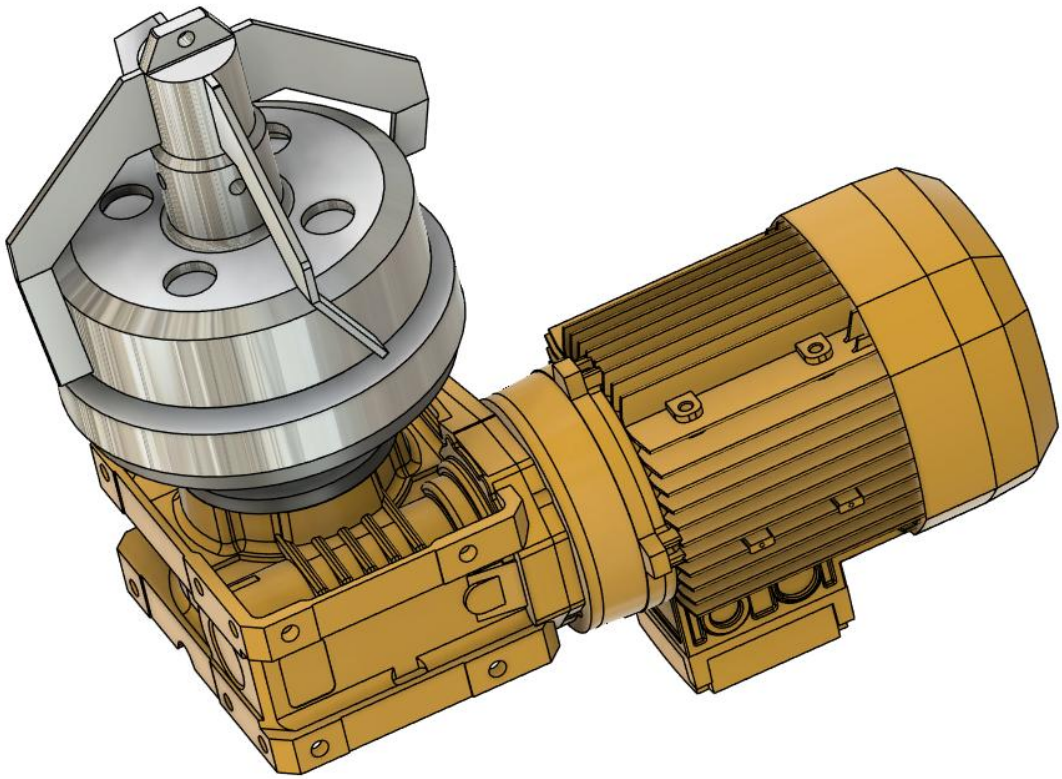
Unit No10
Trent Industrial Estate
Wetmore Road
Burton On Trent
Staffordshire
DE14 1QY
United Kingdom
Telephone: 01283 543431
Email: information@magmix.co.uk
Website: www.magmix.co.uk

APPENDIX A

Vessel Mixer Pad Positioning And Welding Instructions Models: MM4, MM6, MM8, MM12 MM20, MM32 & MM64D



Important

These instructions should be read completely and fully understood before commencing any work. Magmix Engineering inspection procedures ensure that all weld plates are machined from billets with traceable material mill certificates. They are individually inspected prior to dispatch. Magmix Engineering do not take any responsibility/liabilities arising from faulty workmanship in relation to the welding of the mixer pad. Magmix personnel are available if you have any queries or require extra guidance. The methods detailed in this appendix have been developed and found to give minimal distortion to the mixer pads.

The welding of these mixer pads must only be carried out by a suitably qualified and experienced welder.

The Bearing if fitted must be removed from the pad by unscrewing the retaining nut anti-clockwise before carrying out any work.

There are two types of Vessel mixer pad for the MM4 & MM6 MagMixers; both are only suitable for welding into shells up to and including 6mm in thickness.

For the MM8, MM12, MM20, MM32 & MM64D models, there are three types of pads. Types 1 and 2 are for welding into shell thicknesses up to and including 6mm, while Type 3 is for shells, 6mm up to 10 mm in thickness.

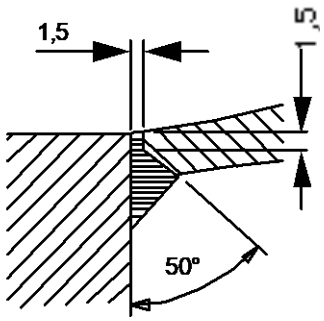
If the shell thickness is outside the range of any of these thicknesses, contact Magmix Engineering to discuss the possible supply of special mixer pads.

The different pad types pertain to alternative forms of weld attachment (See Figure A-1). In all cases, TIG welding is the only weld process that should be adopted. The appropriate filler wire should be used, (e.g. for 316L shell and pad use BS2901 316S92 TIG wire). The key to success is to put the minimal amount of heat into the weld.

