

# Weld plate welding guidelines

STD0019EN00

**APPLIES TO:** Steridose products Sterimixer<sup>®</sup>-Low-Shear, Sterimixer<sup>®</sup>-Medium-Shear, Sterimixer<sup>®</sup>-ATEX, Sanimixer<sup>®</sup>.

## CONTENTS


<b>1</b>	<b>Important safety information</b>	<b>2</b>
1.1	Introduction . . . . .	2
1.2	Safety terminology and symbols . . . . .	2
1.3	General safety . . . . .	2
1.4	User safety . . . . .	2
<b>2</b>	<b>General installation guidelines</b>	<b>3</b>
2.1	General considerations for installation of weld plates into vessels . . . . .	3
2.2	Preparing the hole in the dished end . . . . .	3
<b>3</b>	<b>Tack welding the weld plate</b>	<b>3</b>
<b>4</b>	<b>Final welding &amp; Heat Sink instruction</b>	<b>5</b>
<b>5</b>	<b>Post-welding installation steps</b>	<b>6</b>
5.1	Using the gauge tool to verify installation . . . . .	6
5.2	Assembly . . . . .	7
5.3	Usage . . . . .	7

# 1. IMPORTANT SAFETY INFORMATION

## 1.1. Introduction

### 1.1.1. Purpose of this manual


Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.


 **NOTICE:** Save this manual for future reference


## 1.2. Safety terminology and symbols


### 1.2.1. Hazard levels and indications

The following symbols are used to indicate hazard levels.

 **DANGER:** Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING:** Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION:** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury, or, a situation that might lead to serious damage to the product or components.

 **NOTICE:** Indicates: A potential situation which, if not avoided, could result in undesirable conditions or contains tips to enhance the performance or facilitate the installation of the product.

### 1.2.2. Hazard categories

Hazard categories can either fall under hazard levels or let specific symbols replace the ordinary hazard level symbols.

 **ELECTRICAL HAZARD:**

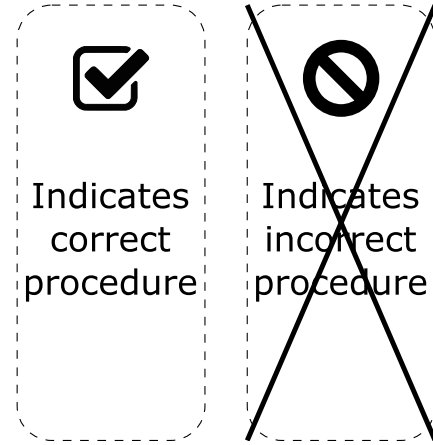
 **STRONG MAGNETIC FIELDS HAZARD:**

 **CORROSIVE AGENTS HAZARD:**

 **HAZARD FOR WEARERS OF CARDIAC PACE-MAKER:**

### 1.2.3. Other symbols used

In situations where confusion could arise, the icons below are used to distinguish between the right and the wrong procedure.



## 1.3. General safety


### 1.3.1. General statement

Undertaking any work covered by this manual may either directly or indirectly create risks to the safety and health of the person undertaking the work or the Sterimixer/Sanimixer and/or its components while the work is being undertaken.


It is the responsibility of the user to ensure that appropriate controls and precautions are identified and applied in relation to the work covered by this document in accordance with relevant statutory, legal and industry requirements to protect the health and safety of the persons undertaking the work.

Neither this document, nor its use, in any way absolves the user from their responsibility to ensure that the controls and precautions referred to in this chapter are implemented.

If, by undertaking any work covered by this document, you become aware of any Steridose product design related feature which could create risk to a person undertaking work or to the Sterimixer/Sanimixer and/or its components please contact Steridose immediately.

 **CAUTION:** You must observe the instructions contained in this manual. Failure to do so could result in physical injury, damage or delays.

## 1.4. User safety

 **WARNING:** This manual cannot replace specific knowledge and adequately trained personnel needed for installing and handling equipment for professional use, such as this product.

