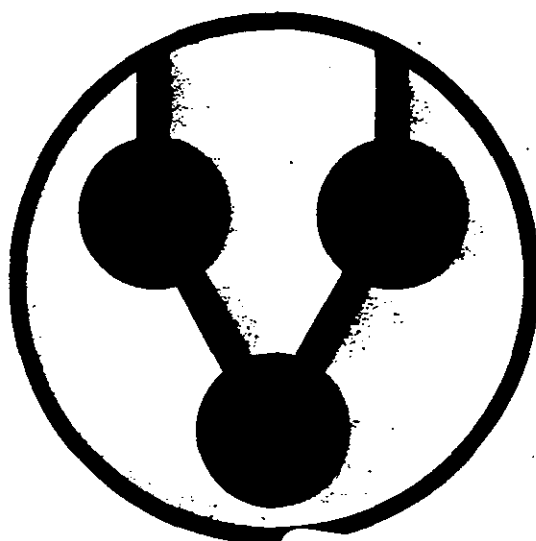


**Thermocouple
and Extension
Wires and Cables.**



RBB 02822

General Information on Thermocouple Wires.

Rockbestos has been manufacturing high temperature, high performance specialty wires and cable for over 50 years, serving the airframe, utility and industrial markets. This experience is now being devoted to improved designs and advanced development of thermocouple and thermocouple extension lead wires.

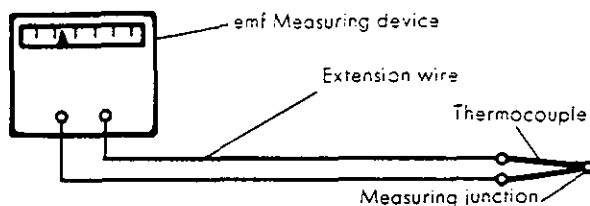


Fig. 1 Thermocouple thermometer (pyrometer)

As illustrated in Fig. 1, a thermocouple consists of two conductors of dissimilar metals, electrically insulated from one another except where connected together to form the temperature measuring junction. The thermocouple extension consists of two conductors of dissimilar metals, electrically insulated from one another, which join to the thermocouple

and carry the electromotive force generated at the junction to the measuring device.

The capability and reliability of these two systems—the thermocouple and the thermocouple extension—rely heavily upon the insulating material. It is in this area that Rockbestos has applied most of its efforts and experience.

Rockbestos high performance wires will assure optimum protection against temperature, radiation, moisture, physical abuse, or other environmental conditions.

The following information will serve as a guide for thermocouple wire selection. There may be variations under different environmental conditions.

All Rockbestos standards are traceable to the National Bureau of Standards.

All insulated wires are guaranteed to meet the Standard Limits of Error of A.S.A./I.S.A. Standard MC-96.1-1975.

Conductors meeting Special Limits of Error are available at a nominal increase in cost.

Rockbestos Thermocouple Extension Wires and Cables Insulation Characteristics and Application

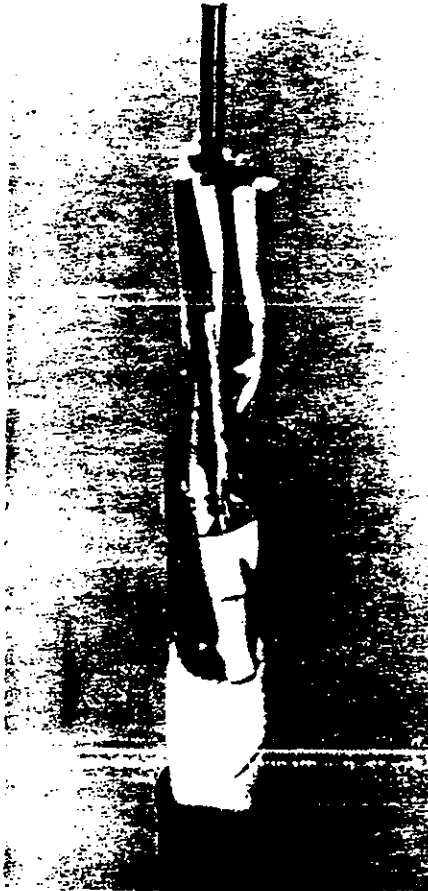
Rockbestos Type	Max. Temp.	Radiation Resistance	Flame Resistance	Moisture Resistance	Mechanical Properties	Application
Firewall III	90°C	Good	Very Good	Excellent	Excellent	Used where fire and radiation resistance is a requirement recommended for industrial and utility installations in conduit, tray, duct or direct burial. Cable will not propagate flame during cable tray fires. Small diameter.
Firewall EP	90°C	Good	Very Good	Excellent	Very Good	Fire and radiation resistant—will not propagate flame—Industrial and utility installation in conduit, tray, duct or direct burial. More flexible than Pyro-Trol III.
Firewall SR	200°C	Good	Excellent	Very Good	Good	Used in high ambients where resistance to radiation and fire is a requirement—has good flexibility—is a chlorine-free insulation. Recommended for industrial and utility installations in conduit, tray or duct.
Mini-Trol NJ	90°C	Good	Good	Very Good	Excellent	Insulation system provides significant space savings—resistant to gamma radiation and nuclear post-accident environmental conditions—will not propagate flame. Good mechanical and electrical properties.
P.V.C.	105°C	Fair	Good	Good	Good	General Purpose for industrial and power generation suitable for conduit, tray, duct, or direct burial.

RBB 02823

Thermocouple Extension Cables

Firewall[®] III

(Pairs Not Shielded)



CONSTRUCTION

Twisted pairs unshielded, overall shield.

Solid conductors are matched, calibrated and color coded to A.S.A./I.S.A. Standard C96.1-1969, Thermocouple Extension Wire for Types "EX," "KX," "JX," or "TX."

Each conductor insulated with flame retardant cross-linked polyethylene.

