

NOTICE:

Prices and availability are subject to change without notice.

Please contact Marlin Manufacturing before ordering for updated pricing.

PROTECTING TUBES GENERAL

Protecting tubes, as their name implies, are used to protect sensors, usually thermocouples, from contaminating atmospheres and/or mechanical damage. Closed on one end and open on the termination end they usually incorporate some means by which the tube, sensor, and terminal are assembled and mounted into the process.

Ceramic Protecting Tubes are dense, fine grained, nonporous compositions that remain gas tight even at temperatures near their melting point. Ceramic tubes are generally used at high temperatures with platinum type thermocouples although use with base metal thermocouples is prevalent in atmospheres harmful to metal tubes but not subjected to mechanical damage. Ceramic tubes will sag at temperatures below their maximum working temperatures so if they are installed horizontally and used above their sagging temperatures they should be fully supported. Sag temperature is temperature at which the tube will sag 1/4" in one hour. Ceramics will retain moisture at room temperature. This moisture may become trapped in the ceramic and cause the destruction of the tube when the tube is thermally shocked. It is recommended that preheating or slow heating of ceramic tubes to 400 to 800° F be done in order to drive off this moisture before high heat is introduced.

Alumina (Al_2O_3) tubes in their purest forms have very good thermal shock and strength characteristics and are virtually chemical resistant. For long term use Alumina 998 is very compatible for use with platinum type thermocouples. Its use is evaluated by examination of these features versus its relatively high cost.

Mullite ($3Al_2O_3 \bullet 2SiO_2$) has good thermal shock and strength characteristics and is chemically resistant. This low cost ceramic is also used with platinum type thermocouples usually for shorter term applications in which mechanical damage is more likely to be encountered rather than the long term detrimental effects of the silica in the mullite on the platinum type thermocouple.

Silicon Carbide (SiC) tubes are porous and highly refractory. They are used to temperatures of 1650° C (3000° F) as secondary protection against extreme temperature, abrasive atmospheres and direct flame impingement. Silicon Carbide tubes are moderate in cost. Primary mullite or alumina tubes are recommended with these tubes.

Single-Phase Silicon Carbide (SA SiC) is a pressureless, sintered form of alpha silicon carbide with a density greater than 98% theoretical. Having a very fine grain structure and being 50% harder than tungsten carbide makes it resistant to erosion. It contains no free silicone, which makes it highly chemical resistant in both oxidizing and reducing environments. For use in air to 1650° C (3000° F), SA SiC tubes are high in cost.

Metal Ceramic tubes are a high cost combination of chromium and alumina for use to temperatures of 1205° C (2200° F) that provides excellent oxidation resistance, thermal conductivity comparable to that of stainless steel, good resistance to wetting by most molten metals. A primary alumina tube is recommended when this tube is used in conjunction with platinum thermocouples.

Refractory Laminated, Metal tubes offer the mechanical protection of metal tubes and the corrosion resistance of ceramics. For molten aluminum and zinc applications, they resist erosion, will not contaminate metal melts, and may outlast iron tubes by many times depending on the application.

Metal tubes offer good mechanical protection for base metal thermocouples up to 1150° C (2100° F) in oxidizing atmospheres. All metals are porous after about 870° C (1600° F) so it may be necessary to provide a ceramic primary tube to protect the thermocouple from detrimental vapors.

Mild Steel provides good protection at lower temperatures against oxidizing and reducing atmospheres and non-corrosive liquids and vapors. Maximum working temperature 700° C (1300° F).

304 SS (18% Chrome/8% Nickel) is a general purpose material that has good resistance to corrosion and oxidation. Maximum working temperature 875° C (1600° F).

316 SS (16% Chrome/10% Nickel) is a material that has superior corrosion resistance as compared to 304 SS with improved oxidation resistance and a higher hot strength. Maximum working temperature 925° C (1700° F).

446 SS (28% Chrome) has excellent resistance to corrosion and oxidation. It is highly resistant to sulphur atmospheres, salt baths and molten non-ferrous metals. Maximum working temperature 1100° C (2000° F).