### 1.4.1. General safety rules

These safety rules apply:

- Always keep the work area clean
- Pay attention to the risks presented by gas and vapors in the work area
- Avoid all electrical dangers. Pay attention to the risks of electric shock or arc flash hazards
- Always bear in mind the risk of pinching fingers, electrical accidents and burn injuries.

### 1.4.2. Safety equipment

Use safety equipment according to the company and local regulations.

### 1.4.3. Electrical connections

Electrical connections must be made by certified electricians in compliance with all international, national, state and local regulations. For more information about requirements see the relevant sections dealing specifically with electrical connections (if applicable).

### 1.4.4. Hazardous liquids

The product is designed for use in liquids that can be hazardous to your health.

**WARNING:** Make sure that all personnel who work with hazardous liquids use suitable protective equipment.

### 1.4.5. Specific operational hazards

Specific operational hazards are listed under its respective section.

### 1.4.6. Specific hazards while performing maintenance

Specific hazards while performing maintenance on the product are listed under its respective section.

## 2. GENERAL INSTALLATION GUIDELINES

**CAUTION:** Incorrect welding procedure may deform the weld plate which in turn will render the mixer inoperable. The guidelines provided will help prevent deformation of the weld plate.

**NOTICE:** The guidelines in this manual are of a general nature and can never replace a properly trained welder.

**DANGER:** Make sure the vessel complies with all relevant international and local requirements on pressure vessels.

### 2.1. General considerations for installation of weld plates into vessels

**NOTICE:** It is usually easier to install the weld plate in the vessel's dished end before the jacket and the dished end are welded together. Repeat the post-welding checks (section 5) after all welding has finished.

**CAUTION:** With the exception of the jacket (see above), it is important that *all other welding on the dished end is finalized before the hole for the weld plate is made.*

Figure 1 shows a typical arrangement of a mixer and a bottom outlet valve in the dished end of a vessel.

Some design and installation considerations are listed below:

1. In the vast majority of cases, the bottom outlet valve (BOV) will be installed in the center of the dished end, at its lowest point.
2. The mixer will be installed with its drive unit (usually the motor) pointing outward.

3. Orientation of the weld plate is important since the drive unit slots for mounting the drive unit, have to line up with the corresponding pins/bolts on the weld plate. In figure 1, letters *a* and *b* indicate the slot/pin positions for mixer sizes 60, 85 and 120. Similarly, *a*, *b*, *c* and *d* indicate the position of the lock nuts for mixer sizes 120H and 210.
4. Keep in mind that in order to mount and dismount the drive unit, the drive unit should have room to be turned the required angle, without interfering with other equipment, pipes, or the vessel's legs (see figure 1).
5. Mixing performance is highly dependent on geometry. Please follow Steridose indications on height:diameter ratio of the vessel (1:1 to 2:1).
6. Recommended weld plate location (refer to figure 1):  
 $d < 1000mm$  Install the weld plate at  $L = 0.5r$ .  
 $d > 1000mm$  Install the weld plate at  $0.3r < L < 0.5r$ .
7. Respect minimal distances between welds as stipulated in local and international regulations for pressure vessels.
8. Respect the minimal distance between the weld and the vessel jacket.
9. Make sure that the position of the weld plate in the vessel is such that no part of the impeller, when installed, would interfere with the vessel wall. See figure 1
10. In general dished end vessel bottoms are easier to work with with respect to getting the weld plate and vessel wall flush with respect to each other. Conical shaped bottoms require more adjustment for a successful installation.
11. The maximum angle with respect to the horizontal reference plane is 30° (see figure 1).

