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Monitoring Report

Subor Boru San. ve Tic. A.Ş.
"SUBOR GRP PIPES"

Report no. 22-210-03585-ÜB

Thirdparty monitoring acc. to DIN 18200:2021-04

Subor Boru San. ve Tic. A.Ş.
Acibadem Mahallesi Sokkullu sokak No:12
34718-Kadiköy/Istanbul

in the production facility

Sakarya-Karapürçek
Ahmetler Mahallesi

This report includes 9 pages (incl. this cover sheet) and 1 Annex.
It may only be handed over to third parties in unabridged form and with the approval of SIEBERT+KNIPSCHILD GmbH. This monitoring report was created in line with the requirements of DIN 18200:2021-04 and the Schleswig-Holstein Ordinance on Recognition of Testing, Monitoring and Certification (PÜZAVO).

Deutsches Institut für Bautechnik DIBt
Approved Monitoring Agency
ID: SHO09

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1 General Information

In the framework of an thirdparty monitoring scheme the company Subor Boru San. ve Tic. A.Ş. has commissioned the inspection and certification body Siebert + Knipschild GmbH to perform the tasks below for the purpose of proving compliance with the requirements of DIN 18200:2021-04 and of DIN CEN/TS 14632:2012-05.

1.1 Inspection of the manufacturing plant

In the framework of monitoring of the manufacturing plant in Sakarya-Karapürçek it is checked whether the staff and equipment meet the requirements for the proper production of the product. The monitoring of the manufacturing plant is performed in line with DIN 18200:2021-04. The inspection of the manufacturing plant includes the following points:

- inspection of the manufacturing site and of the manufacturing process;
- checking the storage of input materials and of the GRP pipes that are ready for shipping;
- checks of labelling

1.2 Check of the in-house production control system

The in-house production control system covers the checks of the input materials during the incoming goods check by checking the factory certificates as well as random spot checks of specific product properties of the incoming input materials.

1.3 Tests on the building product

In the framework of monitoring tests as part of the thirdparty monitoring acc. to DIN CEN/TS 14632:2012-05 the test results have to be compared with the product requirements.

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2 Requirements on the Product

The requirements on the product are defined by ISO 23856:2021-06 as well as by the manufacturer specifications.

2.1 Raw materials

2.1.1 Reactive resins, peroxides and reaction accelerators

For the manufacturing of Subor "GRP Pipes" unsaturated polyester resins on the basis of isophthalic acid, orthophthalic acid or terephthalic acid are used. Depending on customer-specific requirements vinyl ester may also be processed.

The resins are to be delivered with a supplier analysis certificate for every incoming resin batch and in approved safety containers. The individual deliveries are only accepted upon release by the company lab in the framework of in-house production control (INHPC). The specifications defined by Subor Boru San. ve Tic. A.Ş. have to be laid down in the QA manual.

The following parameters have to be tested on incoming materials, compared with the specifications, and the results are documented (INHPC):

- resin viscosity (acc. to ISO 2555)
- reactivity (acc. to ISO 2535)

The tests on the resin system have to be performed on the materials as delivered, with additives, as well as with the process-specific curing recipe.

2.1.2 Glass fibres

For the production of GRP Pipes and Couplings glass fibre rovings and chopped glass fibres made of E- or ECR-glass are used. The glass fibres are delivered with supplier analysis certificates. In the framework of in-house production control the following checks and tests are carried out on the raw materials and during production:

- combustile-matter content (acc. to ISO 1887)
- mass per unit area (acc. to ISO 3374)
- moisture content (acc. to EN ISO 3344)

2.1.3 Silica sand

The used silica sand is delivered with supplier analysis certificates with tests acc. to TS EN 12904 / RN 12902 and TS 2980 / 5426. In the framework of in-house production control a grading curve acc. to ISO 565 is carried out.

