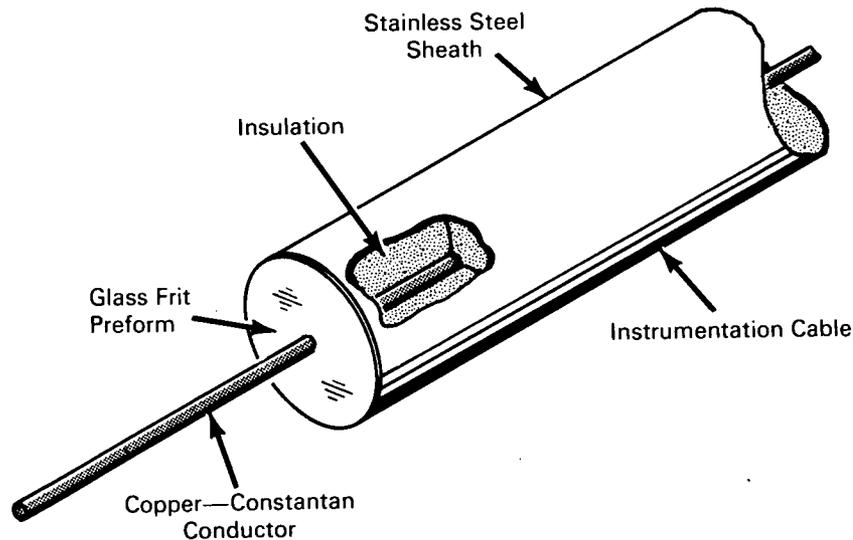


AEC-NASA TECH BRIEF



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Glass Formulation Has High Coefficient of Thermal Expansion



The problem :

To develop a glass that has approximately the same coefficient of expansion as stainless steel and copper. Glass makes a good hermetic seal for the end of a stainless steel or copper tube such as a sheath of an instrumentation cable. The difficulty with ordinary glass is that when heated and melted onto the steel and copper, it cracks upon cooling because of the extreme difference of thermal coefficient of expansion of the materials.

The solution :

A glass formulation having a high coefficient of thermal expansion.

How it's done :

A glass frit (type A-508) was developed which has

the required coefficient of expansion of $13.3 \times 10^{-6}/^{\circ}\text{C}$ between $25^{\circ}\text{--}300^{\circ}\text{C}$. The chemical composition of this frit by weight percent is:

SiO ₂	— 40.00	MgO	— .50
Al ₂ O ₃	— 6.00	ZnO	— 6.00
K ₂ O	— 12.00	TiO ₂	— 2.00
Na ₂ O	— 8.00	V ₂ O ₅	— 6.00
BaO	— 10.00	As ₂ O ₃	— .50
SnO	— 2.00	Li ₂ O	— 4.00
CaO	— 3.00		

Physical properties of the glass are :

Volume Resistivity

Temperature

24°C

382°C

Megohms—cm

12,100

2.12

(continued overleaf)

Deformation Temperature 435°C

Sealing Temperature 878°C

Specific Gravity 2.84

Notes:

1. An interesting use of this glass formulation is described in Tech Brief B66-10704, "Metal Boot Permits Fabrication of Hermetically Sealed Splices in Metal Sheathed Instrumentation Cables."
2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
AEC-NASA Space Nuclear Propulsion
Office

U.S. Atomic Energy Commission
Washington, D.C. 20545T

Reference: B66-10705

Patent status:

No patent action is contemplated by AEC or NASA.

Source: E. K. Davis and J. Seidel
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AEC-NASA Space Nuclear Propulsion Office
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