Pairs twisted (not shielded).

Twisted pairs cabled around communication wire, bedding tape, stranded tinned copper drain, aluminum Mylar[®] tape, fire retardant tape, heavy-duty and flame retardant impervious neoprene overall.

Note: #16 AWG single pair has same insulation on singles.

The two conductors are twisted with a fire retardant tape and heavy duty neoprene jacket overall. No communication wire.

APPLICATION

Recommended where fire and radiation resistant properties are required. Suitable for general use at 90°C and recommended for industrial and power generation installations in conduit, tray, duct or direct burial.

ADVANTAGES

This construction has good electrical and mechanical properties. The cables are operative after radiation exposure in excess of 2×10^6 rads, followed by post-accident environmental conditions. Cables will not propagate flame during a cable tray fire and will also maintain electrical integrity long enough to satisfy post-accident safety requirements.

No. of Pairs	Size AWG (Solid)	Insulation Thickness (Mils)	Jacket Thickness (Mils)	Nominal Overall Diam. (in.)	Minimum Bend Radius (in.)	Maximum Pulling Tension (lbs)	Net Wgt. (lbs/M)
1	16	20	45	.288	1.15	42	50
4	20	20	45	.434	5.20	66	95
8	20	20	60	.567	6.80	131	149
10	20	20	60	.645	7.75	164	200
12	20	20	60	.671	8.05	197	225
16	20	20	60	.737	8.85	262	270
20	20	20	60	.812	9.75	328	320
24	20	20	80	.930	11.15	393	415
36	20	20	80	1.058	12.70	590	558

*DuPont Trade Name

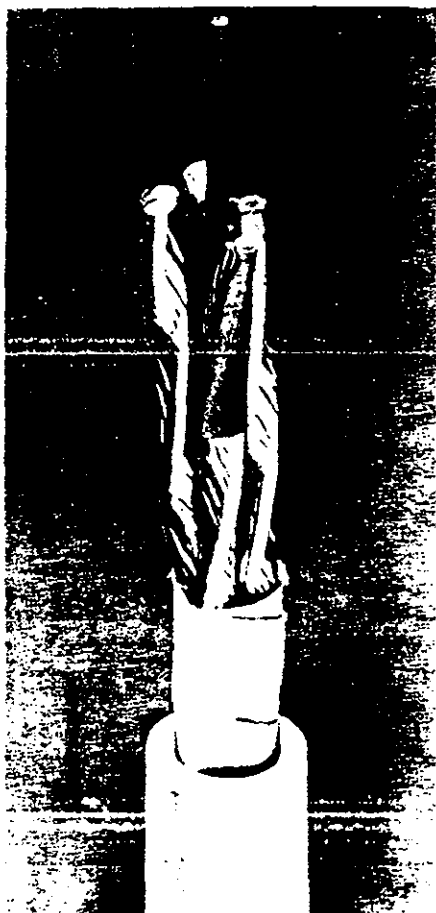
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RBB 02824

Thermocouple Extension Cables

Firewall[®] III

(Pairs Shielded)



CONSTRUCTION

Twisted pairs shielded.

Solid conductors are matched, calibrated and color coded to A.S.A./I.S.A. Standard C96.1-1969, Thermocouple Extension Wire for Types "EX," "KX," "JX," or "TX."

Each conductor insulated with flame retardant cross-linked polyethylene.

Pairs twisted with stranded tinned copper drain, aluminum Mylar* tape.

Shielded pairs cabled around communication wire, flame retardant tape, heavy duty, flame resistant neoprene jacket overall.

Note: #16 AWG single pair has same insulation on singles.

The two conductors are twisted with drain, aluminum Mylar with a fire retardant tape and heavy duty neoprene jacket overall. No communication wire.

APPLICATION

Recommended where fire and radiation resistant properties are required. Suitable for general use at 90°C and recommended for industrial and power generation installations in conduit, tray, duct or direct burial. Shielding is recommended where electrostatic coupling with other electrical or electronic circuits must be minimized.

ADVANTAGES

This construction has good electrical and mechanical properties. The cables are operative after radiation exposure in excess of 2×10^6 rads followed by post-accident environmental conditions. These cables will not propagate flame during a cable tray fire and will also maintain electrical integrity long enough to satisfy post-accident safety requirements.

No. of Pairs	Size AWG (Solid)	Insulation Thickness (Mils)	Jacket Thickness (Mils)	Nominal Overall Diam. (in.)	Minimum Bend Radius (in.)	Maximum Pulling Tension (lbs)	Net Wgt. (lbs/M')
1	16	20	45	.292	3.50	42	57
4	20	20	45	.428	5.15	66	101
8	20	20	60	.576	6.90	131	187
10	20	20	60	.662	7.95	164	227
12	20	20	60	.690	8.30	197	257
16	20	20	60	.762	9.15	262	316
20	20	20	80	.883	10.60	328	416
24	20	20	80	.968	11.60	393	483
36	20	20	80	1.108	13.30	590	663

*DuPont Trade Name

ROCKBESTOS. PRODUCTS

CERRO WIRE & CABLE CO.