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2.1.4 Gasket / Stopper

The elastomeric EPDM gaskets or stoppers which are used for sealing and tightness shall meet the requirements acc. to EN 681-1. In the framework of in-house production control following tests are carried out:

- indentation hardness: Shore (acc. to ISO 7619)
- dimensional tolerances (acc. to ISO 3302)
- classification of imperfections (acc. to ISO 9691)

2.2 Production

The GRP pipes and couplings are made in in a continuous winding process in line with DIN EN 14364:2013-05 / ISO 23856:2021-06. Various profile types and diameters can be made as required by the customer. Acc. to the manufacturer's information the layer structure is as follows:

- Inner liner layer reinforced by chopped glass
- Inner structural layer made of continuous fibres and resin
- Structural core layer made of resin and silica sand
- Outer structural layer made of continuous fibres and resin
- Exterior surface

The GRP pipes of the manufacturer SUBOR use a coupling connection system for assembling. The Couplings are manufactured with the same process and layer structure as the pipes. The standard couplings which are used for common applications like sewer or pressure systems use elastomeric gaskets. A stopper gasket that prevents colliding of the pipes during assemble, and two sealing gaskets. The EPDM gaskets are installed directly after the production with an UV protecting tape for storage, or are supplied separately on the installation site.

2.2.1 Visual Inspection and Dimensional Check

An in-house quality check is performed on each manufactured product. It includes a visual inspection of the inner and the outer surfaces of the pipe and coupling and its coupling-grooves acc. to ASTM D 3754.

The dimensional check of the inner diameter is performed at production start and the outer diameter, thickness and length control are performed for each product acc. to following standards:

- ISO 10639
- EN 1796

- EN 14364
- ASTM D 3567

The measurement of the chamfering and coupling grooves is performed according to an internal standard.

2.2.2 Pipe and Coupling Performance

After the cutting and grooving process a leak tightness test is performed on each produced pipe and coupling acc. to AWWA C950. One per production day or one per 50 produced pipes (which ever comes first). Mechanical tests acc. to following standards are performed:

- EN 1228 / EN 1126 / EN 1393
- ISO 7685 / ISO 8513
- ASTM D 2412 / ASTM D 2105 / ASTM D 2290 / ASTM D 2583
- ignition loss of cured reinforced resins (acc. to ASTM 2584)

2.2.3 Labelling

Every GRP pipe is labelled with the logo of the manufacturer SUBOR and the respective client. On the inside and outside of the pipe and coupling the information of the diameter (DN), pressure-class (PN), stiffness (SN), length, date and running number to the according batch, pipe and project with internal information are painted on.

In addition, a sticker with a barcode is applied for a digital readout, which contains all information of the product and its assigned building project.

2.2.4 Packaging, transportation, storage

The product standards and technical specifications do not include any specific requirements. The manufacturer ensures according to its own requirements that the pipes and couplings are evenly stored to avoid any damage. For transport, pipes with different diameters can be stored inside each other. For this purpose, the pipes are provided with protective films to prevent transport damage.

2.3 Records of the results of in-house production control

The results of in-house production control (INHPC) have to be recorded as described below and kept for no less than 10 years:

- designation of the building product, or of the initial product and the components;
- type of check or test;
- production date and test date of the building product, or of the input material;
- result of the checks and tests and, if applicable, comparison with the requirements;
- signature of the person in charge of production.

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3 Thirdparty monitoring

Place and date of the performance of the thridparty monitoring:

Oktober 18, 2022

Subor Boru San. ve Tic. A.Ş.
Sakarya-Karapürçek
Ahmetler Mahallesi

The following persons were present on the monitoring date:

- Mr. Cumhur Cihat Kiliç, *Subor Boru San. ve Tic. A.Ş.*
  (Quality, Environment & Safety Manager)
- Mr. Berkant Bayar, *Subor Boru San. ve Tic. A.Ş.*
  (Export Sales Engineer)
- Mrs. Dr. Susanne Leddig Bahls, *IQS-Engineering*
  (General Manager)
- Mr. Jürgen Staratzke, *Endoline Rohrsysteme GmbH*
  (Managing Director)
- Mr. Stefan Freitag, *Siebert + Knipschild GmbH*
  (Supervisor)

Thirdparty monitoring includes an inspection of the company site for the assessment of the available staff and equipment, the check of the in-house production control (INHPC) system, and the type test acc. to DIN CEN/TS 14632:2012-05.