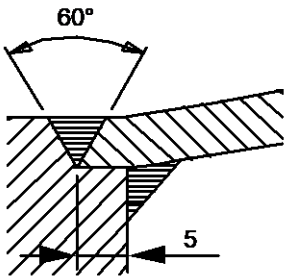
In order to reduce possible distortion to the Mixer pad an aluminium blanking plate is to be made up. This should be placed in the register in the mixer pad during the welding process and not removed until the metal has cooled down to ambient temperature. A tapped hole is incorporated which when fitted with a suitable bolt can be used for the purpose of extracting the blanking plate should it become stuck in the pad.

Where the MM32 & MM64D mixers are to mount in relatively thin vessel shells it may be necessary to fit a suitable bracket to support the weight of the motor.

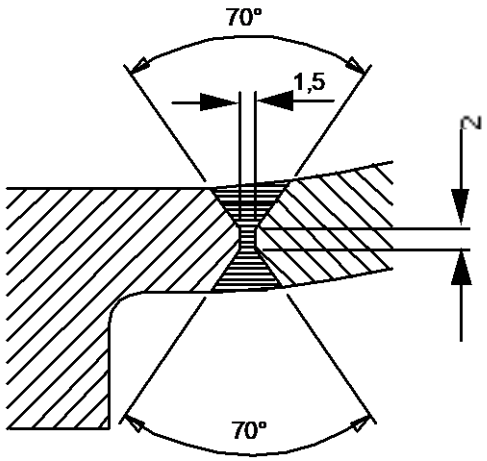
Before cutting the hole in the dishing for the mixer pad all other welding of fitments should have been carried out.



Type (1) Pad Set-in attachment
(All Models)



Type (2) Pad Set-on attachment
(All Models)



Type 3 Pads Double "V" Butt weld
(MM8, MM12, MM20, MM32 & MM64D Models)

Figure A-1 Types of Welding attachment

MIXER PAD POSITIONING

The mixer pad should be placed in a position on the dished end such that the following rules are met:

(1a) Models MM4 & MM6 utilise a Triclamp type connection and therefore the pad may be orientated in any position.

(1b) Models MM8 and MM12 have two mounting studs in the mixer pad. The normal orientation of the mounting studs is as shown in Figure A-2a. This puts the axis of the mixer on the centre line of the vessel.

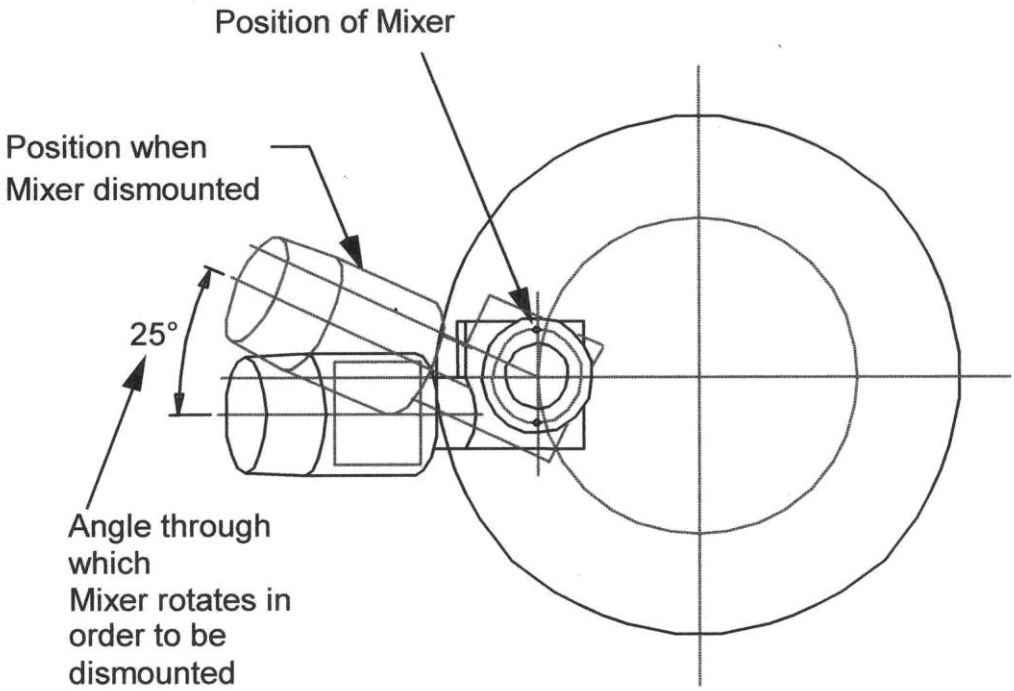


Figure A-2a Mixer position viewed from top of vessel

(1c) Model MM20 has three mounting studs in the mixer pad. The normal orientation of the mounting studs is across the vessel centre line (see Figure A-2b). This puts the axis of the mixer on the centre line of the vessel.

