Deutsches Institut für Bautechnik

Public-law institution jointly founded by the federal states and the Federation

Technical authority granting approvals and permits for construction products and construction techniques

Decision

amending the national technical approval of 25 November 2021

Date: 2 March 2022

Reference number: III 53-1.42.1-25/22

Approval number:

Z-42.1-223

Validity

from: **2 March 2022**

to: **3 December 2026**

Applicant:

REHAU Industries SE & Co. KG
Ytterbium 4
91058 Erlangen

Subject of approval:

Drainage pipes and fittings made of mineral-reinforced PP in nominal sizes DN/OD 32 to DN/OD 200 within buildings as well as underground within the building structure, designated "RAUPIANO PLUS"

This decision amends the national technical approval (*allgemeine bauaufsichtliche Zulassung*) no. Z-42.1-223 of 25 November 2022.

This decision contains three pages. This decision applies only in conjunction with the above-mentioned national technical approval and shall not be used without it.

Translation authorised by DIBt

I GENERAL PROVISIONS

The General Provisions of national technical approval no. Z-42.1-223 shall be replaced by the following version:

1 The national technical approval confirms the fitness for use of the subject of approval within the meaning of the Building Codes of the federal states (*Landesbauordnungen*).

2 The national technical approval does not replace the permits, approvals and certificates prescribed by law for carrying out construction projects.

3 The national technical approval is granted without prejudice to the rights of third parties, in particular private property rights.

4 Notwithstanding further provisions in the 'Special Provisions', manufacturers and distributors of the subject of approval shall make copies of the national technical approval available to the user and point out that the national technical approval must be available at the place of use. Upon request, copies of the national technical approval shall be placed at the disposal of the authorities involved.

5 The national technical approval shall be reproduced in full only. Partial publication requires the consent of DIBt. Texts and drawings in promotional materials shall not contradict the national technical approval. In the event of a discrepancy between the German original of the national technical approval and this authorised translation, the German version shall prevail.

6 The national technical approval may be revoked. The provisions of the national technical approval can subsequently be supplemented and amended, in particular if this is required by new technical findings.

7 This decision is based on the information and documents provided by the applicant on the subject of approval during the approval procedure. Alterations to the information on which this national technical approval was based are not covered by this decision and shall be notified to DIBt without delay.

II SPECIAL PROVISIONS

The Special Provisions of the national technical approval shall be amended as follows:

The address of the applicant of this national technical approval changes in accordance with the cover sheet of this national technical approval.

Ronny Schmidt
Head of Section

Drawn up by
Samuel

Deutsches Institut für Bautechnik

DIBt

Public-law institution jointly founded by the federal states and the Federation

Technical authority granting approvals and permits for construction products and construction techniques

National technical approval

Date: 25 Nov 2021

Reference number: III 53-1.42.1-50/21

Approval number:

Z-42.1-223

Validity

from: **3 December 2021**

to: **3 December 2026**

Applicant:

REHAU AG + Co.
Ytterbium 4
91058 Erlangen

Subject of approval:

Drainage pipes and fittings made of mineral-reinforced PP in nominal sizes DN/OD 32 to DN/OD 200 within buildings as well as underground within the building structure, designated "RAUPIANO PLUS"

The subject of approval named above is herewith granted a national technical approval (*allgemeine bauaufsichtliche Zulassung*).

This decision contains nine pages and six annexes.

Translation authorised by DIBt

I GENERAL PROVISIONS

1 This national technical approval confirms the fitness for use of the subject of approval within the meaning of the Building Codes of the federal states (*Landesbauordnungen*).

2 The national technical approval does not replace the permits, approvals and certificates prescribed by law for carrying out construction projects.

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6 The national technical approval may be revoked. The provisions of the national technical approval can subsequently be supplemented and amended, in particular if this is required by new technical findings.

7 This decision is based on the information and documents provided by the applicant on the subject of approval during the approval procedure. Alterations to the information on which this national technical approval was based are not covered by this decision and shall be notified to DIBt without delay.

II SPECIAL PROVISIONS

1 Subject of approval and field of use

This national technical approval applies to the manufacture and use of drainage pipes with a triple-layer wall structure and fittings made of mineral-reinforced polypropylene (PP) with nominal sizes DN/OD 32 to DN/OD 200.

