

# AEROSPACE MATERIAL SPECIFICATION

**SAE** MAM 2222D

|                        |         |
|------------------------|---------|
| Issued                 | 1982-07 |
| Reaffirmed             | 1999-11 |
| Noncurrent             | 2003-03 |
| Cancelled              | 2008-01 |
| Superseded by AMS 2222 |         |

## Tolerances, Metric Copper and Copper Alloy Sheet, Strip, and Plate

### RATIONALE

MAM 2222C has been designated Cancelled and Superseded because equivalent technical requirements are provided in AMS 2222.

### CANCELLATION NOTICE

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of January, 2008, and has been superseded by AMS 2222. The requirements of the latest issue of AMS 2222 shall be fulfilled whenever reference is made to the cancelled MAM 2222C. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, noting that it has been superseded by AMS 2222.

Cancelled specifications are available from SAE.

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## 1. SCOPE:

This specification covers established metric manufacturing tolerances applicable to copper and copper alloy sheet, strip, and plate ordered to metric dimensions. These tolerances apply to all conditions, unless otherwise noted.

## 1.1 AMS 2222 is the inch/pound version of this MAM.

## 2. THICKNESS:

## 2.1 Non-Refractory:

See Table 1.

TABLE 1A - Strip Thickness Tolerances, Non-Refractory

| Strip<br>Thickness, mm  | Thickness Tolerances,<br>Plus and Minus, mm | Thickness Tolerances,<br>Plus and Minus, mm       | Thickness Tolerances,<br>Plus and Minus, mm       |
|-------------------------|---------------------------------------------|---------------------------------------------------|---------------------------------------------------|
|                         | Strip<br>Up to 200 mm,<br>Incl, in Width    | Strip<br>Over 200 mm to<br>300 mm, Incl, in Width | Strip<br>Over 300 mm to<br>600 mm, Incl, in Width |
| Up to 0.10, incl        | 0.007                                       | 0.015                                             | ---                                               |
| Over 0.10 to 0.20, incl | 0.01                                        | 0.02                                              | 0.03                                              |
| Over 0.20 to 0.30, incl | 0.015                                       | 0.025                                             | 0.035                                             |
| Over 0.30 to 0.40, incl | 0.02                                        | 0.03                                              | 0.045                                             |
| Over 0.40 to 0.50, incl | 0.025                                       | 0.035                                             | 0.05                                              |
| Over 0.50 to 0.60, incl | 0.03                                        | 0.04                                              | 0.05                                              |
| Over 0.60 to 0.70, incl | 0.035                                       | 0.05                                              | 0.06                                              |
| Over 0.70 to 1.0, incl  | 0.045                                       | 0.05                                              | 0.06                                              |
| Over 1.0 to 1.3, incl   | 0.05                                        | 0.06                                              | 0.07                                              |
| Over 1.3 to 2.0, incl   | 0.06                                        | 0.07                                              | 0.08                                              |
| Over 2.0 to 3.5, incl   | 0.07                                        | 0.08                                              | 0.10                                              |
| Over 3.5 to 5.0, incl   | 0.08                                        | 0.10                                              | 0.11                                              |

