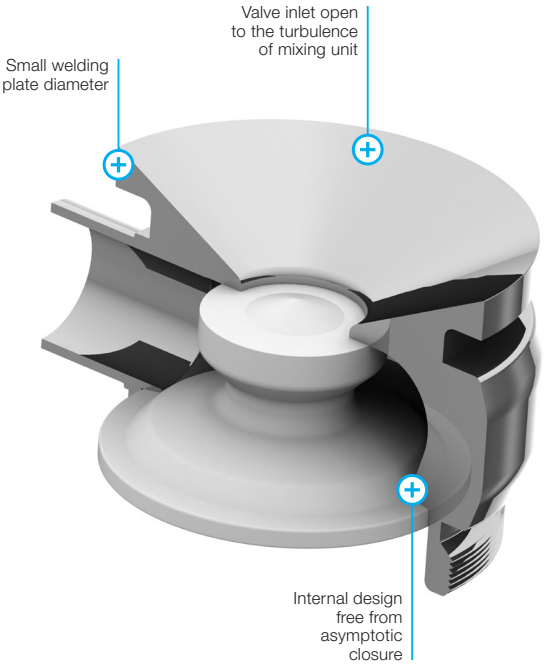
CAD

CLEAN & ASEPTIC DESIGN

WELDING GUIDELINES FOR CAD BOTTOM TANK VALVES

RATTIINOX

ASEPTIC EQUIPMENT - DESIGN & SUPPLIER


Valve inlet open
to the turbulence
of mixing unit
Small welding
plate diameter
Internal design
free from
asymptotic
closure

INDEX

1. General

The following guideline is a recommendation on how to avoid valve deformation when welding CAD Bottom Tank Valves into dished ends.

Before starting to weld, please check that all necessary documents for final approval of the vessel are available, if not contact Rattiinox Documentation Service: info@rattiinox.com

CAD BTVs are highly sensitive to deformation when welded to dished bottom ends. Please follow these instructions to prevent valve deformation that will compromise sealing effectiveness.

> Important: these instructions must be read carefully and fully understood before the valve is welded to the dished bottom end.
> All prohibitions must be followed.
> Any negligence following these instructions can generate damage to the equipment.

> The adopted welding procedure must comply with the designated pressure vessel code and applicable rules.

The scope of the welding procedure described below is to avoid the release of tension forces by the dished end that could cause deformation of the **CAD BTV**.



In addition to the welding procedure described below,
pay attention to the following points:

- Welders must hold a valid welding license for the method and relative thickness involved and must be familiar with this type of welding operation.
- The dimensions of the filler material, the electrical welding current and heat condition are very important and must be selected carefully.
- During welding, it is most important that the applied heat is well balanced and is evenly distributed along the weld seam.

The following instructions must be considered as an aid to the welding work.

2. Positioning of the CAD BT Valve

2.1 Orientation

Outlet piping must be oriented so as not to interfere with other equipment under the vessel.

Check that there is enough space to assemble and remove the valve actuator and space to connect outlet piping (similarly for any satellite valve, if applicable).

2.2) Free distance between welds

The minimum distance between two welds (figure 1-D) should satisfy the applied rules for construction.

2.3) Location

Generally, for better vessel drainage, the **CAD BTV** should be positioned with it's axis in the center of the dished bottom end. It can also be placed elsewhere on the bottom of the vessel, but if the project foresees this position outside the large radius R2 (or the free distance between welds is not respected – point 2.2) calculations must be done to determine the need for reinforcement in that area (Fig. 1).

2.4) Alignment

When **CAD BTV** is to be welded to the center of dished bottom end, check that it is welded flush with the inner surface to optimize drainage.

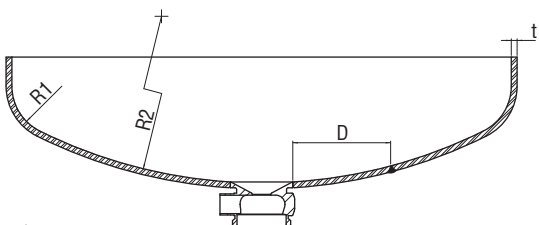


Fig. 1

2.5) Making the hole for the CAD BTV

The hole must have the same diameter as the **CAD BTV** without air gaps (hole diameter tolerance +0.5mm / +1.0mm - Fig. 2).

The outside edge of the hole must be ground with a 45° external chamfer to create a weld groove.
A straight edge of approx. 2mm should be left on the inner edge (Fig. 3).

If the dished bottom end is thicker than the welding flange of the valve, the valve should be placed as shown in Fig. 3.

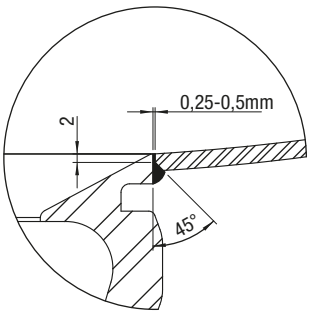


Fig. 2

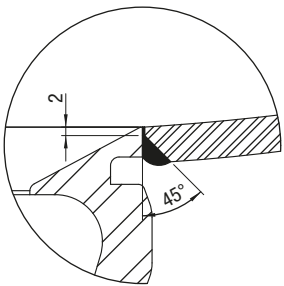


Fig. 3

It is vital that all welding activities involving other equipment (sensors adapters, sampling port, etc.) and the dished bottom end is completed **before** making the hole for the **CAD BTV**.