The drainage pipes and fittings are flammable (*normalentflammbar*) building materials of building material class B2 in accordance with DIN 4102-1[1]. If such piping systems penetrate walls or ceilings, measures in accordance with the regulatory provisions (e.g. DIN 4102-11[2]) shall be taken to prevent the spread of fire and smoke.

If piping systems made of pipes in accordance with this national technical approval are fed through floors or walls to which regulatory provisions concerning fire resistance are applicable,

- the regulatory provisions concerning the fire protection design of piping systems or for sealing combustible pipes shall be complied with or
- pipe penetration seals in accordance with national technical approvals granted for this purpose shall be installed or
- other fire-stopping measures shall be taken, the suitability of which shall have been verified through a national technical test certificate (*allgemeines bauaufsichtliches Prüfzeugnis*) on the basis of tests performed in accordance with DIN 4102-11[2].

The building law provisions and regulatory guidelines for the use of combustible building materials in building construction shall remain unaffected.

The drainage pipes and fittings may be used in accordance with the specifications of DIN EN 1451-1[3] for piping systems inside buildings (application area code "B") as well as underground within the building structure (application area code "BD"), which are normally operated as gravity (non-pressure) pipes.

Unless specified otherwise below, DIN 1986-100[4] and DIN 1986-4[5] in conjunction with DIN EN 12056-1[6] shall apply for the execution.

The drainage pipes and fittings are intended only for wastewater in accordance with DIN 1986-3[7], the temperature of which does not exceed the temperatures specified in DIN EN 476[8].

1	DIN 4102-1	Fire behaviour of building materials and building components – Part 1: Building materials; concepts, requirements and tests, Clauses 3 and 6; publication date: 1998-05
2	DIN 4102-11	Fire behaviour of building materials and building components; pipe encasements, pipe bushings, service shafts and ducts, and barriers across inspection openings; terminology, requirements and testing; publication date: 1985-12
3	DIN EN 1451-1	Plastic piping systems for soil and waste discharge (low and high temperature) within the building structure - Polypropylene (PP) - Part 1: Specifications for pipes, fittings and the system; German version EN 1451-1:2017+AC:2018; publication date: 2018-10
4	DIN 1986-100	Drainage systems on private ground – Part 100: Specifications in relation to DIN EN 752 and DIN EN 12056; publication date: 2016-12
5	DIN 1986-4	Drainage systems on private ground – Part 4: Fields of application of sewage pipes and fittings of different materials; publication date: 2019-08
6	DIN EN 12056-1	Gravity drainage systems inside buildings – Part 1: General and performance requirements; German version EN 12056-1:2000; publication date: 2001-01
7	DIN 1986-3	Drainage systems on private ground – Part 3: Specifications for service and maintenance; publication date: 2004-11
8	DIN EN 476	General requirements for components used in drains and sewers; German version EN 476:2011; publication date: 2011-04

2 Provisions for the construction product(s)

2.1 Properties and composition

2.1.1 General

Unless otherwise specified below, the requirements of DIN EN 1451-1[3] in conjunction with DIN CEN/TS 1451-2[9] shall apply.

2.1.2 Dimensions

The dimensions of the pipes and fittings shall correspond to the specifications and drawings given in Annexes 1 to 4 or to those of DIN EN 1451-1[3] where applicable.

2.1.3 Material

The composition of the mineral-reinforced polypropylene shall correspond to the formulation deposited with DIBt and the external surveillance body.

Material of unverified composition shall not be used.

Use of process scrap of the same composition from the applicant's manufacturing plants is permissible.

2.1.4 Density

When tested in accordance with Section 2.3.2, the density of the drainage pipes and fittings shall correspond to the values given in Annexes 5 and 6.

2.1.5 Vicat dimensional stability

In the dimensional stability test in accordance with DIN EN ISO 306[10], method B/50, the Vicat softening temperature for the drainage pipes and fittings shall correspond to a mean value of VST/B/ 50 $\geq$ 70 °C.

2.1.6 Colour

The pipes and fittings shall be uniformly white.

