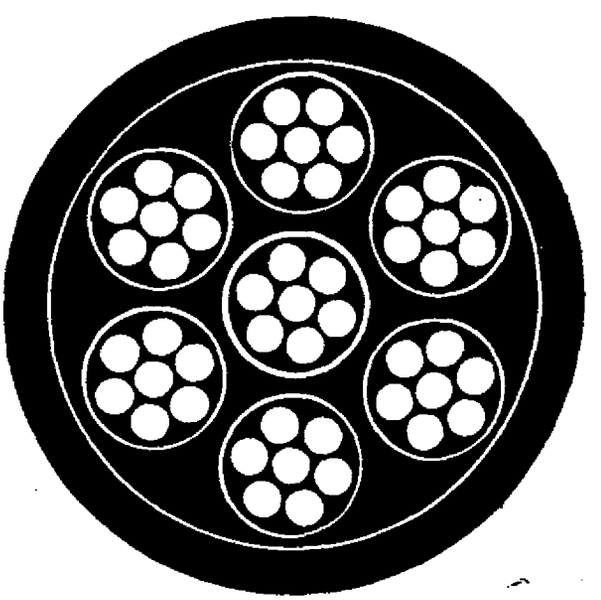
ROCKBESTOS®

WIRE AND CABLE HANDBOOK

PLAINTIFF'S
EXHIBIT
E-229



RBB 01434

ROCKBESTOS

WIRE
AND
CABLE

RBB 01435

HI-TEMP

RBB 01436

high temperature products. These range from 180°C to 1000°C for continuous operating temperature.

Some of the attributes of each include:

Firezone CRC 180°C

CRC 2000/60 minutes

- Maintains circuit integrity for 1 hour in a 2000°F flame
- Has extruded fluoropolymer jacket for excellent fluid resistance
- Stock item

Heatzone III 200°C

- Qualified to Mil-W-22759/4
- Extruded jacket for fluid resistance FEP Jacket
- Silver coated conductor
- Taped teflon dielectric
- Stock item

Heatzone I 260°C → Nickel Clad.

- Nickel plated conductor for 260°C operation
- Taped teflon dielectric
- Less expensive than Heatzone III

Firezone 101 399°C (Intermittent)

- Qualified to Mil-W-25038/1E 50 ohm.
- Good high temperature capability
- Will maintain circuit integrity during flame exposure (15 min. 2000°)
- Stock item

4,000,000.

H-Zone 399°C (Intermittent)

- Qualified to Mil-W-25038/1E
- Good high temperature capability
- Will maintain high I.R. (min. 10K ohm) in 15 min. 2000° flame

Micatemp 650°C (Intermittent)

- Small O.D.
- High temperature
- Nickel clad conductor
- Stock item

Mudgun 650°C (Intermittent)

- Similar to Micatemp but uses asbestos jacket for excellent abrasion resistance

Phosroc "C" 1000°C (With Pure Nickel Conductor)

- Insulation system useable to 2600°F continuous
- Applied by braiding technique

This has given you a quick preview of our product line and an idea of its applications. Now lets talk about some of the materials we have to work with.

Conductors

Tin Coated Copper

- Usable to 150°C
- Inexpensive
- Readily available

Silver Coated Copper

- Usable to 200°C
- Relatively expensive
- Longer lead time

Nickel Coated Copper 2-5%

- Usable to 260°C
- Difficult to solder

Nickel Clad Copper

- 27% Nickel by volume
- Longer high temperature endurance
- 260°C rated

Silver Coated - Nickel Coated Copper

- A solution to beat high silver prices
- 200°C rated
- Solderable

Resistance Alloys (Chromels, etc.)

- Higher temperature ratings (1800°F)
- Higher resistance
- Heating cable applications

"A" Nickel (99% Pure)

- Useful to 2000°F
- Lower resistance than alloys
- Difficult to solder

Now that we have discussed some conductors, we realize we could have covered copper clad steel, alloy 235, and thermocouple conductors. These are special purpose and have increased strength or special EMF characteristics.

The real meat of the high temperature business is the insulating materials themselves, the equipment and know how to put them on the conductor and combining them to enhance their properties.

Each layer of insulation on our wire is for a specific purpose.

We are limited in the number of high temperature materials available, so we must make the most of what we have.

Let's review some of these materials and some of the advantages and

disadvantages of each:

Silicone Rubber 180°C

- Extruded or taped
- Can burn
- Forms non-conductive ash

Fluorinated Ethylene Propylene

- Usually extruded
- Also available in tapes
- Used for sealing kapton or teflon tapes
- Normally a jacketing material
- Very toxic

Kapton (Polyimide Film) 200°C

- Applied as tape
- Thin
- Lightweight
- Toxic
- Expensive

Teflon (Polytetrafluorethylene) 260°C

- Applied as sintered tape
- Applied as unsintered tape
- Also ram extrudable (not done at Rockbestos)

PFA (Perfluoralkoxy Resin) 288°C

- Melt extrudable
- Expensive
- Normally used as jacket material

Asbestos 400°C

- Applied in felted walls, roving, or braids
- Health problem (must impregnate)
- Inorganic
- Poor moisture and fluid resistance
- Good fire resistance
- Cannot melt, burn, drip, or flow

Mica 650°C

- Inorganic
- Applied as tape
- Fragile
- Poor fluid resistance

Glass 650°C

- Becomes conductive at high temperature
- Inexpensive
- Lightweight
- Poor abrasion resistance

Ceramic 1000°C

- Applied by braiding or wrapping of woven tapes
- Expensive
- Not easily color coded
- Abrasive

This concludes our mini-lecture on our high temperature product line.

We hope each of you will pursue "H" class sales as they normally command a good profit ratio. The "H" class business can also help to relieve some of the valleys when there is a slowdown in other market areas.

As Product Manager for both our high temperature and our coaxial cable

products, I will be in the field to assist with particular application problems or to design cables to fit a customer need.

We must work together and above all else we must communicate to provide effective service to a unique group of customers to enable this product line to continue to expand and make $$ for Rockbestos as well as each of us here today.

R. W. Prout

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