

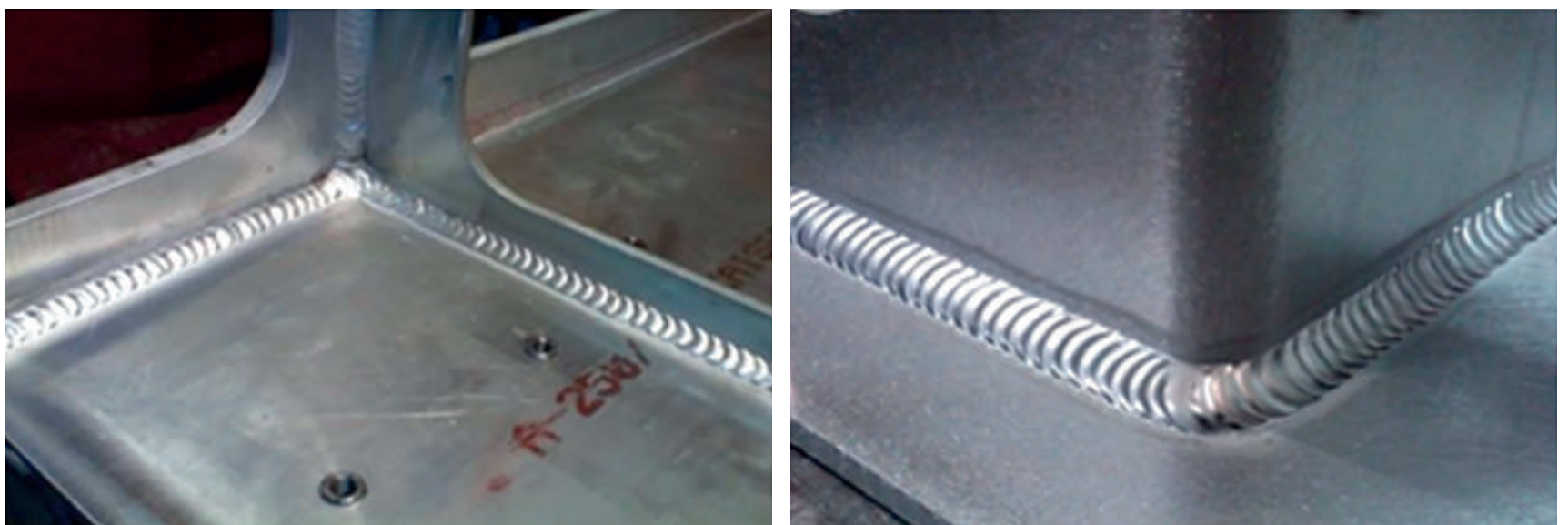


## Welding of Aluminium Castings

Castings are sometimes welded to correct foundry defects, to repair castings damaged in service or to assemble castings in to weldments.

Sand and permanent -mould castings can be welded in similar manner as wrought aluminium alloys and weldability is based on primarily on chemical composition and melting range of casting alloys. Die castings tend to be rather gassy due to entrapment of die lubricant and welds that penetrate their "skin"

(surface layer) will be extremely porous. Vacuum die castings can be possess very sound internal structures and have been welded satisfactorily.



When repairing newly made castings in the foundry a filler metal of the same alloy is used to provide homogeneous structure. New castings are clean and it is usually only necessary to remove any sand or other surface contaminants before repair welding. Internal defects determined by radiography need to be gouged out by chipping manual routers, deburring tools or similar means to permit weld penetration into sound metal. Gas Tungsten arc welding is commonly used to repair new castings. To repair sections up to 4.8 mm and thinner, ac power is commonly used. Direct current electrode negative power is often preferred for thicker sections to minimize preheating requirement.

Repair welding of castings that have been in service requires different consideration. These castings have usually been exposed to oil grease or other contaminants and must be thoroughly cleaned before welding. Also filler metal of same composition may not be available. In such circumstances; it is often acceptable to use another standard filler wire.

The heat treatable castings alloys will exhibit a partial loss of mechanical properties from the heat of welding in same manner as wrought alloys. By selecting proper filler metal to respond to subsequent heat treatment, these heat treatable alloys can be post weld heat treated to restore their original heat treated properties.

When making an assembly by welding an aluminium casting to wrought aluminium alloy, the strength of weldment will be controlled by the lower strength heat affected zone. If heat treatable alloys are joined and a post weld heat treatment and artificial aging practices is an important criteria in selection of cast and wrought alloys. The selection of filler metal for cast to wrought alloy weldment is normally decided based on application requirements.

For highest strength and greatest ductility .castings with high silicon content should be welded with Al Si filler alloy such as 4043. Cast or wrought alloys having high magnesium content should be welded with AL -Mg filler metal., such as alloy 5356. Mixing large amounts of magnesium and silicon in the weld metal will result in the formation of large quantities of magnesium silicide, which increases susceptibility to weld cracking and may affect corrosion resistance.

Welding a high silicon content casting alloy such as 356.0 to high magnesium content wrought alloy such as 5083 should be avoided. Whether a 4XXX series or a 5XXX series filler metal is selected the magnesium - silicon problem will occur in one of weld transition zones. Best overall performance is experienced when joining a 5XXX wrought alloy to 5XX.0 casting alloy. The 3XX.0 and 4XX.0 cast alloys can be joined to 1XXX, 2XXX, 3XXX, 4XXX and 6XXX series wrought alloys with 4XXX series filler metal.

When welding thick to thin sections, thermal strains may result in cracking or distortion. It may be necessary to preheat the casting for welding. The temperature used depends upon the casting alloy and prior heat treatment, but it is generally between 205°C to 485 °C

Election of filler rods and wires for TIG and MIG welding

	LM 25	LM 20	LM 9	LM 6	LM 5	LM 4
Parwat Metal Combination						
1070, 1200, 1350 5251, 5454, 6082, 6061, 6063	4043	4043	4043	4043	5356	4043
5083	4043	NR	4043	NR	5356	4043
7020	NR	4043	NR	NR	5356/5556	NR
LM4	4043	NR	4043	4043	NR	4043
LM5	NR	4043/4047	NR	NR	5356/5056	NR
LM6	4043/4047	4043/4047	4043/4047	4043/4047		
LM9	4043/4047	4043/4047	4043/4047			
LM20	4043/4047					
7M 25	4043/4047					

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