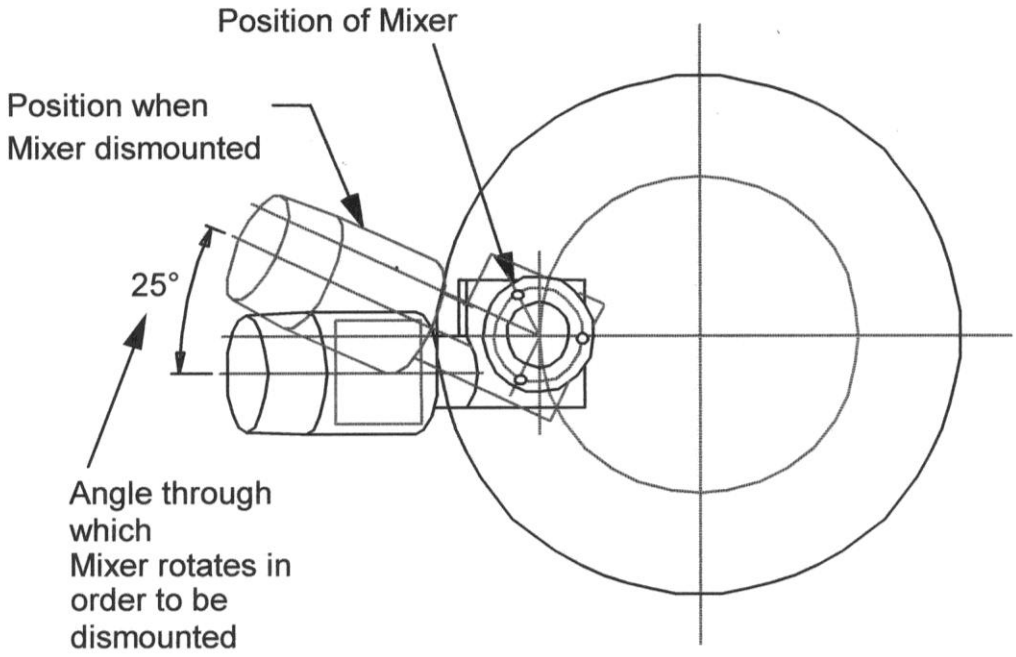


Figure A-2b Mixer position viewed from top of vessel

(1d) Models MM32 and MM64D are bolted to mixer pad and are not designed for quick removal due to the size and weight of the drive unit. The normal orientation of the mounting bolts is off centre of the vessel centre lines (see Figure A-2c). This puts the axis of the mixer on the centre line of the vessel.

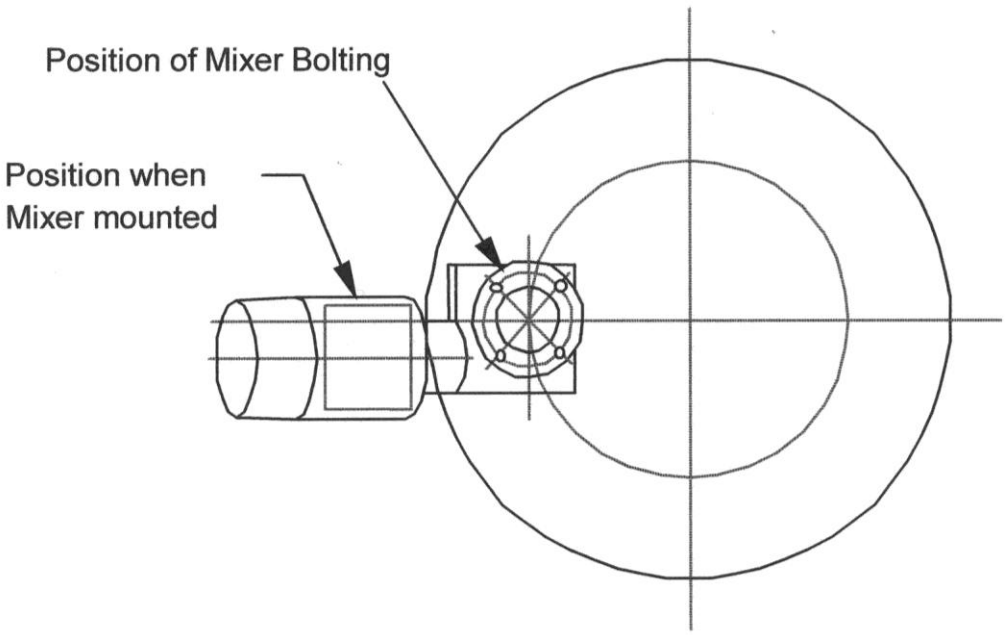


Figure A-2c Mixer position viewed from top of vessel

(2) Where pads are being welded into pressure vessels, the appropriate Pressure Vessel code requirements must be met. For vessels being designed and constructed to B.S.5500 the outermost part of the pad must be within 10% of the vessel diameter (see Figure 3.5.4(0) of BS5500).

