# TECHNICAL REFERENCE

## FORMULAS, FACTS AND FIGURES

**Threaded Pipe Fitting Size, Chart and Dimensions**

**Compressed Air Pressure Loss Reference Tables**
- Pressure Loss in Air Hoses
- Pressure Loss in Threaded Pipe Fittings

**Surface Area Reference Tables**
- Universal Beams
- Universal Columns
- Taper Flange Beams, Channels, Junior Universal Beams
- Square and Rectangular Hollow Sections
- Circular Hollow Sections
- Steel Plate
- Equal and Unequal Angles

**Basic Area and Volume Calculation Formulas**
- Rectangle, Triangle, Circle, Cylinder, Cone, Sphere

**Conversion Calculation Factors: Imperial < to > Metric**
- Length, Area, Volume, Speed - Velocity, Flow Rate
- Weight - Mass, Bulk - Density, Pressure, Vacuum, Power, Temperature

**Conversion Reference Tables: Imperial < to > Metric**
- Pressure
- Temperature
- Ventilation Flow Rates
- Compressed Air Supply Flow Rates

**Quick Reference Guide to Relevant AS, ISO Standards**

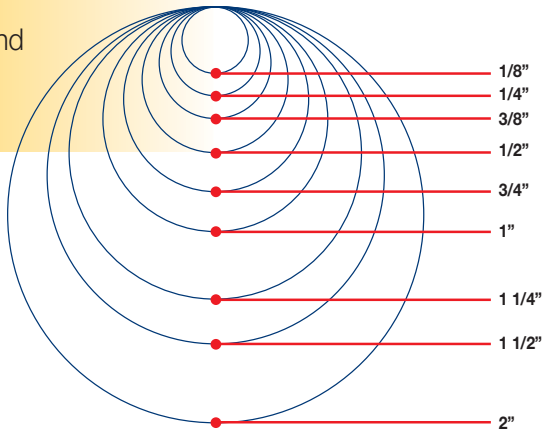


BLAST ONE

# Threaded Fitting Sizes

## INSTRUCTIONS

1. Place male fitting on the sizing circles and match the size.
2. The fitting size is printed outside and below the corresponding sizing circle.




| Male Thread Type | Outside Diameter (approx.) | Number of Thread per Inch |
|---|---|---|
| **1/8” BSP** | **9.5mm (3/8”)** | **28** |
| 1/8” NPT | 9.5mm (3/8”) | 27 |
| **1/4” BSP** | **12.7mm (1/2”)** | **19** |
| 1/4” NPT | 12.7mm (1/2”) | 18 |
| **3/8” BSP** | **15.9mm (5/8”)** | **19** |
| 3/8” NPT | 15.9mm (5/8”) | 18 |
| **1/2” BSP** | **20.7mm (13/16”)** | **14** |
| 1/2” NPT | 20.7mm (13/16”) | 14 |
| **3/4” BSP** | **26.2mm (1 1/32”)** | **14** |
| 3/4” NPT | 26.2mm (1 1/32”) | 14 |
| **1” BSP** | **31.8mm (1 1/4”)** | **11** |
| 1” NPT | 31.8mm (1 1/4”) | 11 1/2 |
| **1 1/4” BSP** | **41.3mm (1 5/8”)** | **11** |
| 1 1/4” NPT | 41.3mm (1 5/8”) | 11 1/2 |
| **1 1/2” BSP** | **47.6mm (1 7/8”)** | **11** |
| 1 1/2” NPT | 47.6mm (1 7/8”) | 11 1/2 |
| **2” BSP** | **58.7mm (2 5/16”)** | **11** |
| 2” NPT | 58.7mm (2 5/16”) | 11 1/2 |