Weld plate size	Design pressure range
All sizes	-1 - +7 bar g (-14.5 - +101.5 psig)

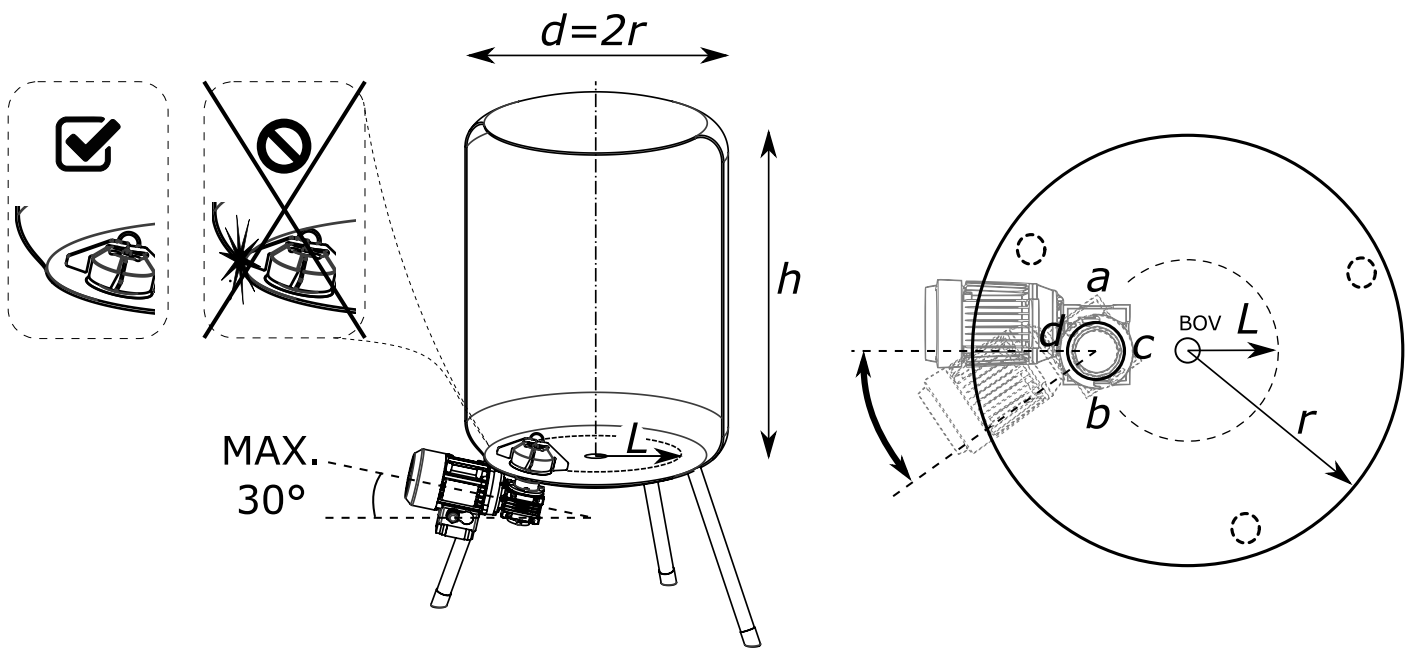
### 2.2. Preparing the hole in the dished end

Taking into account all considerations in section 2.1 proceed to mark the location of the hole on the outside of the dished end. Diameters are listed in table 1.

The hole can then be cut out by using the appropriate equipment and tools. Grind the outside of the hole to a 45° angle, leaving a 1-2 mm straight edge on the inside of the vessel (See figure 2).

**NOTICE:** For vessel walls that have a significantly larger thickness than the weld plate, a different angle or straight-edge-length may be required.

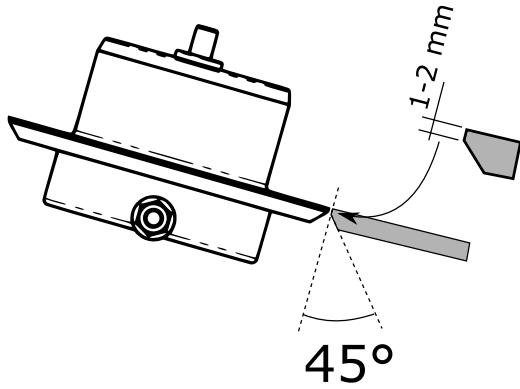
## 3. TACK WELDING THE WELD PLATE



■ **Figure 1** General arrangement of a mixer in the dished end of a vessel. Refer to text for specific installation advice.

