

European Technical Approval ETA-13/0108

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

Typ "DWT"
Type "DWT"

Zulassungsinhaber
Holder of approval

Chemowerk GmbH
In den Backenländern 5
71384 Weinstadt
DEUTSCHLAND

Zulassungsgegenstand
und Verwendungszweck
*Generic type and use
of construction product*

Doppelwandiger Flachbodenbehälter aus GFK - Typ DWT
Double-wall flat-bottom tank made of GRP - type DWT

Geltungsdauer:
Validity:

vom
from
bis
to

28 February 2013
28 February 2018

Herstellwerk
Manufacturing plant

Chemowerk GmbH
91625 Schnelldorf

Diese Zulassung umfasst
This Approval contains

14 Seiten einschließlich 4 Anhänge
14 pages including 4 annexes

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, as amended by Article 2 of the law of 8 November 2011⁵;*
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
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¹ Official Journal of the European Communities L 40, 11 February 1989, p. 12

² Official Journal of the European Communities L 220, 30 August 1993, p. 1

³ Official Journal of the European Union L 284, 31 October 2003, p. 25

⁴ *Bundesgesetzblatt Teil I 1998*, p. 812

⁵ *Bundesgesetzblatt Teil I 2011*, p. 2178

⁶ Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of the storage tanks and intended use

1.2 Definition of the storage tanks

The "DWT" storage tanks are, double walled flat bottom tanks made of glass-reinforced unsaturated polyester resin (GRP) resin. An illustration of the product is given in Annex 1.

The storage capacities of the different tank versions are 1000 L, 1300 L, 1500 L, 2000 L and 2350 L.

The following table 1 shows the main geometry properties.

Type / Volume	Height [mm]		Width [mm]	
1000 L	1788		1040*735	
1300 L	1558		1500*735	
1500 L	1788		1500*735	
2000 L	1788	1558	2000*735	2000*860
2350 L	1788			

Table 1: Types and dimensions

The space between the two shells of the wall and the two bottoms (see Annex 1) is leakage controlled by class 1 leakage detectors (LD) according to EN 13160-1:2010-07. In the event of a leak, an audible and visual alarm is activated. It provides a secondary containment solution with observed control-volume.

1.2 Intended use

The storage tanks are intended to be used for the storage of:

- Domestic heating oil (heating fuel) with a flash point above 55 °C,
- Heating fuels - Fatty Acid Methyl Esters (FAME) according to EN 14213:2004-02,
- Diesel fuel according to EN 590:2011-10, EN 14214:2012-11

for which requirements for mechanical and chemical resistance and stability and safety in use in the sense of the Essential Requirements 2, 3 and 4 of Council Directive 89/106 EEC shall be fulfilled.

Regarding the requirements concerning safety in case of fire it is assumed that the storage tanks meet the requirements of class E according to EN 13501-12007-02. Furthermore, it can be assumed that the tank-tightness will remain, if the fire is burning not longer than 30 minutes (see 2.1.3).

The storage tanks may only be installed inside of buildings. This European Technical Approval applies to the use of these storage tanks in non-earthquake endangered areas. The storage of the above-mentioned liquids is under atmospheric conditions. The maximum operating temperature is 30 °C. The room, in which the tanks are finally assembled, shall not be used for any other purpose or activities.

The provisions made in this European technical approval are based on an assumed working life of the storage tanks of 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

2 Characteristics of the storage tanks and methods of verification

2.1 Characteristics of the storage tanks

2.1.1 General characteristics of the storage tanks

The storage tanks correspond to the drawings given in Annex 1. The laminate setup, wall-thickness, glass-contents and used materials are shown in Annex 2 and 3.

The following table 2 shows the evaluated demand characteristics and the verification method.