3.1 Result of thirdparty monitoring

In the framework of thirdparty monitoring for the GRP pipes of the manufacturer Subor Boru San. ve Tic. A.Ş. we checked the in-house production control system (INHPC) and the operating records. We performed a site inspection including the manufacturing facility and the company lab for in-house production control. Furthermore we looked into the available staff and technical equipment for the manufacture of GRP pipes.

3.1.1 Inspection of the manufacturing plant

We performed an inspection of the manufacturing plant of Subor Boru San. ve Tic. A.Ş. in Sakarya-Karapürçek. At the time of the inspection the factory in Sakarya-Karapürçek was making GRP pipes with round profiles. The raw materials are stored in good order, and the labelling as well as storage conditions are in line with the regulations.

The continuous filament winding technology used by SUBOR meets all technical requirements for manufacturing the GRP pipes in line with their product-specific requirements. Directly after the curing has been achieved the manufactured GRP pipes are cut to the required length.

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For each employee there are clear guidelines as to what training or knowledge they need for their tasks and regular training is carried out both internally and by external companies.

3.1.2 Check of in-house production control

In the framework of the thirdparty monitoring of the manufacturing plant in Sakarya-Karapürçek we checked the in-house production control system (INHPC). The individual points were checked during a walkdown of the storage and manufacturing facility, including the company's in-house labratory.

The in-house laboratory is accredited by the Turkish Accreditation Agency "TÜRKAK" in accordance with TS EN ISO/IEC 17025:2017. Spot checks were done on the documentation of incoming goods checks including the associated tests. The test devices used for incoming goods checks meet the requirements on the according tests to be performed. The devices had valid calibrations. We did random checks of the calibration records for the test equipment, and found that the records were available for the monitoring period. The factory and inspection certificates are complete and are stored in good order.

Every produced GRP pipe has a digital in-house monitoring report that is digitally signed by each employee responsible for the work steps performed with all information an parameters necessary. These digital reports, assigned to each individual pipe, contain all the information, from the raw materials used, to the operations carried out, to the project entitled.

The GRP pipes produced during the inspection had clearly visible painted markings and a barcode labelling. The markings are located on the inside and on the outside of the manufactured GRP pipes and contain all normatively required pipe-specific informations.

3.1.3 Monitoring tests (AT) in the framework of thirdparty monitoring

In the framework of the thirdparty monitoring Siebert + Knipschild GmbH performed monitoring tests (AT) acc. to DIN CEN/TS 14632:2012-05 (Table 4) and compared the results with the with the product requirements. The test specimen as part of the 2022 thirdparty monitoring, provided by the manufacturer, is from the production period beginning 2022. It is a circular GRP-Pipe section DN 1000 (PN: 1, SN: 10000). The GRP-Pipe from which the sample was taken bears the manufacturer's sample number: WE2201476P00. The test results of the material specimens within the scope of the thirdparty monitoring are presented in the test report no.: 22-210-03603-PB:

- Check of the wall structure
- Glass and resin content according to DIN EN ISO 1172:1998-12

Furthermore we have supervised an on-site testing of the longitudinal tensile strength acc. to ISO 8513 Method A of a circular GRP-Pipe DN 1100 (PN: 6, SN: 5000) with the sample number: WE2218475(2)P00. The test results show that the examined GRP-Pipes meet the requirements of the technical specification.

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3.2 Findings on deviations

No deviations from DIN 18200:2021-04 were found.

3.3 Recommendations

We recommend that the standard EN ISO 3126 for determination of diameter, wall thickness and overall length as listed in table 6 "Characteristics for batch release" of DIN CEN/TS 14632:2012-05 should be included in the quality plan.

4 Summary of the thirdparty monitoring

In the framework of the thirdparty monitoring of the GRP Pipes of the manufacturer Subor Boru San. ve Tic. A.Ş. the incoming goods, in-house production control, the operating and storage facility as well as the labelling of the building products was checked.

We found that the available staff and equipment are suitable for the continuously correct manufacture and for the according in-house production control.

According to DIN 18200:2021-04 the manufacturing process meets the applicable requirements.

Oststeinbek, November 25, 2022

Head of the Certification
and Inspection Body
Dipl.-Ing. Andreas Haacker

SIEBERT + KNIPSCHILD GmbH
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Supervisor

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Annexes:
Test Report no.: 22-210-03603-PB