Weld plate size	Weld plate diameter (mm)	Maximum hole diameter (mm)
60/75	60	61
85/100-140 & Sanimixer 500	90	91
120/150-190 & Sanimixer 3 000	149	150
120H/220 & Sanimixer 7 000	150	151
210/275-350 & Sanimixer 30 000	280	281

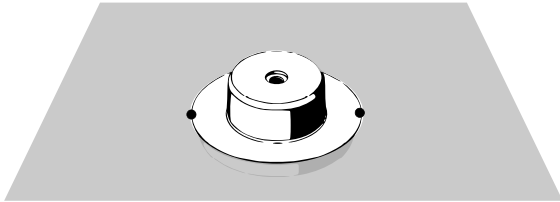
■ **Table 1** Hole diameter specification for different mixer sizes.



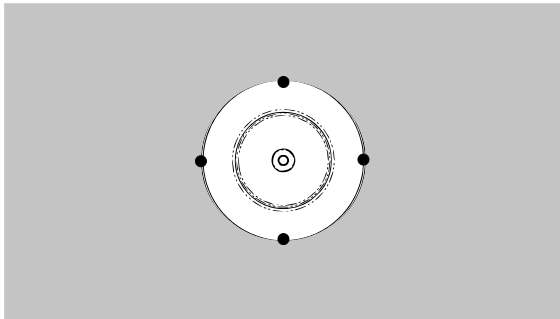
■ **Figure 2** Grind the outside of the hole to a 45° angle, leaving a 1 to 2 millimeter straight edge on the inside.

👉 **NOTICE:** Before welding the weld plate into the vessel, make sure to remove the bearing unit and any other screws and detachable components. Failure to do so might lead to damage to these components.

1. Position the weld plate in the hole, making sure it's completely level and flush with the dished end of the vessel.
2. Tack weld the weld plate in two places on the inside of the dished end, using a correct filler (filler material depends on the weld plate material and vessel material).

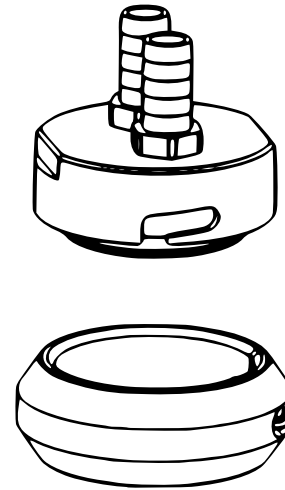


3. Double check that the weld plate is flush with the inside of the vessel wall.
4. Tack weld the weld plate on two more places on the inside.



#### 4. FINAL WELDING & HEAT SINK INSTRUCTION

Final welding is done on the outside of the vessel (as opposed to tack welding in the previous section that is done on the inside.)



■ **Figure 3** Heat sink plate (outside) with the nozzles for cooling-water, alternatively compressed-air, connection and heat sink ring (inside).

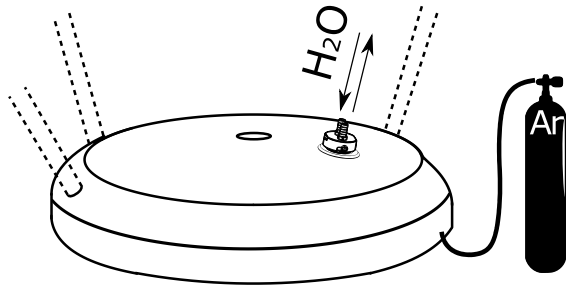
Weld plate size	Heat sink & heat sink plate part number
60/75	111578
85/100-140 & Sanimixer 500	111577
120/150-190 & Sanimixer 3 000	109749
120H/200-220 & Sanimixer 7 000	111575
210/275-350 & Sanimixer 30 000	111576

■ **Table 2** Part numbers for heat sink and heat sink ring for different mixer sizes.



**CAUTION:** For all following steps, the weld plate should be equipped with a heat sink on the inside and a water/air-fed heat sink plate on the outside (see figure 3). Part numbers can be found in table 2. Incorrect welding procedure may deform the weld plate which in turn will render the mixer inoperable.