Nr.	Characteristics	Verification methods	Value
1	Wall thickness of shell laminate	-	Annex 2
2	Wall thickness bottom and cover	-	Annex 2
3	Textile glass portion of the maximum mass	EN ISO 1172:1998-12	Annex 4
4	Textile glass mass per unit area	EN ISO 1172:1998-12	Annex 2
5	Laminate setup	-	Annex 2
6	Barcol hardness laminate	EN 59:1977-11	Annex 4
7	Resistance to tearing, normal force	EN ISO 527-4:1997-07 equivalent to EN 13121-3:2010-06	Annex 4
8	Tensile modulus of elasticity	EN ISO 527-4:1997-07 equivalent to EN 13121-3:2010-06	Annex 4
9	ultimate moment	EN ISO 527-4:1997-07 equivalent to EN 13121-3:2010-06	Annex 4
10	Bending modulus of elasticity	EN ISO 527-4:1997-07 equivalent to EN 13121-3:2010-06	Annex 4
11	Creep rate	EN ISO 527-4:1997-07 equivalent to EN 13121-3:2010-06	Annex 4
12	long-term reduction factor	EN ISO 527-4:1997-07 equivalent to EN 13121-3:2010-06	Annex 4

Table 2: General characteristics and verification methods

2.1.2 Reaction to fire

The glass-reinforced thermosetting resin material were classified to class E according to EN 13501-1:2007-02.

2.1.3 Resistance to heat effects (outside burning)

It can be assumed that the tank-tightness will remain, if a fire is burning not longer than 30 minutes.

2.1.4 Enviromental requirements

The leak-tightness and strength of the interstitial space were proved with at least 600 mbar negative pressure. The test is comparable to the requirements of EN 13160-7:2003-09 section 5.4. There were no leaks and changes in the interstitial space found.

The functionality of the leak observed interstitial space was checked. If a leak observed during operation, an alarm will be displayed.

2.1.5 Safety in use

The assembled storage tanks are stable for the boundary conditions mentioned in section 1. Evidence has been provided by a static analysis. The permissible limit strains are kept under the given loads. The storage tanks are equipped with connections for filling, removing, venting, overfill prevention and the leak detector.

The storage tank fulfils the essential requirements for safety in use.

2.2 Release of dangerous substances

The manufacturer of the tanks has submitted a written declaration stating that the product contains no dangerous substances according to European and national regulations. When these are relevant in the Member States of destination the substances must be listed.

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the communication of the European Commission the system of attestation of conformity laid down in Decision 1999/472/EC as amended by 2001/596/EC of the European Commission⁷ for piping kits pipes, tanks, leakage alarm systems and overfill prevention devices.

This system of attestation of conformity is defined as follows:

System 3: Declaration of conformity of the product by the manufacturer on the basis of:

- (a) Tasks for the manufacturer:
 - (1) factory production control;
- (b) Tasks for the approved body:
 - (2) initial type-testing of the product.

Note: Approved bodies are also referred to as "notified bodies".

⁷

Official Journal of the European Communities L 184 of 17.07.99 and L 209 of 02.08.01

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.⁸

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of storage tanks in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

3.2.2 Tasks for the approved bodies

The approved body/bodies shall perform the

- initial type-testing of the product

in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

3.3 CE marking

The CE marking shall be affixed on the product itself. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the European technical approval,
- Description of the product:
 - o type designation
 - o date of manufacture of the tank parts (month and year)
 - o maximum filling capacity
- Intended use
 - o note "Only for storage of domestic heating oil or diesel fuel (flashpoint > 55 °C)"
 - o note " Use only in combination with leak detector system"
 - o note " Use only inside of buildings"
 - o maximum allowed service temperature

⁸ The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

- o maximum filling temperature
- o note “for atmospheric operation only”
- o maximum allowed filling height

4 Assumptions under which the fitness of the tanks for the intended use was favourably assessed

4.1 Manufacturing

The parts of the storage tanks are made by resin transfer moulding (RTM) processes. It is assumed that the manufacturing of the tanks fulfils the criteria for stable industrial production. The tanks, which are taken as samples to determine the properties, are representative of the whole production.

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

4.2 Installation

The tanks must be vertically placed on a flat, bending resistant base plate inside of buildings. The tanks must be placed in that way, that all pipes (see Annex 1) as well as connections for the leak detector are easily accessible and verifiable. The tanks must be equipped with a tank approved overflow prevention device according to EN 13616:2004-09 type B and a leak detector. The maximum allowable filling level is limited to 95 % of the volume. The alarm-pressure of the leak detector and the adjustment of the overflow prevention device, are set in accordance to the technical specifications of the manufacturer.

