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## ASME VIII – MKII – CLAMPS

[Design code Appendix 24 to ASME Boiler and Pressure Code – Section VIII / Div 1](#)

### Instructions

The following itemises the instruction to be followed for the correct installation and use of Advanced Couplings Limited Extra Heavy ASME VIII clamp pipe coupling.

#### **Application:**

The coupling shall be used at an operational temperature and pressure as quoted in the company's publications and under no circumstances shall these values be exceeded.

The coupling shall be used with hubs (ferrules) and gasket seals which have been specifically designed for the purpose and to sizes/materials as used in the joint calculations. Where ferrules are supplied by others, it shall be their responsibility to ensure that they conform to the ASME VIII design code.



**The ASME VIII CLAMP**

The clamp is designed to meet the requirements of the design code with respect to bolt retainer, bolts sizes, material certification etc.

Where not supplied by ACL care must be taken to ensure that bolts and nuts used for the assembly are of a size, type and material as called for in the written specification.

All sliding surfaces shall have a light coating of lubricant, this to reduce the friction between the two surfaces, prevent galling or seizure and increase clamping efficiency.

#### **Assembly:**

With the two ferrules and gasket assembled the clamp shall be placed around the ferrule flanges and closed to encapsulate the assembly. Two Bolts shall be inserted into the double bolt lug and nuts affixed. With the nuts located in the stepped recess the bolts shall be lightly tightened to achieve a gap of approximately 4 to 5 mm between the two clamp segments.



The clamp can only fit correctly (segments forming a circular geometry) in one position and this ideally occurs in the fully tightened state. From the initial un-tightened assembly the clamp compresses the two ferrules by about 0.9 to 1.3 mm at the fully tightened position.

This means that the two segments cannot have circular geometry in the unclamped state and as one end is fixed the lugs through which the two tightening bolts pass must be open with the bolt hole centres out of alignment. The bolt holes clearance is designed to allow for this.

If for some reason, such as oversize elements, the bolts centre alignment is so great that the bolts cannot pass through the two segments it becomes impossible to tighten the joint by using the bolts to close the assembly.

Should there be a problem with initial fitting the bolts due to the two segments being too far open (and the holes misaligned). It is recommended to use a smaller size bolt (M10 or 7/16") to pull the two segments together until the holes are aligned, whence the correct 1/2" bolts can be fitted. This procedure also prevents the final assembly bolts from being damaged.

The third bolt (at the hinged side) should then be inserted and a nut attached. With this nut engaged in the stepped recess the bolts shall be loosely tightened to give a gap of approximately 4 mm between the two clamp segments.

With the clamp thus assembled, the two-bolt end bolts shall then be torqued alternatively by 1/4 turns until the specified torque value to produce the final assembly. Torque shall be controlled using a torque wrench set to a value of between 80/100 Nm. (It will be necessary to tighten the bolts in sequence several times until both bolts are tightened to the same value). Once the two-bolt side is fully torqued the single bolt end shall be tightened to full torque. With all bolts tight the locking nuts shall be tightened down to prevent nuts coming loose.

With the high torque values it may be found that the nut will not be fully retained in the stepped recess. When this is the case the nut should be held with a spanner to prevent turning.

The main aim of this tightening procedure is to ensure that the clamp segments are evenly clamped at both sides and that there is no load on the hinge plate once fully assembled. Also that the maximum pre-load is applied to bolts to satisfy the design pressure.

Checks shall be made to ensure that:

- a. The two clamp segments have a gap between them and that metal to metal is not achieved.
- b. The inside diameter of the clamp segments is not touching the outside diameter of the hub (ferrules) to which they are attached.
- c. The hinge plate is not loaded (it should be loose to the touch with clearance between the two pins).



**Gasket Seal:**

The calculations for clamp stresses were based on using a flat-face self energising elastomer seal with hardness in the range 70 to 75 Shore A. Care must be taken to ensure that gasket seals of different composition or hardness are not used without due consideration of the effects on the working stresses of the clamp.

**Gasket Fit:** Because of the extreme forces generated by this clamp, when used with a standard elastomer gasket there is excessive compression of the gasket (the gasket width can be reduced to a little as 0.7 mm, this against a normal typical compressed width of 1.5/1.6 mm). This situation could be even worse if the gasket hardness is below 75 shore A.

This results in excessive extrusion of the elastomer material into the bore area of the joint. This is obviously not desirable as the flow characteristics across the joint are impaired and bacteria build up can occur, with also poor cleanability (CIP). The bore of the gasket should therefore be specially sized such that when fully compressed the bore is equivalent to the ferrule bore.

**Ferrules (HUBS) design**

The ferrules (hubs) which are to be used with these ASME VIII clamps shall ideally be designed in accordance with the ASME design code (under 24.1c). Here the hubs shall be metal to metal contact, preferably using a recesses face {Fig 24.1(c)} to give both the metal to metal contact and provide a housing for the gasket. The recesses shall be equal in both hubs and so provide a method if aligning the two hubs. Where standard (Tri-Clamp type) full face gaskets, with location bead, are used there may be some loss of the joints performance.

**Hub Sizes:**

The clamps are designed to fit the following hub tube outside diameters. Where thicker wall tubing is used care must be taken to ensure the clamp has sufficient clearance over the tube. If the tube outside diameter is greater than the tabulated sizes the hub shall be recessed to provide clearance, this will extend for a distance >25 from the face of the hub.

Nominal Size (ins)	4	6	8	10	12
Maximum tube o/d (mm)	106	154	206	256	306

Pressure Ratings: The ACL ASME VIII – Clamps have been designed for the following

Nominal Size (ins)	4	6	8	10	12
Pressure Rating at ambient-bar	50	27	16	10	7
Pressure Rating at 121°C-bar	41	22	13	8.1	5.7
Pressure Rating at 232°C-bar	34	18.5	10.9	6.8	4.8