DIVISION OF CERRO CORPORATION
NICHOL & CANNON ST. NEW HAVEN, CONN. 06504

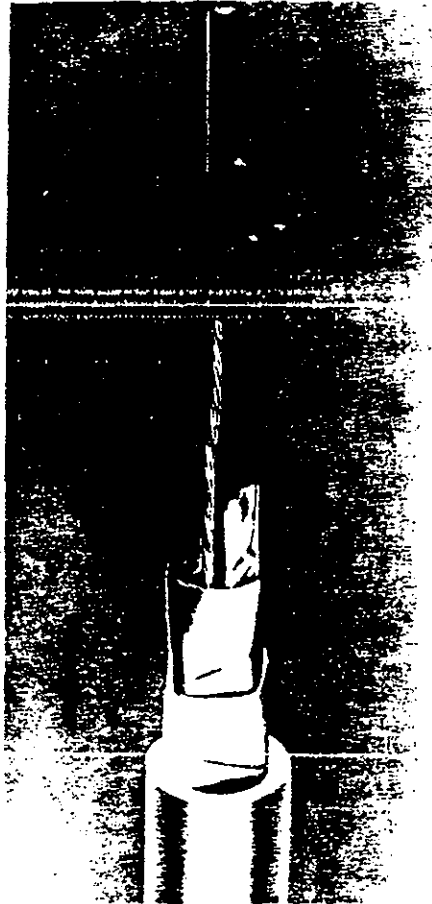
700-1 77 4V

RBB 02825

Thermocouple Extension Cables

Firewall® EP 90°C

(Pairs Not Shielded)



CONSTRUCTION

Twisted pairs unshielded, overall shield

Solid conductors are matched, calibrated and color coded to A.S.A./I.S.A. Standard C96.1-1969, Thermocouple Extension Wire for Types "EX," "KX," "JX" or "TX."

Each conductor insulated with ethylene propylene rubber compound and jacketed with flame resistant neoprene bonded firmly to the insulation.

Pairs twisted (not shielded).

Twisted pairs cabled around communication wire, bedding tape, stranded tinned copper drain, aluminum Mylar* tape, flame retardant tape, heavy duty and flame resistant impervious neoprene jacket overall.

Note: #16 AWG single pair has same insulation on singles. The two conductors are twisted with flame retardant tape and neoprene overall. No communication wire.

APPLICATION

Recommended for areas where fire and radiation resistant properties are required.

ADVANTAGES

These cables will not propagate flame; will maintain circuit integrity in fire; and will operate after radiation exposure in excess of 2×10^8 rads followed by post-accident environmental conditions.

No. of Pairs	Size AWG (Solid)	Insulation Thickness (Mils)	Sheath Thickness (Mils)	Jacket Thickness (Mils)	Nominal Overall Diam. (in.)	Minimum Bend Radius (in.)	Maximum Pulling Tension (lbs)	Net Wgt. (lbs/M')
1	16	25	15	20	.330	1.35	42	56
4	20	25	15	60	.657	7.90	66	193
8	20	25	15	80	.866	10.40	131	347
10	20	25	15	80	.994	11.93	164	417
12	20	25	15	80	1.036	12.40	197	468
16	20	25	15	80	1.145	13.75	262	557
20	20	25	15	80	1.267	15.20	328	665
✓ 24	20	23	15	80	1.396	16.75	393	775
36	20	23	15	80	1.606	19.27	590	1064

*DuPont Trade Name

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RBB 02826

Thermocouple Extension Cables

Firewall[®] EP 90°C

(Pairs Shielded)



CONSTRUCTION

Twisted pairs shielded.

Solid conductors are matched, calibrated, and color coded to A.S.A./I.S.A. Standard C96.1-1969, Thermocouple Extension Wire for Types "EX," "KX," "JX" or "TX."

Each conductor insulated with ethylene propylene rubber compound and jacketed with flame resistant neoprene bonded firmly to the insulation.

Pairs twisted, stranded tinned copper drain, aluminum Mylar^{*} tape

Shielded pairs cabled around communication wire, flame retardant tape, heavy duty and flame resistant impervious neoprene jacket overall.

Note: #16 AWG single pair has same insulation on the singles. The two conductors are twisted with drain, aluminum Mylar, flame retardant tape, neoprene overall. No communication wire.

APPLICATION

Recommended for areas where fire and radiation resistant properties are required. Shielding is recommended where electrostatic coupling with other electrical or electronic circuits must be minimized.

ADVANTAGES

These cables will not propagate flame; will maintain circuit integrity in fire; and will operate after radiation exposure in excess of 2×10^8 rads followed by post-accident environmental conditions.

No. of Pairs	Size AWG (Solid)	Insulation Thickness (Mils)	Sheath Thickness (Mils)	Jacket Thickness (Mils)	Nominal Overall Diam. (in.)	Minimum Bend Radius (in.)	Maximum Pulling Tension (lbs)	Net Wgt. (lbs/M')
1	16	25	15	20	.334	4.00	42	63
4	20	25	15	60	.659	7.90	66	199
8	20	25	15	80	.891	10.70	131	370
10	20	25	15	80	1.029	12.35	164	450
12	20	25	15	80	1.075	12.90	197	508
16	20	25	15	80	1.191	14.30	262	608
20	20	25	15	80	1.323	15.90	328	731
24	20	25	15	80	1.461	17.55	393	855
36	20	25	15	110	1.748	21.00	590	1305

*DuPont Trade Name

ROCKBESTOS[®] PRODUCTS

CERRO WIRE & CABLE CO.
DIVISION OF CERRO-MARMON CORPORATION
Hisco & Conner Sts. New Haven, Conn. 06511

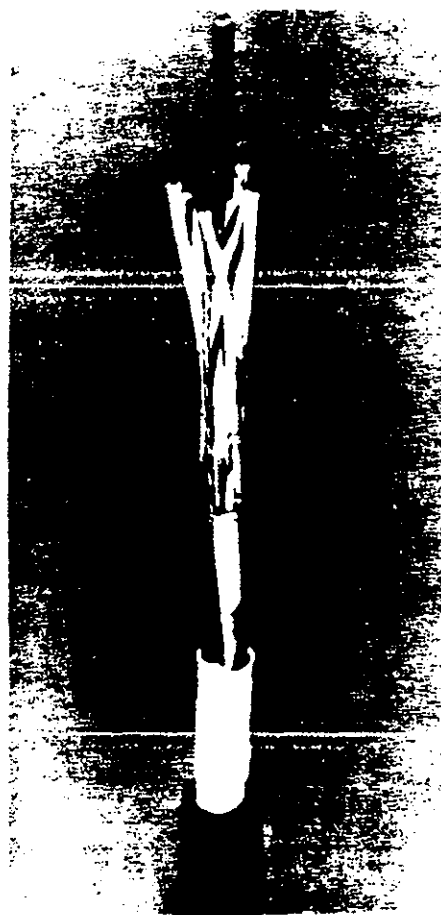
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RBB 02827

Thermocouple Extension Cables

Mini-Trol NJ 90°C

(Pairs Not Shielded)



CONSTRUCTION

Twisted pairs unshielded, overall shield.

