

SHEET METALWORK DATA

Aluminium 1050A (S1B) SHEET

TYPICAL APPLICATIONS

| | |
|--------------------------|---------------------|
| General sheet metal work | Automotive industry |
| Packaging | Architecture |
| Boilermaking | Cabinets |
| Heat transfer devices | Appliances |
| Kitchenware | Vessels |
| Chemical industry | Panelling |
| Pharmaceutical industry | |

PRODUCT DESCRIPTION

An unalloyed ('pure') non-heat treatable rolled aluminium sheet engineered for general sheet metal work where high mechanical properties are not required.

TECHNICAL DESCRIPTION

Internationally recognised grade EN AW 1050A H14 – 99.50% pure aluminium (Al 99.5) sheet strain hardened to the half-hard temper. The previous BS specification was known as S1B and the half-hard temper was known as H4, giving S1B H4. Smiths range of 1050A will meet all appropriate national/international standards.

PRODUCT ATTRIBUTES

Good surface finish
Very good anodising qualities
Very good corrosion resistance

Capable of cold forming

Very good welding qualities

Close tolerance sheet

Close tolerance cut to size service for both cut blanks and circles/rings

Immediate or just-in-time delivery

CUSTOMER BENEFITS

Excellent aesthetics

Ideal for sheet metal work applications which do not need high strength

Ideal for welding fabrication

Components are easier to manufacture/assemble and have closer tolerances

Uneconomic cutting to size and stockholding costs are removed – your highly skilled operators and resources are used more efficiently

NOMINAL COMPOSITION %

| | Al | Si | Fe | Cu | Mn | Mg | Zn | Ti | Others each |
|-----|-------|------|------|------|------|------|------|------|-------------|
| Min | 99.50 | | | | | | | | |
| Max | | 0.25 | 0.40 | 0.05 | 0.05 | 0.05 | 0.07 | 0.05 | 0.03 |

SURFACE TREATMENT

Grade 1050A has very good anodising properties for both decorative and technical requirements. It is also well-suited to chemical and electrolytic brightening.

COLD FORMABILITY

1050A H14 has good formability and is the ideal specification when bending or spinning is required with fair strength. The bending data detailed below is a guideline only for cold bends and will vary depending on the exact bending practices carried out. We recommend the tables below as a starting point only for your own application and not as part of the design process.

For a simple guide use the table below – multiply the thickness of the sheet in mm by the bending factor to give a minimum bending radius.

Simple bending guidelines:

| Sheet thickness/mm | | Minimum bending factor | |
|--------------------|---------------------|------------------------|-----|
| Over | Up to and including | 180° | 90° |
| 0.5 | 1.5 | 1.0 | 0.5 |
| 1.5 | 3.0 | 1.0 | 1.0 |
| 3.0 | 6.0 | 1.5 | 1.5 |
| 6.0 | 12.0 | – | 2.5 |

Therefore, a 90° bend in 4mm sheet would require a minimum bend radius of $4 \times 1.5 = 6\text{mm}$.

Detailed bending guidelines: cold 90° bend made with the axis normal to the rolling direction.

| Sheet thickness/mm | | | | | | | | | Plate | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-------|--|
| 0.5 | 1.0 | 1.5 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 | 8.0 | 10.0 | |
| Minimum Inner radius of the bent sheet after spring-back/mm | | | | | | | | | | |
| 0.3 | 0.5 | 1.0 | 1.5 | 2.5 | 3.8 | 5.5 | 7.5 | 13 | 18 | |

Sheet spring-back guidelines.

The ratio of spring-back, factor k , is defined as the ratio of the bending angle after spring-back to that before spring-back was permitted. The spring-back is dependant on the ratio of the bending radius after spring-back to the sheet thickness. The table below will allow factors of k to be estimated.

| Ratio of bending radius to sheet thickness | | | | | | | |
|--|------|------|------|------|------|------|------|
| 1 | 2 | 4 | 6 | 10 | 15 | 30 | 60 |
| Spring-back factor, k | | | | | | | |
| 0.98 | 0.98 | 0.97 | 0.95 | 0.93 | 0.90 | 0.80 | 0.65 |

Therefore, an attempted 90° bend on a bend radius of 18mm using 3mm thick sheet would give a ratio of bending radius to sheet thickness of $18/3 = 6$. Looking up this ratio of 6 gives a spring-back factor of 0.95. After bending was complete the sheet would have only bent $0.95 \times 90^\circ = 85.5^\circ$. To have achieved a 90° bend the sheet would have to have been bent to an original angle of $90^\circ/0.95 = 95^\circ$ in the first instance.

