

Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 876

CDA Copper Alloy 876

| | | | |
|----------|-------|------------|----------|
| Copper | 90.8 | Silicon | 4.05 |
| Tin | 0.020 | Manganese | 0.003 |
| Lead | 0.027 | Phosphorus | 0.008 |
| Zinc | 4.42 | Arsenic | (0.0009) |
| Iron | 0.28 | Antimony | (0.002) |
| Nickel | 0.023 | Carbon | (0.0035) |
| Aluminum | 0.002 | Sulfur | (0.0005) |

(analysis listed as percent by weight)

Some of the co-operating laboratories were:

Brammer Standard Co. Inc., Houston, Texas
J. Dirats and Co., Inc., Westfield, Massachusetts
VHG Labs, Manchester, New Hampshire

See data on reverse side.

Certificate No. 876-030392

Brammer Standard Company, Inc., 14603 Benfer Road, Houston, TX 77069-2895
Telephone (281) 440-9396 Fax (281) 440-4432

B.S. No. 876

Certificate Number 876-030292

| Analysis | Cu | Sn | Pb | Zn | Fe | Ni | Al | Si |
|-----------|--------|--------|--------|-------|-------|--------|--------|-------|
| 1 | 90.72 | 0.019 | 0.0234 | 4.35 | 0.265 | 0.0203 | 0.0007 | 4.00 |
| 2 | 90.85 | 0.019 | 0.0263 | 4.40 | 0.279 | 0.022 | 0.002 | 4.05 |
| 3 | | 0.020 | 0.027 | 4.47 | 0.29 | 0.023 | 0.002 | 4.06 |
| 4 | | 0.0203 | 0.031 | 4.48 | 0.293 | 0.0237 | 0.0025 | 4.08 |
| 5 | | | | | | 0.0245 | 0.003 | |
| Average | 90.785 | 0.0196 | 0.0269 | 4.425 | 0.282 | 0.0227 | 0.0020 | 4.048 |
| Std Dev | 0.092 | 0.0007 | 0.0031 | 0.061 | 0.013 | 0.0016 | 0.0009 | 0.034 |
| Certified | 90.8 | 0.020 | 0.027 | 4.42 | 0.28 | 0.023 | 0.002 | 4.05 |

| Analysis | Mn | P | As | Sb | Ag | C | S |
|-----------|--------|--------|----------|---------|----------|----------|----------|
| 1 | 0.0016 | 0.0072 | 0.0009 | 0.0009 | 0.0039 | 0.0035 | 0.0005 |
| 2 | 0.0028 | 0.0072 | 0.0009 | 0.0021 | | | |
| 3 | 0.003 | 0.008 | | | | | |
| 4 | 0.0031 | 0.008 | | | | | |
| Average | 0.0026 | 0.0076 | 0.0009 | 0.0015 | | | |
| Std Dev | 0.0007 | 0.0005 | 0.0000 | 0.0008 | | | |
| Certified | 0.003 | 0.008 | (0.0009) | (0.002) | (0.0039) | (0.0035) | (0.0005) |

Chemical analyses were made on millings from cross-sections of the bars. The individual values listed above are the average of each analyst's results.

Methods of analysis used were a combination of ASTM Standard Methods E 54-86a, E 478, plus additional ICP, and AA spectrometric methods. The following Certified Reference Materials were used to validate the analytical data listed above: NIST SRM 871, SRM 872; BAM 227, BAM 228, BAM 361; BCS 183/4, and IPT 10A, IPT 15.

This Reference Material was tested for homogeneity by optical emission spectrometry using ASTM Standard Method E 826 and found acceptable. NIST had no similar Certified Reference Materials procurable in solid form for spectrometric comparison during the testing of this material.

A Material Safety Data Sheet (MSDS) is not required for this material. This material will not release or otherwise result in exposure to a hazardous chemical, under normal conditions of use. Inquiries concerning this Reference Material should be directed to:

Brammer Standard Co., Inc. Phone: (281) 440-9396
 14603 Benfer Road
 Houston, Texas 77069-2895 Fax: (281) 440-4432
 USA

Certified by _____ on March 3, 1992.

G. R. Brammer