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DVS-PersZert®

Qualification testing of plastics laminators and adhesive bonders
Fabrication of Test Piece I.1/II.1 Joint for a pipe nozzle in a panel

DVS PERSZERT
Guideline DVS® 2220 Supplement 1

This supplement includes the procedure for the fabrication of Test Piece I.1/II.1 in the Guideline DVS® 2220 guideline.

Contents:

1 Preparation of the panel and the pipe nozzle

1.1 Recess in the panel

First of all, a recess with the same outside diameter as that of the pipe nozzle is sawn into the centre of a GFRP panel according to the dimensions from Table 1 in the DVS® 2220 guideline. This is carried out manually with mechanical support, e.g. with a compass saw. In this respect, it must be ensured that the diameter of the recess is selected in such a way that an adhesive bonding gap thickness in compliance with the guideline can be produced for the joint with the pipe nozzle.

1.2 Grinding

Not only the pipe nozzle but also the panel must be ground for an optimum bond of the new laminate to be created. The region to be ground should be executed generously for both construction elements but at least as large as the glass fibre cuts produced in Work Step 3.

The grinding should be performed manually with mechanical support. During the grinding operation, merely the surface is roughened for better adhesion without damaging the base laminate. The top edge of the plate recess and the outside edge of the pipe nozzle must be bevelled.

2 Cutting of the glass fibre mats/fabrics

Chopped strand glass fibre mats and roving fabrics in compliance with Table 1 in the DVS® 2220 guideline are needed for producing the top laminate. The glass fibre cuts must be fabricated in the dimensions and semi-finished products in compliance with Table 1 (supplement 1).

Table 1. Glass fibre cuts and laminate plan.

Laminate layer	Dimensions in mm	Semi finished product	Deposition location
1	∅ 260	Chopped strand mat	Panel
2	340 x 130	Chopped strand mat	Pipe nozzle
3	∅ 280	Roving fabric	Panel
4	340 x 130	Roving fabric	Pipe nozzle
5	∅ 300	Chopped strand mat	Panel
6	360 x 130	Chopped strand mat	Pipe nozzle
7	∅ 320	Roving fabric	Panel
8	360 x 130	Roving fabric	Pipe nozzle
9	∅ 340	Chopped strand mat	Panel
10	400 x 70	Chopped strand mat	Pipe nozzle
11	∅ 340	Non-woven glass fibre	Panel
12	400 x 70	Non-woven glass fibre	Pipe nozzle

3 Production of the joint between the panel and the pipe nozzle

The joint between the panel and the pipe nozzle must be manufactured with a thick resin before the top laminate is applied. The thick resin is a customary UP laminating resin which is mixed with a thixotropic agent, e.g. aerosil. The joint between the pipe nozzle and the panel must be executed as a fillet weld without any voids. Attention must be paid to the positioning of the pipe nozzle at a right angle in the panel. The thick resin may be coloured for the better visual evaluation of the quality of the adhesive-bonded joint.

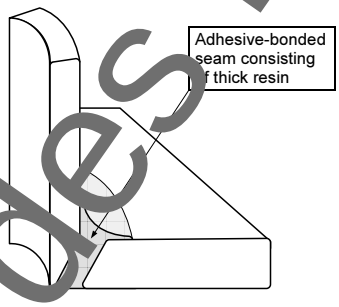

Figure 1. Adhesive-bonded joint as a fillet weld.

This publication was drawn up by a group of experienced experts in cooperative work on an honorary basis and was approved by the "Training and Qualification Testing" working group. It is binding for DVS educational facilities. The user must always check whether the version in his possession is still valid.

DVS, Technical Committee, Working Group "Joining of Plastics"
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Orders to: DVS Media GmbH, P. O. Box 10 19 65, 40010 Düsseldorf, Germany, Phone: +49(0)211/1591-0, Telefax: +49(0)211/1591-150

4 Lamination operation

In compliance with the information from Table 1 in the DVS® 2220 guideline and from the laminate plan listed in Table 1 (supplement 1), one round laminate layer is applied for the bonding to the panel and one laminate layer for the circumferential laminate at the pipe nozzle and this procedure is repeated successively and alternately. For optimum bonding at the pipe nozzle, cuts or tears are introduced into every round glass fibre cut in a star shape. Cuts or tears are introduced into the cuts for the circumferential laminate several times at a depth of approx. 80 mm.

During the lamination operation, it must be ensured that not only the round cuts but also the cuts for the circumferential laminate must be placed in an offset arrangement for every laminate layer. This serves to reduce the production of thickness differences caused by the necessary overlapping of the individual laminate layers. The top laminate should run out at a flat angle and should exhibit smooth interfaces to the panel and to the pipe section.

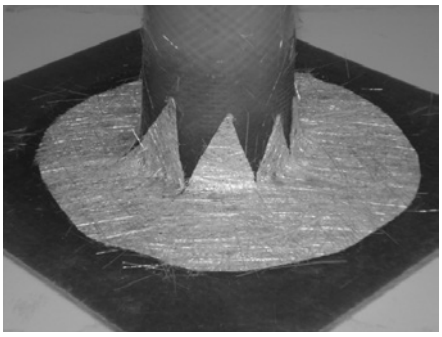

Figure 2. Arrangement of the glass fibre cuts for the joining laminate to the panel.

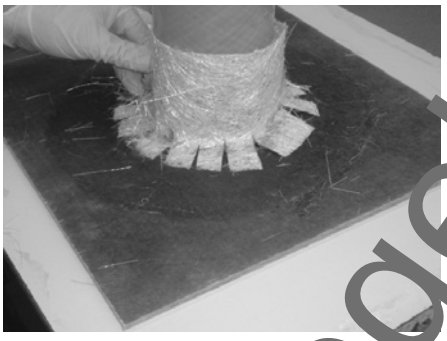

Figure 3. Arrangement of the glass fibre cuts for the circumferential laminate at the pipe nozzle.