2.1.7 Impact resistance

2.1.7.1 Impact resistance of the drainage pipes

In drop ball tests using the staircase method in accordance with the specifications given in Section 2.3.2 at 0 °C ± 1 °C and an H_{50} value $\geq$ 1 m, the drainage pipes shall maximally break below 0.5 m. In the drop ball tests using the round-the-clock method in accordance with the specifications given in Section 2.3.2 at 0 °C $\pm$ 1 °C, the breakage rate of the drainage pipes shall be $\leq$ 10 %.

2.1.7.2 Impact resistance of the fittings

In the drop test, the breakage rate of the injection-moulded fittings (including pump station connecting pieces) shall not exceed the values specified in Section 2.3.2.

2.1.8 Reaction to fire

The drainage pipes and fittings shall meet the requirements for flammable (*normalentflammbar*) building materials of building material class B2 in accordance with DIN 4102-1[1].

[9]	DIN CEN/TS 1451-2	Plastic piping systems for soil and waste discharge (low and high temperature) within the building structure – Polypropylene (PP) – Part 2: Guidance for the assessment of conformity; German version CEN/TS 1451-2:2019; publication date: 2020-08
[10]	DIN EN ISO 306	Plastics – Thermoplastic materials – Determination of Vicat softening temperature (VST) (ISO 306:2004); German version EN ISO 306:2004; publication date: 2004-10

2.1.9 Elastomeric seals

The elastomeric seals of the socket joints of the drainage pipes and fittings shall meet the requirements of DIN EN 681-1[11].

2.1.10 Melt mass-flow rate (MFR)

The test in accordance with Section 2.3.2 shall show that the melt mass-flow rate (MFR 230°C/2.16 kg) of the processed polypropylene of the drainage pipes and fittings has the following values:

- Middle layer (of the pipes) ≤ 3.0
- Moulded parts ≤ 3.0

2.1.11 Oxidation induction time (OIT)

The test in accordance with Section 2.3.2 shall show that the OIT of the middle layer of the pipe and fittings has a value of at least 8 min at 200 °C.

2.1.12 Ring stiffness

The test in accordance with Section 2.3.2 shall show that the short-term ring stiffness has a minimum value of 4.0 kN/mm^2.

The following values for the ring stiffness shall be taken into account for verifying stability:

- $S_{R\ Short\text{-}term}$ (24h value) = 20.8 kN/m^2
- $S_{R\ Long\text{-}term}$ = 5.1 kN/m^2

Changes in the vertical diameter shall not exceed the following values:

- in the short-term verification 4 %
- in the long-term verification 6 %

2.2 Manufacture, packaging, transport, storage and marking

2.2.1 Manufacture

The drainage pipes and fittings described in Section 2.1 shall be manufactured by extrusion or by injection moulding, taking into account the requirements of Section 2.3.2. During manufacture, the following production parameters shall be calibrated and recorded for each new batch and each time the machine is started:

- temperature at the extruder or at the injection head,
- screw speed,
- torque (via motor power or power input),
- melt pressure,
- melt temperature and
- dimensions.

2.2.2 Packaging, transport and storage

The drainage pipes and fittings shall be stored and transported such that they are not impermissibly deformed. If boxes are used to transport and store the fittings, they shall be protected from moisture. The stack height of the drainage pipes at the construction site or in temporary storage shall not exceed 1.50 m, even if wood beams are inserted between the pipes.

2.2.3 Marking

The drainage pipes and fittings shall be marked by the manufacturer with the national conformity mark (*Ü-Zeichen*) in accordance with the Conformity Marking Ordinances (*Übereinstimmungszeichen-Verordnungen*) of the federal states, including approval number Z-42.1-223. The mark shall only be applied if the requirements given in Section 2.3 ('Confirmation of conformity') are met.

