



Technical Requirements

Test criteria for the fabrication of highly acid resistant glass-lined steel piping and valves

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ISO 9001 – ASME – QHD

Safety through approved quality

Highest standards are set by the pharmaceutical and chemical industry for safety through operation and production as well as in maintenance and servicing. Technical enamels of Düker can meet all these demands at all levels.

A quality management system in accordance with ISO 9001 was already incorporated in the Düker quality policy in 1994. All the glass lined Division Works at all locations have been successfully audited by the appropriate German authorities and have been awarded the TÜV Certificate.

The production of pressure parts according to the ASME-Code (American Society of Mechanical Engineers) calls for specially defined materials, welding processes and documentation. Highly efficient quality management with dedicated employees ensures documented safety at all levels.

Hygiene and cleanliness is right to the foreground in the production of pharmaceuticals, especially in situations where equipment is used for different production campaigns.

QHD – “Quality Hygienic Design” is a special testing procedure which ensures that these demands are fulfilled. There are two phases of the QHD testing system.

In phase one all the regulations which cover hygiene take the form of a check list. There are directives for design, material selection, production, assembly and surface finish. Keeping these relevant standards is approved by the award of the QHD symbol.

In phase two evidencing cleanliness in practice follows according to standardized and practical testing methods.

The utilization of these testing systems offers concrete advantages for plant operators, namely the assurance that the components can be cleaned easily and are of hygienic state-of-the-art construction.



Fabrication

Düker only uses pipe material in grades of steel suitable for glass-lining with all necessary quality certificates.

The collar and pipe components are joined on automatic welding machines. The root is laid by inert gas-shielded tungsten arc welding (TIG) and the pass provided by inert gas metal arc welding (MAG). Inert gas welding is a reliable and fast method particularly for smaller nominal diameters.

Submerged arc-welding is particularly suitable for larger nominal diameters. It guarantees extremely low weld seam porosity as well as fast welding. Düker welds one pass on both the inside and outside.

Special parts are produced on semi-automatic welding machines. The root, fill and pass are welded in two to three welding operations by this method.

All weld seams are machined and smoothed. Absolutely non-porous and clean round weld seams are essential for glass-lining. Before glass-lining, each piece is checked for exact dimensional accuracy.

Two ground coats of glass are applied to the previously annealed, pickled and sandblasted parts. These serve as the bonding layer between the base material and the cover-lining. The cover-lining is applied by spraying, dipping or flowing

The dried parts are fired in electric or gas heated furnaces at temperatures between 800 °C (1472 °F) and 900 °C (1652 °F). This firing is repeated six to seven times until the glass-lining will have the required thickness.

Apart from mechanical gripping at a high firing temperature a chemical reaction takes place which leads to positive adherence of metal and glass.

A first visual inspection takes place immediately after glasslining. All glass-lined parts are subject to a spark test to identify any porosity.

Other test criteria include measuring the thickness of the glass coating and testing the angularity and plane parallelism. The tested glass-lined parts are provided with a quality seal by the QA-department.



Glass lined products from Düker have excellent characteristics against wear, corrosion resistance and diffusion resistance.

Technical requirements for fabrication

1. Materials

Düker only uses the materials listed in DIN 2876 with quality certificates in accordance with the AD Directives, Series W, for producing highly acid resistant glass-lined pipeline components. In case parts are subject to an acceptance procedure the material has to be marked prior to cutting to size. Our workers have the approval for restamping granted by the appropriate German authorities (TÜV).

2. Welding

All weld seams are produced in two passes. Our welding methods comply with the latest regulations; welding tests are available. Our qualified welders have valid test certificates issued by the appropriate German authorities (TÜV). These must be renewed every two years.

3. Tests

All round seams are subject to a non-destructive test according to AD 2000, HP 100 R, "Tafel 3". The spark test follows after glass-lining. Since pore-free glass-lining automatically calls for a perfect surface on the weld seam, these tests also serve as a substitute for the water pressure test.

4. Certificates

If required by the customer, we supply glass-lined pipe parts and fittings with Works Certificates (Certificate 2.2 to EN 10 204). The type of certificate demanded for special conditions (i.e. highly toxic media, large nominal diameters and higher pressures) is to be agreed when ordering.

Enamel & enamel tests / External protection

Düker has its own technique for melting the mixture of quartz, minerals and metal oxides into a glass frit at a temperature of 1.400 °C (2552 °F). In this way samples are constantly analysed and compared with given standards in order to guarantee a consistent quality.

According to DIN EN 14 483-2, 14 483-4 and DIN ISO 13 807 tests are carried out on enamelled samples for acid resistance water steam, steam alkaline and thermal shock.

Our QA-department subjects every glass-lined part to the following tests:

1. Preliminary spark test of 20.000 V.
2. Check on lining thickness (especially on all convex radii) according to DIN 2 876.
3. Dimension and tolerance check according to DIN 2 873.
4. Visual examination of surface condition by refraction.
5. Final 12.000 V spark test and visual recheck prior to despatch.

After glass-lining all pieces are sandblasted and, unless other instructions are specified by the customers, prepared with a heat-resistant anti-rust primer (dry coat thickness min. 60 µm).

