

Fillet Welding Procedures

Fillet welding is used on body parts that have different thicknesses and that need to be strong comparatively. It is important to have a thorough grasp of what follows.

1. Adherence

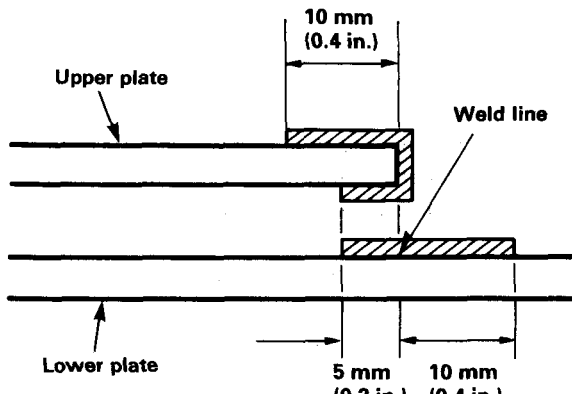
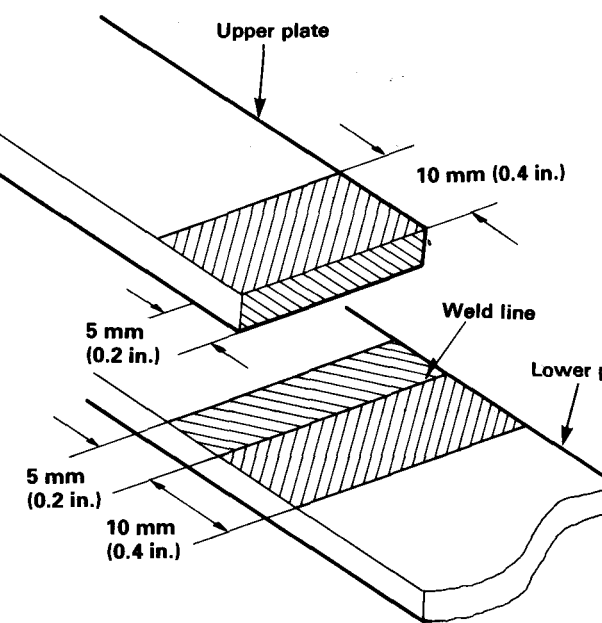
The aluminum alloy plates where the fillet welding is to be performed must fit together firmly. Otherwise, the weld will be defective.

2. Cleaning and sanding

Use a wax and grease remover to clean away any dirt, oil or grease prior to welding. If the aluminum alloy surface is coated with a paint film, use a disc sander with a #80 sanding disc to remove the paint.

NOTE: Use a stainless steel wire brush to burnish the bare surface of the aluminum alloy immediately before welding.

Sanding range:

 <p>Upper plate</p> <p>Lower plate</p> <p>Weld line</p> <p>10 mm (0.4 in.)</p> <p>5 mm (0.2 in.)</p> <p>10 mm (0.4 in.)</p>	<p>Sand the top and bottom surfaces of the upper plate and the adhesion surface of the lower plate.</p>
<p>Range of oxide film removal by sanding:</p>  <p>Upper plate</p> <p>Lower plate</p> <p>Weld line</p> <p>10 mm (0.4 in.)</p> <p>5 mm (0.2 in.)</p> <p>5 mm (0.2 in.)</p> <p>10 mm (0.4 in.)</p>	<p>Sand to a width of about 10 mm (0.4 in.) on both the upper and lower plates on the outside of the weld line, and to a width of about 5 mm (0.2 in.) from the weld line for the inside surface which will be overlapped. Also sand the end of the upper plate.</p>

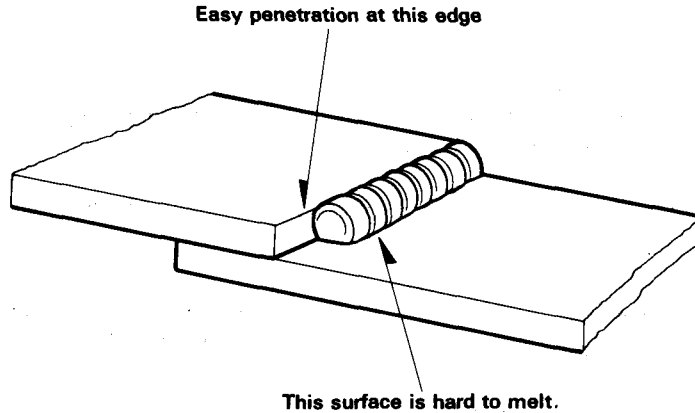
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Aluminum Alloy Repair

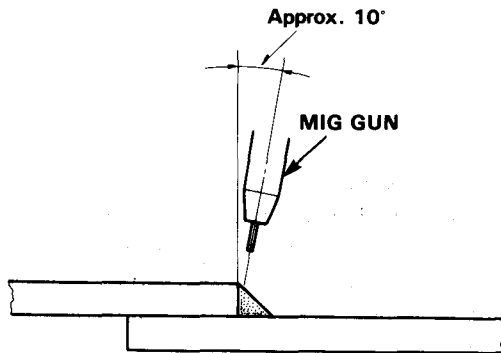
Fillet Welding Procedures (cont'd)

3. Welding

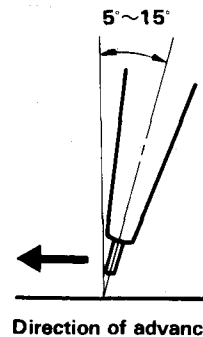
During actual welding, penetration will occur quickly for the top plate since the end of the plate is being welded. For the bottom plate, however, welding starts at the center of the plate, which is hard to melt. Proceed with the current slightly higher than for butt welding and closely observe bottom plate penetration.