TABLE 1B - Sheet Thickness Tolerances, Non-Refractory

| Strip<br>Thickness, mm    | Thickness Tolerances,<br>Plus and Minus, mm<br>Sheet | Thickness Tolerances,<br>Plus and Minus, mm<br>Sheet | Thickness Tolerances,<br>Plus and Minus, mm<br>Sheet | Thickness Tolerances,<br>Plus and Minus, mm<br>Sheet |
|---------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
|                           | Over 600 mm to<br>700 mm, Incl,<br>in Width          | Over 700 mm to<br>900 mm, Incl,<br>in Width          | Over 900 mm to<br>1200 mm, Incl,<br>in Width         | Over 1200 mm to<br>1600 mm, Incl,<br>in Width        |
| Up to 0.010, incl         | ---                                                  | ---                                                  | ---                                                  | ---                                                  |
| Over 0.010 to 0.020, incl | ---                                                  | ---                                                  | ---                                                  | ---                                                  |
| Over 0.020 to 0.030, incl | ---                                                  | ---                                                  | ---                                                  | ---                                                  |
| Over 0.030 to 0.040, incl | 0.06                                                 | 0.08                                                 | 0.09                                                 | 0.10                                                 |
| Over 0.040 to 0.050, incl | 0.06                                                 | 0.08                                                 | 0.09                                                 | 0.11                                                 |
| Over 0.050 to 0.060, incl | 0.08                                                 | 0.09                                                 | 0.10                                                 | 0.12                                                 |
| Over 0.060 to 0.070, incl | 0.08                                                 | 0.09                                                 | 0.10                                                 | 0.12                                                 |
| Over 0.070 to 1.0, incl   | 0.09                                                 | 0.10                                                 | 0.12                                                 | 0.15                                                 |
| Over 1.0 to 1.3, incl     | 0.10                                                 | 0.12                                                 | 0.15                                                 | 0.17                                                 |
| Over 1.3 to 2.0, incl     | 0.12                                                 | 0.15                                                 | 0.17                                                 | 0.20                                                 |
| Over 2.0 to 3.5, incl     | 0.15                                                 | 0.17                                                 | 0.20                                                 | 0.25                                                 |
| Over 3.5 to 5.0, incl     | .17                                                  | 0.20                                                 | 0.25                                                 | 0.30                                                 |

TABLE 1C - Rolled Bar Thickness Tolerances, Non-Refractory

| Rolled Bar<br>Thickness, mm | Thickness Tolerances,<br>Plus and Minus, mm<br>Rolled Bar | Thickness Tolerances,<br>Plus and Minus, mm<br>Rolled Bar | Thickness Tolerances,<br>Plus and Minus, mm<br>Rolled Bar |
|-----------------------------|-----------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
|                             | Up to 200 mm,<br>Incl, in Width                           | Over 200 mm to<br>300 mm, Incl, in Width                  | Over 300 mm to<br>600 mm, Incl, in Width                  |
| Over 5.0 to 8.0, incl       | 0.10                                                      | 0.11                                                      | 0.12                                                      |
| Over 8.0 to 13.0, incl      | 0.11                                                      | 0.12                                                      | 0.15                                                      |
| Over 13.0 to 20.0, incl     | 0.13                                                      | 0.17                                                      | 0.22                                                      |
| Over 20.0 to 30.0, incl     | 0.17                                                      | 0.22                                                      | 0.27                                                      |
| Over 30.0 to 40.0, incl     | 0.55                                                      | 0.55                                                      | 0.55                                                      |
| Over 40.0 to 60.0, incl     | 0.65                                                      | 0.65                                                      | 0.65                                                      |

TABLE 1D - Plate Thickness Tolerances, Non-Refractory

| Plate Thickness, mm     | Thickness Tolerances, Plus and Minus, mm<br>Plate<br>Over 600 mm to 700 mm, Incl in Width | Thickness Tolerances, Plus and Minus, mm<br>Plate<br>Over 700 mm to 900 mm, Incl in Width | Thickness Tolerances, Plus and Minus, mm<br>Plate<br>Over 900 mm to 1200 mm, Incl in Width | Thickness Tolerances, Plus and Minus, mm<br>Plate<br>Over 1200 mm to 1600 mm, Incl in Width |
|-------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Over 5.0 to 8.0, incl   | 0.22                                                                                      | 0.25                                                                                      | 0.30                                                                                       | 0.35                                                                                        |
| Over 8.0 to 13.0, incl  | 0.30                                                                                      | 0.35                                                                                      | 0.40                                                                                       | 0.45                                                                                        |
| Over 13.0 to 20.0, incl | 0.40                                                                                      | 0.45                                                                                      | 0.50                                                                                       | 0.60                                                                                        |
| Over 20.0 to 30.0, incl | 0.45                                                                                      | 0.55                                                                                      | 0.60                                                                                       | 0.75                                                                                        |
| Over 30.0 to 40.0, incl | 0.55                                                                                      | 0.65                                                                                      | 0.75                                                                                       | 0.90                                                                                        |
| Over 40.0 to 60.0, incl | 0.65                                                                                      | 0.75                                                                                      | 0.90                                                                                       | 1.1                                                                                         |

## 2.2 Refractory:

See Table 2.

