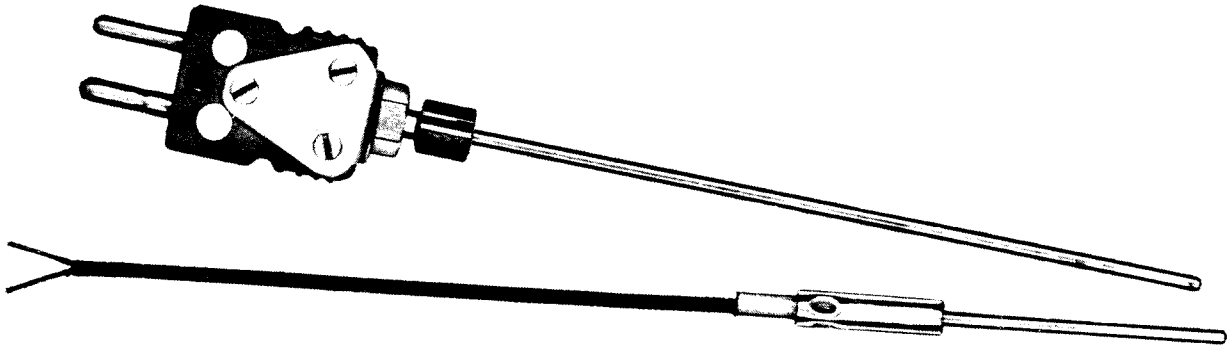


ARI ULTRA HIGH TEMPERATURE THERMOCOUPLES UP TO 2 000°C+



ARI Industries offers time tested thermocouples for temperature measurement in ULTRA HIGH TEMPERATURES beyond the usable range for base metal thermocouples.

The material combinations listed in the following tables have been carefully selected to make use of desirable properties, for a common sense approach to an otherwise difficult selection

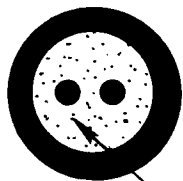
process. Each element, insulation and sheath combination is listed for the temperature range or environment least likely to result in short term failures, extending reliable temperature measurement to the 2 200°C range. Inert gas backfilling prior to reduction is available on request. This extra step may be performed on either the compacted insulation 'AerOpak[®]' approach or non-compacted protection tube styles.

AerOpak[®] CONSTRUCTION

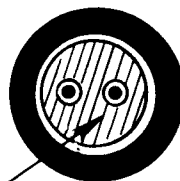
USED WITH ALL BUT MOLYBDENUM AND OCR SHEATHS

PROTECTION TUBE CONSTRUCTION

USED WITH MOLYBDENUM AND COATED MOLYBDENUM SHEATHS



COMPACTED CERAMIC INSULATION



SOLID CERAMIC INSULATORS

THERMOCOUPLE WIRE COMBINATIONS

Table 1

Types B, R, S per ASTM E-230-81

THERMOCOUPLE COMBINATION	ARI SYMBOL	LIMITS OF ERROR
Platinum 13% Rhodium/Platinum	R	±1,5°C from 0°C to 600°C
Platinum 10% Rhodium/Platinum	S	±0,25% from 600°C to 1 500°C
Platinum 30% Rhodium/Platinum 6% Rhodium	B	±0,5% from 875°C to 1 700°C
Tungsten 5% Rhenium/Tungsten 26% Rhenium	AE	±4°C to 425°C
Tungsten 3% Rhenium/Tungsten 25% Rhenium	AO	±1%, 400°C to 2 300°C

