

## RWMA Class 3 and Class 4 Alloys

RWMA Class 3 Alloys from Materion Brush Performance Alloys provide high electrical and thermal conductivity coupled with moderate hardness for resistance welding electrodes and structural components. The high thermal and electrical conductivity allows Class 3 components to run cooler without softening or “mushrooming” at high temperatures, and consequently last longer. This is especially important for weld wheels and electrodes which see the high temperatures at the point of the weld. The high elastic modulus results in less bending under load in structural components such as resistance welding arms. If additional wear resistance is required, Class 4 Alloys provide higher hardness for added resistance to permanent deformation. All of this results in fewer replacement parts, less down time, better welds and better accuracy when using Materion’s Class 3 and Class 4 Alloys.

### CHEMICAL COMPOSITION (weight percent)

| Alloy       | Class | Nickel (Ni) | Cobalt (Co) | Nickel + Cobalt | Beryllium (Be) | Silicon (Si) | Chromium (Cr) | Copper (Cu) |
|-------------|-------|-------------|-------------|-----------------|----------------|--------------|---------------|-------------|
| 3 (C17510)  | 3     | 1.4 – 2.2   | -           |                 | 0.2 – 0.6      |              |               | Balance     |
| 310         |       | 0.8 – 1.3   | 0.8 – 1.3   |                 | 0.4 – 0.7      |              |               | Balance     |
| C18000      |       | 1.8 – 3.0   |             |                 |                | 0.4 – 0.8    | 0.1 – 0.8     | Balance     |
| 25 (C17200) | 4     |             |             | 0.20 min.       | 1.80 – 2.00    |              |               | Balance     |

### TYPICAL PHYSICAL PROPERTIES\*

| Alloy  | Elastic Modulus |     | Density            |                   | Thermal Expansion Coefficient |                       | Thermal Conductivity (25 °C) |        |
|--------|-----------------|-----|--------------------|-------------------|-------------------------------|-----------------------|------------------------------|--------|
|        | ksi             | GPa | lb/in <sup>3</sup> | g/cm <sup>3</sup> | in/in °F                      | m/m °C                | BTU/ft hr °F                 | W/m °C |
| 3      | 20,000          | 138 | 0.319              | 8.83              | 9.8×10 <sup>-6</sup>          | 17.6×10 <sup>-6</sup> | 140                          | 240    |
| 310    | 20,000          | 138 | 0.318              | 8.80              | 9.8×10 <sup>-6</sup>          | 17.6×10 <sup>-6</sup> | 135                          | 235    |
| C18000 | 18,000          | 124 | 0.320              | 8.86              | 9.7×10 <sup>-6</sup>          | 17.5×10 <sup>-6</sup> | 120                          | 208    |
| 25     | 19,000          | 131 | 0.302              | 8.36              | 9.7×10 <sup>-6</sup>          | 17.5×10 <sup>-6</sup> | 60                           | 105    |

\*These properties are listed for reference only and are not certified nor are they considered a specification.

### MINIMUM MECHANICAL AND PHYSICAL PROPERTIES

| Class (per RWMA Bulletin #16) | Electrical Conductivity | Hardness |
|-------------------------------|-------------------------|----------|
| Class 3                       | 45% IACS                | HRB 90   |
| Class 4                       | 20% IACS                | HRC 33   |

### FORMS AVAILABLE

RWMA Class 3 and RWMA Class 4 materials are available in rod, plate, and forged products.

### STANDARDS AND SPECIFICATIONS

There are no official standards or specifications for RWMA material, other than meeting the minimum hardness and conductivity as listed in RWMA Bulletin 16.

### RELATED INFORMATION

Additional technical information on RWMA materials may be obtained by phoning 800-375-4205, or the local sales office as listed on the bottom of this sheet.

### SAFE HANDLING OF COPPER BERYLLIUM ALLOYS

Handling copper beryllium alloys in solid form poses no special health risk. Like many industrial materials, beryllium-containing materials may pose a health risk if recommended safe handling practices are not followed. Inhalation of airborne beryllium may cause a serious lung disorder in susceptible individuals. The Occupational Safety and Health Administration (OSHA) has set mandatory limits on occupational respiratory exposures. Read and follow the guidance in the Material Safety Data Sheet (MSDS) before working with this material. For additional information on safe handling practices or technical data on copper beryllium contact Materion Brush Performance Alloys Customer Technical Service Department at 800-375-4205.

## North American Service Centers – Sales Inquiries

For bar, tube, plate/sheet >0.060" (1.5 mm) thick  
and rod >0.5" (12.7 mm) diameter:

### Warren, MI

TOLL FREE: 800-521-8800

PHONE: +(1) 586-772-2700

FAX: +(1) 586-772-2472

## International Sales Offices

### CHINA/HONG KONG

TEL: + (852) 2318-1960 / 1907

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### CHINA/SHANGHAI

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