[11] DIN EN 681-1 Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Part 1: Vulcanised rubber; German version EN 681-1:1996 + A1:1998 + A2:2002 + AC:2002 + A3:2005; publication date: 2006-11

The drainage pipes and fittings shall also each be marked at least once in a clearly visible and durable manner with the following information:

- nominal size
- angle (for elbows)
- manufacturing plant
- year of manufacture
- ice crystal symbol in accordance with DIN EN 1451-1
- domestic drainage pipe "B" or "BD" in accordance with DIN EN 1451-1
- building material class B2 flammable (*normalentflammbar*) in accordance with DIN 4102-1

2.3 Confirmation of conformity

2.3.1 General

The attestation of conformity of the drainage pipes and fittings with the provisions of this national technical approval shall be issued for every manufacturing plant in the form of a certificate of conformity based on factory production control and regular external surveillance of the drainage pipes and fittings in accordance with the following provisions.

To issue the certificate of conformity and for external surveillance, including the associated product testing, the manufacturer of the drainage pipes and fittings shall use a certification body and an inspection body recognised for these purposes.

The declaration that a certificate of conformity has been granted shall be submitted by the applicant through marking of the construction products with the national conformity mark, stating the intended use.

The certification body shall send a copy of the certificate of conformity issued by it to DIBt.

2.3.2 Factory production control

A factory production control system shall be set up and implemented in each manufacturing plant. Factory production control is understood to be continuous surveillance of production by the manufacturer to ensure that the construction products manufactured satisfy the provisions of this national technical approval.

The factory production control shall at least include the measures listed below.

Description and verification of the starting material and the constituents:

The mineral-reinforced polypropylene used shall comply with the specifications given in Section 2.1.1 and the formulation deposited with DIBt and the external surveillance body.

To verify the quality of the raw material, the manufacturer shall obtain a test report 2.2 in accordance with DIN EN 10204[12] from the supplier for each delivery, which also includes a determination of the mineral filler content by means of ashing tests in accordance with DIN EN 3451-1[13]. The filler content of the pipes shall be determined for each batch by determining the density given in Section 2.1.4.

The applicant shall check for each delivery that the elastomeric seals or the respective accompanying documents bear the CE marking and include the specific information required in accordance with DIN EN 681-1[11] to verify compliance with the specifications given in Section 2.1.9 pertaining to the elastomeric seals.

Checks and tests to be carried out during manufacture:

Compliance with the specifications set out in Section 2.2.1 shall be verified.

12	DIN EN 10204	Metallic products – Types of inspection documents; German version EN 10204:2004; publication date: 2005-01
13	DIN EN ISO 3451-1	Plastics – Determination of ash – Part 1: General methods (ISO 3451-1:2019); German version EN ISO 3451-1:2019); publication date: 2019-05

Verifications and tests to be carried out on the finished construction product:

A check for compliance with the requirements of DIN EN 1451-1[3] as well as any other requirements in the following sections shall be carried out:

1. Adherence to the specifications for the dimensions of the pipes and fittings given in Section 2.1.2 shall be continuously checked during production.
2. Adherence to the limit values specified in Section 2.1.4 for the density of the drainage pipes and fittings shall be checked at least once per material batch for each machine and dimension in accordance with DIN EN ISO 1183-1[14], method A.
3. Adherence to the specifications on Vicat dimensional stability of the drainage pipes and fittings given in Section 2.1.5 shall be tested in accordance with DIN EN ISO 306[10] at least once per material batch for each machine and dimension.
4. Adherence to the specifications on the colouring of the pipes and fittings given in Section 2.1.6 shall be checked at least every two production hours for each machine and dimension for the pipes and at least every eight production hours for the fittings.
5. Compliance with the specifications on impact resistance given in Section 2.1.7.1 shall be verified at least once per production month for each extrusion line using the staircase method in accordance with DIN EN ISO 11173[15] and at least once per production week for each extrusion line using the round-the-clock method in accordance with DIN EN ISO 3127[16].
6. The specifications given in Section 2.1.7.2 regarding the impact resistance of the injection-moulded fittings shall be checked by means of a drop test at least once per production week for each injection moulding machine and dimension and each time the machine is started.

   Ten fittings shall be taken as test specimens. Of these, five fittings shall be stored for at least 2 hours at a temperature of 23 ± 2 °C. At the same temperature, these five fittings shall be dropped from a height of 1 ± 0.05 m – each with a different orientation – onto a plane concrete floor in a free-fall drop test.