Solid conductors are matched, calibrated, and color coded to A.S.A./I.S.A. Standard C96.1-1969, Thermocouple Extension Wire for Types "EX," "KX," "JX," or "TX."

Each conductor insulated with heat sealed polyester tapes and covered with impervious extruded thermoplastic jacket.

Pairs twisted (not shielded).

Twisted pairs cabled around communication wire, bedding tape and stranded tinned copper drain, aluminum Mylar* tape, flame retardant tapes, heavy duty, flame resistant impervious neoprene jacket overall.

Note: #16 AWG single pair has same insulation on singles.
The two conductors are twisted with flame retardant tape, neoprene overall. No communication wire.

APPLICATION

The lightest and smallest cable available for applications in instrumentation.

ADVANTAGES

Excellent resistance to the effects of gamma radiation and nuclear post-accident environmental conditions. Will not propagate fire. The superior electrical and mechanical properties of Mini-trol insulation system make possible significant space savings.

No. of Pairs	Size AWG (Solid)	Insulation Thickness (Mils)	Jacket Thickness (Mils)	Nominal Overall Diam. (in.)	Minimum Bend Radius (in.)	Maximum Pulling Tension (lbs)	Net Wgt. (lbs/M')
1	16	10	20	.198	.80	42	29
4	20	10	45	.350	4.20	66	74
8	20	10	45	.425	5.10	131	112
10	20	10	45	.481	5.75	164	138
12	20	10	45	.500	6.00	197	156
16	20	10	60	.577	6.90	262	207
20	20	10	60	.631	7.60	328	246
24	20	10	60	.688	8.25	393	286
36	20	10	60	.781	9.40	590	392

*DuPont Trade Name

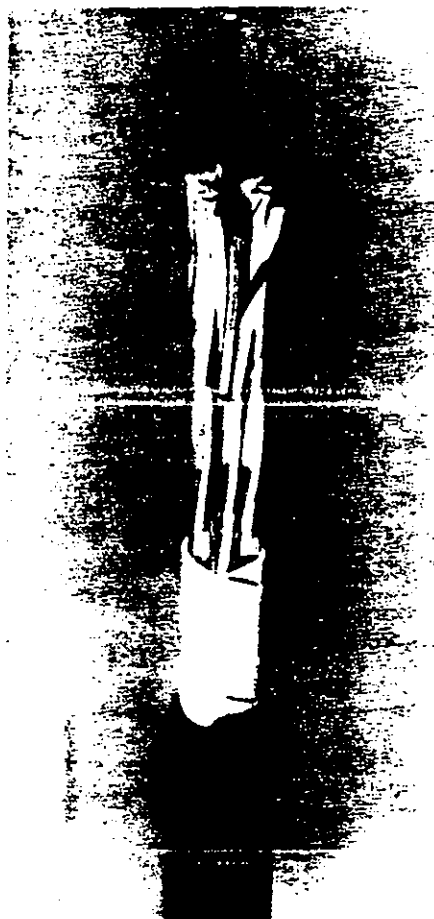
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RBB 02828

Thermocouple Extension Cables

Mini-Trol NJ 90°C

(Pairs Shielded)



CONSTRUCTION

Twisted pairs shielded.

Solid conductors are matched, calibrated and color coded to A.S.A./I.S.A. Standard C96.1-1969, Thermocouple Extension Wire for Types "EX," "KX," "JX," or "TX."

Each conductor insulated with heat sealed polyester tapes and covered with an impervious extruded thermoplastic jacket.

Pairs twisted, bedding tape, stranded tinned copper drain, aluminum Mylar* tape.

Shielded pairs cabled around communication wire, fire retardant tape, heavy duty, flame resistant impervious neoprene jacket overall.

Note: #16 AWG single pair has same insulation on the singles, twisted with drain, aluminum Mylar, fire retardant tape, neoprene overall. No communication wire.

APPLICATION

The lightest and smallest cable available for applications in instrumentation. Shielding is recommended where electrostatic coupling with other electrical or electronic circuits must be minimized.

ADVANTAGES

Excellent resistance to the effects of gamma radiation and nuclear post-accident environmental conditions. Will not propagate fire. The superior electrical and mechanical properties of Mini-trol insulation system make possible significant space savings.

No. of Pairs	Size AWG (Solid)	Insulation Thickness (Mils)	Jacket Thickness (Mils)	Nominal Overall Diam. (in.)	Minimum Bend Radius (in.)	Maximum Pulling Tension (lbs)	Net Wgt. (lbs/M')
1	16	10	20	.202	2.40	42	35
4	20	10	45	.341	4.10	66	79
8	20	10	45	.428	5.15	131	132
10	20	10	45	.490	5.90	164	161
12	20	10	45	.510	6.10	197	184
16	20	10	60	.593	7.10	262	248
20	20	10	60	.652	7.80	328	298
24	20	10	60	.714	8.60	393	349
36	20	10	60	.816	9.80	590	488

*DuPont Trade Name

ROCKBESTOS* PRODUCTS

CERRO WIRE & CABLE CO.
DIVISION OF CERRO-MARMON CORPORATION
Nico & Conner Sts. New Haven, Conn. 06504