(3) The distance between the weld of the pad and any other welds must be at least 4x (15mm minimum) the shell thickness.

(4) The mixer pad must not be positioned such that it passes through any weld seams in the vessel end.

(5) For non pressure vessels, welding into the knuckle region of the dished end must be avoided.

(6) The mixer pad should be positioned so that its axis passes through the centre of the vessel at approximately 2/3 of the liquid depth.

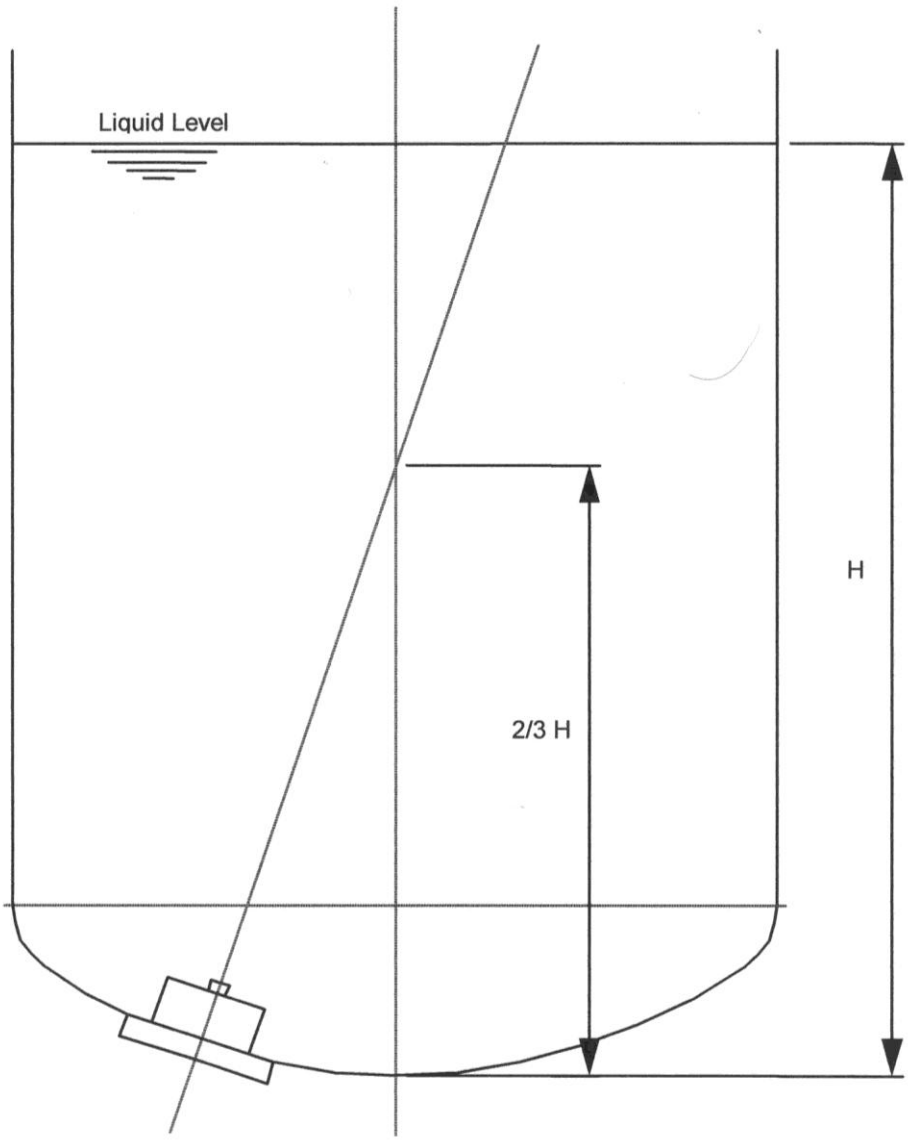
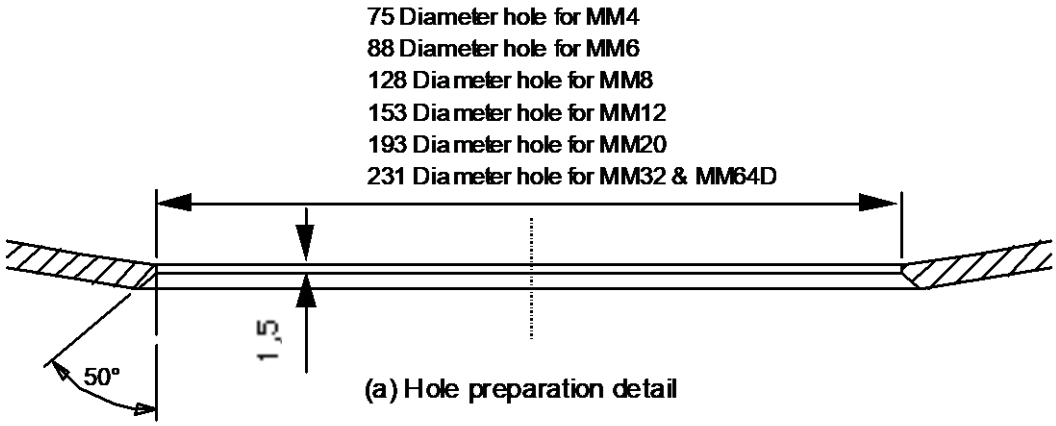


