WELD SYMBOLS ON DRAWINGS

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WELD HERE

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A

B

C
<table>
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<tr>
<th>Welding Process</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>ARC WELDING</td>
<td>AW</td>
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<tr>
<td>SHIELDED METAL ARC WELDING</td>
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<td>FLUX CORED ARC WELDING</td>
<td>FCAW</td>
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<td>SUBMERGED ARC WELDING</td>
<td>SAW</td>
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<td>GAS METAL ARC WELDING</td>
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<td>GAS TUNGSTEN ARC WELDING</td>
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<tr>
<td>PLASMA ARC WELDING</td>
<td>PAW</td>
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<td>RESISTANCE WELDING</td>
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<td>OFW</td>
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<tr>
<td>OXYACETYLENE WELDING</td>
<td>OAW</td>
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<td>FRICTION WELDING</td>
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<td>FORGE WELDING</td>
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<tr>
<td>THERMIT WELDING</td>
<td>TW</td>
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<tr>
<td>ELECTROSLAG WELDING</td>
<td>ESW</td>
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<td>STUD ARC WELDING</td>
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<tr>
<td>BRAZING</td>
<td>B</td>
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<tr>
<td>SOLDERING</td>
<td>S</td>
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</tbody>
</table>

**Suffixes**

- **Automatic**: AU
- **Manual**: MA
- **Semi-Automatic**: SA

**Machines**

- **Manual**: ME
- **Automatic**: AU
- **Semi-Automatic**: MA
<table>
<thead>
<tr>
<th>Type of Test</th>
<th>Symbol</th>
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<tbody>
<tr>
<td>ACOUSTIC EMISSION</td>
<td>AET</td>
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<tr>
<td>EDDY CURRENT</td>
<td>ET</td>
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<tr>
<td>LEAK</td>
<td>LT</td>
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<tr>
<td>MAGNETIC PARTICLE</td>
<td>MT</td>
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<tr>
<td>NEUTRON RADIOGRAPHIC</td>
<td>NRT</td>
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<td>PENETRANT</td>
<td>PT</td>
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<tr>
<td>ULTRASONIC</td>
<td>UT</td>
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<tr>
<td>VISUAL</td>
<td>VT</td>
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</tbody>
</table>
Single 'J' welds 10 deep

6mm fillet

Butt weld to have removable backing ring. X ray weld.

All dimensions in millimetres

FLANGE ENDED PIPE
SECTION 23: EXERCISE 2, VESSEL

Problem 1. Describe welds to be made, with sketches where necessary.

Comments
1. The standard used for welding symbols has not been identified: there are six clear indications that it is to ANSI/AWS.
   - A: process abbreviation in fork is alphabetical.
   - B, C, D: 3 x ‘melt-thru’ symbols.
   - B and D: 2 x ‘radiographic test’ symbol.
2. A: stud arc welding, confirmed by studs on drawing.
4. C: single-bevel butt weld, stub pipe only bevelled, (set-on branch), with melt-thru, ground flush inside.
5. E: fillet weld, of 6mm leg length, both sides of joint. See sketches on overlay (a) for interpretation.

a OVERLAY: possible interpretations of flange to tube joint E.
   - F: this is consistent with the weld symbol, but the view does not show the expected projection of the tube through the flange: also a form unlikely to be used, because of clearance problems.
   - G, H: consistent with weld symbol and drawing. To decide between these two, it would be necessary to have details of the flange.

Problem 2. Modify symbols to conform to BS 499: Part 2: 1980, with joint as at H.

b OVERLAY: symbols to BS, solution to problem 2.
   - I: symbol replacing A.
   - J: symbol replacing B: note that BS can only specify NDT, not specifically radiography. As there is no ‘melt-thru’ symbol, only full penetration and a flat rear face can be specified: the symbol requirements would be met by welding to produce a substantially flat surface, without further treatment.
   - K: symbol replacing C
   - L: symbol replacing D see comments on J above
   - M: Symbol replacing E
VESSEL

MATERIAL:
STAINLESS STEEL

BODY 6mm
FLANGE 20mm

All dimensions in millimetres

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**SECTION 25: EXERCISE 4, BEAM**

25 (Base transparency and overlay)

**BASE TRANSPARENCY**
Sketch of beam, not to scale, to be assembled by manual metal arc welding in the shop and on site.

Problem. Sketch in welding details and symbols to BS 499: Part 2: 1980 (or other standard as instructed).

a **OVERLAY: SOLUTION.** (Letters in circles are for reference only).