Materials

for pressure vessels, pipes and fittings

in accordance with PED 97/23/EG

Description	Material codename		Material- No.	Standard	Regulation
	old	new			
Pipes, fittings	ST 37.0	–	1.0254	DIN 1 626 / 1 629	AD 2000-W4
	ST 35.8	–	1.0305	DIN 17 175	AD 2000-W4
	ST 37.4	P 235 TR 2	1.0255	DIN EN 10 216-1 DIN EN 10 217-1	AD 2000-W4
	H II	P 265 GH	1.0345	DIN EN 10 216-2 DIN EN 10 217-2 + 5	AD 2000-W4
Sheet metal	RST 37-2	S 235 JRG 2	1.0038	DIN EN 10 025	AD 2000-W1
	H II	P 265 GH	1.0425	DIN EN 10 218-2	AD 2000-W1
Stub ends	RST 37-2	S 235 JRG 2	1.0038	DIN EN 10 025 DIN EN 10 250-2	AD 2000-W9
Loose flanges	RST 37-2	S 235 JRG 2	1.0038	DIN EN 10 025 DIN EN 10 250-2	AD 2000-W9
Flanges	RST 37-2	S 235 JRG 2	1.0038	DIN EN 10 025 DIN EN 10 250-2	AD 2000-W9
Dished heads	H II	P 265 JRG 2	1.0425	DIN EN 17 273 DIN EN 10 216-1 + 2	AD 2000-W1, AD 2000-W12 (AD 2000-W13)
Torospherical head	H II	P 265 JRG 2	1.0425	DIN EN 17 273 DIN EN 10 216-1 + 2	AD 2000-W1, AD 2000-W12 (AD 2000-W13)
Valve bodies	RST 37-2	S 235 JRG 2	1.0038	DIN EN 10 025 DIN EN 10 250-2	AD 2000-A4, AD 2000-W4, AD 2000-W13
		GS-38	1.0420	DIN EN 10 213-2	AD 2000-W4, AD 2000-W5

Careful quality conformance inspection guarantees that only the correct materials are used. We check our pre-defined analysis by examining random samples with a spectrometer in our own laboratory.

Pressure Equipment Directives – 97/23/EC

Our glass lined products are subject to PED if they are considered as being valves, columns, vessels and complete pipelines. Single pipe parts are not subject to PED as they become a pipeline only when assembled. Only from this point onwards the part of the plant is subject to PED.

Düker products are in accordance with PED 97/23/EC

The CE-mark is only the symbol for the fulfilment of the relevant EC directives. Therefore it is not a quality certificate but is to be considered solely as a kind of “product identity card” when crossing the borders within the EU.



Düker handles the PED as follows:

1. Valves to module A 1, monitored by TÜV with CE-mark (CE 0036).
2. Pipelines, columns and vessels to module G, single inspection by TÜV, with CE-mark (CE 0036).

Installation Instructions

for glass lined pipes and fittings (Part of our Installation Instructions)

Transport and Storage

- Do not remove the protective caps from the pipeline parts
- Avoid external loads, vibration and impact

Installation

- Use soft gaskets (PTFE or PTFE-envelope)
- Connection bolts are to be fastened with a torque wrench

Support system

- DN 25 bis 100: max. distances 3 000 mm
- DN 125 bis 400: max. distances 4 000 mm
- Select kind of support (fixed, guiding or loose support)

Working conditions

- Pressure testing of the installed pipeline is to be carried out at 1,1 times of the admissible working pressure to AD 2000 - HP 30
- Consider working pressure conditions (pressure, temperature) and admissible bending of the glass lined pipes



General

- Do not weld on glass lined pipe parts
- Earthing studs are to be used in case where electrostatic charges are likely to occur (contact Düker)

Please ask for our detailed installation manual or download from www.dueker.de

Declaration of Conformity (Example)

in accordance with Pressure Equipment Directive 97/23/EG


Qualitätssicherungssystem
Zertifiziert nach
DIN EN ISO 9001:2000
Registrier-Nr. 12 100 21864 

Konformitätserklärung
Declaration of Conformity
gemäß Druckgeräterichtlinie 97/23/EG
in accordance with Pressure Equipment Directive 97/23/EC

Der Hersteller: Düker GmbH & Co. KGaA
The manufacturer
Technische Emaillierung
63846 Laufach, Hauptstraße 39 - 41

erklärt, dass das Druckgerät (Bauteil):
declares, that the pressure equipment (single part):

AB-Nr. 7200000	
Diverse Rohrleitungen, Kategorie II <i>Various single pipe parts, Category II</i>	DN 32 - 350
Max. zulässiger Druck PS (bar) <i>max. allowable pressure PS</i>	-1/10
Zulässige max./min. Temperatur TS (°C) <i>allowable max./min. temperature TS</i>	-10/200 - email800 -10/150 - email350
Fluidgruppe <i>Fluid group</i>	1

mit der Druckgeräterichtlinie 97/23/EG übereinstimmt.
complies with the requirements of the Pressure Equipment Directive 97/23/EC.

Die Rohrleitungsteile sind im Rahmen der Inbetriebnahme einer Druckprüfung zu unterziehen.
The installed pipework (single pipe parts) must be pressure tested after installation.

Angewandtes Regelwerk: AD 2000-Merkblätter / AD 2000-Code
Applied code:

Konformitätsbewertung nach: Modul A1 (interne Fertigungskontrolle mit Überwachung der Abnahme)
Conformity Assessment Procedure: Module A1 (internal manufacturing checks with monitoring of the final assessment)

Überwachende benannte Stelle: TÜV Rheinland Group Industrie Service GmbH
Monitoring notified body: 51105 Köln, Am Grauen Stein

Nummer der Konformitätsbescheinigung: 35
Certificate of conformity number: 01 202 511/Q-04/006

Ort, Datum <i>City, date</i> Laufach, 29.10.2007	Abteilung <i>department</i> Technische Emaillierung Glass Lining Technology	Unterschrift <i>signature</i> Gerd-Peter Imhof
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FB GCH-GP-030-1.08 / 29.10.2007

GLASS LINING TECHNOLOGIES

JOBGING FOUNDRY

FITTINGS AND VALVES

DRAINAGE TECHNOLOGY

ENGINEERING

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