Figure A-3 Mixer position in bottom head

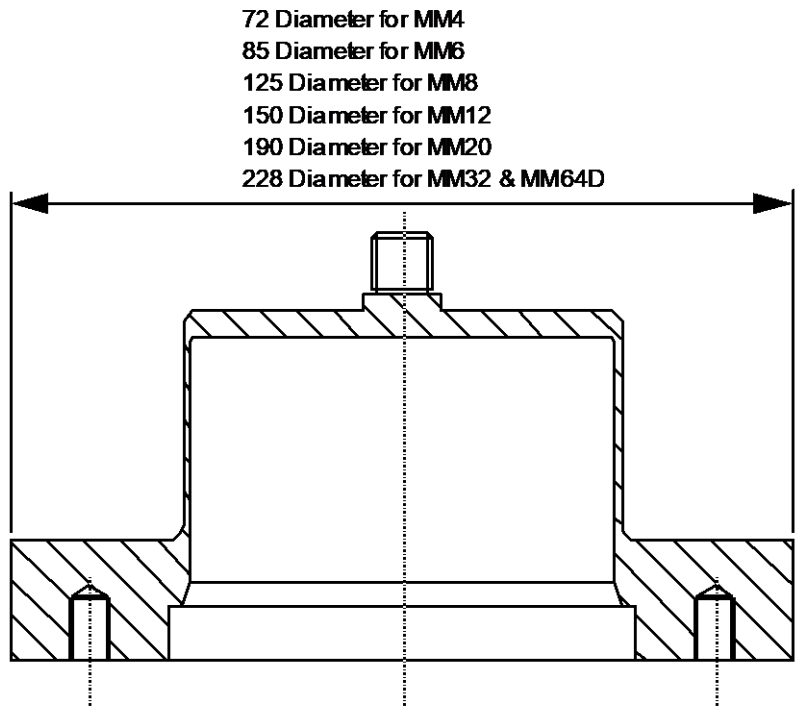
Type (1) Pads - Set-in Attachment

Preparation of hole in dished head

Refer to figure A-4: Once the location of the weld plate has been determined a hole should be marked out on the outside of the end. The hole should be made by plasma cutting, ensuring it is cut undersized, and then ground to produce the weld prep. It is essential that an even gap is maintained around the pad.



(a) Hole preparation detail



(b) Standard Type 1 Mixer pad

Figure A-4 Type (1) Preparation Details

Type 1 - Welding Procedure

For this method it is essential that a good argon purge is obtained in order to produce an unoxidised root penetration. A suitable cup arrangement should be made up that covers the entire pad, which can be sealed and placed on the inside and outside of the head.Firstly place the cup on the outside of the head. The pad should be positioned in the hole ensuring it is orientated correctly. With a full argon purge, tack weld from inside the vessel at eight positions in the sequence illustrated in Figure A-7. The pad should be checked at this stage, ensuring that it lies flat and flush onto the inside of the head.

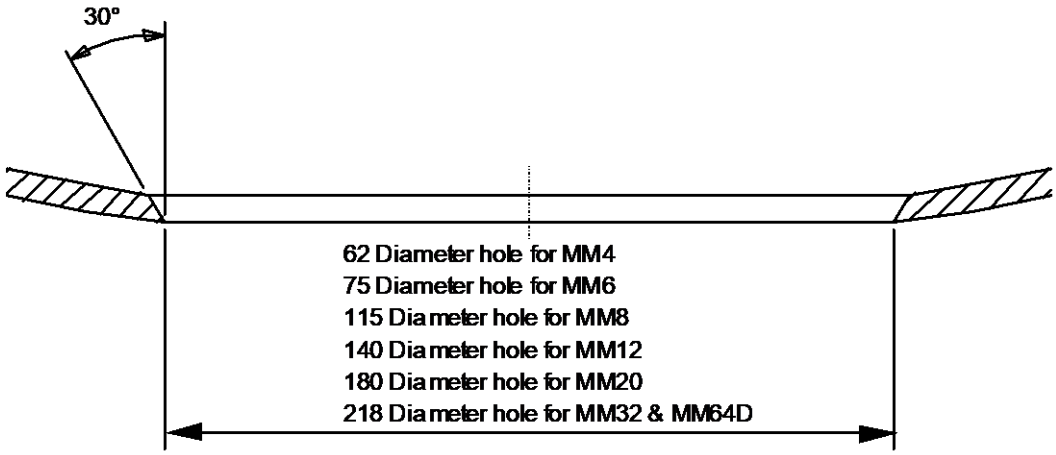
Secondly the cap should be positioned on the outside of the head, sealed and purged with argon. Refer to Figure A-8. From inside the vessel do a continuous 360° TIG root run from point A using 1.6 mm diameter filler wire at 30 to 40 Volts/110 to 120 Amps . Carry out a second run from point B. If required a third run should then be carried out from point A to build up the fillet weld.