Inconel 600™ (75% Nickel/15% Chrome) combines good mechanical strength at elevated temperatures with high resistance to oxidation, corrosion and scaling. Not suitable for use in sulfurous atmospheres above 875° C (1600° F). Maximum working temperature 1150° C (2100° F).

Inconel 601™ (60% Nickel/23% Chrome) has similar properties of Inconel 600 and offers improved resistance to sulfur attack at elevated temperatures.

Cast Iron is a low cost material used in molten aluminum and aluminum alloy applications and also has good resistance to acid and caustic solutions. Maximum working temperatures 875° C (1600° F) reducing; 700° C (1300° F) Oxidizing.

TYPICAL CHEMICAL ANALYSIS										
	Al ₂ O ₃	SiO ₂	MgO	Na ₂ O	CaO	Fe ₂ O ₃	Cr ₂ O ₃	TiO ₂	B ₂ O ₃	K ₂ O
998	99.8	.060	.035	.008	.040	.025	<.003	.004	<.001	<.001
997	99.7	.1	.05	.06	.04	.05	—	—	—	—
Mullite 60	60.0	38.0	.2	.2	.1	.5	—	.5	—	.7

TYPICAL PHYSICAL PROPERTIES			
Material	998	997	Mullite 60
Constitution	99.8% Al ₂ O ₃	99.7% Al ₂ O ₃	85% Mullite 15% SiO ₂
Bulk Specific Gravity	3.85	3.65	2.8
Impenetrability	gas tight	gas tight	gas tight
Max. Working Temp.	1950° C (3542° F)	1800° C (3270° F)	1600° C (2912° F)
Sag. Temp. (Unsupported)	1600° C (2912° F)	1500° C (2730° F)	1400° C (2552° F)
Thermal Conductivity @ 24° C (75° F) @ 800° C (1472° F)	(BTU/ft ² /hr/° F/in) 230 60	125 30	40 25
Dielectric Strength (V/Mil) @ 24° C (75° F)	230	250	250
Thermal Expansion (24 to 1000° C)	(per ° C X 10 ⁻⁶) 8.5	7.7	5.0

™ - International Nickel Co., Inc.



Since 1952
Marlin MANUFACTURING CORPORATION 12404 TRISKETT ROAD CLEVELAND, OHIO 44111 FAX: (216) 941-6207

(216) 941-6200

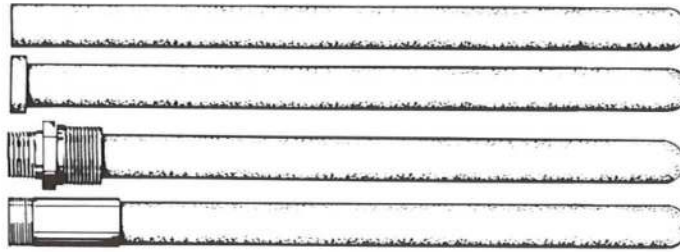
PROTECTING TUBES CERAMIC

TUBE w/Plain End

TUBE w/Collar

TUBE w/Bushing

TUBE w/Brass Sleeve



Example: 60-687-0-24"

Mullite 60, 7/16 X 11/16, Plain End Protecting Tube

DISCOUNT SCHEDULE	
QUANTITY	FACTOR
1-9	NET
10-49	.90
50-74	.85
75-99	.80
100+	.75

PROTECTING TUBE		PART NUMBER	BASE PRICE*	
MATERIAL	SIZE I.D. X. O.D.		12" TUBE	6" ADDITION
MULLITE 60	3/16 × 1/4	(see tables) 60 — 250 — □ — □	\$ 8.00	\$ 3.25
	1/4 × 3/8	60 — 375 — □ — □	8.00	3.25
	3/8 × 1/2	60 — 500 — □ — □	8.50	3.25
	7/16 × 11/16	60 — 687 — □ — □	10.00	3.75
	3/4 × 1	60 — 1000 — □ — □	13.00	4.50
	1 × 1-1/4	60 — 1250 — □ — □	15.00	5.00
	1 1/4 × 2	60 — 2000 — □ — □	20.00	10.00
ALUMINA 997	3/16 × 1/4	(see tables) 97 — 250 — □ — □	20.00	9.00
	1/4 × 3/8	97 — 375 — □ — □	20.00	9.00
	3/8 × 1/2	97 — 500 — □ — □	20.00	9.00
	7/16 × 11/16	97 — 687 — □ — □	20.00	9.00
	3/4 × 1	97 — 1000 — □ — □	30.00	13.50
	1 × 1-1/4	97 — 1250 — □ — □	38.00	18.00
	ALUMINA 998	3/16 × 1/4	(see tables) 98 — 250 — □ — □	33.00
1/4 × 3/8		98 — 375 — □ — □	37.00	17.00
3/8 × 1/2		98 — 500 — □ — □	40.00	20.00
7/16 × 11/16		98 — 687 — □ — □	40.00	20.00
3/4 × 1		98 — 1000 — □ — □	50.00	25.00
1 × 1-1/4		98 — 1250 — □ — □	52.00	35.00

