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5 July 5, 2001

Mr. Bill Ward
US NRC
Washington D.C.
Phone: (301) 415-7038
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Dear Mr. Ward,

I have enclosed a data sheet showing the properties of the G18 heavy metal shielding.

If I can help further, please feel free to contact me.

Very Best Regards,

Frank A. Festa
Project Coordinator
Alternate RSO
***IMS Systems Inc.***

# r to your problems

| Type | S17 | G17 | G17B | G17M | S17,5 | G17,5 | G17,5B |
|---|---|---|---|---|---|---|---|
| Density (g/cm³) | 17±0,1 | 17±0,1 | 17±0,1 | 17,2±0,1 | 17,5±0,1 | 17,5±0,1 | 17,5±0,1 |
| Tungsten content (mol %) | 90 | 90 | 90 | – | 92,5 | 93 | 93 |
| Binder phases (elements) | Ni, Cu | Ni, Fe | Ni, Fe | Ni, Fe, Mo | Ni, Cu | Ni, Fe | Ni, Fe |
| Tensile strength (N/mm²) | 650–750 | 650–780 | 700–880 | 700–900 | 660–800 | 700–840 | 750–900 |
| Elongation at rupture (%) | 2–6 | 2–6 | 10–18* | 2–8 | 2–6 | 2–6 | 10–18* |
| Young's modulus (kN/mm²) | 310–330 | 320–340 | 320–340 | 360 | 330–350 | 340–360 | 340–360 |
| Hardness (HV 10) | 270–320 | 280–330 | 280–330 | 280–330 | 280–330 | 290–330 | 290–330 |
| Mean coefficient of thermal expansion between 200 and 800 °C ($10^{-6}$/K) | 6,0 | 6,0 | 6,0 | 5,0 | 5,6 | 5,6 | 5,6 |
| Magnetic properties Coercive force (A/m) | paramagnetic 3–4 | slightly ferromagnetic 250 | 250 | 400 | paramagnetic 3–4 | slightly ferromagnetic 230 | 230 |
| Specific electrical resistance ($\mu\Omega \cdot$ cm) | 13 | 17 | 17 | – | 12 | 15 | 15 |

| Type | S18 | G18 | G18B | S18,5 | G18,5 | G19 | |
|---|---|---|---|---|---|---|---|
| Density (g/cm³) | 18±0,1 | 18±0,1 | 18±0,1 | 18,5±0,1 | 18,5±0,1 | 18,8±0,1 | |
| Tungsten content (mol %) | 95 | 95 | 95 | 97,5 | 97,5 | 98,5 | |
| Binder phases (elements) | Ni, Cu | Ni, Fe | Ni, Fe | Ni, Cu | Ni, Fe | Ni, Fe | |
| Tensile strength (N/mm²) | 680–850 | 730–860 | 760–920 | 680–850 | 740–880 | 680–800 | |
| Elongation at rupture (%) | 2–8 | 2–6 | 4–10 | 1–3 | 1–3 | < 2 | |
| Young's modulus (kN/mm²) | 340–360 | 350–380 | 350–380 | 350–370 | 360–380 | 360–390 | |
| Hardness (HV 10) | 300–340 | 300–340 | 300–340 | 320–360 | 320–360 | 340–380 | |
| Mean coefficient of thermal expansion between 200 and 800 °C ($10^{-6}$/K) | 5,2 | 5,2 | 5,2 | 5,0 | 5,0 | 4,8 | |
| Magnetic properties Coercive force (A/m) | paramagnetic 3 | slightly ferromagnetic 220 | 220 | paramagnetic 2–3 | slightly ferromagnetic 210 | 200 | |
| Specific electrical resistance ($\mu$ $\Omega \cdot$ cm) | 11 | 13 | 13 | 9 | 10 | 9 | |

* higher values on request