# Compressed Air Pressure Loss in Air Hose

## HOSELINE PRESSURE LOSS (psi)

| Inside Diameter | Hose Length | Free Air | Line Pressure (psig) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| (in.) | (ft) | (cfm) | 60 | 80 | 100 | 120 | 150 | 200 | 300 |
| 3/4 | 50 | 60 | 3.1 | 2.4 | 2.0 | | | | |
| | | 80 | 5.3 | 4.2 | 3.5 | 2.9 | 2.4 | 1.8 | 1.2 |
| | | 100 | 8.1 | 6.4 | 5.2 | 4.5 | 3.6 | 2.8 | 1.9 |
| | | 120 | | 9.0 | 7.4 | 6.3 | 5.1 | 3.9 | 2.7 |
| | | 140 | | 12.0 | 9.9 | 8.4 | 6.9 | 5.3 | 3.6 |
| | | 160 | | | 12.7 | 10.8 | 8.9 | 6.8 | 4.6 |
| | | 180 | | | | 13.6 | 11.1 | 8.5 | 5.8 |
| | | 200 | | | | 16.6 | 13.5 | 10.4 | 7.1 |
| | | 220 | | | | | 16.2 | 12.4 | 8.4 |
| 1 | 50 | 120 | 2.7 | 2.1 | | | | | |
| | | 150 | 4.1 | 3.2 | 2.7 | 2.3 | | | |
| | | 180 | 5.8 | 4.6 | 3.8 | 3.2 | 2.6 | 2.0 | 1.3 |
| | | 210 | 7.7 | 6.1 | 4.0 | 4.3 | 3.5 | 2.7 | 1.8 |
| | | 240 | | 7.9 | 6.5 | 5.5 | 4.5 | 3.4 | 2.3 |
| | | 270 | | 9.8 | 8.1 | 6.9 | 5.6 | 4.3 | 2.9 |
| | | 300 | | 12.0 | 9.9 | 8.4 | 6.9 | 5.3 | 3.6 |
| | | 330 | | | 11.8 | 10.0 | 8.2 | 6.3 | 4.3 |
| | | 360 | | | 13.9 | 11.9 | 9.7 | 7.4 | 5.0 |
| | | 390 | | | | 13.8 | 11.3 | 8.7 | 5.9 |
| | | 420 | | | | 15.9 | 13.0 | 10.0 | 6.8 |
| | | 450 | | | | | 14.8 | 11.4 | 7.7 |
| 1 1/4 | 50 | 200 | 2.4 | | | | | | |
| | | 250 | 3.7 | 2.9 | 2.4 | 2.0 | | | |
| | | 300 | 5.2 | 4.1 | 3.4 | 2.9 | 2.3 | 1.8 | 1.2 |
| | | 350 | 7.0 | 5.5 | 4.5 | 3.8 | 3.1 | 2.4 | 1.6 |
| | | 400 | 8.9 | 7.0 | 5.8 | 4.9 | 4.0 | 3.1 | 2.1 |
| | | 450 | | 8.8 | 7.3 | 6.2 | 5.0 | 3.9 | 2.6 |
| | | 500 | | 10.8 | 8.9 | 7.6 | 6.2 | 4.7 | 3.2 |
| | | 550 | | | 10.7 | 9.1 | 7.4 | 5.7 | 3.9 |
| | | 600 | | | 12.6 | 10.7 | 8.7 | 5.7 | 4.6 |
| | | 650 | | | 14.6 | 12.4 | 10.2 | 7.8 | 5.3 |
| | | 700 | | | | 14.3 | 11.7 | 9.0 | 6.1 |
| | | 750 | | | | | 13.3 | 10.2 | 6.9 |
| | | 800 | | | | | 15.0 | 11.5 | 7.8 |
| 1 1/2 | 50 | 300 | 2.1 | | | | | | |
| | | 400 | 3.7 | 2.9 | 2.4 | 2.0 | | | |
| | | 500 | 5.6 | 4.4 | 3.7 | 3.1 | 2.5 | 1.9 | 1.3 |
| | | 600 | 8.0 | 6.3 | 5.2 | 4.4 | 3.6 | 2.8 | 1.9 |
| | | 700 | | 8.5 | 7.0 | 5.9 | 4.9 | 3.7 | 2.5 |
| | | 800 | | 10.9 | 9.0 | 7.7 | 6.3 | 4.8 | 3.2 |
| | | 900 | | | 11.2 | 9.5 | 7.8 | 6.0 | 4.1 |
| | | 1000 | | | 13.6 | 11.6 | 9.5 | 7.3 | 4.9 |
| | | 1100 | | | | 14.0 | 11.4 | 8.8 | 6.0 |
| | | 1200 | | | | | 13.6 | 10.4 | 7.1 |
| | | 1300 | | | | | 15.8 | 12.1 | 8.3 |
| 2 | 50 | 600 | 1.9 | | | | | | |
| | | 800 | 3.2 | 2.5 | 2.1 | | | | |
| | | 1000 | 5.0 | 3.9 | 3.2 | 2.7 | 2.2 | 1.7 | 1.1 |
| | | 1200 | 7.0 | 5.5 | 4.5 | 3.8 | 3.1 | 2.4 | 1.6 |
| | | 1400 | 9.3 | 7.4 | 6.1 | 5.2 | 4.2 | 3.2 | 2.2 |
| | | 1600 | | 9.6 | 7.9 | 6.7 | 5.5 | 4.2 | 2.8 |
| | | 1800 | | 12.1 | 9.9 | 8.4 | 6.9 | 5.3 | 3.6 |
| | | 2000 | | | 12.2 | 10.4 | 8.5 | 6.5 | 4.4 |
| | | 2200 | | | 14.6 | 12.5 | 10.2 | 7.8 | 5.3 |
| | | 2400 | | | | 14.7 | 12.0 | 9.2 | 6.3 |
| | | 2600 | | | | | 14.1 | 10.8 | 7.3 |
| | | 2800 | | | | | 16.2 | 12.4 | 8.5 |

# Compressed Air Pressure Loss in Air Hose

## HOSELINE PRESSURE LOSS (psi)

| Inside Diameter (in.) | Hose Length (ft) | Free Air (cfm) | Line Pressure (psig) 60 | 80 | 100 | 120 | 150 | 200 | 300 |
|---|---|---|---|---|---|---|---|---|---|
| 2 1/2 | 50 | 1000 | 1.7 | | | | | | |
| | | 1500 | 3.7 | 2.9 | 2.4 | 2.0 | | | |
| | | 2000 | 6.5 | 5.1 | 4.2 | 3.6 | 2.9 | 2.2 | 1.5 |
| | | 2500 | 10.0 | 7.9 | 6.5 | 5.5 | 4.5 | 3.4 | 2.3 |
| | | 3000 | | 11.2 | 9.3 | 7.9 | 6.4 | 4.9 | 3.3 |
| | | 3500 | | | 12.4 | 10.6 | 8.7 | 6.6 | 4.5 |
| | | 4000 | | | | 13.7 | 11.2 | 8.6 | 5.8 |
| | | 4500 | | | | | 14.0 | 10.7 | 7.3 |
| 3 | 50 | 2000 | 2.5 | 2.0 | | | | | |
| | | 2500 | 3.9 | 3.0 | 2.5 | 2.1 | | | |
| | | 3000 | 5.5 | 4.4 | 3.6 | 3.1 | 2.5 | 1.9 | 1.3 |
| | | 3500 | 7.5 | 5.9 | 4.9 | 4.1 | 3.4 | 2.6 | 1.7 |
| | | 4000 | 9.8 | 7.6 | 6.3 | 5.3 | 4.4 | 3.3 | 2.3 |
| | | 4500 | | 9.6 | 7.9 | 6.7 | 5.5 | 4.2 | 2.8 |
| | | 5000 | | 11.7 | 9.6 | 8.2 | 6.7 | 5.1 | 3.5 |
| | | 5500 | | | 11.5 | 9.8 | 8.0 | 6.1 | 4.2 |
| | | 6000 | | | 13.6 | 11.5 | 9.4 | 7.2 | 4.9 |
| | | 6500 | | | | 13.5 | 11.0 | 8.4 | 5.7 |
| | | 7000 | | | | 15.6 | 12.7 | 9.8 | 6.6 |
| | | 7500 | | | | | 14.5 | 11.1 | 7.6 |