Comments

A Cope-holes have been introduced to avoid the need to dress welds where they meet other welds, and to avoid welding up into corners, often a site for defects.

B We cannot use a 'weld all round' symbol for the end flange joints, as it cannot go over top and bottom of the flanges, and it is interrupted by the cope-holes.

C Similarly to B, the web-to-flange joints are in four sections, needing four arrows if they are to be shown individually.

The spacing in BS is not the pitch (here 300mm) but the distance between the ends of weld elements, here (300-100) = 200mm.

D A suggestion to be taken seriously! Apart from simplifying the drawing, complete shop fabrication can considerably reduce the costs of welding and of quality assurance.
End flanges: 12mm fillet weld all round (inside)
Flange-to-web: 12mm fillet welds 100mm long, 300mm pitch each side, alternately each side.

SECTION X-X

Not to scale

FLANGES 15mm
WEB 10mm
END PLATES 20mm

SKETCH FOR BEAM

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## Basic Weld Symbols and Their Location Significance

<table>
<thead>
<tr>
<th>Location Significance</th>
<th>Filet</th>
<th>Plug or Slot</th>
<th>Spot or Projection</th>
<th>Root</th>
<th>Head</th>
<th>Groove</th>
<th>Back or Backing</th>
<th>Swaying</th>
<th>Planes</th>
<th>Fillet</th>
<th>Plug</th>
<th>Slot</th>
<th>Spot</th>
<th>Projection</th>
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<tr>
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<td>Other Side</td>
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<tr>
<td>Both Sides</td>
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<tr>
<td>No Arrow Side</td>
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## Supplementary Symbols

<table>
<thead>
<tr>
<th>Welding Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single V Groove</td>
<td>Welding symbol indicating root penetration</td>
</tr>
<tr>
<td>Double V Groove</td>
<td>Welding symbol indicating root penetration</td>
</tr>
<tr>
<td>Square</td>
<td>Welding symbol indicating square shape</td>
</tr>
<tr>
<td>Flange</td>
<td>Welding symbol indicating flange shape</td>
</tr>
</tbody>
</table>

## Location of Elements of a Welding Symbol

- **Fillet**: Represents the size of the weld.
- **Plug**: Represents the size of the plug.
- **Slot**: Represents the size of the slot.
- **Spot**: Represents the size of the spot.
- **Projection**: Represents the size of the projection.
- **Root**: Represents the size of the root.
- **Head**: Represents the size of the head.
- **Groove**: Represents the size of the groove.
- **Back or Backing**: Represents the size of the back or backing.
- **Swaying**: Represents the size of the swaying.
- **Planes**: Represents the size of the planes.

## Supplementary Symbols Used with Welding Symbols

- **Weld-All-Around Symbol**: Indicates weld all around.
- **Field Weld Symbol**: Indicates field weld.
- **Melt Thru Symbol**: Indicates melt thru.
- **Flush Contour Symbol**: Indicates flush contour.
- **Convex Contour Symbol**: Indicates convex contour.

## Basic Joints

- **Butt Joint**: Joint made by welding two pieces of metal together.
- **Corner Joint**: Joint made by welding three pieces of metal together.
- **Tee Joint**: Joint made by welding three pieces of metal together in a corner.
- **Lap Joint**: Joint made by welding two pieces of metal together with a gap.

## Designation of Welding Processes by Letters

- **G**: Gas metal arc welding.
- **S**: Shielded metal arc welding.
- **M**: Manual metal arc welding.
- **T**: Tungsten inert gas welding.

## Designation of Cutting Processes by Letters

- **G**: Gas cutting.
- **S**: Shielded metal arc cutting.
- **M**: Manual metal arc cutting.
- **T**: Tungsten inert gas cutting.