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DVS – DEUTSCHER VERBAND FÜR SCHWEISSEN UND VERWANDTE VERFAHREN E.V.

Heated tool butt welding of pipes and piping parts with high wall thicknesses or diameters made of PE

Technical Code DVS 2207-1 Supplement 2

Contents:

1 Scope of application

This supplement applies to the heated tool butt welding of pipes and piping parts made of PE according to DIN 8074 / DIN 8075 with wall thicknesses > 30 mm or with diameters > 630 mm.

The process sequences basically correspond to the procedure described in the DVS 2207-1 technical code. The recommendations described below constitute additional indications.

2 General requirements

The quality of the welded joints is dependent on the qualification of the welders, on the suitability of the utilised machines and jigs as well as on the compliance with the technical codes for welding.

The welding work must be monitored by a welding supervisor qualified according to the DVS 2213 or DVGW GW 331 guideline. The contracting parties must reach agreement on the type and scope of the monitoring. The process data must be documented on welding record sheets or on data carriers. In this respect, preference should be given to electronic data acquisition.

Within the framework of the quality assurance, it is recommended to manufacture and test trial welds in the given working conditions before commencing and during the welding work.

Every welder must be trained and must possess a valid qualification test certificate according to the DVS 2212-1 or GW 330 guideline. The planned area of application determines the type of the qualification.

The machines and jigs used for the welding must satisfy the requirements according to the DVS 2208-1 technical code.

3 Measures before the welding

The immediate welding area must be protected from unfavourable weathering influences (e.g. wind or the action of moisture). If suitable measures (e.g. preheating, enclosing with tents or heating) ensure the existence of conditions permissible for the welding, the work may be carried out at any outdoor temperature - provided that the dexterity of the welder is not hindered. If necessary, additional proof must be provided by manufacturing trial welds in the specified conditions.

If the semi-finished product is heated non-uniformly due to solar radiation, the temperatures must be equalised by covering the area of the welding point in good time. It is necessary to avoid any draught-induced non-uniform cooling during the welding operation, e.g. by closing the pipe ends.

4 Indications about the process sequence

When thick-walled pipes are welded, it is necessary to pay explicit attention to the points described below:

4.1 Temperature checking

In order to be certain to achieve a suitable welding temperature, a heated tool temperature of 220°C (± 10°C) is stipulated for thick-walled piping. The uniform temperature of the heated tool must be checked in the welding area at a minimum of eight measuring points evenly distributed around the circumference. Calibrated thermal contact measuring devices must be used for the measurement (according to the DVS 2208-1 technical code).

4.2 Minimise the misalignment of the joining faces

The maximum permissible misalignment is 10 % of the wall thickness (max. 5 mm).

- The misalignment must be minimised in order to avoid any notch effect or stress concentrations.
- As compensation for any fabrication-induced tolerances in the wall thickness or in the ovality, orientation to the marking is recommended during the alignment of the pipes in order to minimise the misalignment. For this purpose, it is recommended to join the pipes according to the production sequence (matching).
- Since different pipe end sagging may be a cause of impermissible misalignment, the pipe end sagging must be checked and, if necessary, must be eliminated by shortening the pipe ends.
- Welds between pipes and fittings require particular attention because the fitting was manufactured from a different pipe batch, was injection-moulded or was subjected to chip-producing machining. If the ovality of the pipe end leads to a non-tolerable misalignment, this must be compensated for with suitable aids.

4.3 Handling of the pipe trains

Particular diligence is imperative when handling thick-walled components.

- The outer fibre strains must be minimised in order to avoid any stress peaks on the welds. Therefore, it is recommended to carefully observe the following bending radii in relation to the outside diameter (OD) in question:

20°C	30 x OD
10°C	52.5 x OD
0°C	75 x OD

Applies to pipe series ≤ SDR 26

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– In order to avoid having to unnecessarily apply any force for the movement of the pipes, the friction of the pipe train to be moved must be reduced by taking suitable measures (e.g. dollies). It is preferable to move the shorter pipe train.
– Since the pipe trains consisting of thick-walled pipes naturally exhibit a higher weight, it must be ensured that the utilised welding machines can produce enough force reserves in order to achieve the stipulated changeover time.

4.4 Removal of the welding bead

As a rule, it is not necessary to remove the welding bead for reasons relating to the hydraulic flow resistance. Moreover, the removal of the welding bead makes it more difficult to evaluate the weld and does not improve the quality of the weld.

Special applications (e.g. relining processes) demand the removal of the external and/or internal welding bead on butt-welded piping. With regard to the tools used for this purpose (bead removers), it must be ensured that, during the removal of the bead, the pipe is not damaged (notches) and the wall thickness of the pipe in the area of the weld is not lower than the nominal wall thickness of the pipe. This can only be guaranteed with suitable devices or with devices specially developed for this purpose. The indications from the device manufacturer must be observed.