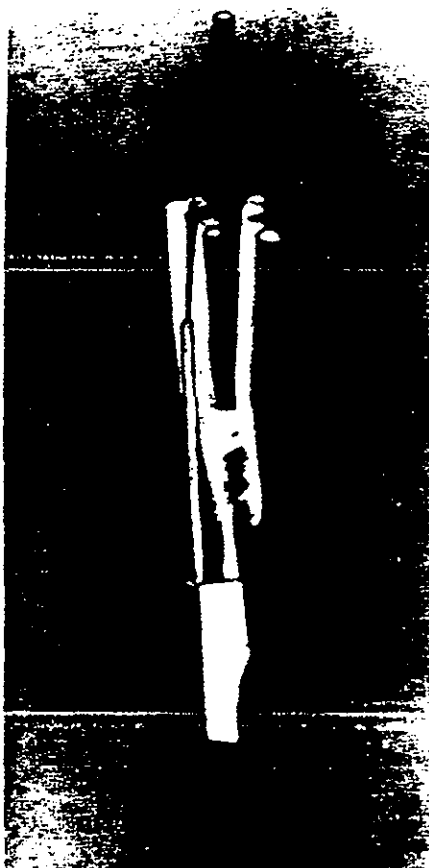
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RBB 02829

Thermocouple Extension Cables

Polyvinyl Chloride 105°C

(Pairs Not Shielded)



CONSTRUCTION

Twisted pairs unshielded, overall shield.

Solid conductors are matched, calibrated and color coded to A.S.A./I.S.A. Standard C96.1-1969, Thermocouple Extension Wire for Types "EX," "KX," "JX," or "TX."

Each conductor insulated with polyvinyl chloride (105°C).

Pairs twisted (not shielded).

Twisted pairs cabled around communication wire, bedding tape, stranded tinned copper drain, aluminum Mylar* tape, polyvinyl chloride overall.

Note: #16 AWG single pair has same insulation on the singles.
Twisted with clear Mylar tape, P.V.C. (105°C) overall.
No communication wire.

APPLICATION

General purpose for industrial and power generation suitable for conduit, tray, duct or direct burial installations.

ADVANTAGES

The insulating materials are resistant to acids, alkalis and moisture.

No. of Pairs	Size AWG (Solid)	Insulation Thickness (Mils)	Jacket Thickness (Mils)	Nominal Overall Diam. (in.)	Minimum Bend Radius (in.)	Maximum Pulling Tension (lbs)	Net Wgt. (lbs/M')
1	16	18	20	.217	.90	42	29
4	20	17	45	.393	4.70	66	80
8	20	17	45	.487	5.85	131	128
10	20	17	60	.589	7.05	164	168
12	20	17	60	.613	7.35	197	194
16	20	17	60	.673	8.10	262	240
20	20	17	60	.742	8.90	328	288
24	20	17	60	.814	9.80	393	336
36	20	17	80	.971	11.65	590	505

*DuPont Trade Name

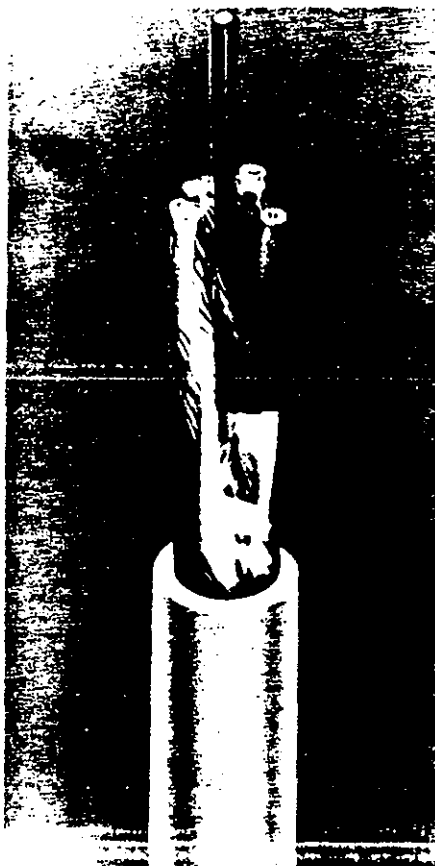
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RBB 02830

Thermocouple Extension Cables

Polyvinyl Chloride 105°C

(Pairs Shielded)



CONSTRUCTION

Twisted pairs shielded.

The solid conductors are matched, calibrated and color coded to A.S.A./I.S.A. Standard C96.1-1969, Thermocouple Extension Wire for Types "EX," "KX," "JX" or "TX."

Each conductor insulated with polyvinyl chloride (105°C).

Pairs twisted with stranded tinned copper drain, aluminum Mylar* tape.

Shielded pairs cabled around communication wire, bedding tape, polyvinyl chloride jacket overall.

Note: #16 AWG single pair has same insulation on the singles. Twisted with drain, aluminum Mylar, P.V.C. (105°C) jacket overall. No communication wire.

APPLICATION

General purpose for industrial and power generation suitable for conduit, tray, duct or direct burial installations. Shielding is recommended where electrostatic coupling with other electrical or electronic circuits must be minimized.

ADVANTAGES

The insulating materials are resistant to acids, alkalies and and moisture.