The installation of the tanks shall be in accordance with the manufacturer's technical documentation.

5 Indications to the manufacturer

5.1 Packaging, transport and storage

The tanks shall be packed in an appropriate way. The packaging may only be removed on installation site.

The transport may only be performed by such companies with technical experience, adequate equipment, facilities and means of transport as well as sufficiently trained personnel.

For the prevention of hazards to employed persons and third parties the relevant regulations for the prevention of accidents of the Member States shall be considered.

5.2 Use, maintenance, repair

5.2.1 Filling

The filling process needs to be monitored. Before starting the filling procedure it is necessary to determine whether the liquid is allowed and the temperature of the liquid is within the limits (see 1.2). The overflow prevention device and the leak detection system must be working. The maximum flow rate is 1200 L/min.

5.2.2 Inspection and alarm

The tank operator must periodically carry out a visual inspection on tanks and pipings. When leaks or alarm are detected, the damaged tank must be evacuated. Inspections and checks must be performed to leak detection device, overfill prevention and other equipments in accordance with the relevant regulations.

Tests for other areas of law are not affected.

5.2.3 Cleaning

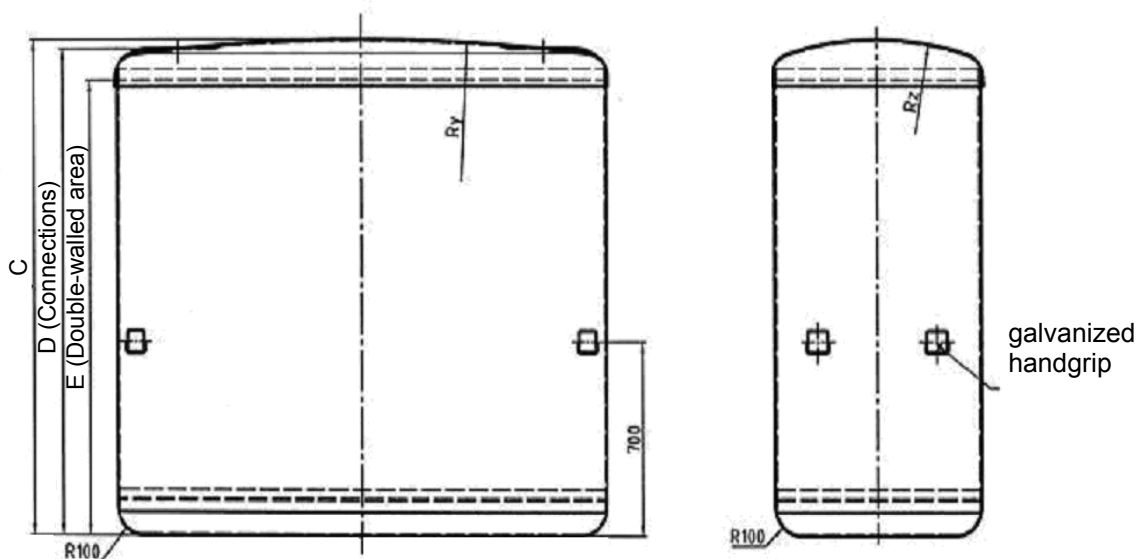
The cleaning must be performed according to the manufacturer's documentation.

5.2.4 Repair

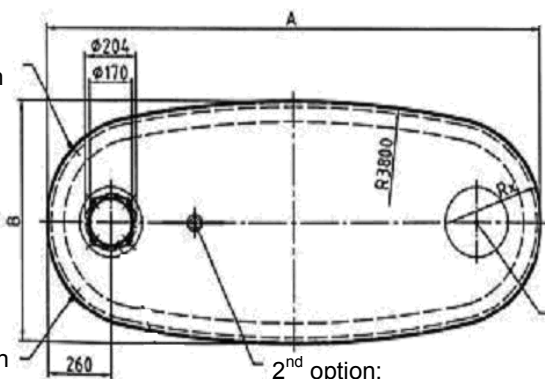
Actions to repair damaged storage tanks must be in accordance with the technical documentation or in agreement with the manufacturer.