*Price for tube to 48" long — for tubes to 60" add 30% to base price.

Notes: 1) Standard diameter tolerance for size variation and out-of-roundness is ±5% or 0.025" min.

2) Camber tolerance is 1/16" max. per foot.

DESCRIPTION	ORDER CODE	Suffix "A"	
		PRICE ADDITION	
PLAIN END	0	N/C	
CERAMIC COLLAR	1	\$3.50	
TUBE O.D. COLLAR O.D.			
.250 .500			
.375 .687			
.500 .875			
.687 1.000			
1.000 1.250			
1.250 1.750			
Steel Bushing* 1/2 NPT X 3/4 NPT	2	3.50	

*Max. tube size 11/16" O.D.

DESCRIPTION	ORDER CODE	Suffix "A"						
		PRICE ADDITION						
Brass Sleeve* 7/8 — 27 thread	3	3.50						
Coupling 1 NPT (internal)	4	5.00						
Steel Bushing 1 NPT X 1 NPT	5	6.00						
SS Support Tube	Length ↓	6" Tube	6"	6"				
					Max. Tube O.D.	Tube Size	Tube Addition	
					0.500	1/2 NPT	\$10.00	\$4.00
					0.687	3/4 NPT	11.00	4.25
1.000	1 NPT	12.00	5.00					



MANUFACTURING CORPORATION 12404 TRISKETT ROAD CLEVELAND, OHIO 44111 (216) 941-6200 FAX: (216) 941-6207

PROTECTING TUBES SILICON CARBIDE

SILICON CARBIDE is a porous high refractory material used for protection against extreme temperature, abrasive atmospheres and direct flame impingement. "SIC" tubes can also be used for direct immersion into molten aluminum or brass.

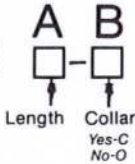
PART NO.	OVERALL LENGTH	STOCK	PRICE PER TUBE
SIC 	12"	CO	\$52.
	18"	CO	61.
	24"	CO	65.
	30"	CO	85.
	36"	CO	91.
	42"	C—	113.
	48"	C—	137.

TABLE A
Tube Length in Inches

TABLE B
Collar Designation (with collar Yes-C); i.e. SIC-24"-C
(without collar No-O); i.e. SIC-24"-O

STOCK
C = Stocked with collar. O = Stocked, no collar.

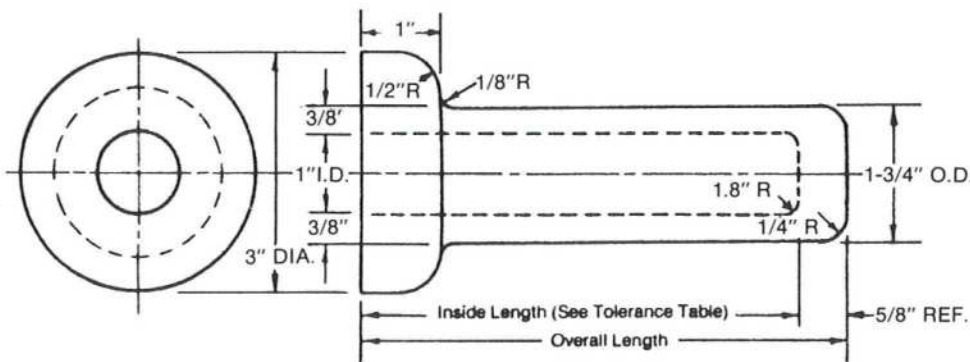


WITH COLLAR "C"



