

Welding Instruction BL010727

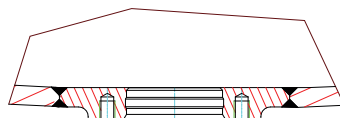
NEUMO BioControl® Block Flanges



Product: Block Flange with Weld Collar

Drawing 1

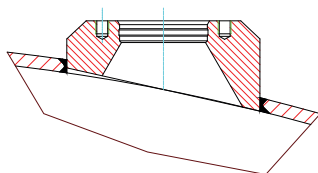
Connecting dimensions $S = 8-12$ mm
 Weld collar $-\text{Ø} +40$ mm
 Partial connection



Block Flange solid

Drawing 2

Connecting dimensions $S = 8-12$ mm
 Without Weld collar
 Full connection



Introductory remarks:

In the past, welding of Block Flanges without weld collar to bottoms / sheets proved to be critical with regards to evenness of the level / sealing surfaces. With the warping occurring due to the welding heat input, the sealing of interior sealing systems in particular is impeded. In addition, in case of a full connection, the lack of a weld collar causes a conical shrinking of the inner diameter. Based on this experience we recommend to add a weld collar. The objective is to transfer the welding heat into a flexible zone and to keep the block flange stable by employing suitable coolants. The weld collar is to be prepared with a Ø of $+30-40$ mm to the block flange. The weld collar is connected to the block flange height with a $R5$. In case of solid block flanges (drawing 2), it has shown that an acceptable dimensional accuracy of bores, end faces and sealing grooves can also be obtained without a weld collar. The following welding instructions apply to both versions. For connections under static stress (< 10.000 stress reversals/lifetime in accordance with DIN 18 800 T1 1990) or with $\kappa_j +0,5$ a partial connection as depicted in drawing 1 should be agreed with the user in order to introduce less welding heat into the connection.

Results:

After welding, the dimensional deviations of the bores of $+0.1 - 0.3$ mm and for the end plane a slope to the inner diameter of $< 0.05 - 0.1$ mm are measured as compared to the original dimensions.

Welding Instruction BL010727:

Preparation:

Material: CrNiMo steel, such as 1.4301/1.4571/1.4404/1.4435

Sheet steel thickness 8 - 15 mm

Weld collar fitting dimensions \cong sheet steel thickness

Seam preparation in accordance with DIN EN 22 553

Full connection with double V groove weld or a double bevel groove weld - root face width 2 mm, weld gap 1.5 - 2 mm

The loose flange to be welded is mounted between two plate coolers/flanges of high-tensile strength Al material, such as F28-32 s) 20 mm, for instance. Before clamping, the bearing surfaces of the plate coolers are to be moistened with a thermo-conducting paste. The center of the block flange is to be flooded with running water without pressure. A low water flow rate is sufficient, inlet via $M5-1/8"$ - outlet via $1/8"-1/4"$ connections. Impermeability between the cooling flange and the block flange is obtained by using an O-Ring. With a low static water pressure and plane flange surfaces, the thermo-conducting paste sufficiently serves as sealing agent. On the plane side (interior of the container), the diameter of the cooling flange is to be advanced to a distance of about 10 mm to the place of welding. The block flange plane surfaces with threaded connectors should be cooled across the full diameter. This water cooling is required during the entire welding process.

Welding process manual TIG welding:

- After provisionally fixing the block flange with a few tack welds, a root pass of about 1/3 of the weld connection is welded in the Tandem weld process. Approx. 100A/ 80A, alternating at approx. 180° , $L = 20 - 25$ mm length with a distance of approx. 30 - 35 mm.
- With identical weld parameters, the root pass in the remaining welding joint is completed with Tandem welding. Additional cooling with an air/water mixture.
- Upon completion of the root pass, the final pass is completed by alternating weld lengths of 30 - 40 mm on both sides offset by 180° . The opposite side of the weld zone is to be permanently cooled by an air/water mixture during the welding process.
- In case of base material thicknesses > 8 mm further layers may be required. Here, again, each pass has to be cooled on the opposite side with an air/water mixture during the welding process.

Remarks:

- ◆ When welding 1 4435 BN2 Delta Ferrite $< 3\%$ ensure that the tack welds are ground before final welding or completely liquefied in the Tandem welding process, in particular in case of short tack welds of a length < 5 mm; this is required because of the high tendency to fissuring.
- ◆ When grinding the weld seams, keep the heat introduction as low as possible. By our experience, excessive heat introduction by grinding tension from the weld seam may be released causing an additional torsion of up to 0.5 mm.
- ◆ In case of warping of the plane surface, a correction of block flanges with weld collar (drawing 1) can be obtained by using suitable hydraulic pulling and clamping devices. This will, however, modify the inner diameter.
- ◆ Tests with the WP plug weld process to weld 8 mm in one layer a square butt joint or to obtain a joint of $s = 12$ mm with three layers, gave negative results because of conical torsion and considerably bigger dimensional deviations.
- ◆ By the above mentioned weld process, the contraction strain of the weld joint is transferred into the base material and the welding deposit itself. In isolated cases it is therefore possible that the base material in the vicinity of the weld joint twists and buckles.
- ◆ With the employment of the welding instructions BL010727, the calculated value (hours required) for the welding of a block flange is increased by a factor of 2 – 2.5. In addition, set-up times for installing the water cooling, as well as the costs incurred for the production of cooling flanges have to be taken into consideration.
- ◆ Transferring and utilizing these welding instructions BL010727 as well as the insights gained thereof to applications outside the purview or influence of NEUMO GmbH + Co KG is left to the user. However, NEUMO GmbH + Co KG will accept no liability whatsoever for such applications.