## THREADED PIPE FITTINGS PRESSURE LOSS CONVERSION TABLE

**Expressed as length in feet of straight piping giving equivalent pressure loss**

| Nominal Pipe Inside Size Diameter (in.) | Actual Pipe Inside Size Diameter (in.) | Gate Valve | Long Radius Ell or on Run of Standard Tee | Standard Ell or on Run of Tee Reduced in Size 50 Percent | Angle Valve | Close Return Bend | Tee Through Side Outlet | Globe Valve |
|---|---|---|---|---|---|---|---|---|
| 1/2 | 0.622 | 0.36 | 0.62 | 1.55 | 8.65 | 3.47 | 2.10 | 17.3 |
| 3/4 | 0.824 | 0.48 | 0.82 | 2.06 | 11.4 | 4.60 | 4.12 | 22.9 |
| 1 | 1.049 | 0.61 | 1.05 | 2.62 | 14.6 | 5.82 | 5.24 | 29.1 |
| 1 1/4 | 1.380 | 0.81 | 1.38 | 3.45 | 19.1 | 7.66 | 6.90 | 38.3 |
| 1 1/2 | 1.610 | 0.94 | 1.61 | 4.02 | 22.4 | 8.95 | 8.04 | 44.7 |
| 2 | 2.067 | 1.21 | 2.07 | 5.17 | 28.7 | 11.5 | 10.3 | 57.4 |
| 2 1/2 | 2.469 | 1.44 | 2.47 | 6.16 | 34.3 | 13.7 | 12.3 | 68.5 |
| 3 | 3.068 | 1.79 | 3.07 | 6.16 | 42.6 | 17.1 | 15.3 | 85.2 |
| 4 | 4.026 | 2.35 | 4.03 | 7.67 | 56.0 | 22.4 | 20.2 | 112 |
| 5 | 5.047 | 2.94 | 5.05 | 10.1 | 70.0 | 28.0 | 25.2 | 140 |
| 6 | 6.065 | 3.54 | 6.07 | 15.2 | 84.1 | 33.8 | 30.4 | 168 |
| 8 | 6.981 | 4.65 | 7.98 | 20.0 | 111 | 44.6 | 40.0 | 222 |
| 10 | 10.020 | 5.85 | 10.00 | 25.0 | 139 | 55.7 | 50.0 | 278 |
| 12 | 11.940 | 6.96 | 11.0 | 29.8 | 166 | 66.3 | 59.6 | 332 |

# Surface Areas

## SURFACE AREAS OF UNIVERSAL BEAMS

### Universal Beams

| Designation | Profile Distance | Profile Surface Area per metre | Profile Surface Area per tonne | Profile Distance Less One Flange Face | Profile Surface Area Less Area of One Flange Face per metre | Profile Surface Area Less Area of One Flange Face per tonne |
|---|---|---|---|---|---|---|
| | mm | $m^2/m$ | $m^2$/tonne | mm | $m^2/m$ | $m^2$/tonne |
| 760 UB 244 | 2580 | 2.58 | 10.6 | 2310 | 2.31 | 9.47 |
| 220 | 2570 | 2.57 | 11.7 | 2300 | 2.30 | 10.4 |
| 197 | 2550 | 2.55 | 13.0 | 2280 | 2.28 | 11.6 |
| 173 | 2530 | 2.53 | 14.6 | 2270 | 2.27 | 13.1 |
| 147 | 2510 | 2.51 | 17.0 | 2250 | 2.25 | 15.2 |
| 690 UB 140 | 2330 | 2.33 | 16.6 | 2080 | 2.08 | 14.8 |
| 125 | 2320 | 2.32 | 18.5 | 2070 | 2.07 | 16.5 |
| 610 UB 125 | 2090 | 2.09 | 16.7 | 1870 | 1.87 | 14.9 |
| 113 | 2080 | 2.08 | 18.4 | 1860 | 1.86 | 16.4 |
| 101 | 2070 | 2.07 | 20.4 | 1840 | 1.84 | 18.2 |
| 530 UB 92 | 1860 | 1.86 | 20.1 | 1650 | 1.65 | 17.9 |
| 82 | 1850 | 1.85 | 22.6 | 1640 | 1.64 | 20.0 |
| 460 UB 82 | 1650 | 1.65 | 20.1 | 1460 | 1.46 | 17.8 |
| 74 | 1640 | 1.64 | 22.0 | 1450 | 1.45 | 19.4 |
| 67 | 1630 | 1.63 | 24.3 | 1440 | 1.44 | 21.5 |
| 410 UB 60 | 1490 | 1.49 | 25.0 | 1310 | 1.31 | 22.0 |
| 54 | 1480 | 1.48 | 27.6 | 1310 | 1.31 | 24.3 |
| 360 UB 57 | 1370 | 1.37 | 24.2 | 1200 | 1.20 | 21.2 |
| 51 | 1360 | 1.36 | 26.9 | 1190 | 1.19 | 23.5 |
| 45 | 1360 | 1.36 | 30.3 | 1190 | 1.19 | 26.5 |
| 310 UB 46 | 1250 | 1.25 | 27.0 | 1080 | 1.08 | 23.4 |
| 40 | 1240 | 1.24 | 30.7 | 1080 | 1.08 | 26.6 |
| 250 UB 37 | 1070 | 1.07 | 28.8 | 925 | 0.925 | 24.8 |
| 31 | 1060 | 1.06 | 33.8 | 916 | 0.916 | 29.2 |
| 200 UB 30 | 923 | 0.923 | 30.9 | 789 | 0.789 | 26.5 |
| 25 | 915 | 0.915 | 36.1 | 782 | 0.782 | 30.8 |

## SURFACE AREAS OF UNIVERSAL COLUMNS

### Universal Columns

| Designation | Profile Distance | Profile Surface Area per metre | Profile Surface Area per tonne | Profile Distance Less One Flange Face | Profile Surface Area Less Area of One Flange Face per metre | Profile Surface Area Less Area of One Flange Face per tonne |
|---|---|---|---|---|---|---|
| | mm | $m^2/m$ | $m^2$/tonne | mm | $m^2/m$ | $m^2$/tonne |
| 310 UC 283 | 1940 | 1.94 | 6.85 | 1620 | 1.62 | 5.71 |
| 240 | 1900 | 1.90 | 7.94 | 1590 | 1.59 | 6.61 |
| 198 | 1870 | 1.87 | 9.45 | 1560 | 1.56 | 7.86 |
| 158 | 1840 | 1.84 | 11.6 | 1530 | 1.53 | 9.68 |
| 137 | 1820 | 1.82 | 13.3 | 1510 | 1.51 | 11.0 |
| 118 | 1810 | 1.81 | 15.4 | 1500 | 1.50 | 12.8 |
| 97 | 1790 | 1.79 | 18.5 | 1480 | 1.48 | 15.3 |
| 250 UC 89 | 1500 | 1.50 | 16.8 | 1250 | 1.25 | 13.9 |
| 73 | 1480 | 1.48 | 20.4 | 1230 | 1.23 | 16.9 |
| 200UC 60 | 1200 | 1.20 | 20.2 | 999 | 0.999 | 16.8 |
| 52 | 1190 | 1.19 | 22.9 | 991 | 0.991 | 19.0 |
| 46 | 1190 | 1.19 | 25.7 | 984 | 0.984 | 21.3 |
| 150 UC 37 | 912 | 0.912 | 24.5 | 758 | 0.758 | 20.4 |
| 30 | 900 | 0.900 | 30.0 | 747 | 0.747 | 24.9 |
| 23 | 889 | 0.889 | 38.0 | 737 | 0.737 | 31.5 |
| 100 UC 15 | 563 | 0.563 | 38.0 | 464 | 0.464 | 31.3 |