TABLE 2A - Strip Thickness Tolerances, Refractory

| Strip Thickness, mm     | Thickness Tolerances, Plus and Minus, mm<br>Strip<br>Up to 200 mm, Incl, in Width | Thickness Tolerances, Plus and Minus, mm<br>Strip<br>Over 200 mm to 300 mm, Incl, in Width | Thickness Tolerances, Plus and Minus, mm<br>Strip<br>Over 300 mm to 600 mm, Incl, in Width |
|-------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Up to 0.010, incl       | 0.01                                                                              | 0.02                                                                                       | ---                                                                                        |
| Over 0.10 to 0.20, incl | 0.015                                                                             | 0.025                                                                                      | 0.035                                                                                      |
| Over 0.20 to 0.30, incl | 0.02                                                                              | 0.03                                                                                       | 0.05                                                                                       |
| Over 0.30 to 0.40, incl | 0.025                                                                             | 0.035                                                                                      | 0.06                                                                                       |
| Over 0.40 to 0.50, incl | 0.03                                                                              | 0.05                                                                                       | 0.06                                                                                       |
| Over 0.50 to 0.60, incl | 0.035                                                                             | 0.06                                                                                       | 0.07                                                                                       |
| Over 0.60 to 0.70, incl | 0.05                                                                              | 0.06                                                                                       | 0.07                                                                                       |
| Over 0.70 to 1.0, incl  | 0.06                                                                              | 0.07                                                                                       | 0.08                                                                                       |
| Over 1.0 to 1.3, incl   | 0.07                                                                              | 0.08                                                                                       | 0.10                                                                                       |
| Over 1.3 to 2.0, incl   | 0.08                                                                              | 0.10                                                                                       | 0.11                                                                                       |
| Over 2.0 to 3.5, incl   | 0.10                                                                              | 0.11                                                                                       | 0.12                                                                                       |
| Over 3.5 to 5.0, incl   | 0.11                                                                              | 0.13                                                                                       | 0.15                                                                                       |

TABLE 2B - Sheet Thickness Tolerances, Refractory

| Sheet<br>Thickness, mm    | Thickness Tolerances,<br>Plus and Minus, mm<br>Sheet | Thickness Tolerances,<br>Plus and Minus, mm<br>Sheet | Thickness Tolerances,<br>Plus and Minus, mm<br>Sheet | Thickness Tolerances,<br>Plus and Minus, mm<br>Sheet |
|---------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
|                           | Over 600 mm to<br>700 mm, Incl,<br>in Width          | Over 700 mm to<br>900 mm, Incl,<br>in Width          | Over 900 mm to<br>1200 mm, Incl,<br>in Width         | Over 1200 mm to<br>1600 mm, Incl,<br>in Width        |
| Up to 0.010, incl         | ---                                                  | ---                                                  | ---                                                  | ---                                                  |
| Over 0.010 to 0.020, incl | ---                                                  | ---                                                  | ---                                                  | ---                                                  |
| Over 0.020 to 0.030, incl | ---                                                  | ---                                                  | ---                                                  | ---                                                  |
| Over 0.030 to 0.040, incl | ---                                                  | ---                                                  | ---                                                  | ---                                                  |
| Over 0.040 to 0.050, incl | ---                                                  | ---                                                  | ---                                                  | ---                                                  |
| Over 0.050 to 0.060, incl | ---                                                  | ---                                                  | ---                                                  | ---                                                  |
| Over 0.060 to 0.070, incl | 0.10                                                 | 0.13                                                 | 0.15                                                 | 0.18                                                 |
| Over 0.070 to 1.0, incl   | 0.13                                                 | 0.15                                                 | 0.18                                                 | 0.20                                                 |
| Over 1.0 to 1.3, incl     | 0.15                                                 | 0.18                                                 | 0.20                                                 | 0.25                                                 |
| Over 1.3 to 2.0, incl     | 0.18                                                 | 0.20                                                 | 0.25                                                 | 0.30                                                 |
| Over 2.0 to 3.5, incl     | 0.20                                                 | 0.25                                                 | 0.30                                                 | 0.35                                                 |
| Over 3.5 to 5.0, incl     | 0.25                                                 | 0.30                                                 | 0.35                                                 | 0.40                                                 |