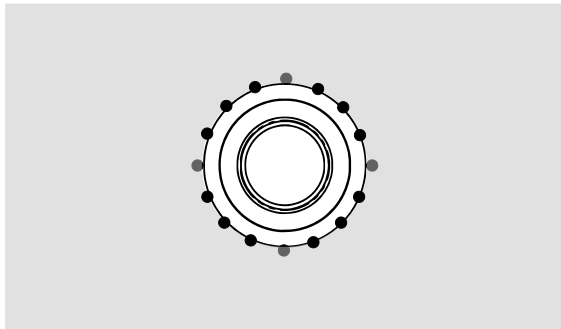
1. Install the heat sink ring (inside) and the heat sink plate (outside) and connect the heat sink plate to a suitable cooling water tap or compressed air supply.
2. Turn the dished end upside down over a flat surface and fill the space below with argon gas (tape may be applied along the circumference of the dished end to keep the argon from escaping). Depending on the dished end size, it may take from a few, to several minutes, for the argon to have replaced the air under the dished end.



3. Turn the cooling water (or compressed air) on and tack weld the weld plate on the outside as shown in the figure below.

**CAUTION:** Make sure to always weld in an alternating 'X'-shaped pattern. Using the dial of a clock as an reference: weld 1 o'clock, cool with compressed air, and then weld 7 o'clock, cool with air. Weld 4 o'clock, cool with air, followed by 10 o'clock, cool with air, etc.

**DANGER:** Only compressed air shall be used as a cooling aid between welds (in addition to the running water in the heat sink plate).



4. When the weld plate and dished end have cooled down, proceed with welding along the circumference, from tack weld to tack weld, in an alternating 'X'-shaped pattern. See figure 4.

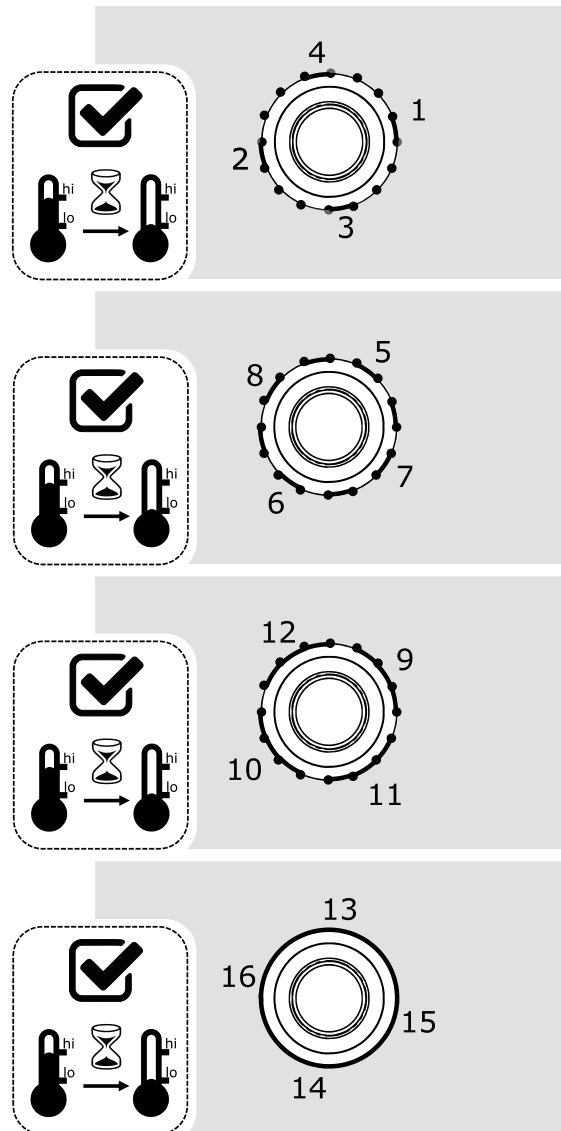
## 5. POST-WELDING INSTALLATION STEPS

For correct operation of the mixer, it is important to verify that the weld plate has not deformed during the welding procedure. To verify this, a gauge tool is available from Steridose, see table 3 for part numbers.