WITHOUT COLLAR "O"

DISCOUNT	
QUANTITY PER ORDER	FACTOR
1-9	NET
10-49	.90
50-74	.85
75-99	.80
100+	.75



TOLERANCE TABLE	
Overall Length	Inside Length
Less than 24"	±1/8"
24" to 45"	±3/16"
Over 45"	±1/4"

PHYSICAL PROPERTIES

Major Constituent:	Silicon Carbide (SiC)	Thermal Conductivity:	15.7 W/m °C (109 Btu in/hr ft² °F)
Dry Abrasion Resistance Index:	1.0	Coefficient of Linear Expansion:	4.68 × 10 ⁻⁶ mm/mm °C (2.6 × 10 ⁻⁶ in/in °F)
Maximum Usable Hot Face Temperature		Thermal Shock Resistance:	very good
In Oxidizing Atmosphere:	1650°C (3000°F)	Acid Resistance	good
In Inert Atmosphere:	1650°C (3000°F)	(except hydrofluoric):	
Bulk Density:	2.58 g/cm ³ (3800 lb/in ²)	Permeability:	nil
Modulus of Rupture:	267 kg/cm ² (>20,000 lb/in ²)	Apparent Porosity:	14%
Compressive Strength:	>1406 kg/cm ²	Electrical Characteristics:	semi-conductor



MANUFACTURING CORPORATION 12404 TRISKETT ROAD CLEVELAND, OHIO 44111

(216) 941-6200

FAX: (216) 941-6207

PROTECTING TUBES SMALL DIAMETER SILICON CARBIDE - SA

SA SiC is produced by pressureless sintering sub micron silicon carbide powder. The sintering process results in a self-bonded, fine grain SiC product which is highly resistant to corrosion, erosion, high temperature and thermal shock.

CORROSION RESISTANCE

SA SiC has superior corrosion resistance than alumina and other refractory materials in environments of hot gases and liquids, including strong acids and bases.

EROSION RESISTANCE

SA SiC is 50% harder than tungsten carbide. This extreme hardness combined with high purity and fine micro structure makes SA SiC resistant to erosion under abrasive conditions.

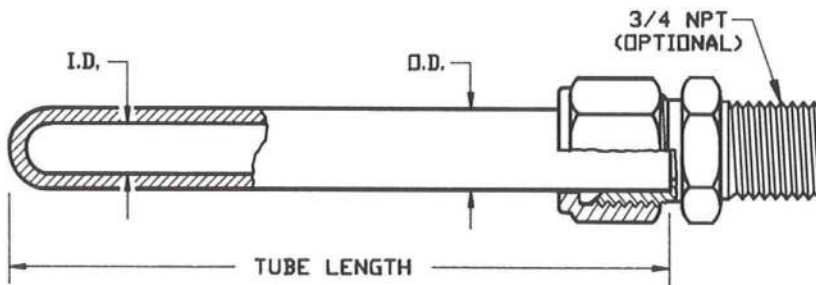
HIGH TEMPERATURE PROPERTIES

The single phase composition of SA SiC enables it to reliably perform in air up to temperatures of 1650°C (3000°F). It contains no free silicon which makes it highly chemical resistant in both oxidizing and reducing environments.

THERMAL SHOCK RESISTANCE

Because of its high thermal conductivity and low coefficient of thermal expansion, SA SiC is very resistant to thermal shock and thermal cycling as compared to other refractory materials.