3. Welding (Example for 1” CAD BTV)

> These instructions are to avoid deformation of the **CAD BTV**.

3.1 Before Welding

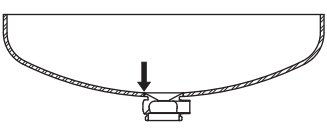
- Check that the stamped reference heat number on the **CAD BTV** is the same as on the certification documents.
- Use TIG welding method if this conforms to the vessel certification rules.
- Use filler material appropriate for the materials of the **CAD BTV** and dished bottom end.
- Welders must have valid licenses to weld according to the method and relative thickness involved.

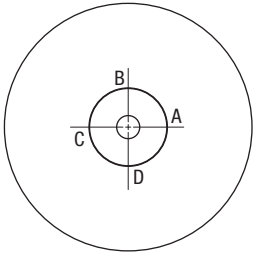
Welding parameter: don't exceed welding current of 85-90 Amper.

3.2 Positioning and tack welding the CAD BTV

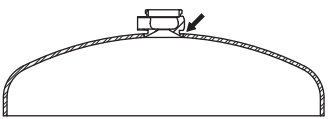
Set position of **CAD BTV** into the pre-machined hole so that the inner surface is flush with the dished end inner surface.

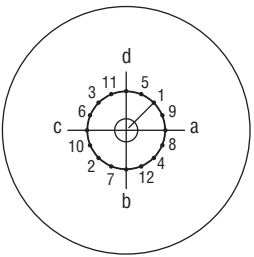
- **Step 1 - From the inside**
  Tack-weld at A and C, without filling material. Check alignment with inner surface. If necessary, correct.
  Then, tack-weld at position B and D





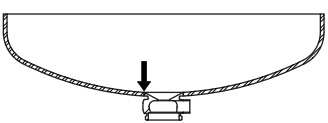
- **Step 2 - from the outside**
  Turn upside down the dished bottom end on a plain working table and fill it with Argon gas (keep a certain gas flow during the welding). Tack-weld crosswise, without filling materials. Start with a then c then b then d. Next follow the numbers from 1 to 12.

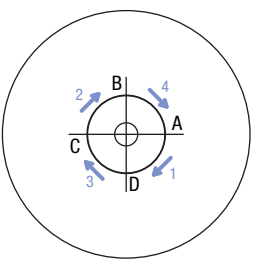




3.3 Final Welding (from the inside).

Turn the dished end to weld from the inside.
With the aid of filler material, apply one continuous weld layer A to D.
Then, apply the next layer from C to B, D to C and B to A.
Between one weld and the next, let cool until maximum “hand-hot” (i.e. you can leave your unprotected hand on the weld without burning yourself).





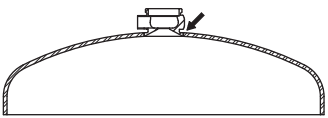
Don't overheat during weld,
there is a potential risk of deformation!

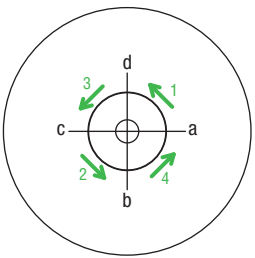
3.4 Final Welding (from the outside)

Turn the dished end to weld from the outside with filler material.
Start to weld from a to d, then apply the next layer from c to b, d to c and b to a.
Between one weld and the other let cool for the necessary time (i.e. maximum hand-hot as previously).
With the aid of filler material, apply one or more continuous weld layer (as shown above).

The procedure must be followed until the weld groove is filled as required by the building requirement foreseen from the code of the pressure vessel.

Don't overheat during weld, there is a potential risk of deformation!





Attention

The division of the final welding into segments depends on the size of the valve. The main concept is not to overheat the **CAD BTV**.

Consider the following data in order to avoid overheating of the valve:

UP TO 1": Divide the welding into quarters
FROM 1.1/2" TO 2": Divide the welding into eighths
2" UP: Divide the welding into sixteenths

Do not weld 2 consecutive segments but alternate one side and the other of the welding flange.

4. Cooling

When the welding is finished leave the dished bottom end section and **CAD BTV** to self-cool.

5. Grinding / Polishing

After cooling, the welds can be ground, polished and finished as required by the construction specification.
Grinding of the valve seat (closure area) and all internal surfaces of the **CAD BTV** is expressly prohibited.

6. Final control

When the dished bottom end has cooled to room temperature, and all welding and polishing activities are finished, a check should be made that the **CAD BTV** is not deformed.

This check can be done by accurate measurement with the aid of a gauge, measuring from different radial points of the valve seat to the top of the actuator-mounting thread.

Tolerance of sealing surface flatness of diaphragm must not exceed 0,08 mm.

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