   If no failure (breakage) occurs, the test shall be considered to have been passed. However, if one fitting fails, the test shall also be carried out on the remaining five fittings. If more than 10% of the specimens fail, the associated production volume back to the last passed test shall be discarded.
7. Compliance with the specification given in Section 2.1.10 for the melt mass-flow rate (MFR) of the pipes and fittings shall be verified in accordance with DIN EN ISO 1133-1[17] at least once per material batch.
8. Adherence to the specifications given in Section 2.1.11 for the OIT of the pipes and fittings shall be checked at least once per material batch in accordance with DIN EN ISO 11357-6[18].

14	DIN EN ISO 1183-1	Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pyknometer method and titration method (ISO 1183-1:2019, corrected version 2019-05); German version EN ISO 1183-1:2019; publication date: 2019-09
15	DIN EN ISO 11173	Thermoplastics pipes – Determination of resistance to external blows – Staircase method (ISO 11173:1994); German version EN ISO 11173:2017; publication date: 2018-02
16	DIN EN ISO 3127	Thermoplastics pipes – Determination of resistance to external blows – Round-the-clock method (ISO 3127:1994); German version EN ISO 3127:2017; publication date: 2018-01
17	DIN EN ISO 1133-1	Plastics – Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics – Part 1: Standard method (ISO 1133-1:2011); German version EN ISO 1133-1:2011; publication date: 2012-03
18	DIN EN ISO 11357-6	Plastics – Differential scanning calorimetry (DSC) – Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT) (ISO 11357-6:2018); German version EN ISO 11357-6:2018; publication date: 2018-07

9. Compliance with the values for the ring stiffness of the pipes given in Section 2.1.12 shall be verified in accordance with DIN EN ISO 9969[19] at least once per quarter.
10. Compliance with the production specifications given in Section 2.2.1. shall be continuously checked during production.
11. Compliance with the marking specifications given in Section 2.2.3 shall be checked continuously during production.
12. Deviating from Section 2, the longitudinal reversion shall be verified at least once per production week for each extrusion line in accordance with DIN EN ISO 2505[20].

The results of factory production control shall be recorded. The records shall at least include the following information:

- designation of the construction product or the starting material or the constituents,
- type of check or test,
- date of manufacture and testing of the construction product or the starting material,
- results of the checks and tests as well as, if applicable, comparison with requirements and
- signature of the person responsible for factory production control.

The records shall be kept for at least five years and submitted to the inspection body used for external surveillance. They shall be presented to DIBt and the competent supreme building authority upon request.

If the test result is unsatisfactory, the manufacturer shall immediately take the necessary measures to resolve the defect. Construction products that do not meet the requirements shall be handled in such a way that they cannot be mixed up with compliant products. After the defect has been remedied, the relevant test shall be repeated immediately – where technically feasible and necessary to show that the defect has been eliminated.

2.3.3 External surveillance

The plant and the factory production control system shall be verified regularly, i.e. at least twice a year, by means of external surveillance at each manufacturing plant.

Within the framework of external surveillance, adherence to the relevant requirements in accordance with DIN EN 1451-1[3] as well as Sections

- 2.1.2 Dimensions,
- 2.1.4 Density,
- 2.1.5 Vicat,
- 2.1.6 Colouring,
- 2.1.7 Impact resistance,
- 2.1.8 Reaction to fire,
- 2.1.9 Elastomeric seals,
- 2.1.10 MFR,
- 2.1.11 OIT,
- 2.1.12 Ring stiffness,
- 2.2.1 Manufacture and
- 2.2.3 Marking

shall be randomly checked.