Physical Properties	Units	Typical Values SA
Composition (phases)		SiC
Density	G/cm ³	3.10
Grain Size	microns	4-6
Hardness (Knoop)		2800
Flexural Strength 4pt @ RT	MPa x10 ³ lb/in ²	460 60
Compressive Strength @ RT	MPa x10 ³ lb/in ²	3900 560
Modulus of Elasticity @ RT	GPa x10 ⁶ lb/in ²	410 59
Weibull Modulus (2 parameters)		10
Poisson Ratio		0.14
Fracture Toughness @ RT Double Torsion & SENB	MPa/m x10 ³ lb/in ² /√in	4.60 4.20
Coefficient of Thermal Expansion RT to 700°C	x10 ⁻⁶ mm/mm°C x10 ⁻⁶ in/in°F	4.02 2.20
Max. Service Temp (air)	°C °F	1650 3000
Mean Specific Heat @ RT	J/gm°C	0.67
Thermal Conductivity @ RT		125.6 72.6
@ 200°C	W/mK Btu/ft h°F	102.6 59.3
@ 400°C		77.5 44.8
Permeability, RT to 1000°C		Impervious to gases over 31 MPa
Electrical Resistivity @ RT @ 1000°C	ohm-cm	10 ² -10 ⁶ 0.01-0.2
Emissivity		0.9



Discount Schedule		Price to 24"	Price to 48"
Quantity	Factor		
1-5	Net	\$210.	\$395.
6-25	.95	295.	395.
26+	.90	385.	590.

Material	Tube Size I.D. x O.D.	Part Number
SA SiC	1/4" x 3/8"	SA - 375 - □ - □
	1/2" x 3/4"	SA - 750 - □ - □
	1/2" x 1"	SA - 1000 - □ - □
		A B ↑ ↑ length end option (note A)

- Notes: 1) Standard diameter to tolerance for size variation and out-of-roundness is ±5%.
 2) Camber tolerance is 1/16" per foot.
 A) Plain end "A" is 0: i.e. SA-750-0-12"
 Optional 3/4" NPT steel Ftg. "A" is 1: i.e. SA-750-1-12" - Add \$40 to list



PROTECTING TUBES LT-1 METAL-CERAMIC

- * Superior oxidation resistance to 2200°F
- * Thermal conductivity comparable to that of stainless steel
- * Good resistance to wetting by most molten metals

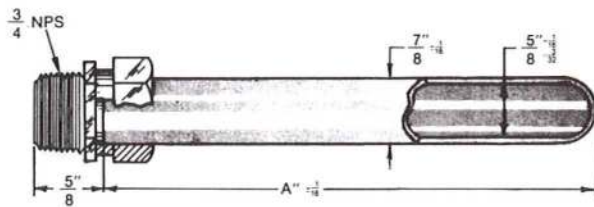
LT-1 is hard, abrasion-resistant and dense—is a slip-cast composite of two compatible high temperature materials, chromium and aluminum oxide. LT-1 has excellent oxidation resistance and also resists wetting by many metals and alloys, as well as basic furnace slags. The chromium-metal phase takes on a very tightly bonded layer of chromium oxide which, together with the naturally inert nature of the alumina, provides this material with its remarkable resistance to oxidizing atmospheres over 2200°F, good corrosion resistance, and the ability to resist wetting by molten metals. High thermal conductivity and the resultant excellent sensitivity to temperature changes accounts in part for its demand in the high temperature pyrometry field as a thermocouple protection tube.

LT-1 has good strength at temperatures where many high-temperature metals melt. Above about 2800°F, it begins to soften and becomes plastic. LT-1 thermocouple protection tubes have, however, been used successfully for dip immersion at a temperature of 3000°F. In use or service care must be taken to

avoid conditions of extreme thermal shock, extreme thermal gradients, mechanical shock, and impact. Although LT-1 is superior to ceramics in all of these properties, it is less resistant to shock and impact than the metallic alloys. Therefore, a standard thermocouple protection tube should be preheated to about 900°F before immersion in molten metal at 2000°F or higher. Whenever practical the following preheat procedure can also be used: Hold the tube immediately above the molten metal for approximately one minute before immersing. In tests conducted this procedure proved to be adequate to prevent thermal shock failure.

LT-1 exhibits good resistance to wear under conditions of sliding friction as well as resistance to abrasion at high temperatures. The hardness of this material (Rockwell C 37) is more indicative of the crushing strength of the material than its true hardness because the individual particles have a greater hardness than the combined body.

LT-1 is less porous than most compacts. There is no significant passage of gases through the body at high temperature, except under high vacuum. For the usual industrial application, it is sufficiently impermeable.