Uwe Bender
Head of Department

beglaubigt:
Dr.-Ing. Schwuchow



1st option:
connection for suction
line



Measuring connection

2nd option:
connection for suction
line

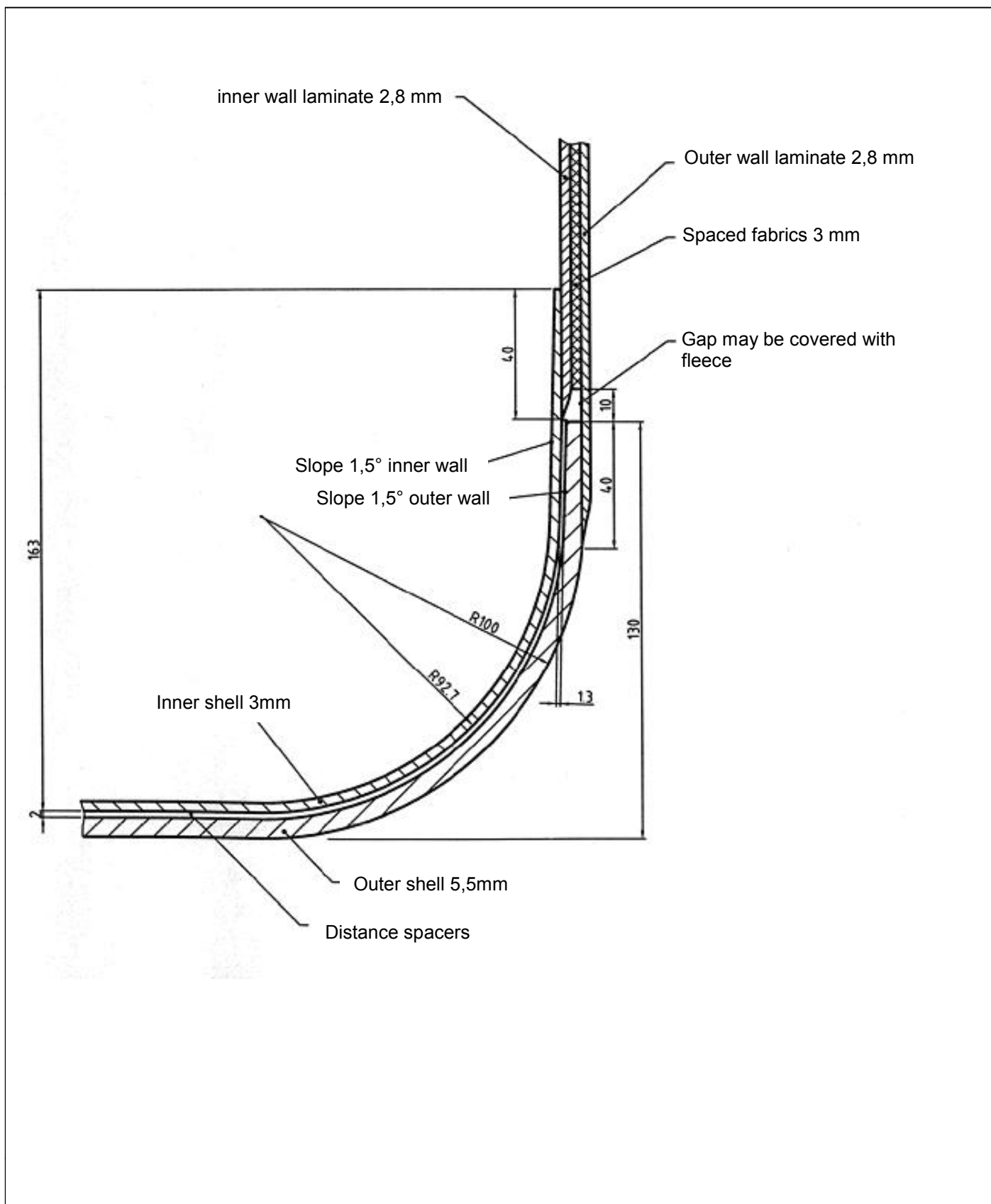
Tank size	2350 l	2000 l	2000 l	1500 l	1300 l	1000 l
Size A	2000	2000	2000	1500	1500	1040
Size B	860	860	735	735	735	735
Size C	1788	1558	1788	1788	1558	1788
Size D	1756	1526	1756	1756	1526	1756
Size E	1640	1410	1640	1640	1410	1640
R _x	372	372	294	343	343	364
R _y	8494	8494	8513	4449	4449	2454
R _z	1307	1307	876	876	876	876