# Surface Areas

## SURFACE AREAS OF TAPER FLANGE BEAMS CHANNELS AND JUNIOR UNIVERSAL BEAMS

| Designation | Profile Distance | Profile Surface Area per metre | Profile Surface Area per tonne | Profile Distance Less One Flange Face | Profile Surface Area Less Area of One Flange Face per metre | Profile Surface Area Less Area of One Flange Face per tonne |
|---|---|---|---|---|---|---|
| | mm | m²/m | m²/tonne | mm | m²/m | m²/tonne |
| **Taper Flange Beams** | | | | | | |
| 178 x 89 | 658 | 0.658 | 29.4 | 569 | 0.569 | 25.4 |
| 152 x 76 | 562 | 0.562 | 31.4 | 486 | 0.486 | 27.2 |
| 125 x 65 | 470 | 0.470 | 35.7 | 405 | 0.405 | 30.8 |
| 100 x 45 | 349 | 0.349 | 48.5 | 304 | 0.304 | 42.2 |
| **Channels** | | | | | | |
| 380 x 100 | 1130 | 1.13 | 20.7 | 1030 | 1.03 | 18.8 |
| 300 x 90 | 932 | 0.932 | 23.2 | 842 | 0.842 | 21.0 |
| 250 x 90 | 834 | 0.834 | 23.5 | 744 | 0.744 | 21.0 |
| 230 x 75 | 737 | 0.737 | 29.4 | 662 | 0.662 | 26.4 |
| 200 x 75 | 678 | 0.678 | 29.6 | 603 | 0.603 | 26.4 |
| 180 x 75 | 638 | 0.638 | 30.5 | 563 | 0.563 | 26.9 |
| 150 x 75 | 580 | 0.580 | 32.8 | 505 | 0.505 | 28.5 |
| 125 x 65 | 480 | 0.480 | 35.7 | 415 | 0.415 | 30.9 |
| 100 x 50 | 374 | 0.374 | 40.0 | 324 | 0.324 | 34.6 |
| 74 x 40 | 286 | 0.286 | 43.0 | 246 | 0.246 | 37.0 |
| **Junior Universal Beams** | | | | | | |
| 180 UB 22 | 691 | 0.691 | 31.1 | 601 | 0.601 | 27.1 |
| 18 | 685 | 0.685 | 37.8 | 595 | 0.595 | 32.9 |
| 150 UB 18 | 584 | 0.584 | 32.4 | 509 | 0.509 | 28.3 |
| 14 | 576 | 0.576 | 41.1 | 501 | 0.501 | 35.8 |

## EXTERNAL SURFACE AREAS OF HOLLOW SECTIONS

### Square

| Designation | | Profile Surface Area | |
|---|---|---|---|
| Nominal Size D x B | Nominal Thickness t | Per metre | Per tonne |
| mm x mm | mm | m²/m | m²/tonne |
| 254. x 254. | 9.5 | 0.975 | 13.8 |
| | 8.0 | 0.982 | 16.3 |
| | 6.3 | 0.989 | 20.6 |
| 203. x 203. | 9.5 | 0.772 | 13.9 |
| | 8.0 | 0.778 | 16.5 |
| | 6.3 | 0.786 | 20.7 |
| 152. x 152. | 9.5 | 0.569 | 14.2 |
| | 8.0 | 0.575 | 16.7 |
| | 6.3 | 0.583 | 20.9 |
| | 4.9 | 0.589 | 26.7 |
| 127. x 127. | 9.5 | 0.467 | 14.3 |
| | 8.0 | 0.474 | 16.8 |
| | 6.3 | 0.481 | 21.1 |
| | 4.9 | 0.487 | 26.8 |
| 102. x 102. | 9.5 | 0.366 | 14.6 |
| | 8.0 | 0.372 | 17.1 |
| | 6.3 | 0.379 | 21.3 |
| | 4.9 | 0.385 | 27.1 |
| | 4.0 | 0.389 | 32.9 |
| 89. x 89. | 6.3 | 0.329 | 21.5 |
| | 4.9 | 0.335 | 27.3 |
| | 3.6 | 0.340 | 36.6 |
| 76. x 76. | 6.3 | 0.278 | 21.8 |
| | 4.9 | 0.284 | 27.5 |
| | 4.0 | 0.288 | 33.3 |
| | 3.2 | 0.291 | 41.2 |
| 64.x 64. | 6.3 | 0.227 | 22.2 |
| | 4.9 | 0.233 | 27.8 |
| | 4.0 | 0.237 | 33.6 |
| | 3.2 | 0.240 | 41.5 |
| 51. x 51. | 4.9 | 0.182 | 28.4 |
| | 4.0 | 0.186 | 34.2 |
| | 3.2 | 0.189 | 42.0 |

### Rectangular

| Designation | | ProfileSurfacArea | |
|---|---|---|---|
| Nominal Size D x B | Nominal Thickness t | Per metre | Per tonne |
| mm x mm | mm | m²/m | m²/tonne |
| 254. x 152. | 9.5 | 0.772 | 13.9 |
| | 8.0 | 0.778 | 16.5 |
| | 6.3 | 0.786 | 20.7 |
| 203. x 152. | 9.5 | 0.670 | 14.0 |
| | 8.0 | 0.677 | 16.5 |
| | 6.3 | 0.684 | 20.8 |
| 203. x 102. | 9.5 | 0.569 | 14.2 |
| | 8.0 | 0.575 | 16.7 |
| | 6.3 | 0.583 | 20.9 |
| | 4.9 | 0.589 | 26.7 |
| 152. x 102. | 9.5 | 0.467 | 14.3 |
| | 8.0 | 0.474 | 16.8 |
| | 6.3 | 0.481 | 21.1 |
| | 4.9 | 0.487 | 26.8 |
| 152. x 76. | 8.0 | 0.423 | 16.9 |
| | 6.3 | 0.430 | 21.2 |
| | 4.9 | 0.436 | 26.9 |
| 127. x 76. | 8.0 | 0.372 | 17.1 |
| | 6.3 | 0.379 | 21.3 |
| | 4.9 | 0.385 | 27.1 |
| 127. x 64. | 6.3 | 0.354 | 21.4 |
| | 4.9 | 0.360 | 27.2 |
| | 4.0 | 0.364 | 33.0 |
| 127. x 51. | 6.3 | 0.329 | 21.5 |
| | 4.9 | 0.335 | 27.3 |
| | 3.6 | 0.340 | 36.6 |
| 102. x 76. | 6.3 | 0.329 | 21.5 |
| | 4.9 | 0.335 | 27.3 |
| | 3.6 | 0.340 | 36.6 |
| 102. x 51. | 6.3 | 0.278 | 21.8 |
| | 4.9 | 0.284 | 27.5 |
| | 4.0 | 0.288 | 33.3 |
| | 3.2 | 0.291 | 41.2 |
| 76. x 51. | 6.3 | 0.227 | 22.2 |
| | 4.9 | 0.233 | 27.8 |
| | 4.0 | 0.237 | 33.6 |
| | 3.2 | 0.240 | 41.5 |
| 76. X 38. | 4.0 | 0.211 | 33.9 |
| | 3.2 | 0.215 | 41.8 |
| 64. X 38. | 4.0 | 0.186 | 34.2 |
| | 3.2 | 0.189 | 42.0 |