Part Number	TUBE LENGTH (Dimension "A") Inches	Price Per Tube
LT-1	9	\$82.
	12	94.
	18	141.
	24	187.
	30	249.
	36	293.
	48	583.

DISCOUNT SCHEDULE	
Quantity	Factor
1-9	NET
10-49	.90
50-74	.85
75-99	.80
100+	.75

TOLERANCES AND SPECIFICATIONS:

- I.D. Size - Will pass a 33/64 inch diameter x 2 inch long probe through the full length of the tube.
 Straightness - Tube to be straight within 3/16 inch per foot of length as measured chord to arc.
 Note - For use with B & S Wire Gage 8 or smaller. A ceramic primary tube is required when noble metal thermocouple is used.

CONNECTING FITTINGS:

Standard 3/4" conduit fitting, malleable iron with 3/4" N.P.S. thread. Thermocouple Protecting Tubes can be supplied without fitting. Specify with suffix "0" eg. LT-1-12-0 and add \$5.00 to tube cost.

TYPICAL PHYSICAL PROPERTIES

PROPERTY	UNITS	VALUE	LENGTH (INCHES)	WEIGHT PER TUBE (POUNDS)
Thermal Conductivity	BTU-ft/ft ² -hr°F	17	9	.56
Coefficient of Thermal Expansion	in/in/°F	5 x 10 ⁻⁶	12	.75
Density	gm/cc	5.8	18	1.20
Flexural Strength	psi	45,000	24	1.75
Compressive Strength	psi	110,000	30	2.00
Hardness	Rc	34	36	2.60
Chemical Composition	Weight %	Cr-77 Al ₂ O ₃ -23	48	3.50

RECOMMENDED APPLICATIONS

1. Molten copper and brass to 2100°F intermittent and continuous immersions.
2. Corrosive SO₂ and SO₃ gas (to 2200°F) and SO₃ and HF gas (to 2000°F).
3. Open hearth furnace checker chambers to 2200°F.
4. Steel mill soaking pits to 2200°F.
5. Pelletizing chamber of Taconite refining operation to 2100°F.
6. Molten zinc to 1600°F.
7. Molten lead to 650°F.
8. Basic steels and slags to 3000°F (intermittent) and 2200°F (continuous in open hearth and general foundry practices).
9. Calcining kilns to 2200°F.
10. Barium titanate (barium oxide service) to 2200°F.
11. Magnesium oxide calcining kilns.
12. Fluid bed cement process with severe corrosion and temperature to 2200°F (fluid method of producing builders cement).
13. Gas and ethylene cracking atmosphere.
14. Atmosphere directly upon burning sodium (1800-2200°F).
15. Oil fired furnace chambers.
16. Atmosphere directly above molten glass in an open hearth glass furnace.
17. Molten silver solder.
18. Molten tin.
19. Borax flux.
20. Copper matte.
21. Boiling sulphuric acid — 97%.
22. Blast furnace stove dome and bustle pipes.

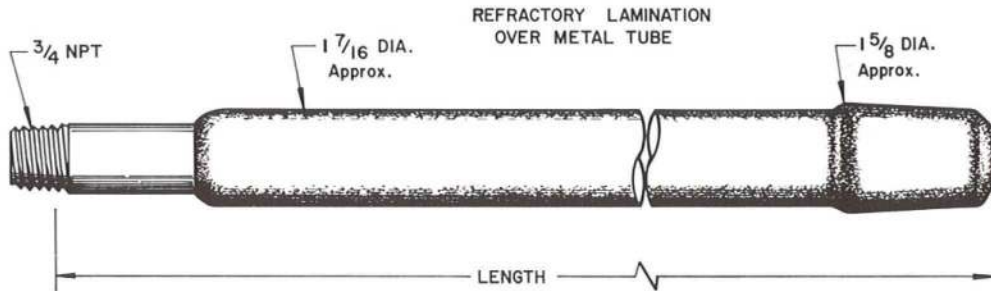
NON-RECOMMENDED APPLICATIONS

- | | | |
|-------------------------------------|----------------------------------|---|
| 1. Molten aluminum. | 5. Carbide slag. | 9. Nitriding atmospheres. |
| 2. Cryolite. | 6. Molten glass. | 10. Barium chloride salt bath. |
| 3. Tin (stannous) chloride (750°F). | 7. Boiling sulphuric acid — 10%. | 11. Sodium Nitrate — nitrate salt bath. |
| 4. Acid slag. | 8. Carburizing atmospheres. | |