Type (2) Pads - Set-on Attachment

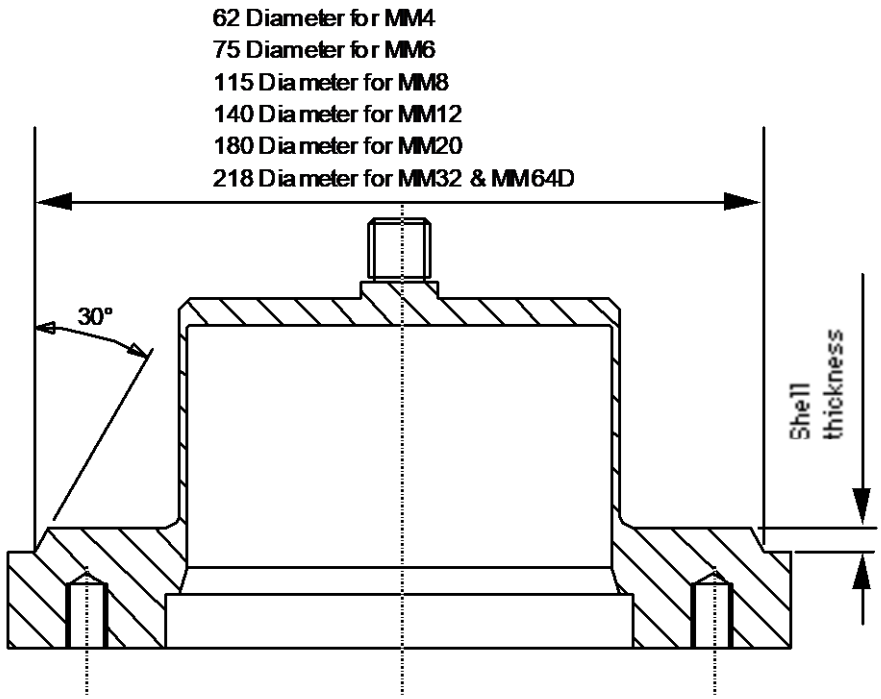
Preparation of hole in Dished Head

Refer to figure A-5: For this type of attachment the Mixer pad requires a shoulder to be machined on to it as illustrated in Figure A-4. The pad may be supplied with a shoulder if requested at the time of ordering.

Once the location of the weld plate has been determined a hole should be marked out on the outside of the end. The hole should be made by plasma cutting, ensuring the hole is undersized, and then ground to produce the weld prep. It is essential that an even gap is maintained around the pad.



(a) Hole preparation detail



(b) Machining detail for mixer pad shoulder

Figure A-5 Type (2) Preparation Details

Type 2 Pads - Welding Procedure

The pad should be positioned in the hole ensuring it is orientated correctly and tacked from inside the vessel at eight positions in the sequence illustrated in Figure A-7. The pad should be checked at this stage, ensuring that it lies flat on to the end.

Refer to Figure A-8. From inside the vessel do a continuous 360° TIG root run from point A using 1.6 mm diameter filler wire at 30 to 40 Volts/110 to 120 Amps . Carry out a second run from point B. If required a third run should then be carried out from point A.

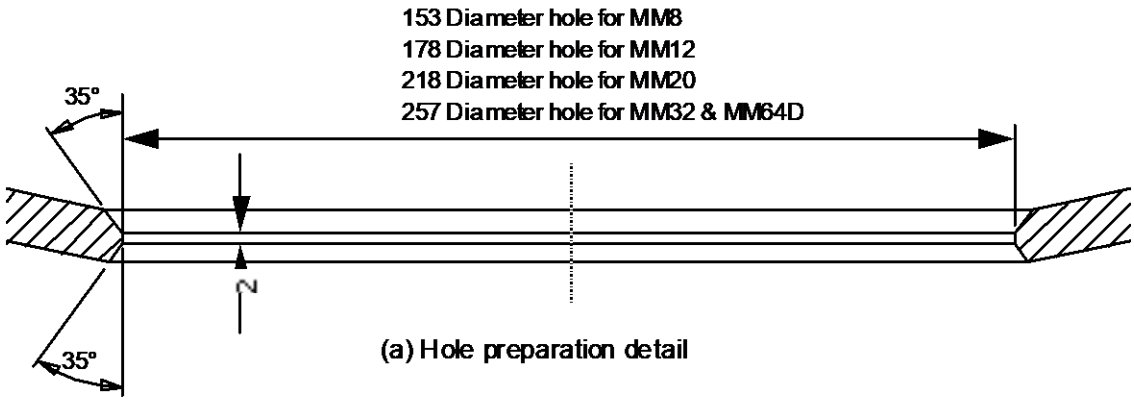
Finally the end should be turned over and a continuous 360° TIG fillet weld laid around the pad using 1.6 mm diameter filler wire. If necessary this weld can be built up in two or three runs.