# Surface Areas

## EXTERNAL SURFACE AREAS OF CIRCULAR HOLLOW SECTIONS

| Designation | | External Surface Area | |
|---|---|---|---|
| Actual Outside Diameter | Nominal Thickness t | Per metre | Per tonne |
| mm | mm | $m^2/m$ | $m^2$/tonne |
| 457 | 9.5 | 1.44 | 13.7 |
| | 6.4 | 1.44 | 20.2 |
| 406.4 | 9.5 | 1.28 | 13.7 |
| | 6.4 | 1.28 | 20.2 |
| 355.6 | 9.5 | 1.12 | 13.8 |
| | 6.4 | 1.12 | 20.3 |
| 323.9 | 9.5 | 1.02 | 13.8 |
| | 6.4 | 1.02 | 20.3 |
| 273.1 | 9.3 | 0.858 | 14.2 |
| | 6.4 | 0.858 | 20.4 |
| | 4.8 | 0.858 | 27.0 |
| 219.1 | 8.2 | 0.688 | 16.1 |
| | 6.4 | 0.688 | 20.5 |
| | 4.8 | 0.688 | 27.1 |
| 168.3 | 7.1 | 0.529 | 18.7 |
| | 6.4 | 0.529 | 20.7 |
| | 4.8 | 0.529 | 27.3 |
| 165.1 | 5.4 | 0.519 | 24.4 |
| | 4.9 | 0.519 | 26.8 |
| 139.7 | 5.4 | 0.439 | 24.5 |
| | 4.9 | 0.439 | 26.9 |
| 114.3 | 5.4 | 0.359 | 24.8 |
| | 4.5 | 0.359 | 29.5 |
| 101.6 | 4.9 | 0.319 | 27.3 |
| | 4.0 | 0.319 | 33.2 |
| 88.9 | 5.9 | 0.279 | 23.1 |
| | 4.9 | 0.279 | 27.5 |
| | 4.0 | 0.279 | 33.3 |
| | 3.2 | 0.279 | 41.3 |
| 76.1 | 5.9 | 0.239 | 23.4 |
| | 4.5 | 0.239 | 30.1 |
| | 3.6 | 0.239 | 37.1 |
| | 3.2 | 0.239 | 41.6 |
| 60.3 | 5.4 | 0.189 | 25.9 |
| | 4.5 | 0.189 | 30.6 |
| | 3.6 | 0.189 | 37.6 |
| 48.3 | 5.4 | 0.152 | 26.6 |
| | 4.0 | 0.152 | 34.7 |
| | 3.2 | 0.152 | 42.6 |
| 42.4 | 4.9 | 0.133 | 29.4 |
| | 4.0 | 0.133 | 35.2 |
| | 3.2 | 0.133 | 43.1 |

## STEEL PLATE AREAS

**Steel Plate Thicknesses**

| Size mm | kg/$m^2$ | One Side $m^2$/tonne | Both Sides $m^2$/tonne |
|---|---|---|---|
| 3. | 24.14 | 41.42 | 82.84 |
| 4. | 32.18 | 31.07 | 62.14 |
| 5. | 30.23 | 24.86 | 49.72 |
| 6. | 48.27 | 20.71 | 41.42 |
| 8. | 64.37 | 15.54 | 31.08 |
| 10. | 80.46 | 12.43 | 24.86 |
| 12. | 96.56 | 10.36 | 20.72 |
| 16. | 128.70 | 7.77 | 15.54 |
| 20. | 160.90 | 6.21 | 12.42 |
| 25. | 201.10 | 4.97 | 9.94 |
| 28. | 225.29 | 4.44 | 8.88 |
| 32. | 257.40 | 3.88 | 7.77 |
| 36. | 289.60 | 3.45 | 6.90 |
| 40. | 321.80 | 3.11 | 6.22 |
| 45. | 362.00 | 2.76 | 5.52 |
| 50. | 401.30 | 2.49 | 4.98 |
| 55. | 442.50 | 2.26 | 4.52 |
| 60. | 482.70 | 2.07 | 4.14 |
| 70. | 563.20 | 1.78 | 3.56 |
| 80. | 643.70 | 1.56 | 3.12 |
| 90. | 724.10 | 1.38 | 2.76 |
| 100. | 804.60 | 1.24 | 2.48 |
| 110. | 885.00 | 1.13 | 2.26 |
| 120. | 965.50 | 1.04 | 2.08 |
| 140. | 1126.00 | 0.89 | 1.78 |
| 160. | 1287.00 | 0.78 | 1.56 |
| 180. | 1448.00 | 0.69 | 1.38 |
| 200. | 1609.00 | 0.62 | 1.24 |
| 225. | 1810.00 | 0.55 | 1.10 |
| 250. | 2011.00 | 0.50 | 1.00 |