MANUFACTURING CORPORATION 12404 TRISKETT ROAD CLEVELAND, OHIO 44111 (216) 941-6200
 FAX: (216) 941-6207

PROTECTING TUBES REFRACTORY-LAMINATED METAL

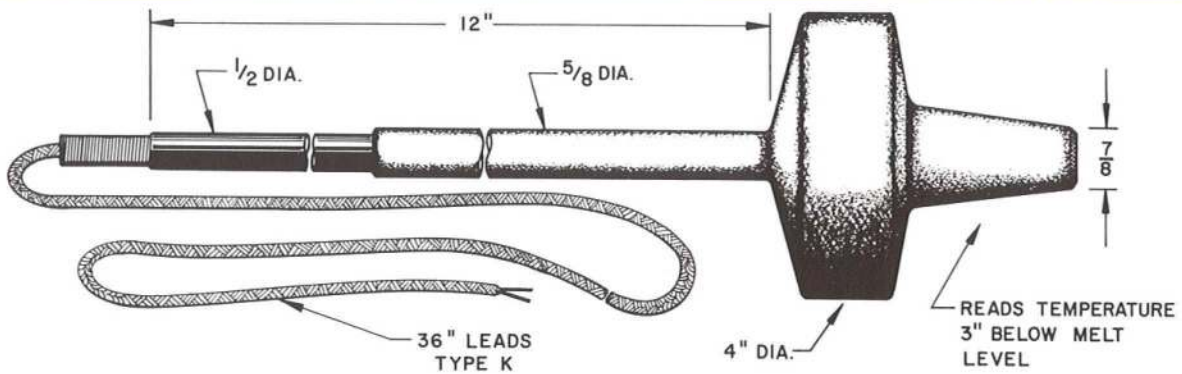


Refractory-Laminated Metal Tube offers the mechanical protection of metal tubes and the corrosion resistance of ceramics. For molten aluminum or zinc applications, they resist erosion, will not contaminate metal melts and will out last iron tubes by many times.

PART NUMBER	LENGTH INCHES	PRICE \$ / ea.
RL-	12	\$29.
	18	31.
	21	32.
	24	33.
	30	36.
	36	38.

DISCOUNT SCHEDULE	
Quantity	Factor
1-9	Net
10-49	.90
50-74	.85
75-99	.80
100+	.75

PROTECTING TUBES FLOATING REFRACTORY-LAMINATED METAL WITH THERMOCOUPLE

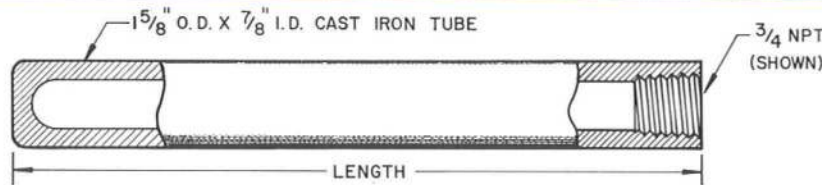


Floating, refractory-laminated, metal protecting tube with thermocouple for accurate temperature indication approximately 3" below the melt level. Laminated silicon carbide tip provides good heat transfer to SS sheathed, Type K, .125 O.D., thermocouple with 36" fiberglass insulated and SS overbraided leads. Floatation may require support spring or holder.

PART NUMBER	PRICE \$ / each
FL-K-12	\$49.00

Discount Schedule above applies.