Option for 2nd dome cover

Type "DWT"

DESCRIPTION OF DWT STORAGE TANKS – TYPES AND DIMENSIONS

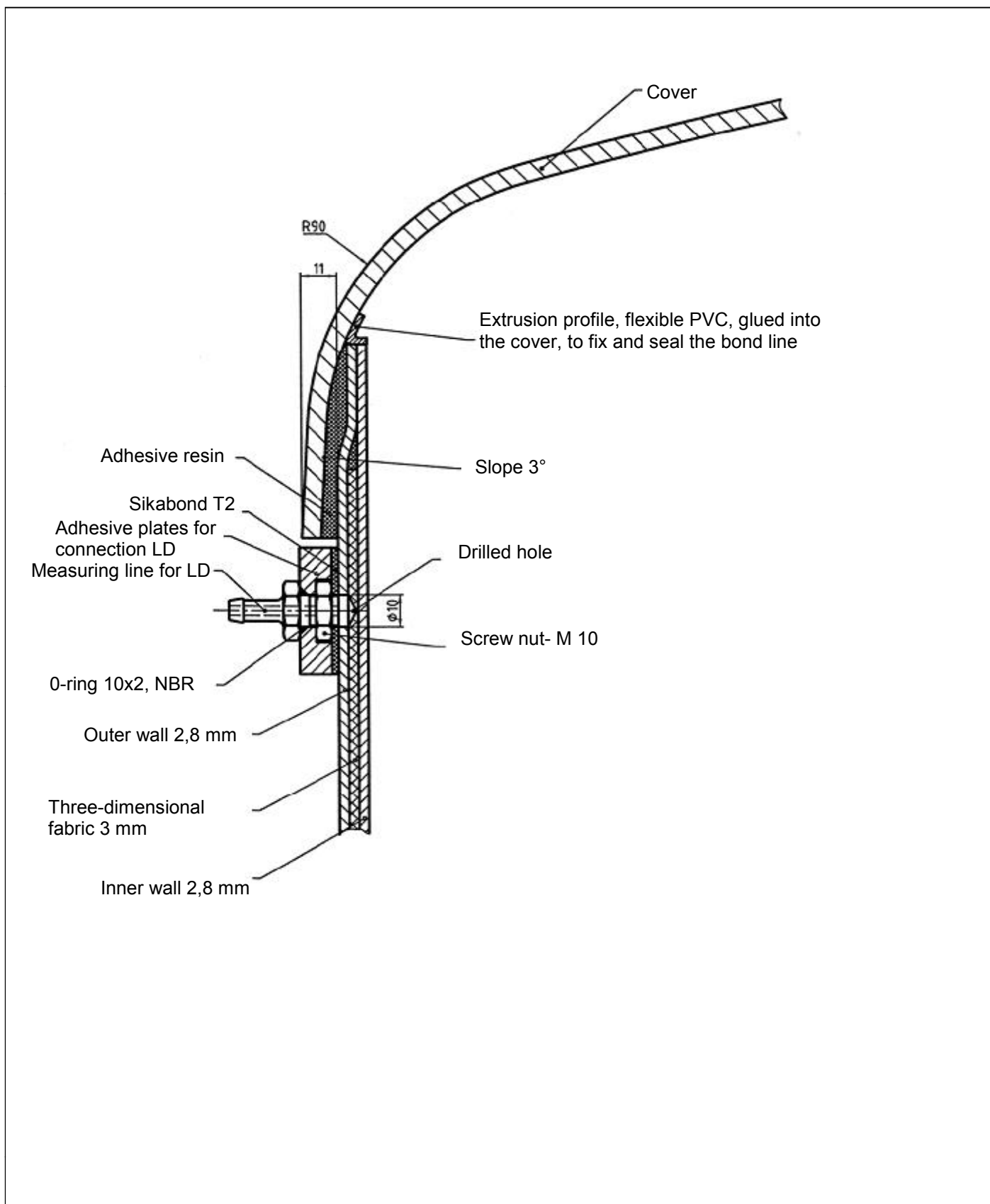
Annex 1



Type "DWT"