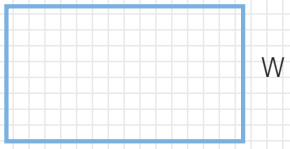
# Surface Areas

## SURFACE AREAS OF ANGLES

| Designation | | Surface Area | | Designation | | Surface Area | | Designation | | Surface Area | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Leg Size A x B | Nominal Thickness | Per metre | Per tonne | Nominal Leg Size A x B | Nominal Thickness | Per metre | Per tonne | Nominal Leg Size A x B | Nominal Thickness | Per metre | Per tonne |
| mm | mm | $m^2/m$ | $m^2/tonne$ | mm | mm | $m^2/m$ | $m^2/tonne$ | mm | mm | m2/m | $m^2/tonne$ |
| **Equal Angles** | | | | | | | | **Unequal Angles** | | | |
| 200 x 200 | 26 | 0.788 | 10.3 | 65 x 65 | 10 | 0.255 | 28.3 | | | | |
| | 20 | 0.788 | 13.1 | | 8 | 0.255 | 33.9 | 150 x 100 | 12 | 0.491 | 21.8 |
| | 18 | 0.788 | 14.5 | | 6 | 0.255 | 43.4 | | 10 | 0.491 | 27.3 |
| | 16 | 0.788 | 16.2 | | 5 | 0.255 | 55.9 | | | | |
| | 13 | 0.788 | 19.7 | | | | | 150 x 90 | 16 | 0.471 | 16.9 |
| | | | | 55 x 55 | 6 | 0.215 | 43.6 | | 12 | 0.471 | 21.8 |
| 150 x 150 | 19 | 0.590 | 14.0 | | 5 | 0.215 | 60.0 | | 10 | 0.471 | 27.2 |
| | 16 | 0.590 | 16.7 | | | | | | 8 | 0.471 | 33.0 |
| | 12 | 0.590 | 21.6 | 50 x 50 | 8 | 0.195 | 34.3 | | | | |
| | 10 | 0.590 | 26.9 | | 6 | 0.195 | 43.7 | 125 x 75 | 12 | 0.392 | 22.2 |
| | | | | | 5 | 0.195 | 56.0 | | 10 | 0.392 | 27.6 |
| 125 x 125 | 16 | 0.491 | 16.9 | | 3 | 0.195 | 84.4 | | 8 | 0.392 | 33.2 |
| | 12 | 0.491 | 21.8 | | | | | | 6 | 0.392 | 42.8 |
| | 10 | 0.491 | 27.3 | 45 x 45 | 6 | 0.175 | 44.2 | | | | |
| | 8 | 0.491 | 33.0 | | 5 | 0.175 | 56.5 | 100 x 75 | 10 | 0.342 | 27.6 |
| | | | | | 3 | 0.175 | 85.1 | | 8 | 0.342 | 33.2 |
| 100 x 100 | 12 | 0.392 | 22.2 | | | | | | 6 | 0.342 | 42.9 |
| | 10 | 0.392 | 27.6 | 40 x 40 | 6 | 0.155 | 44.4 | | | | |
| | 8 | 0.392 | 33.2 | | 5 | 0.155 | 56.9 | 75 x 50 | 8 | 0.245 | 34.1 |
| | 6 | 0.392 | 42.8 | | 3 | 0.155 | 84.9 | | 6 | 0.245 | 43.6 |
| | | | | | | | | | 5 | 0.245 | 56.3 |
| 90 x 90 | 10 | 0.352 | 27.7 | 30 x 30 | 6 | 0.115 | 45.0 | | | | |
| | 8 | 0.352 | 33.2 | | 5 | 0.115 | 57.4 | 65 x 50 | 8 | 0.225 | 34.1 |
| | 6 | 0.352 | 42.9 | | 3 | 0.115 | 85.4 | | 6 | 0.225 | 43.6 |
| | | | | | | | | | 5 | 0.225 | 55.9 |
| 75 x 75 | 10 | 0.292 | 27.8 | 25 x 25 | 6 | 0.0953 | 45.8 | | | | |
| | 8 | 0.292 | 33.5 | | 5 | 0.0953 | 57.7 | | | | |
| | 6 | 0.292 | 42.9 | | 3 | 0.0953 | 85.1 | | | | |
| | 5 | 0.292 | 55.5 | | | | | | | | |

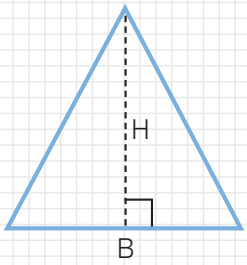
# Basic Area and Volume Formulae

## RECTANGLE



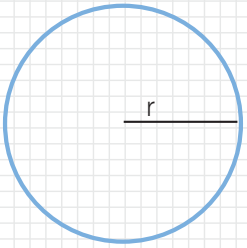

Area = Length x Width

## TRIANGLE



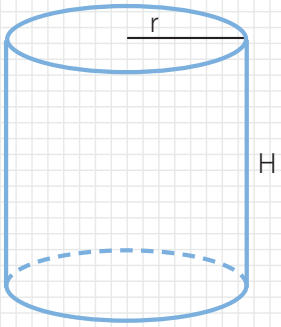

Area = 1/2 x Base x Perpendicular Height

## CIRCLE



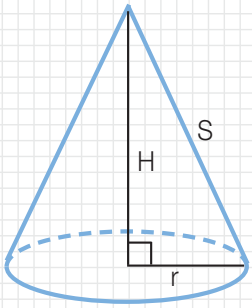

Area = $\pi$ x radius$^2$
Circumference = 2 x $\pi$ x radius
(or $\pi$ x diameter)

## CYLINDER




Area (ends not included) = 2 x $\pi$ x radius x Height
Volume = $\pi$ x radius$^2$ x Height

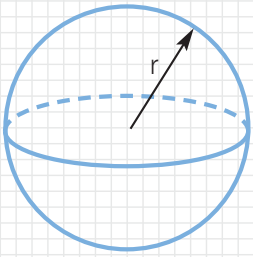
## CONE




Area (excluding base) = $\pi$ x radius x slant height
Volume = 1/3 x $\pi$ x radius$^2$ x height