No. of Pairs	Size AWG (Solid)	Insulation Thickness (Mils)	Jacket Thickness (Mils)	Nominal Overall Diam. (in.)	Minimum Bend Radius (in.)	Maximum Pulling Tension (lbs)	Net Wgt. (lbs/M')
1	16	18	20	.218	2.60	42	34
4	20	17	45	.389	4.65	66	86
8	20	17	45	.498	6.00	131	147
10	20	17	60	.606	7.30	164	196
12	20	17	60	.632	7.60	197	225
16	20	17	60	.698	8.40	262	283
20	20	17	60	.773	9.30	328	343
24	20	17	80	.892	10.70	393	438
36	20	17	80	1.020	12.25	590	608

*DuPont Trade Name

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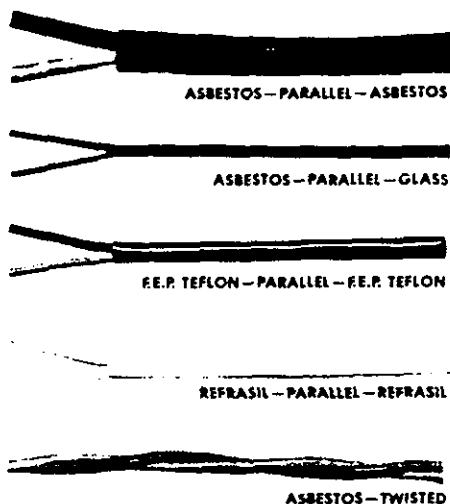
ROCKBESTOS* PRODUCTS

CERRO WIRE & CABLE CO.

DIVISION OF CERRO-MARMON CORPORATION
Nicol & Carter Sts. New Haven, Conn. 06504

RBB 02831

Thermocouple Wire—Single Pair



Listed below are a few of the standard thermocouple wire constructions manufactured by Rockbestos. Except for the Refrasil which is used for very high ambients (1800°F), the other insulations are impregnated with high temperature compounds to give resistance to abrasion and temperature. Special constructions are available for specific requirements. Various braid and tape shields can also be supplied.

A.S.A./I.S.A. Type "E"

Size AWG (Solid)	Insulation Each cond.	Parallel or Twisted	Jacket Overall	Nominal Diam. (in.)	Net Wgt. lbs./M'
20	Felted Asbestos	Parallel	Glass Braid	.087 x .159	10
20	Glass Braid	Parallel	Glass Braid	.065 x .115	11

A.S.A./I.S.A. Type "K"

14	Felted Asbestos	Parallel	Asbestos Braid	.160 x .274	44
20	Felted Asbestos	Parallel	Glass Braid	.087 x .159	10
20	Glass Braid	Parallel	Glass Braid	.065 x .115	11
20	F.E.P. Teflon*	Parallel	F.E.P. Teflon	.076 x .132	13
20	Refrasil**	Parallel	Refrasil	.112 x .184	15
24	Glass Braid	Parallel	Glass Braid	.044 x .076	7
30	Glass Braid	Parallel	Glass Braid	.034 x .056	3

A.S.A./I.S.A. Type "J"

14	Felted Asbestos	Parallel	Asbestos Braid	.160 x .274	43
20	Felted Asbestos	Parallel	Glass Braid	.087 x .159	10
20	Glass Braid	Parallel	Glass Braid	.065 x .115	11
20	Felted Asbestos	Twisted	None	.144	8
20	F.E.P. Teflon	Parallel	F.E.P. Teflon	.076 x .132	12
24	Felted Asbestos	Parallel	Glass Braid	.055 x .095	5
30	Glass Braid	Parallel	Glass Braid	.034 x .056	3

A.S.A./I.S.A. Type "T"

20	Glass Braid	Parallel	Glass Braid	.065 x .115	11
24	Glass Braid	Parallel	Glass Braid	.044 x .076	7

*DuPont Trade Mark

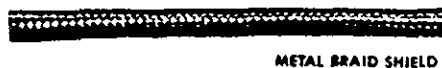
**H. I. Thompson Trade Mark

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RBB 02832

Thermocouple Extension Wire

Single Pair



Listed below are a few of the standard thermocouple extension wires manufactured by Rockbestos. Other constructions and configurations are available to meet specific applications. Various types of braid and tape shields can also be supplied. Rockbestos can furnish practically any type of insulation required to meet the most demanding ambient conditions.

A.S.A./I.S.A. Type "EX"

Size AWG (Solid)	Insulation Each cond.	Parallel or Twisted	Jacket Overall	Nominal Diam. (in.)	Net Wgt. lbs/M'
16	Polyvinyl chloride	Parallel	Polyvinyl chloride	.125 x .210	30
20	Polyvinyl chloride	Parallel	Polyvinyl chloride	.106 x .172	14

A.S.A./I.S.A. Type "KX"

14	Felted Asbestos	Parallel	Asbestos Braid	.160 x .274	43
16	Felted Asbestos	Parallel	Asbestos Braid	.137 x .228	34
16	Polyvinyl chloride	Parallel	Polyvinyl chloride	.125 x .210	30
16	F.E.P. Teflon*	Parallel	F.E.P. Teflon	.091 x .162	25
20	Polyvinyl chloride	Parallel	Polyvinyl chloride	.106 x .172	14

A.S.A./I.S.A. Type "JX"

14	Felted Asbestos	Parallel	Asbestos Braid	.160 x .274	40
16	Felted Asbestos	Parallel	Asbestos Braid	.137 x .228	33
16	Polyvinyl chloride	Parallel	Polyvinyl chloride	.125 x .210	29
16	F.E.P. Teflon	Parallel	F.E.P. Teflon	.091 x .162	24
20	Polyvinyl chloride	Parallel	Polyvinyl chloride	.106 x .172	13

A.S.A./I.S.A. Type "TX"

16	Polyvinyl chloride	Parallel	Polyvinyl chloride	.125 x .210	30
16	F.E.P. Teflon	Parallel	F.E.P. Teflon	.091 x .162	25
20	Polyvinyl chloride	Parallel	Polyvinyl chloride	.106 x .172	14

*DuPont Trade Mark

ROCKBESTOS* PRODUCTS

CERRO WIRE & CABLE CO.
DIVISION OF CERRO-MARMON CORPORATION
Nicol & Carver Bldg. New Haven, Conn. 06504