DESCRIPTION OF DWT STORAGE TANKS – BOTTOM AND SIDEWALL

Annex 1.1



Type "DWT"

DESCRIPTION OF DWT STORAGE TANKS – COVER-SIDEWALL- CONNECTION
Measuring line

Annex 1.2

For the description of the laminate structure, the following abbreviations are used:

V = non-woven layer, fleece	ca. 30 bis 60 g/m ²
M1 = non-woven mat,	450 g/m ²
M2 = CSM,	450 g/m ²
M3 = CSM,	600 g/m ²
M4 = CSM,	300 g/m ²
M5 = CSM,	350 g/m ²

CSM: chopped strand mat

Component	Thickness t_n	Laminate Setup	Glass-weight per unit area
Inner bottom	3,0 mm	V / M1 / M1 / M1 / M1	ca. 1850 g/m ²
Outer bottom	5,5 mm	M1 / M1 / M1 / M1 / M1 / M1 / M1 / V	ca. 3200 g/m ²
Inner wall	2,8 mm	V / M2 / M3 or V / M2 / M4 / M4 or V / M5 / M5 / M5	ca. 1100 g/m ²
Outer wall	2,8 mm	M2 / M3 or M2 / M4 / M4 / V or M5 / M5 / M5 / V	ca. 1100 g/m ²
cover	4,8 mm	V / M1 / M1 / M1 / M1 / M1 / M1 / V	ca. 2800 g/m ²

Table 4: laminate setup

Type "DWT"	Annex 2
LAMINAT SETUP OF "DWT" STORAGE TANKS	

1 Materials of the parts of the tank

1.1 Resins and curing systems

There are unsaturated polyester resins of the resin groups 1B to 7B according to EN 13121-1:2003-10 with associate curing systems used.

1.2 Reinforcement

E-textile glass mats according to ISO 2559:2011-12 with 300 to 600 g/m² basis weight (see Appendix 2) and E, - E-CR-or C-fleece mats with about 30 to 60 g/m² basis weight.

For the production the interstitial space in the shell area a spacer fabric made by Parabeam b.v. shall be used.

1.3 Filler

As the filler, aluminum hydroxide is used. The mass proportion is smaller than 30 %, based on the resin content in the laminate. In the inner bottom the filler mass fraction must be smaller than 50 %.

2 Adhesive resin

A resin of the type 7A or 7B according to EN 13121-1:2003-10 is used as adhesive resin.

Type "DWT"

MATERIAL OF "DWT" STORAGE TANKS

Annex 3

Component Value	Inner bottom	Outer bottom	Inner wall	Outer wall	cover
Thickness t_n [mm]	3,0	5,5	2,8	2,8	4,8
Textile glass portion of the maximum mass EN ISO 1172:1998-12	33 %	36 %	28 %	30,4 %	33,2 %
Barcol hardness EN 59:1977-11	45	47	47	49	46
Resistance to tearing, normal force EN ISO 527-4:1997-07 5 %-fractile	94 N/mm ²	122 N/mm ²	78 N/mm ²	see inner wall	107 N/mm ²
Tensile modulus of elasticity EN ISO 527-4:1997-07 5 % fractile	7755 N/mm ²	9373 N/mm ²	7760 N/mm ²	see inner wall	9256 N/mm ²
ultimate moment EN ISO 527-4:1997-07 equivalent to EN 13121-3:2010-06	276 Nm/m	789 Nm/m	217 Nm/m	see inner wall	699 Nm/m
Bending modulus EN ISO 527-4:1997-07 equivalent to EN 13121-3:2010-06 5 % fractile	6742 N/mm ²	7396 N/mm ²	6751 N/mm ²	see inner wall	6800 N/mm ²
Creep rate EN ISO 527-4:1997-07 equivalent to EN 13121-3:2010-06	13,0 %	13,6 %	13,7 %	see inner wall	12,1 %
long-term reduction factor EN ISO 527-4:1997-07 equivalent to EN 13121-3:2010-06	1,9	1,97	1,84	see inner wall	1,91

Type "DWT"

Characteristics of the laminate

Annex 4