WELDING

1050A is easily welded by MIG or TIG processes, with a recommended filler metal of 1050A (S-Al99.5) or 4043A (S-AlSi5) for welding to 1050A structures. A good weld is likely to have a strength of up to 65Mpa, although this will be dependant on the type and quality of welding.

CUT TO SIZE GUILLOTINED BLANKS

Edge deviation over cut length/width $\pm 0.2\text{mm per m}$
(maximum thickness 6.35mm)

CUT TO SIZE SAWN BLANKS

mm
Edge deviation over cut length/width +1.5,-0
(minimum thickness 3mm)

CUT TO SIZE CAPABILITY

Smiths Metal Centres carry a full range of 1050A in both imperial and metric sizes.

Our close tolerance high capacity guillotines can cut accurately to exact customer requirements, whether that be 1 blank or 10,000 blanks. The cut blanks will be delivered immediately when cut or just in time to meet your schedules.

We can also stamp or turn circles or rings to your specifications as part of our first stage engineering capability.

CORROSION RESISTANCE

Unalloyed aluminium sheet has very good corrosion resistance and can be used in normal, industrial and marine environments without problems. Where the sheet is being specifically used in marine environments it may be worthwhile reviewing alloyed aluminium grades, such as 5251 (NS4), which may be generally more suitable to marine environment applications.

MACHINING

Pure aluminium has only fair machinability due to the softness of the alloy. The half-hard temper increases the hardness over the annealed/soft base alloy but could not be described as free chipping compared to the harder, alloyed aluminums. We recommend aluminium geometry cutting tools running at a reasonable speed to avoid the edge build-up which can occur at lower cutting speeds. High speed steel tools may be more economical than carbide, particularly with the possibility of a large rake angle on machines which cannot reach carbide cutting speeds.

VINYL COATING

Smiths can supply aluminium sheet vinyl-coated for surface protection during machining, bending and fabrication. Our CNC vinyl coating line can apply a variety of coatings and colours dependent on your exact requirements.

The single source for all your engineering materials.

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Fax: 01767 600466
- ▶▶ Biggleswade Metal Centre
Tel: 01767 604604
Fax: 01767 315271
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Tel: 0121 327 5511
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TYPICAL MECHANICAL PROPERTIES

| | | |
|----------------------------------|-------------------|-----------------------|
| Tensile strength | N/mm ² | 100-135 |
| Yield strength | N/mm ² | Min 75 (approx. only) |
| Shear strength | N/mm ² | 70 |
| Elongation | % (A50) | 4-8 |
| Brinell Hardness | HB | 35 |
| Thermal conductivity | W/m.K | 229 |
| Melting range | °C | 645-657 |
| Electrical conductivity | %IACS | 58.4 |
| Coefficient of thermal expansion | 1/K | 23.5x10 ⁻⁶ |
| Elastic modulus | MPa | 69000 |

The mechanical properties of (unalloyed) 1050A are low. The corollary of this is the good forming properties of this grade. If both forming and higher mechanical properties are required then we recommend the potential selection of grades 3103 (NS3) or 5251 (NS4). In general the better mechanical properties the lower the formability.

THICKNESS TOLERANCES

Thickness tolerances after cutting

| Specified nominal sheet thickness | >0.2 ≤ 0.4 | >0.4 ≤ 0.5 | >0.5 ≤ 0.6 | >0.6 ≤ 0.8 | >0.8 ≤ 1.0 | >1.0 ≤ 1.2 | >1.2 ≤ 1.5 | >1.5 ≤ 1.8 | >1.8 ≤ 2.0 | >2.0 ≤ 2.5 | >2.5 ≤ 3.0 | >3.0 ≤ 3.5 | >3.5 ≤ 4.0 | >4.0 ≤ 5.0 | >5.0 ≤ 6.0 | >6.0 ≤ 8.0 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Sheet base width up to 1000mm | ±0.02 | ±0.03 | ±0.03 | ±0.03 | ±0.04 | ±0.04 | ±0.05 | ±0.06 | ±0.06 | ±0.07 | ±0.08 | ±0.10 | ±0.15 | ±0.18 | ±0.20 | ±0.24 |
| Sheet base width over 1000mm up to and including 1250mm | ±0.04 | ±0.04 | ±0.05 | ±0.06 | ±0.06 | ±0.07 | ±0.09 | ±0.10 | ±0.11 | ±0.12 | ±0.13 | ±0.15 | ±0.20 | ±0.22 | ±0.24 | ±0.30 |

When measuring the thickness, a zone 10mm wide from the edges of the product shall be disregarded.

Nationwide suppliers of all forms of non-ferrous metals, stainless steel and engineering plastics.

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