$$\text{slant height} = \sqrt{\text{radius}^2 + \text{perpendicular height}^2}$$

## SPHERE




Area = 4 x $\pi$ x radius$^2$
Volume = 4/3 x $\pi$ x radius$^3$

# Conversion Factors

## IMPERIAL TO METRIC

| | |
|---|---|
| **Length** | |
| thousandth of inch (thou or mil) | x 25.4 = µm |
| inches (in) | x 25.4 = mm |
| feet (ft) | x 0.3048 = m |
| **Area** | |
| square inches ($in^2$) | x 645.16 = $mm^2$ |
| square feet ($ft^2$) | x 0.0929 = $m^2$ |
| **Volume** | |
| cubic inches (cu in) | x 16.38716 = $cm^3$ or mL |
| cubic feet (cu ft) | x 0.028317 = $m^3$ |
| cubic feet (cu ft) | x 28.31701 = L |
| US gallons (gal) | x 3.7854 = L |
| quart (qt) | x 0.9464 = L |
| fluid ounces (fl oz) | x 29.57 = mL |
| **Speed - Velocity** | |
| feet per minute (ft/min) | x 0.00508 = m/s |
| feet per second (ft/s) | x 0.03048 = m/s |
| **Flow Rate** | |
| cubic feet per minute (CFM) | x 0.47195 = L/s |
| cubic feet per minute (CFM) | x 0.028317 = $m^3$/min |
| cubic feet per minute (CFM) | x 1.69902 = $m^3$/hr |
| US gallons per minute (gpm) | x 3.7854 = L/min |
| **Weight - Mass** | |
| pounds (lb) | x 0.4536 = kg |
| **Bulk - Density** | |
| pounds per cubic foot (lb/cuft) | x 16.0185 = kg/$m^3$ |
| pounds per cubic foot (lb/cuft) | x 0.016019 = kg/L |
| **Pressure** | |
| pounds per square inch (psi) | x 6.8947 = kPa |
| pounds per square inch (psi) | x 0.0068947 = MPa |
| pounds per square inch (psi) | x 0.068947 = bar |
| **Vacuum** | |
| inches of mercury (in. Hg) | x 3.38638 = -kPa |
| inches of mercury (in. Hg) | x 13.596 = in. $H_2O$ |
| **Power** | |
| horsepower (hp) | x 0.7457 = kW |
| **Temperature** | |
| degrees Fahrenheit (°F) | - 32, then x 0.5555 = °C |

## METRIC TO IMPERIAL

| | |
|---|---|
| **Length** | |
| microns (µm) | x 0.03937 = thou or mil |
| millimetres (mm) | x 0.03937 = in |
| metres (m) | x 3.28083 = ft |
| **Area** | |
| square millimetres ($mm^2$) | x 0.00155 = $in^2$ |
| square metres ($m^2$) | x 10.7639 = $ft^2$ |
| **Volume** | |
| cubic centimetres ($cm^3$) | x 0.061023 = cu in |
| cubic metres ($m^3$) | x 35.3145 = cu ft |
| litres (L) | x 0.035315 = cu ft |
| litres (L) | x 0.26417 = US gal |
| litres (L) | x 1.05668 = qt |
| millilitres (mL) | x 0.03381 = fl oz |
| **Speed - Velocity** | |
| metres per second (m/s) | x 196.85 = ft/min |
| metres per second (m/s) | x 3.28083 = ft/s |
| **Flow Rate** | |
| litres per second (L/s) | x 2.11887 = CFM |
| cubic metres per minute ($m^3$/min) | x 35.3145 = CFM |
| cubic metres per hour ($m^3$/hr) | x 0.58857 = CFM |
| litres per minute (L/min) | x 0.26417 = US gpm |
| **Weight - Mass** | |
| kilograms (kg) | x 2.2046 = lb |
| **Bulk - Density** | |
| kilograms per cubic metre (kg/$m^3$) | x 0.062428 = lb/cuft |
| kilograms per litre (kg/L) | x 62.4277 = lb/cuft |
| **Pressure** | |
| kilopascals (kPa) | x 0.145 = psi |
| Megapascals (MPa) | x 145.04 = psi |
| bar (bar) | x 14.504 = psi |
| **Vacuum** | |
| kilopascals vacuum (-kPa) | x 0.2953 = in. Hg |
| inches of water (in. $H_2O$) | x 0.07355 = In. Hg |
| **Power** | |
| kilowatts (kW) | x 1.341 = hp |
| **Temperature** | |
| degrees Celsius (°C) | x 1.8, then +32 = °F |

# Conversion Tables

## PRESSURE

### psi to bar, kPa (MPA)

| psi | bar | kPa |
|---|---|---|
| 40 | 2.8 | 276 |
| 50 | 3.4 | 345 |
| 60 | 4.1 | 414 |
| | | |
| 70 | 4.8 | 483 |
| 80 | 5.5 | 552 |
| 90 | 6.2 | 621 |
| | | |
| 100 | 6.9 | 689 |
| 110 | 7.6 | 758 |
| 120 | 8.3 | 827 |
| | | |
| 130 | 9.0 | 896 |
| 140 | 9.6 | 965 |
| 150 | 10.3 | 1034 |
| | | MPa |
| 1000 | 68.9 | 6.9 |
| 1500 | 103 | 10.3 |
| 2000 | 138 | 13.8 |
| | | |
| 2500 | 172 | 17.2 |
| 3000 | 207 | 20.7 |
| 3500 | 241 | 24.1 |
| | | |
| 4000 | 276 | 27.6 |
| 5000 | 345 | 34.5 |
| 6000 | 414 | 41.4 |
| | | |
| 7000 | 483 | 48.3 |
| 8000 | 552 | 55.2 |
| 9000 | 621 | 62.1 |
| 10000 | 689 | 68.9 |
| 20000 | 1380 | 137 |
| 30000 | 2070 | 206 |
| 35000 | 2410 | 241 |
| 40000 | 2760 | 275 |
| `50000 | 3450 | 344 |

### bar, kPa (MPa) to psi

| bar | kPa | psi |
|---|---|---|
| 1 | 100 | 14.5 |
| 2 | 200 | 29 |
| 3 | 300 | 43.5 |
| | | |
| 4 | 400 | 58 |
| 5 | 500 | 72.5 |
| 6 | 600 | 87 |
| | | |
| 7 | 700 | 101.5 |
| 8 | 800 | 116 |
| 9 | 900 | 130.5 |
| | | |
| 10 | 1000 | 145 |
| 11 | 1100 | 159.5 |
| 12 | 1200 | 174 |
| | MPa | |
| 100 | 10 | 1450 |
| 200 | 20 | 2900 |
| 250 | 25 | 3626 |
| | | |
| 300 | 30 | 4351 |
| 350 | 35 | 5076 |
| 400 | 40 | 5800 |
| | | |
| 500 | 50 | 7250 |
| 600 | 60 | 8700 |
| 700 | 70 | 10150 |
| | | |
| 800 | 80 | 11600 |
| 900 | 90 | 13050 |
| 1000 | 100 | 14500 |
| 1500 | 150 | 21750 |
| 2000 | 200 | 29000 |
| 2500 | 250 | 36260 |
| 3000 | 300 | 43500 |
| 3500 | 350 | 50760 |
| 4000 | 400 | 58000 |

