



## ENGINEERING MATERIAL SPECIFICATION

### ALUMINUM SHEET, VACUUM BRAZING

WSH-M2A112-B1  
WSH-M2A112-B3  
WSS-M2A112-B4

#### 1. SCOPE

The materials defined by these specifications are aluminum sheet clad with brazing alloy typically on both sides.

#### 2. APPLICATION

These materials were released originally for fabrication of plates and supports for air conditioning evaporator assemblies joined by vacuum brazing.

#### 3. REQUIREMENTS

##### 3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

##### 3.2 CHEMICAL COMPOSITION % (ASTM E 34)

|                      | B1<br>Core  | B3<br>Core  | B4<br>Core  |
|----------------------|-------------|-------------|-------------|
| Silicon              | 0.60 max    | 0.50 max    | 0.50 max    |
| Iron                 | 0.70 max    | 0.70 max    | 0.70 max    |
| Copper               | 0.10 - 0.30 | 0.30 max    | 0.23 - 0.36 |
| Magnesium            | 0.15 - 0.80 | 0.40 - 0.60 | 0.39 - 0.51 |
| Manganese            | 0.10 - 0.80 | 1.0 - 1.5   | 0.60 - 0.80 |
| Chromium             | 0.10 max    | 0.10 max    | 0.05 max    |
| Nickel               | 0.05 max    | ---         | 0.05 max    |
| Titanium             | 0.10 max    | 0.10 max    | 0.09 - 0.17 |
| Zinc                 | 0.10 max    | 0.10 max    | 0.05 max    |
| Zirconium            | ---         | ---         | 0.05 - 0.15 |
| Each other element   | 0.05 max    | 0.05 max    | 0.05 max    |
| Total other elements | 0.15 max    | 0.15 max    | 0.15 max    |
| Aluminum             | Balance     | Balance     | Balance     |

| Date       | Action   | Revisions                    |
|------------|----------|------------------------------|
| 2005 01 19 | Revised  | Inserted 3.0, Deleted 3.8, 4 |
| 1998 04 29 | Revised  | para 5                       |
| 1991 08 20 | Released | CE00E10109215010             |

**3.3 CHEMICAL COMPOSITION PERCENTAGE -  
BRAZE CLAD MATERIAL**  
(ASTM E 34)

|                      | <b>B1<br/>Clad</b> | <b>B3/B4<br/>Clad</b> |
|----------------------|--------------------|-----------------------|
| Silicon              | 9.2 - 10.2         | 11.5 - 12.5           |
| Iron                 | 0.50 max           | 0.50 max              |
| Copper               | 0.10 max           | 0.10 max              |
| Magnesium            | 1.25 - 1.75        | 0.10 - 0.25           |
| Manganese            | 0.10 max           | 0.10 max              |
| Zinc                 | 0.10 max           | 0.10 max              |
| Bismuth              | 0.15 max           | ---                   |
| Each other element   | 0.05 max           | 0.05 max              |
| Total other elements | 0.15 max           | 0.15 max              |
| Aluminum             | Balance            | Balance               |

Specific composition limits to meet performance and manufacturing requirements will form part of an agreed Control Plan for individual component geometries and process routes. See para 5.1.

**3.4 BRAZE CLAD THICKNESS**

Material will be clad on both sides of the sheet (unless otherwise specified) at the percentage (shown below) of the total material thickness specified on the engineering drawing.

| <b>B1 Clad Material<br/>Thickness</b> | <b>B3 Clad Material<br/>Thickness</b> | <b>B4 Clad Material<br/>Thickness</b> |
|---------------------------------------|---------------------------------------|---------------------------------------|
| < 1.0 mm, 13 - 17%                    | < 1.0 mm, 11 - 14%                    | < 1.0 mm, 10 - 15%                    |
| > 1.0 mm, 5 - 9%                      | > 1.0 mm, 4 - 8%                      | > 1.0 mm, 4 - 8%                      |

**3.5 MECHANICAL PROPERTIES** (Material as supplied)  
(ASTM B 557M)

| <b>B1 - Material</b>      | <b>O-Temper</b> | <b>H-120 Temper</b> |
|---------------------------|-----------------|---------------------|
| Ultimate Tensile Strength | 93 - 138 MPa    | 117 - 179 MPa       |
| Yield Strength, min       | 36 MPa          | 83 MPa              |
| Elongation, 50 mm, min    | 19%             | 6%                  |
| <b>B3 Material</b>        | <b>O-Temper</b> | <b>H-120 Temper</b> |
| Ultimate Tensile Strength | 120 - 155 MPa   | 117 - 179 MPa       |
| Yield Strength, min       | 45 MPa          | 83 MPa              |
| Elongation, 50 mm, min    | 20%             | 6%                  |
| <b>B4 Material</b>        | <b>O-Temper</b> | <b>H-120 Temper</b> |
| Ultimate Tensile Strength | 131 - 159 MPa   | ---                 |
| Yield Strength, min       | 45 MPa          | ---                 |
| Elongation, 50 mm, min    | 19%             | ---                 |