TYPE (3) MIXER PADS

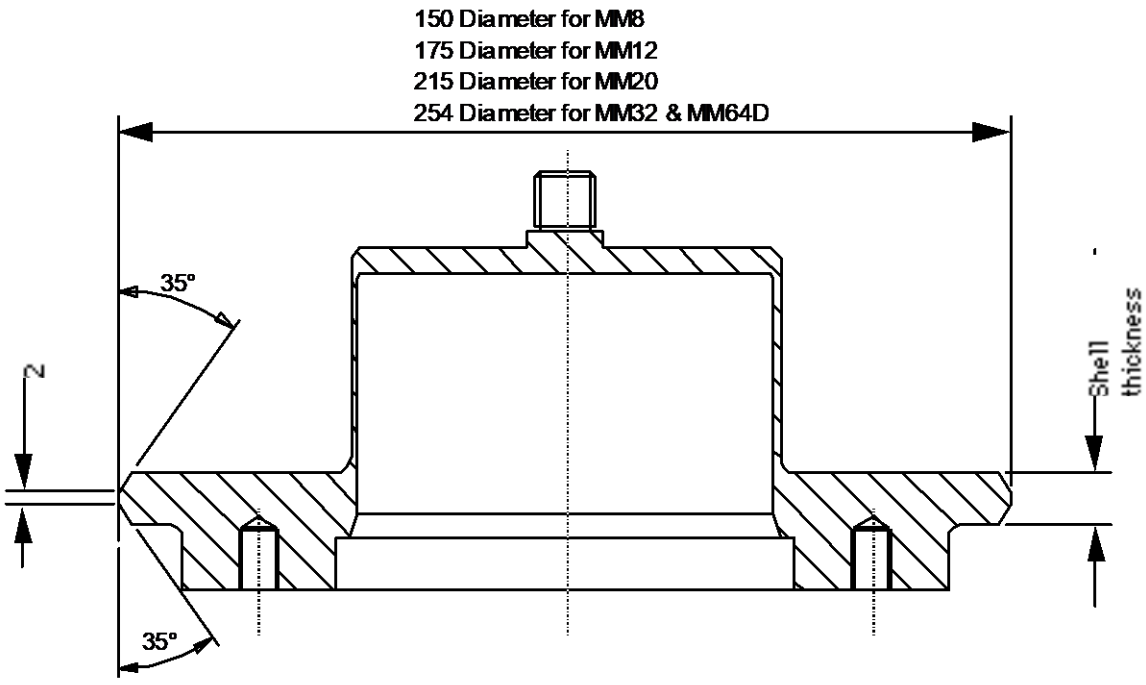
This weld attachment is a Set-in type with a Double 'V' butt weld. This reduces possible distortion by balancing out the welding.

Preparation of hole in dished head

Refer to figure A-6: Once the location of the weld plate has been determined a hole should be marked out on the outside of the end. The hole should be made by plasma cutting, ensuring it is cut undersized, and then ground to produce the weld prep on the inside and outside of the hole. It is essential that an even gap is maintained around the pad.



(a) Hole preparation detail



(b) Type 3 Mixer pad machining details

Figure A-6 Type (3) Preparation details

Type 3 - Welding Procedure

For this method it is essential that a good argon purge is obtained in order to produce an unoxidised root penetration. A suitable cup arrangement should be made up that covers the entire pad, which can be sealed and placed on the inside and outside of the head.

Firstly place the cup on the outside of the head. The pad should be positioned in the hole ensuring it is orientated correctly. With a full argon purge, tack weld from inside the vessel at eight positions in the sequence illustrated in Figure A-7. The pad should be checked at this stage, ensuring that it lies flat and flush onto the inside of the head.

Secondly with the cap still positioned on the outside of the head, sealed and purged with argon. Refer to Figure A-8. From inside the vessel do a continuous 360° TIG root run from point A using 1.6 mm diameter filler wire at 30 to 40 Volts/110 to 120 Amps . Carry out a second run from point B. If required a third run should then be carried out from point A to build up.