## TEMPERATURE

### degrees Fahrenheit ⟷ degrees Celsius

| °F | °C |
|---|---|
| -20 | -28.9 |
| -10 | -23.3 |
| -4 | -20 |
| 0-ZERO | -17.8 |
| 10 | -12.2 |
| 14 | -10 |
| 20 | -6.7 |
| 30 | -1.1 |
| 32 | 0-ZERO |
| 40 | 4.4 |
| 50 | 10 |
| 59 | 15 |
| 68 | 20 |
| 70 | 21.1 |
| 80 | 26.7 |
| 86 | 30 |
| 90 | 32.2 |
| 100 | 37.8 |
| 104 | 40 |
| 122 | 50 |
| 140 | 60 |
| 158 | 70 |
| 176 | 80 |
| 194 | 90 |
| 212 | 100 |
| 230 | 110 |
| 248 | 120 |
| 266 | 130 |
| 284 | 140 |
| 300 | 148.9 |

# Conversion Tables

## VENTILATION FLOW RATES

| CFM → | Litres/min → | m³/min → | m³/hr | m³/min → | CFM | m³hr → | CFM |
|---|---|---|---|---|---|---|---|
| 500 | 14,159 | 14.16 | 849.5 | 15 | 529.7 | 1000 | 588.6 |
| 1000 | 28,317 | 28.32 | 1699 | 25 | 882.9 | 2000 | 1177 |
| 2000 | 56,634 | 56.63 | 3398 | 50 | 1765 | 3000 | 1766 |
| 3000 | 84,951 | 84.95 | 5097 | 75 | 2648 | 4000 | 2354 |
| 4000 | 113,270 | 113.3 | 6796 | 100 | 3531 | 5000 | 2943 |
| 5000 | 141,590 | 141.6 | 8495 | 125 | 4414 | 7500 | 4414 |
| 6000 | 169,900 | 169.9 | 10,194 | 150 | 5297 | 10,000 | 5886 |
| 7000 | 198,220 | 198.2 | 11,893 | 200 | 7062 | 12,500 | 7357 |
| 8000 | 226,540 | 226.5 | 13,592 | 250 | 8829 | 15,000 | 8828 |
| 9000 | 254,850 | 254.9 | 15,291 | 300 | 10,590 | 20,000 | 11,770 |
| 10000 | 283,170 | 283.2 | 16,990 | 400 | 14,130 | 25,000 | 14,710 |
| 15000 | 424,760 | 424.8 | 25,485 | 500 | 17,660 | 30,000 | 17,660 |
| 20000 | 566,340 | 566.3 | 33,980 | 600 | 21,190 | 35,000 | 20,600 |
| 25000 | 707,930 | 707.9 | 42,476 | 700 | 24,720 | 40,000 | 23,540 |
| 30000 | 849,510 | 849.5 | 50,971 | 800 | 28,250 | 45,000 | 26,490 |
| 35000 | 991,100 | 991.1 | 59,466 | 900 | 31,780 | 50,000 | 29,430 |
| 40000 | 1,132,700 | 1133 | 67,961 | 1000 | 35,310 | 60,000 | 35,310 |
| 45000 | 1,274,300 | 1274 | 76,456 | 1250 | 44,140 | 75,000 | 44,140 |
| 50000 | 1,415,900 | 1416 | 84,951 | 1500 | 52,970 | 100,000 | 58,860 |
| 75000 | 2,123,800 | 2124 | 127,427 | 2000 | 70,630 | 125,000 | 73,570 |
| 100000 | 2,831,700 | 2832 | 169,902 | 2500 | 88,290 | 150,000 | 88,290 |

## COMPRESSED AIR SUPPLY FLOW RATES

| CFM → | litres/second | litres/second → | CFM |
|---|---|---|---|
| 100 | 47.2 | 35 | 74.2 |
| 150 | 70.8 | 40 | 84.8 |
| 200 | 94.4 | 50 | 106 |
| 250 | 118 | 75 | 159 |
| 300 | 142 | 100 | 212 |
| 350 | 165 | 125 | 265 |
| 400 | 189 | 150 | 318 |
| 450 | 212 | 175 | 371 |
| 500 | 236 | 200 | 424 |
| 600 | 283 | 250 | 530 |
| 700 | 330 | 300 | 636 |
| 900 | 425 | 350 | 742 |
| 1000 | 472 | 400 | 848 |
| 1200 | 566 | 500 | 1059 |
| 1400 | 661 | 600 | 1271 |

# Quick Reference Guide to Relevant AS and ISO Standards

## PAINTS/COATINGS

| | |
|---|---|
| Glossary of Terms | AS2310 |
| Solvent Flashpoint | AS2106 |
| Soluble Lead Content | AS1580-501 |
| Painting of Buildings | AS2311 |
| Climatic Conditions for Painting | AS3894-7 |
| Site Inspection Reports | |
| – Daily surface & ambient conditions | AS3894-10 |
| – Equipment | AS3894-11 |
| – Coating | AS3894-12 |
| – Daily blast & paint | AS3894-13 |
| – Daily painting | AS3894-14 |
| Paint Systems – Etch Primers | AS3750-17 |
| – Inorganic Zinc Silicate | AS3750-15 |
| – Metallic & Related Coatings | AS1397 |
| | AS4534 |
| | AS4680 |
| | AS4791 |
| | AS4792 |
| | ISO2063 |
| | ISO2064 |
| – Metallic Coatings Methods of Test | AS2331 |
| | ISO1461 |
| | ISO2064 |
| – External fusion-bonded epoxy | AS3862 |
| – Corrosion Prevention | AS2312 |
| | ISO12944 |
| – Degree of substrate corrosion | AS1580-481.1 |
| – Degree of blistering | AS1580-481.0 |
| – Evaluation of degradation | ISO4628 |

## PAINTS/COATINGS

### Test Methods

| | |
|---|---|
| Sampling Procedures | AS1580-102.1 |
| Wet Film Thickness | AS1580-107 |
| | AS3894-3 |
| Dry Film Thickness | AS1580-108 |
| | AS3894-3 |
| | ISO2178 |
| | ISO2808 |
| | ISO2360 |
| Adhesion | AS1580-408 |
| | AS3894-9 |
| | ISO2409 |
| | ISO4624 |
| Continuity (Porosity) | AS3894-1 |
| | AS3894-2 |
| | ISO2746 |
| | ISO8289 |
| Hardness | AS1580-405 |
| | ISO2815 |
| Hard Dry Conditions | AS1580-401.5 |
| Cure | AS3894-4 |
| Gloss | AS1580-602 |
| | AS3894-8 |
| | ISO2813 |
| | ISO7668 |
| Density | AS1580-202.1 |
| Visual inspection of metal products | AS3978 |