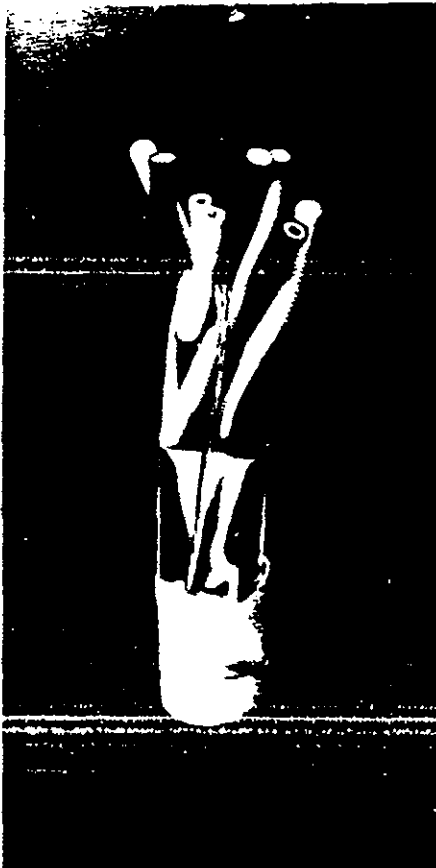
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RBB 02833

Thermocouple Extension Cables

Firewall® SR 200°C

(Pairs Not Shielded)



CONSTRUCTION

Twisted pairs unshielded, overall shield.

Solid conductors are matched, calibrated and color coded to A.S.A./I.S.A. Standard C96.1-1969, Thermocouple Extension Wire for Types "EX," "KX," "JX" or "TX."

Each conductor insulated with silicone rubber and glass braid.

Pairs twisted (not shielded).

Twisted pairs cabled around communication wire, stranded tinned copper drain, aluminum Mylar® tape, flame retardant tape, flame and moisture resistant asbestos braid overall.

Note: #16 AWG single pair has same insulation on the singles. Twisted with flame retardant tape and asbestos braid overall. No communication wire.

APPLICATION

Will satisfy any requirements for chlorine-free cables.

ADVANTAGES

Excellent mechanical and electrical properties. Cable is serviceable after radiation exposure up to 2×10^6 rads followed by post-accident environmental conditions. It will not propagate flame and will maintain electrical integrity in a fire longer than any other flexible insulation system known.

No. of Pairs	Size AWG (Solid)	Insulation Thickness (Mils)	Nominal Overall Diam. (in.)	Minimum Bend Radius (in.)	Maximum Pulling Tension (lbs)	Net Wgt. (lbs/M')
1	16	25	.336	1.35	42	49
4	20	25	.512	6.15	66	114
8	20	25	.644	7.75	131	185
10	20	25	.744	8.90	164	224
12	20	25	.776	9.30	197	255
16	20	25	.861	10.35	262	323
20	20	25	.956	11.50	328	391
24	20	25	1.057	12.70	393	460
36	20	25	1.221	14.65	590	653

*DuPont Trade Name

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RBB 02834

Thermocouple Extension Cables

Firewall®SR 200°C

(Pairs Shielded)



CONSTRUCTION

Twisted pairs shielded.

Solid conductors are matched, calibrated and color coded to A.S.A./I.S.A. Standard C96.1-1969, Thermocouple Extension Wire for Types "EX," "KX," "JX" or "TX."

Each conductor insulated with silicone rubber and glass braid. Pairs twisted with stranded tinned copper drain and aluminum Mylar.*

Shielded pairs cabled around communication wire, flame retardant binder tape, flame and moisture resistant asbestos braid overall.

Note: #16 AWG single pair has same insulation on the singles. Twisted with drain, aluminum Mylar, flame retardant tape, asbestos braid overall.

APPLICATION

Will satisfy any requirements for chlorine-free cables. Shielding is recommended where electrostatic coupling with other electrical or electronic circuits must be minimized.

ADVANTAGES

Excellent mechanical and electrical properties. Cable is serviceable after radiation exposure up to 2×10^8 rads followed by post-accident environmental conditions. It will not propagate flame and will maintain electrical integrity in a fire longer than any other flexible insulation system known.

No. of Pairs	Size AWG (Solid)	Insulation Thickness (Mils)	Nominal Overall Diam. (in.)	Minimum Bend Radius (in.)	Maximum Pulling Tension (lbs)	Net Wgt. (lbs/M')
1	16	25	.340	4.10	42	55
4	20	25	.513	6.15	66	121
8	20	25	.664	8.00	131	206
10	20	25	.772	9.25	164	251
12	20	25	.808	9.70	197	290
16	20	25	.899	10.80	262	371
20	20	25	1.002	12.00	328	452
24	20	25	1.111	13.30	393	533
36	20	25	1.288	15.45	590	761

*DuPont Trade Name

ROCKBESTOS. PRODUCTS

CERRO WIRE & CABLE CO.
DIVISION OF CERRO CORPORATION
Nicollet & Canner Sts. New Haven, Conn. 06504

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RBB 02835

THERMOCOUPLE CONDUCTOR ELEMENTS

Thermocouple Element Designations	Extension Lead Element Designations	Conductor Element by Manufacturer Trade Names
EP EN	EPX ENX	CHROMEL, T-1, TOPHEL CONSTANTAN, ADVANCE, CUPRON
JP JN	JPX JNX	IRON CONSTANTAN, ADVANCE, CUPRON
KP KN	KPX KNX	CHROMEL, T-1, TOPHEL ALUMEL, T-2, NIAL
RP RN	— —	PLATINUM—13% RHODIUM PLATINUM
SP SN	— —	PLATINUM—10% RHODIUM PLATINUM
— —	SPX* SNX*	COPPER COPPER-NICKEL ALLOY, PCLW, ALLOY #11
TP TN	TPX TNX	COPPER CONSTANTAN, ADVANCE, CUPRON
YP YN	YPX YNX	IRON CONSTANTAN, ADVANCE, CUPRON

*Used for extension on type "K" and "J" thermocouples.

trade names: Cupron, Tophel, Nial (W. B. Driver Co.)
Advance, T1 & T2, Alloy #11 (Driver Harris Co.)
Chromel, Alumel (Hoskins Mfg. Co.)

