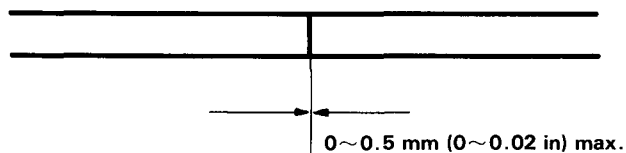


## Butt Welding Procedures

Reduce the clearance as shown in the figure below for butt welding thin plates or sheets. If the clearance is too wide, welding should be performed in the stitch mode.

### 1. Edge preparation

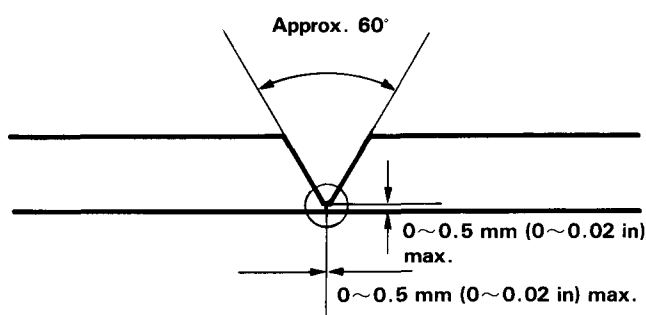
With plates less than 3 mm (0.12 in) thick:



Weld with a square edge without special preparation.

- Use a smooth-cut file to bring the the edge preparation surface to a smooth finish.

With plates more than 3 mm (0.12 in) thick:



Proceed with V-shaped edge preparation.

- Edge preparation is required for butt welding thick plates, as shown.
- Use a disc grinder and file (rough-cut or vixen file) for edge preparation.
- Use a disc sander with #80 sanding disc and a file (smooth-cut) to finish the prepared area.

- Reverse side beads often occur because of edge preparation in the above figure.

### 2. Cleaning and sanding

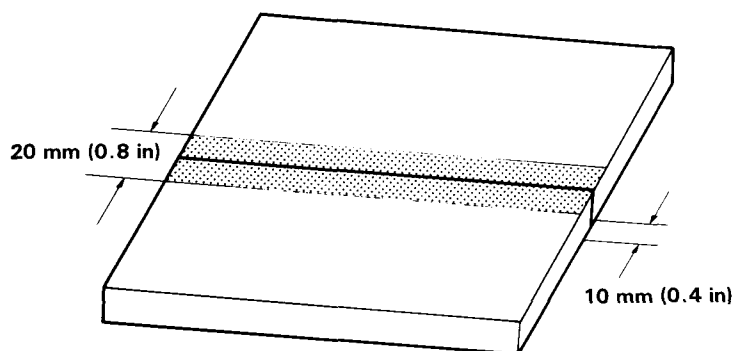
Use a wax and grease remover to clean off any dirt, oil or grease prior to welding.

If the aluminum alloy surface is coated with a paint film, use disc sander and #80 sanding disc to remove the paint.

NOTE: Use a stainless steel wire brush to brush the bare surface of the aluminum alloy. Do this on both the top and bottom surfaces.

Sanding range

For square edge preparation:



Sand the top to a width of approx. 20 mm (0.8 in) and the bottom to a width of approx. 10 mm (0.4 in).

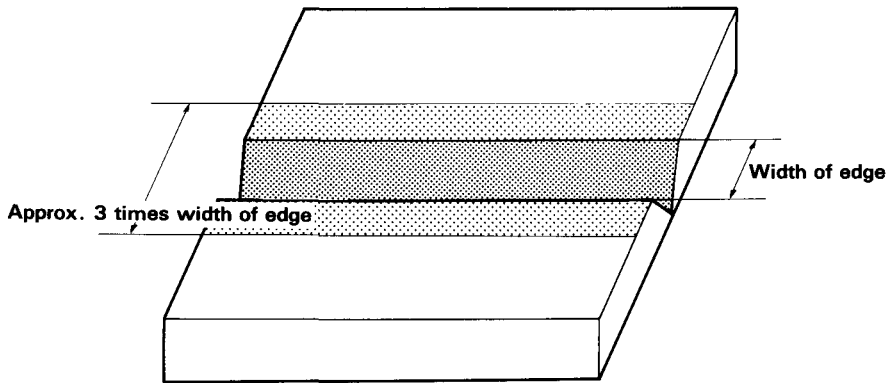
(cont'd)

# Aluminum Alloy Repair

## Butt Welding Procedures (cont'd)

Sanding range

For V-shaped edge preparation:



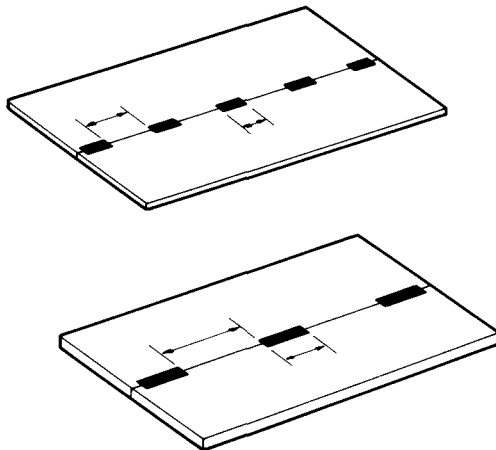
Sand the top to a width approximately 3 times the width of the edge and the bottom to a width approximately equivalent to the edge.

NOTE: Also sand the edge preparation area.

### 3. Tack Welding

Prior to finish welding, carry out tack welding to prevent strain and enhance joint precision. Weld the plates at several points with short beads.

NOTE: Use a stainless steel wire brush to clean the tack weld zones prior to finish welding.



- The thinner the sheet or plate, the shorter the tack welding pitch and bead.
- Avoid tack welding the ends and corners of the base metal.
- Since the beads left by tack welding are not ground down afterward, this process should be carried out with the same precision as finish welding.

#### 4. Main welding

Maintain a stable posture so that the gun does not move around but is held firmly. The weld zone is clearly visible. Maintain the proper distance between the gun contact tip and the base metal, and maintain the proper gun angle. Adjust the gun feed speed while observing penetration.

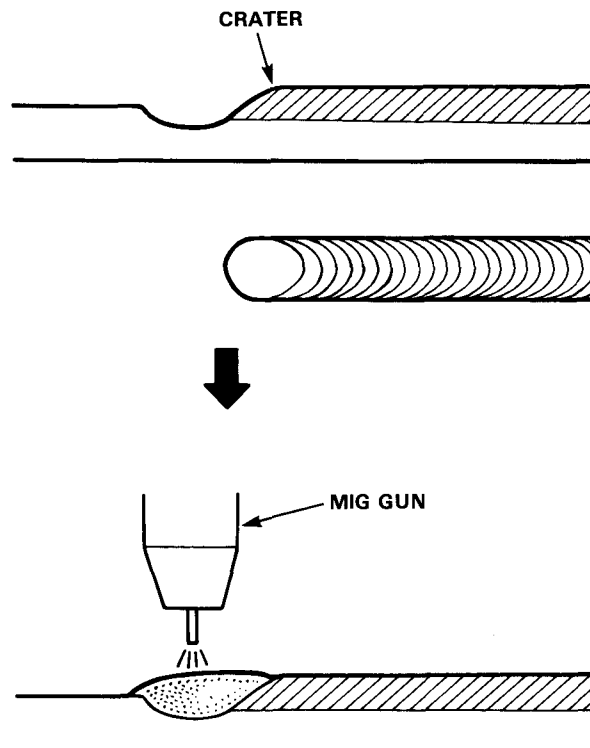
#### NOTE:

- Aluminum alloys are welded at a higher gun feed speed than steel plate.
- Use the forehand welding sequence for the gun advance direction in order to minimize the formation of black soot.
- Until the operator is experienced in welding, take care not to increase the distance between the torch contact tip and the base metal.
- When welding multiple layers of a thick material, brush the surface of the welded area thoroughly using a stainless steel wire brush after each pass.

#### 5. Crater treatment

Craters may form when the welding bead is completed. They should be filled properly to avoid defects.

There are two ways of treating craters. Either stop the gun and fill the crater without switching off the arc suddenly when the welding bead is completed, or alternatively, switch the arc and then back on again to fill the crater.