Thirdly the weld should be examined on the inside of the head and if necessary, ground back to sound metal. The cap should be positioned on the inside of the head, sealed and purged with argon. Refer to Figure 7. From outside the vessel do a continuous 360° TIG root run from point A using 1.6 mm diameter filler wire at 30 to 40 Volts/110 to 120 Amps . Carry out a second run from point B. If required a third run should then be carried out from point A to build up.

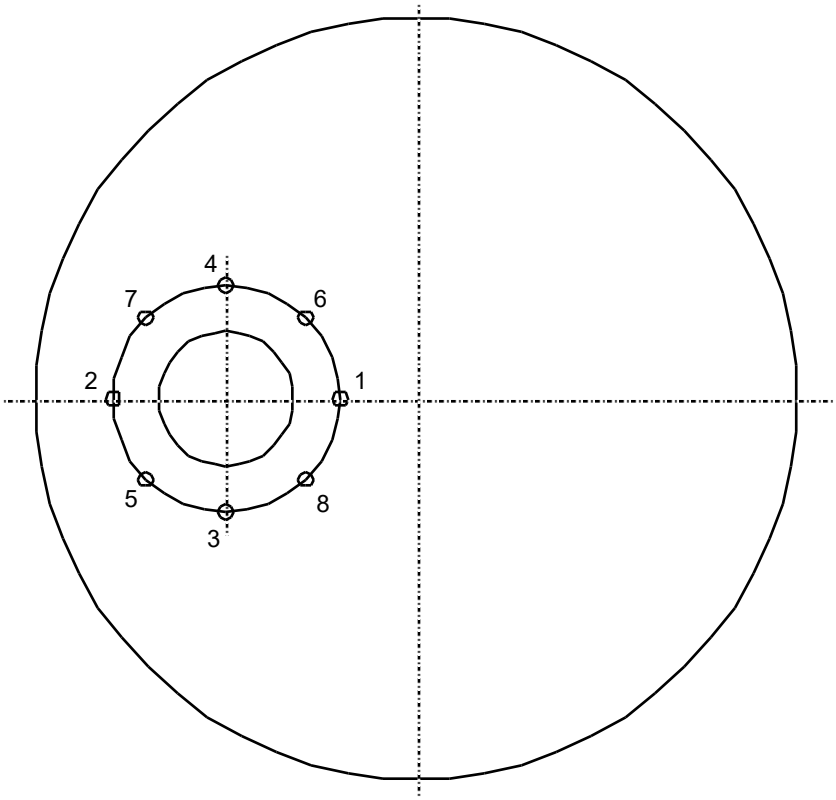


Figure A-7 Sequence for tack welds

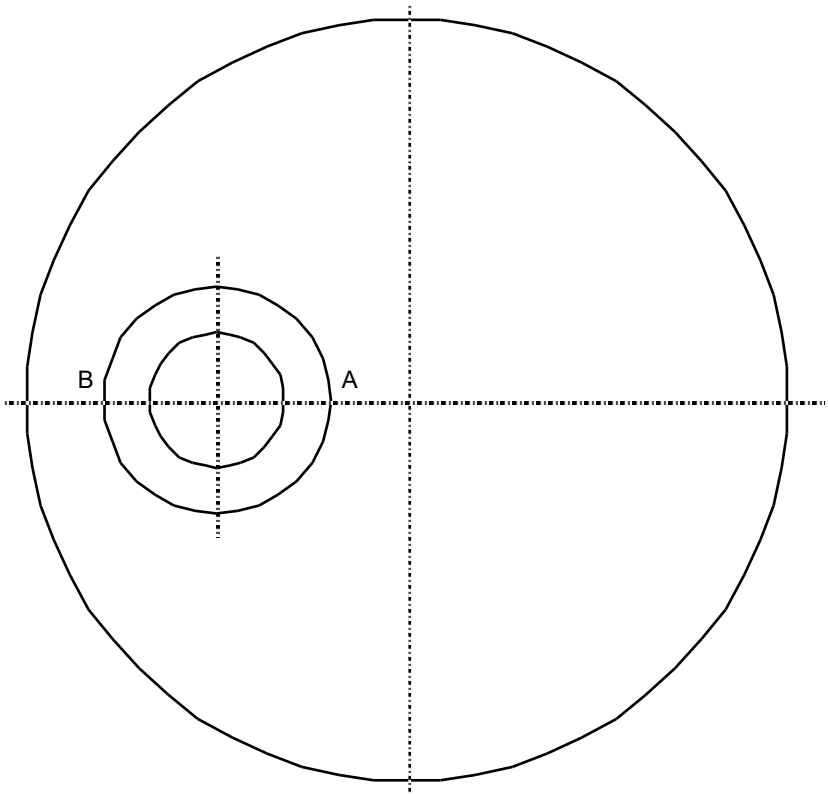


Figure A-8 Continuous root runs

Final Grinding and Polishing Stage

After the head and mixer pad has been allowed to cool naturally at room temperature, the welds should be ground and polished to the required finish. If necessary any pit holes should be spotted up and re-polished.