The weld plate gauge tool is a calibrated instrument. Steridose certifies that it meets or exceeds all specification and has been calibrated using measurement standards traceable to national measurement institutes. Each component is individually marked with a unique ID, meaning all critical dimensions have been verified (a calibration certificate is shipped with the tool).

### 5.1. Using the gauge tool to verify installation

The weld plate gauge tool consists of an anodized aluminium rotor and a 316L stainless steel bushing.



■ **Figure 4** Weld from tack weld to tack weld, in an alternating 'X'-shaped pattern, allowing to cool down with aid of compressed air between each step

**NOTICE:** Never store the gauge tool individual parts (i.e. rotor and bushing) assembled.

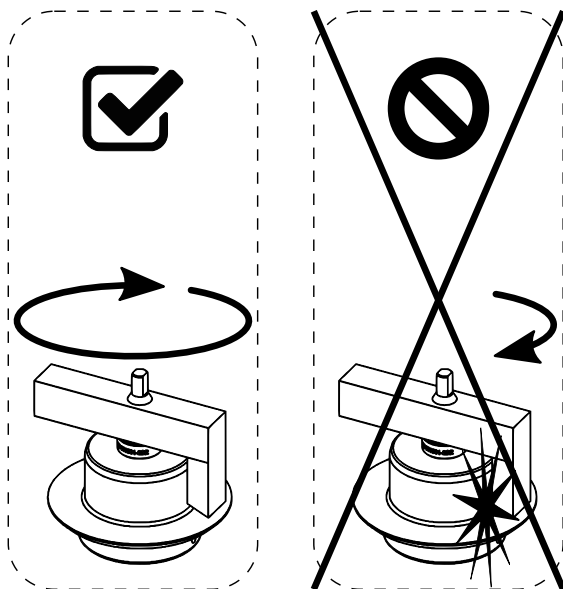
### 5.2. Assembly

To use the weld plate gauge tool the male bearing must be removed from the weld plate. The weld plate gauge tool can then be installed. To install, thread the bushing into the weld plate by hand or, very lightly, with a wrench.

**CAUTION:** Using a wrench to install the gauge plate bushing might cause damage, nicks or burrs, that subsequently might damage the rotor-part of the gauge tool, which might render the tool unusable.

### 5.3. Usage

With the gauge tool bushing installed, the rotor can be carefully placed into position. Once in place, the rotor should rotate freely around the entire circumference of the weld plate.



Any welding performed after verification may still be capable of deforming the weld plate, depending on its proximity to the weld. Verification with the gauge tool must be repeated after all welding has finished.

**NOTICE:** The weld plate must be verified with the weld plate gauge tool once more after all welding and polishing in the vessel have been completed.

**CAUTION:** Any interference between the rotor and the weld plate indicates that the weld plate deformed to such an extent that it has become out of tolerance. **This must be corrected before the mixer can be put into operation.**

Weld plate size	Weld plate gauge tool part number
60/75	110891
85/100-140 & Sanimixer 500	110893
120/150-190 & Sanimixer 3 000	110896
120H/200-220 & Sanimixer 7 000	110899
210/275-350 & Sanimixer 30 000	110902

**Table 3** Part number for weld plate gauge tool for verification of correct installation.



# About us

Steridose is a Swedish company highly specialized in the design, development and manufacturing of magnetic coupled mixers and radial diaphragm valves.

Steridose is part of the Velcora group, with regional offices in key locations around the world.

Steridose is represented in important certifying and standards organizations, most notably and relevant to the pharmaceutical industry, ASME BioProcessing Equipment standards committee (BPE). We help develop the standards and Good Manufacturing Practices that minimize risk for process interference.

Steridose partners with the best distributors and representatives in the industry all over the world. Together we become the perfect mix; a premium product with global references combined with local presence for product and application support.



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