PROTECTING TUBES CAST IRON



Example :34 - CIR - 18" \$13.50

MATERIAL	INDUSTRIAL - CAST IRON PROTECTING TUBES				
	PROTECTING TUBE SIZE		PART NUMBER	12" TUBE PRICES	6" ADDITION
	NPT	I.D. x O.D.			
CAST IRON	3/4 (INTERNAL)	7/8 x 1-5/8	34 - CIR - □	\$10.00	\$3.50
	1" NPT (EXTERNAL)		44 - CIR - □	14.00	3.50



MANUFACTURING CORPORATION 12404 TRISKETT ROAD CLEVELAND, OHIO 44111

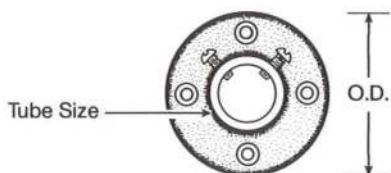
(216) 941-6200
FAX: (216) 941-6207

PROTECTING TUBES MOUNTING ACCESSORIES

FIXED BUSHING SIZE	PART NO. (steel)	PRICE \$ add	PART NO. (SS)	PRICE \$ add
1/2 NPT	F12C	8.00	F12S	10.00
3/4 NPT	F34C	9.00	F34S	11.00
1 NPT	F44C	9.00	F44S	13.00
1 1/4 NPT	F54C	11.00	F54S	27.00
1 1/2 NPT	F64C	11.00	F64S	32.00

NOTES:

- Bushings are welded to tubes.
- 1/2 NPT Bushing fits up to 3/8 pipe
3/4 NPT Bushing fits up to 1/2 pipe
1 NPT Bushing fits up to 3/4 pipe
1 1/4 NPT Bushing fits up to 1 pipe
1 1/2 NPT Bushing fits up to 1 1/4 pipe
- GIVE IMMERSION LENGTH WHEN ORDERING BUSHING
e.g. 12-304-24"-F34C-18" and add bushing price to base list price



Adjustable Flange For Metal Protecting Tubes

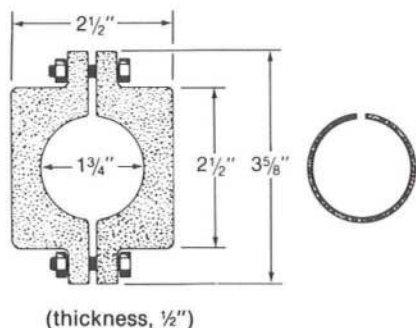
PROTECTING TUBE SIZE	FLANGE O.D.*	PART NO.	PRICE \$/ea.
1/4" NPT	2 3/8"	AF-14	6.00
3/8" NPT	2 7/8"	AF-38	6.00
1/2" NPT	3"	AF-12	6.00
3/4" NPT	3 1/4"	AF-34	6.00
1" NPT	3 3/4"	AF-44	7.50
1-1/2" NPT	4 1/2"	AF-64	9.00

*Approx. Dim.

Split Flange For Ceramic Protecting Tubes

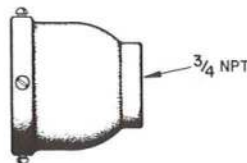
FOR PROTECTING TUBE	PART NO.	PRICE \$/ea.
1 3/4 O.D. SILICON CARBIDE	SF	11.

*Includes gasket



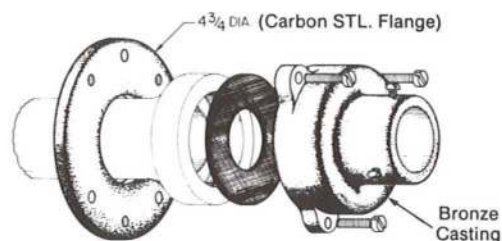
DISCOUNT SCHEDULE	
QUANTITY	FACTOR
1-9	NET
10-49	.90
50-74	.85
75-99	.80
100+	.75

Fixed Steel Mounting Bushing For Metal Protecting Tubes



PART NO.	PRICE
WP	12.00

Weatherproof cover for SIC



Support Flange and Casting Assembly For 1-3/4" O.D. Silicon Carbide Protecting Tube w/ Collar

DESCRIPTION	PRICE \$/ea.
Support Casting MF-0	10.50
Gasket MF-1	1.25
CS Support Flange MF-2	10.00

When ordering complete assembly, order all three part numbers.

Tapered Steel Mtg. Plug For Blast Furnace Assembly

PART NO.	PRICE
TP	18.00