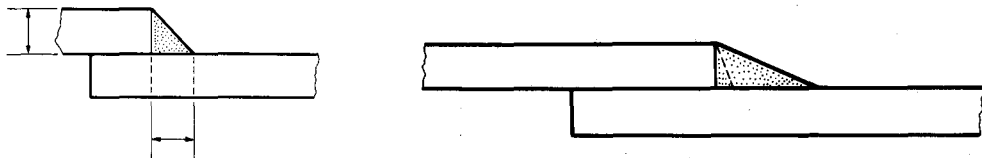
Although in the case of butt welding the gun is positioned perpendicular to the base metal, in fillet welding it is used at an angle with the base metal surface which depends on the plate thickness. The operator should carefully observe the melting of the base metal and proceed. Special attention must be paid when the thicknesses of the top and bottom plates differ.



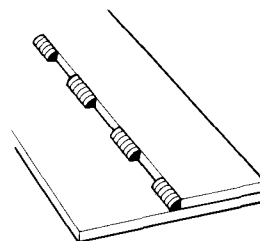
Forehand weld sequence



The ideal size of the bead in a cross-sectional view of fillet welding is identical to or slightly larger than the plate thickness. If the thickness of the plates differ, proceed to weld in alignment with the thin plate so as to minimize both the strain induced by welding the base metal and any changes in organization which may occur.

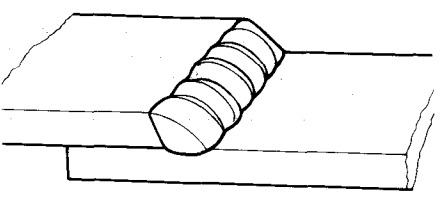
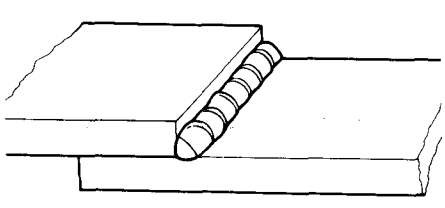
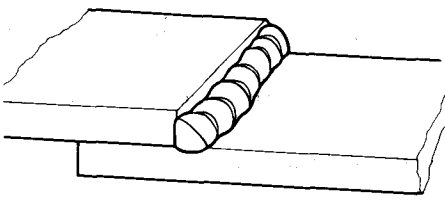
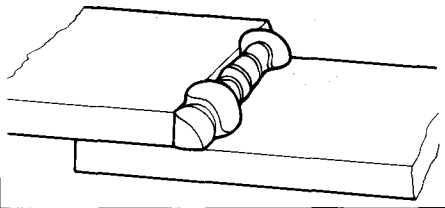
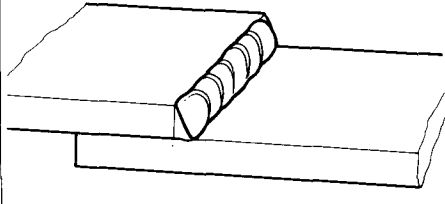


NOTE: Welding should be intermittent.



Fillet weld zone defects:

The table below shows frequent fillet weld zone defects and their causes.

Defect	Appearance	Main causes
Excessive melting of upper plate	 <p>A 3D perspective drawing of a fillet weld joint between two plates. The upper plate is significantly melted and distorted downwards, while the lower plate remains relatively flat. The weld bead is visible on the upper surface of the upper plate.</p>	<p>Poor gun angle. Poor gun position. Excessively high welding current.</p>
Incomplete penetration	 <p>A 3D perspective drawing of a fillet weld joint. The weld bead is visible, but there is a clear gap between the two plates at the root of the joint, indicating that the weld metal did not reach the bottom.</p>	<p>Insufficient welding current.</p>
Poor adhesion position	 <p>A 3D perspective drawing of a fillet weld joint. The weld bead is positioned away from the root of the joint, leaving a gap between the plates at the bottom. The weld metal is only attached to the top surfaces of the plates.</p>	<p>Faulty gun feed position.</p>
Unaligned beads	 <p>A 3D perspective drawing of a fillet weld joint. The weld bead is not straight and follows an irregular path across the joint, indicating inconsistent welding technique.</p>	<p>Improper gun feed speed. Poor gun height.</p>
Incomplete penetration of lower plate.	 <p>A 3D perspective drawing of a fillet weld joint. The weld bead is visible, but there is a gap between the plates at the root of the joint, indicating that the weld metal did not reach the bottom.</p>	<p>Faulty gun feed position. Insufficient welding current.</p>