(cont'd)

# Aluminum Alloy Repair

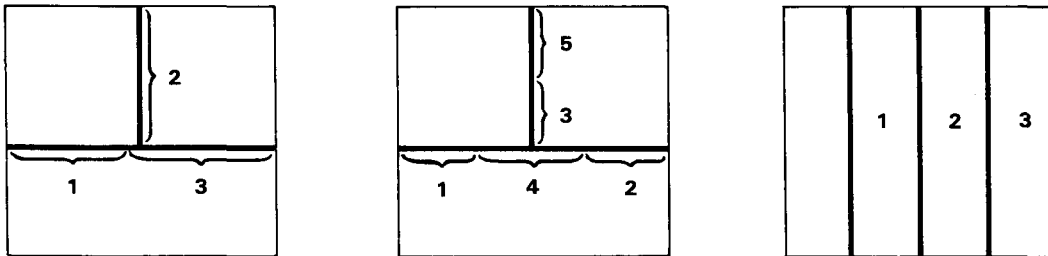
## Butt welding Procedures (cont'd)

### 6. How to weld without inducing strain

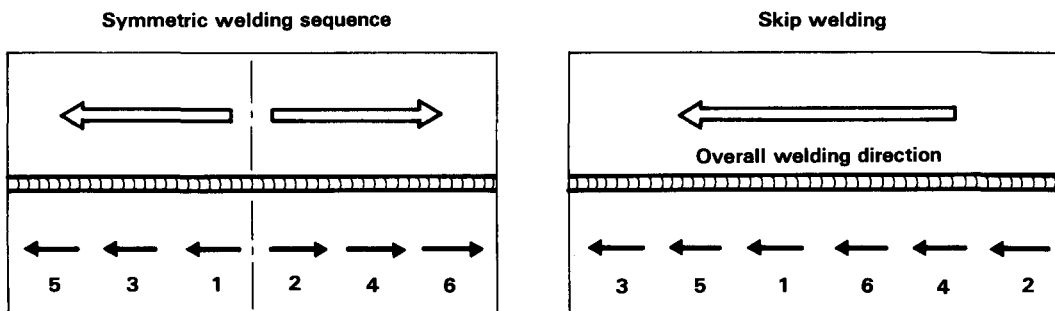
Tremendous strain results if the base metal is overheated during MIG welding.

- When many welding joints have been created, proceed to weld from a location with a minimal degree of freedom. Normally, welding proceeds from the center of the area or center of the joints to the outside.
- In direct proportion to the thickness of the plates, do not conduct lengthy welding operations at one time. Instead, divide the job up into shorter operations, as shown in the figure below.

Preventing strain by sequencing welding work:



Preventing strain by sequencing bead:

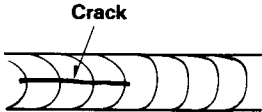
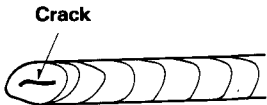
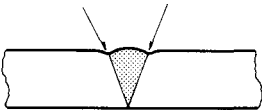
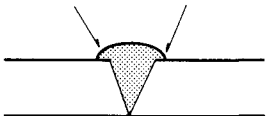

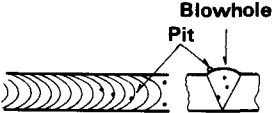


### Welding procedure

- When an operator is experienced, the strain can be reduced by increasing the gun feed speed at higher power settings (current). This method reduces the amount of heat transmitted to the base metal.
- In the case of thin plates where there is a danger of melt-down, do not weld continuously without stopping but weld short sections at a time. If the welder is provided with a stitch mode, set to this mode and perform stitch welding.

### Butt weld zone defects:


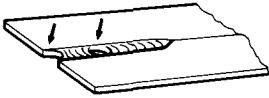
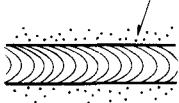
The table below shows possible weld zone defects and their causes. Care must be taken to ensure that none of these defects occur. If a defect does develop, pinpoint the causes and consider the appropriate countermeasure, change the work method, and proceed in a way which will produce stable welding results.

Defect	Appearance	Main causes
Bead crack		Excessively high welding current. Unsuitable filler metal (welding wire).
Crater crack		Unsuitable crater treatment.
Undercut		Poor gun aim. Excessively high welding current. Excessively high welding speed.
Overlap		Insufficient welding current. Excessively low welding speed.
Incomplete penetration		Unsuitable edge preparation. Insufficient welding current. Excessively high welding speed.
Blowhole, pit		Dirt on base metal (inadequate cleaning). Use steel wire brush. Improper shielding (insufficient shielding gas, strong wind). Moisture on plate surface. Dirt on electrode wire.

(cont'd)

# Aluminum Alloy Repair

## Butt welding Procedures (cont'd)

Defect	Appearance	Main causes
Unaligned beads		Welding wire speed not constant. Gun travel speed not constant.
Melt-down		Excessively high welding current. Unsuitable edge preparation (too wide).
Formation of soot		Poor gun angle. Improper gun advance (forehand weld sequence). Improper shielding (insufficient shielding gas, strong wind). Dirt on base metal.