MATERIAL SELECTION GUIDE

Table 2

Temperature Class and (Insulation Material)	South Material, (ARI Symbol)	Thermocouple Combination ARI Symbol						Allowable Environment	Minimum Bending or Forming Radius	Available Sheath Diameter (mm)	Maximum Single Length (mm)	Hot Junctions Available (ARI Style Number)
		B	R	S	AE	AO						
CLASS I 1 150°C max. (N) MgO Insulation	INCONEL 600 (B)	X	X	X				Inert, Oxidising, Vacuum	Twice Sheath Diameter	1,0 1,67 3,17 4,75 6,35	4 600	8 (Grounded) 9 (Insulated)
CLASS II 1 700°C max. (N) MgO Insulation	Pt 6% Rh (AA)		X	X				Inert, Oxidising	5 times sheath O.D.	1,0 1,67 3,17	3 000	8 (Grounded) 9,6 (Insulated)
	Coated Molybdenum (OCR)				X	X		Inert, Oxidising	Do not Bend	3,17	435	9 (Insulated)
	Tantalum (N)	X	X	X	X	X		Inert, Vacuum	5 times Sheath O.D.		3 500	8 (Grounded)
	Molybdenum (O)	X	X	X	X	X		Inert, Reducing	Do not Bend	3,17 4,75 6,35	1 200	9 (Insulated)
CLASS III 2 250°C max. (B) BeO Insulation	Tantalum (N)				X	X		Inert, Vacuum	5 times Sheath O.D.	1,67 3,17	3 500	8 (Grounded)
	Columbium 1% Zirconium (AV)				X			Inert, Vacuum N ²				
	Molybdenum (O)				X	X		Inert, Vacuum, Reducing	Do not Bend	3,17 4,75 6,35	1 200	9 (Insulated)

Lead wire available with fibreglass insulation or as a part of completed thermocouple styles T-77, T-99, T-103, or T-107.
Lead wire temperature limits:

S: Copper/Copper 11% Nickel. Used for 'R' and 'S' to 250°C

B: Copper/Copper. Used for 'B' to 100°C

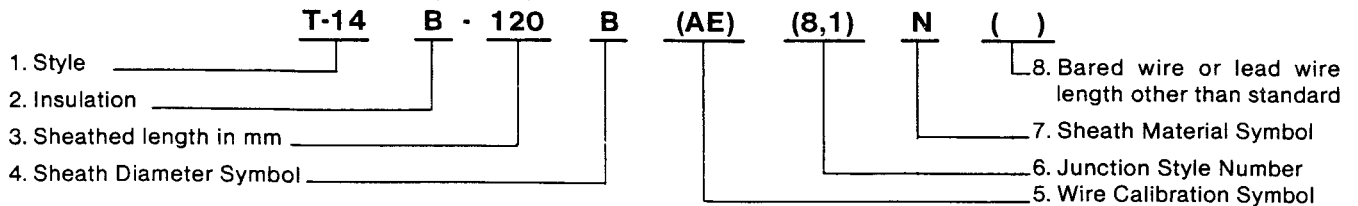
AE: Hoskins 405/426. Used for ARI type AE to 475°C with fibreglass insulation, to 920°C in AerOpak®

AO: Hoskins 203/225, or Englehard 300P/300N. Used for type AO to 310°C

PART NUMBER DERIVATION

Table 3

Specification of the thermocouple may be made by referring to the style illustrations on the Page 12 and the tables above. Derive the final part number by following the steps below.



1. Applicable Styles:	T-14, T-77, T-91, T-92, T-96, T-99, T-103, T-107 High temperature(437°C)transition to lead wire is available. Add the prefix HI to Styles T-77, T-99, T-103, T-107.	5. Wire Calibration:	Symbol from Table 1.
2. Insulation Material:	B = BeO, N = MgO,	6. Junction Style:	Number from Table 2 8 enclosed and grounded; 9 enclosed and insulated from sheath.
3. Sheathed Length in mm:	Manufacturing Standard is ±10mm	7. Sheath Material Symbol:	AA-Pt6 Rh, B-Inconel 600, N-Tantalum, O-Molybdenum OCR-Coated Molybdenum AV-Cb1%Zr (Nb1%Zr).
4. Sheath Diameter Symbol in mm:	A=1,0; B=1,67; D=3,17; E=4,75; F=6,35 Standard tolerance is ±0,2mm.	8. Bared Wire Length for Style T-14 (12,7mm Standard) or Lead wire length for Styles T-77, T-99, T-103, T-107. This length is added when lead wire lengths other than the standard 500mm are desired.	