A.S.A./I.S.A. LIMITS OF ERROR AND COLOR IDENTIFICATION

Thermocouple Wire

Type	Color Code			Temperature Range °F	Limits of Error*	
	Overall	Positive	Negative		Standard	Special
ASA/ISA TYPE "E"	BROWN	PURPLE	RED	32 to 600 600 to 1600	±3°F ±½%	
ASA/ISA TYPE "K"	BROWN	YELLOW	RED	32 to 530 530 to 2300	±4°F ±¾%	±2°F ±¾%
ASA/ISA TYPE "J" ASA/ISA TYPE "Y"†	BROWN BROWN	WHITE GREY	RED RED	32 to 530 530 to 1400	±4°F ±¾%	±2°F ±¾%
ASA/ISA TYPE "T"	BROWN	BLUE	RED	-300 to -75 -150 to -75 -75 to +200 200 to 700	— ±2°F ±1½°F ±¾%	±1°F ±1°F ±¾°F ±¾%
PLATINUM RHODIUM— PLATINUM	COLORS AS SPECIFIED			0 to 1000 1000 to 2700	±5°F ±½%	—

†For ISA Type "Y" Bureau of Standards color code is supplied—Brown overall, positive black, negative yellow.

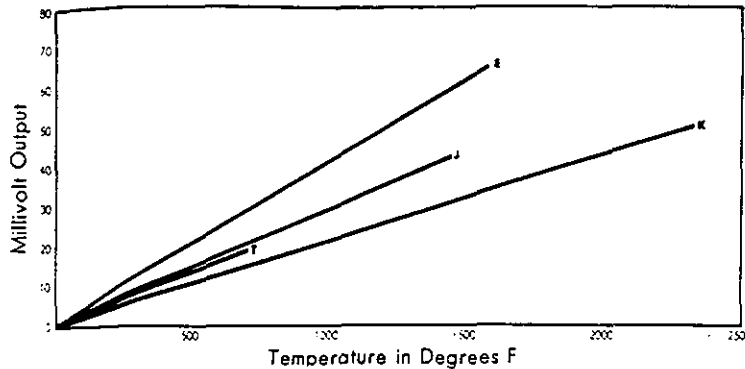
Thermocouple Extension Wire

Type	Color Code			Temperature Range °F	Limits of Error	
	Overall	Positive	Negative		Standard	Special
ASA/ISA TYPE "EX"	PURPLE	PURPLE	RED	0 to 400	±3°F	—
ASA/ISA TYPE "KX"	YELLOW	YELLOW	RED	0 to 400	±4°F	±2°F
ASA/ISA TYPE "JX"	BLACK	WHITE	RED	0 to 400	±4°F	±2°F
ASA/ISA TYPE "TX" ASA/ISA TYPE "SX"	BLUE GREEN	BLUE BLACK	RED RED	-75 to +200 75 to 400	±1½°F ±12°F	±¾°F

*Where limits of error are given in percentage, the percentage applies to the temperature being measured, for example, the standard limit of error for iron-constantan over the temperature range of +530°F. to 1400°F. is ±¾%. If the temperature being measured is 1000°F. the limit of error is ±¾% of 1000, or ±7.5°F.

RBB 02836

TEMPERATURE — MILLIVOLT GRAPH



Note. Curves are approximate values of EMF output for type and temperature.

SOLID & STRANDED CONDUCTORS

Normally thermocouple and thermocouple extension wires are solid conductors. Various strandings are available for all elements when a more flexible construction is desired. The table below gives the standard stranding used in industry.

Conductor	Stranding	
Gauge Size	No. of Strands	Gauge Size
14	7	22
16	7	24
18	7	26
20	7	28
22	7	30
24	7	32

NOMINAL RESISTANCE — OHMS/FT AT 20°C (68°F) SOLID CONDUCTOR

AWG Solid	Diam., Inches	KN	EP, KP	EN, JN, TN	TP	SNX	JP
# 30	.0100	1.77	4.25	2.94	.1032	.2786	.710
# 28	.0126	1.11	2.68	1.85	.0649	.1752	.447
# 24	.0201	.438	1.05	.728	.0257	.0693	.1767
# 22	.0253	.276	.663	.456	.0161	.0436	.1111
# 20	.0320	.173	.415	.287	.0102	.0274	.0699
# 18	.0403	.111	.266	.184	.00648	.0175	.0446
# 16	.0508	.0683	.164	.113	.00402	.0108	.0276
# 14	.0641	.0432	.104	.0718	.00253	.0068	.0174

TEMPERATURE LIMITS

Type	Material	Couple Condition	AWG					
			8	14	16	20	24	30
S R	PLATINUM, 10%/13% RHODIUM & PLATINUM	BARE PROTECT.	— —	— —	— —	2800°F	2700°F	2400°F
T	COPPER & CONSTANTAN	BARE PROTECT.	— —	600°F 700°F	500°F 600°F	400°F 500°F	400°F 400°F	400°F 400°F
J	IRON & CONSTANTAN	BARE PROTECT.	1200°F 1400°F	900°F 1100°F	900°F 1100°F	800°F 900°F	650°F 700°F	600°F 700°F
K	CHROMEL & ALUMEL	BARE PROTECT.	2000°F 2300°F	1700°F 2000°F	1700°F 2000°F	1600°F 1800°F	1400°F 1600°F	1300°F 1500°F
E	CHROMEL & CONSTANTAN	BARE PROTECT.	1400°F 1600°F	1100°F 1200°F	1100°F 1200°F	900°F 1000°F	700°F 800°F	700°F 800°F

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