TABLE 2C - Rolled Bar Thickness Tolerances, Refractory

| Rolled Bar<br>Thickness, mm | Thickness Tolerances,<br>Plus and Minus, mm<br>Rolled Bar | Thickness Tolerances,<br>Plus and Minus, mm<br>Rolled Bar | Thickness Tolerances,<br>Plus and Minus, mm<br>Rolled Bar |
|-----------------------------|-----------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
|                             | Up to 200 mm,<br>Incl, in Width                           | Up to 200 mm to<br>300 mm, Incl, in Width                 | Up to 300 mm to<br>600 mm, Incl, in Width                 |
| Over 5.0 to 8.0, incl       | 0.13                                                      | 0.15                                                      | 0.18                                                      |
| Over 8.0 to 13.0, incl      | 0.15                                                      | 0.18                                                      | 0.20                                                      |
| Over 13.0 to 20.0, incl     | 0.20                                                      | 0.25                                                      | 0.30                                                      |
| Over 20.0 to 30.0, incl     | 0.30                                                      | 0.40                                                      | 0.50                                                      |
| Over 30.0 to 40.0, incl     | 0.70                                                      | 0.70                                                      | 0.70                                                      |
| Over 40.0 to 60.0, incl     | 0.85                                                      | 0.85                                                      | 0.85                                                      |

TABLE 2D - Plate Thickness Tolerances, Refractory

| Plate Thickness, mm     | Thickness Tolerances, Plus and Minus, mm<br>Plate<br>Over 600 mm to 700 mm, Incl, in Width | Thickness Tolerances, Plus and Minus, mm<br>Plate<br>Over 700 mm to 900 mm, Incl, in Width | Thickness Tolerances, Plus and Minus, mm<br>Plate<br>Over 900 mm to 1200 mm, Incl, in Width | Thickness Tolerances, Plus and Minus, mm<br>Plate<br>Over 1200 mm to 1600 mm, Incl, in Width |
|-------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Over 5.0 to 8.0, incl   | 0.30                                                                                       | 0.35                                                                                       | 0.40                                                                                        | 0.45                                                                                         |
| Over 8.0 to 13.0, incl  | 0.40                                                                                       | 0.45                                                                                       | 0.50                                                                                        | 0.60                                                                                         |
| Over 13.0 to 20.0, incl | 0.50                                                                                       | 0.55                                                                                       | 0.60                                                                                        | 0.75                                                                                         |
| Over 20.0 to 30.0, incl | 0.60                                                                                       | 0.65                                                                                       | 0.75                                                                                        | 0.95                                                                                         |
| Over 30.0 to 40.0, incl | 0.70                                                                                       | 0.80                                                                                       | 0.95                                                                                        | 1.2                                                                                          |
| Over 40.0 to 60.0, incl | 0.85                                                                                       | 0.96                                                                                       | 1.1                                                                                         | 1.4                                                                                          |

## 3. WIDTH:

## 3.1 General Purpose (Including Square Sheared Metal):

Applicable to all lengths up to 3000 mm, inclusive. See Table 3.

TABLE 3 - Width Tolerances, General Purpose

| Specified Width, mm    | Width Tolerance, mm Plus and Minus<br>Thickness Ranges, mm<br>Up to 1.5, Incl | Width Tolerance, mm Plus and Minus<br>Thickness Ranges, mm<br>Over 1.5 to 3.5, Incl | Width Tolerance, mm Plus and Minus<br>Thickness Ranges, mm<br>Over 3.5 |
|------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Up to 500, incl        | 0.79                                                                          | 1.2                                                                                 | 1.6                                                                    |
| Over 500 to 900, incl  | 1.2                                                                           | 1.2                                                                                 | 1.6                                                                    |
| Over 900 to 3000, incl | 1.6                                                                           | 1.6                                                                                 | 1.6                                                                    |

## 3.2 Slit Metal and Slit Metal With Rolled Edges:

See Table 4.

