar	500-700 °F	Wrought Iron
	Vegetables and Fruit	200-300 °F	304 Stainless Steel


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YEAR - 01, VOL:I

NEWSLETTER

Edition:SEPTEMBER-2012

Industry	Application	Conditions	Material
Gas	Producer gas		28% Chrome Iron - Inconel 601
	Water gas		
	carburetor		Inconel 600 - 28% Chrome Iron
	superheater		Inconel 600 - 28% Chrome Iron
	Tar stills		C1018 Steel
Glass	Melting tank		
	roof & wall	to 2400 °F	C30 Ceramic
	flues and checkers	to 1800 °F	Inconel 600 - 28% Chrome Iron - Wrought Iron
	Forehearth and feeder	to 2200 °F	Bare Platinum Thermocouple
	Lehr	300-500 °F	Wrought Iron
Heat Treatment	Open Hearth Roof		LT-1
	Annealing	to 1200 °F	Wrought Iron
		1300-2000 °F	Inconel 600 - Inconel 601 - 28% Chrome Iron (for sulphur atmospheres)
	Hardening		Wrought Iron
	open fired or electric heated	to 1500 °F	Inconel 600 - 28% Chrome Iron
		to 2000 °F	C30 Ceramic
		to 2400 °F	Inconel 600 - Nickel
	H. S. Tool Steel	to 2350 °F	
	Salt Baths		28% Chrome Iron
	Neutral	to 2000 °F	C30 Ceramic
	High Speed	to 2350 °F	28% Chrome Iron
	Lead Pot	to 2000 °F	Inconel 600 - Nickel
	Cyanide Pot	1750 °F	Nickel
		2350 °F	Inconel 600 - 28% Chrome Iron
	Lavite Pot	2400 °F	
	Carburizing		Inconel 601 - 28% Chrome Iron
	gas	to 2000 °F	Nickel
	cyanide pot		28% Chrome Iron
	Nitriding	to 1000 °F	Wrought Iron
	Quench Oil	900 °F	
Iron and Steel	Blast Furnace		
	down comer		Inconel 601 - 28% Chrome Iron - Silicon Carbide - Silicon Nitride
	stove dome	1800-2300 °F	Silicon Carbide - Silicon Nitride
	stock trunk		Inconel 600
	stove outlet flue		Wrought Iron
	hot blast main	900-1600 °F	Inconel 601 - 28% Chrome Iron



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Iron and Steel	Open Hearth		
	flues and stack	to 1800 °F	Inconel 601 - 28% Chrome Iron - LT-1
	checkers	to 2200 °F	Inconel 601 - LT-1
	Waste Head Boilers	to 1600 °F	Inconel 601 - 28% Chrome Iron
	Soaking Pits	2000 °F	Inconel 601 - 28% Chrome Iron - Silicon Carbide - Silicon Nitride
		Over 2000 °F	Silicon Carbide - C30 Ceramic - Silicon Nitride
	Billet and Slab Furnace	2000 °F	Inconel 601 - 28% Chrome Iron
		Over 2000 °F	Silicon Carbide - C30 Ceramic - Silicon Nitride
	Forging Furnace	2000-2400 °F	Silicon Carbide - C30 Ceramic - Silicon Nitride
	Annealing		Inconel 600 - Inconel 601 or 28% Chrome Iron
	Bright Annealing		(for sulphur atmospheres)
	batch		Inconel 600
	continuous		C30 Ceramic - Silicon Carbide - Silicon Nitride
	Pickling		Lead Sheath - Silicon Carbide - Silicon Nitride
	Galvanizing		XH Seamless Steel - Silicon Carbide - Silicon Nitride
	Tinning		
	tin pot		Seamless Steel - 28% Chrome Iron - Silicon Carbide - Silicon Nitride
palm oil		304 Stainless Steel	
Vacuum Melting (Induction Melting)	to 3200 °F	C98 Ceramic	
Non-Ferrous Metals	Aluminum		
	melting pot		Cast Iron (Washed) - Silicon Carbide - Silicon Nitride
	pouring ladles	1300 to 1400 °F	Open end thermocouple assemblies
	furnaces	950 °F	304 Stainless Steel Cerampak
	heat treating	800-1300 °F	Wrought Iron - 304 Stainless Steel Cerampak
	die casting		Cast Iron - Wrought Iron - Silicon Carbide
	Magnesium		
	melt		Wrought Iron
	die casting		Wrought Iron
	ladle		Wrought Iron
Lead	1000 °F		
pots	1500 °F	Wrought Iron	
		28% Chrome Iron - Silicon Carbide - Silicon Nitride	
Brass			
ladle		LT-1 - Silicon Carbide - Silicon Nitride - Immersion T/C	
billet and forging		Inconel 601 - 28% Chrome Iron	
anneal		Wrought Iron - 304 Stainless Steel Cerampak	


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Industry	Application	Conditions	Material
Non-Ferrous Metals	Copper		
	molten		Silicon Nitride- LT-1
	smelting & ore roasters		Inconel 601 - 28% Chrome Iron - C30 Ceramic - Silicon Carbide - Silicon Nitride
	Tin		XH Seamless Steel - Silicon Carbide - Silicon Nitride
	pot	500 °F	
	Zinc		XH Seamless Steel - Silicon Carbide - Silicon Nitride
	die casting	800 °F	
Paper	Digesters	220-300 °F	316 Stainless Steel - Tantalum Sleeved
	Sulphur Burners	900-1400 °F	Inconel 601 - 28% Chrome Iron - LT-1
Petroleum	Cracking lines	950 °F	304 Stainless Steel
	Dewaxing	minus 20 °F	304 Stainless Steel
	Fractionating column top tower	150-500 °F	304 Stainless Steel
	Reaction chamber	850-890 °F	304 Stainless Steel
	Tube still inlet	575-700 °F	304 Stainless Steel
	Tube still bridge wall	1500-2200 °F	Inconel 600
Power and Heat	Fire Box	1800-2200 °F	Inconel 600
	Flue gas	450-1000 °F	304 Stainless Steel Cerampak
			Wrought Iron - 28% Chrome Iron
	Preheaters	200-500 °F	Wrought Iron - 304 Stainless Steel Cerampak
	Steam lines	300-950 °F	304 Stainless Steel
	Powdered coal air	500 °F	304 Stainless Steel
	Diesel engine exhaust	600 °F	304 Stainless Steel
	Water lines		C1018 Carbon Steel
Smelting and Refining	Roasting sulphur ores	700-1900 °F	28% Chrome Iron - Inconel 601
	Zinc retort preheater	1300-2400 °F	C30 Ceramic
	Zinc spelter	700-900 °F	28% Chrome Iron
Misc.	Asphalt mixing		Wrought Iron - Sand Thermocouple
	Incinerator	to 2000 °F	Inconel 601 - 28% Chrome Iron
		over 2000 °F	C30 Ceramic - Silicon Carbide - Silicon Nitride

Thermowell materials for Chemicals shall follow in our next edition.



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