TABLE 4 - Width Tolerances, Slit Metal

| Specified Width        | Width Tolerance, mm Plus and Minus<br>Thickness Ranges, mm<br>0.10 to 0.80, Incl | Width Tolerance, mm Plus and Minus<br>Thickness Ranges, mm<br>Over 0.80 to 3.2, Incl | Width Tolerance, mm Plus and Minus<br>Thickness Ranges, mm<br>Over 3.2 to 5.0, Incl | Width Tolerance, mm Plus and Minus<br>Thickness Ranges, mm<br>Over 5.0 to 12.0, Incl |
|------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Up to 50, incl         | 0.13                                                                             | 0.25                                                                                 | 0.30                                                                                | 0.38                                                                                 |
| Over 50 to 200, incl   | 0.20                                                                             | 0.33                                                                                 | 0.38                                                                                | 0.38                                                                                 |
| Over 200 to 600, incl  | 0.40                                                                             | 0.40                                                                                 | 0.40                                                                                | 0.80                                                                                 |
| Over 600 to 1000, incl | 0.79                                                                             | 0.79                                                                                 | 0.79                                                                                | 1.19                                                                                 |

## 3.3 Rolled (Not Previously Slit) or Drawn Edge Metal:

See Table 5.

TABLE 5 - Tolerances, Rolled or Drawn

| Width, mm             | Tolerances<br>Plus and Minus<br>mm |
|-----------------------|------------------------------------|
| Up to 1.2, incl       | 0.040                              |
| Over 1.2 to 2.3, incl | 0.050                              |
| Over 2.3 to 3.3, incl | 0.075                              |
| Over 3.3 to 4.8, incl | 0.10                               |
| Over 4.8 to 12, incl  | 0.13                               |
| Over 12 to 32, incl   | 0.18                               |

## 3.4 Sawed Metal:

See Table 6.

TABLE 6 - Width Tolerances, Sawed Metal

| Width, mm              | Width Tolerances<br>Plus and Minus, mm<br>For Lengths<br>Up to 3000 mm, Incl<br>For Thicknesses<br>Up to 38 mm,<br>Incl | Width Tolerances<br>Plus and Minus, mm<br>For Lengths<br>Up to 3000 mm, Incl<br>For Thicknesses<br>Over 38 mm | Width Tolerances<br>Plus and Minus, mm<br>For Lengths Over<br>3000 mm<br>All Thicknesses |
|------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Up to 300, incl        | 0.79                                                                                                                    | 1.6                                                                                                           | 1.6                                                                                      |
| Over 300 to 3000, incl | 1.6                                                                                                                     | 1.6                                                                                                           | 1.6                                                                                      |

## 4. LENGTH:

## 4.1 Square Sheared Metal:

See Table 7.

TABLE 7 - Length Tolerance, Square Sheared Metal

| Specified Length<br>mm | Length Tolerance, mm<br>Plus and Minus<br>Thickness Ranges, mm<br>Up to 1.6, Incl | Length Tolerance, mm<br>Plus and Minus<br>Thickness Ranges, mm<br>Over 1.6 to 3.2, Incl | Length Tolerance, mm<br>Plus and Minus<br>Thickness Ranges, mm<br>Over 3.2 |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Up to 500, incl        | 0.8                                                                               | 1.2                                                                                     | 1.6                                                                        |
| Over 500 to 900, incl  | 1.2                                                                               | 1.2                                                                                     | 1.6                                                                        |
| Over 900 to 3000, incl | 1.6                                                                               | 1.6                                                                                     | 1.6                                                                        |

## 4.2 Full length pieces specific and stock lengths with or without ends.

See Table 8.

TABLE 8 - Length Tolerance, Full and Stock Lengths

| Length, mm                                                                                                                           | Length Tolerances<br>mm<br>Plus Only |
|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Specific lengths, mill lengths, multiple lengths, and<br>specific lengths with ends                                                  | 6.5                                  |
| 3000 and under                                                                                                                       | 13                                   |
| Over 3000 to 6000, incl                                                                                                              | 25 <sup>1</sup>                      |
| Stock lengths and stock lengths with ends                                                                                            |                                      |
| <sup>1</sup> As stock lengths are cut and placed in stock in advance of orders, departure<br>from this tolerance is not practicable. |                                      |

## 4.3 Slit Metal and Slit Metal with Rolled Edges:

When specific lengths are ordered, length shall not vary from the length ordered by more than -0, +6.25 mm for lengths up to 3000 mm, incl, and by not more than -0, +12.5 mm for lengths over 3000 to 6000 mm, inclusive. Stock lengths shall not vary by more than -0, +25.0 mm from the length ordered.