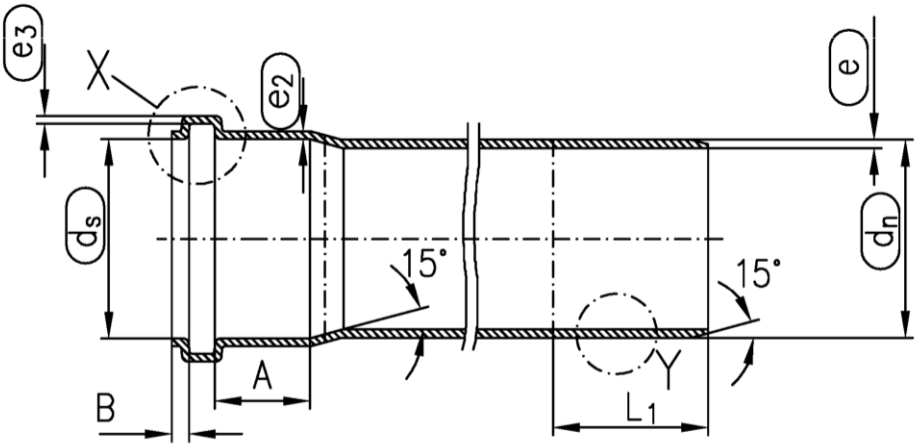
19	DIN EN ISO 9969	Thermoplastics pipes - Determination of ring stiffness (ISO 9969:2016); German version EN ISO 9969:2016; publication date: 2016-06
20	DIN EN ISO 2505	Thermoplastics pipes – Longitudinal reversion – Test method and characteristic values (ISO 2505:2005); German version EN ISO 2505:2005; issue: 2005-08

Additionally, compliance with the requirements for dimensional stability in accordance with Section 2.1.5 and those for reaction to fire in accordance with Section 2.1.8, in particular, shall be verified.

Sampling and testing shall be the responsibility of the recognised inspection body taking into consideration the provisions of DIN CEN/TS 1451-2[9]. The results of certification and external surveillance shall be kept for at least five years. They shall be presented by the certification body or inspection body to DIBt and the competent supreme building authority upon request.

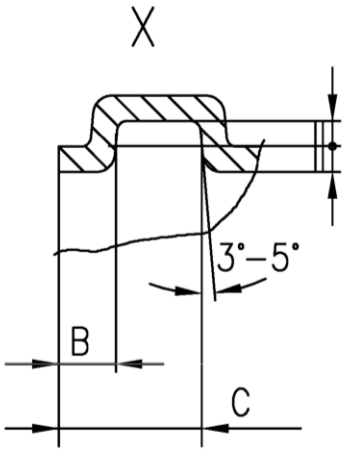
Ronny Schmidt
Head of Section

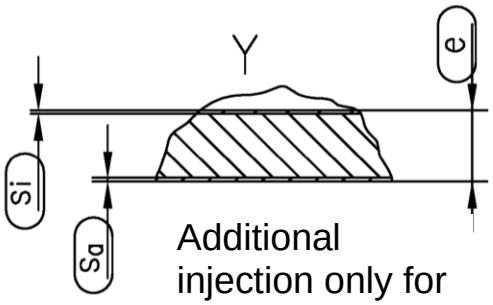
Drawn up by
Samuel



Socket

Spigot end





Additional injection only for pipes

Drainage pipes and fittings made of mineral-reinforced PP in nominal sizes DN/OD 32 to DN/OD 200 within buildings as well as underground within the building structure, designated "RAUPIANO PLUS"

Dimension drawings

Annex 1

Deutsches Institut für Bautechnik DIBt

Pipes

	DN	200
Spigot end	d_n	200
	Tol. d_n	+0.6
	e	6.2
	Tol. e	+1.0
	$S_{i\ min.}$	0.08
	$S_{a\ min.}$	0.10
Socket	$d_{s\ min.}$	*
	$e_{2\ min.}$	*
	$e_{3\ min.}$	*
	$L_{1\ min.}$	85
	$A_{min.}$	*
	$B_{min.}$	*
	$C_{max.}$	*

* Pushed-on double socket in accordance with Table 2 in Part 2.1.4

si min. =0.05mm for DN 32 to DN 160

sa min. =0.1mm for DN 32 to DN 160

Pipes DN 32 to DN 160 corresponding to pipe series S20 in accordance with DIN EN 1451-1

Drainage pipes and fittings made of mineral-reinforced PP in nominal sizes DN/OD 32 to DN/OD 200 within buildings as well as underground within the building structure, designated "RAUPIANO PLUS"	Annex 2
Dimensions of pipes	

Deutsches Institut für Bautechnik DIBt

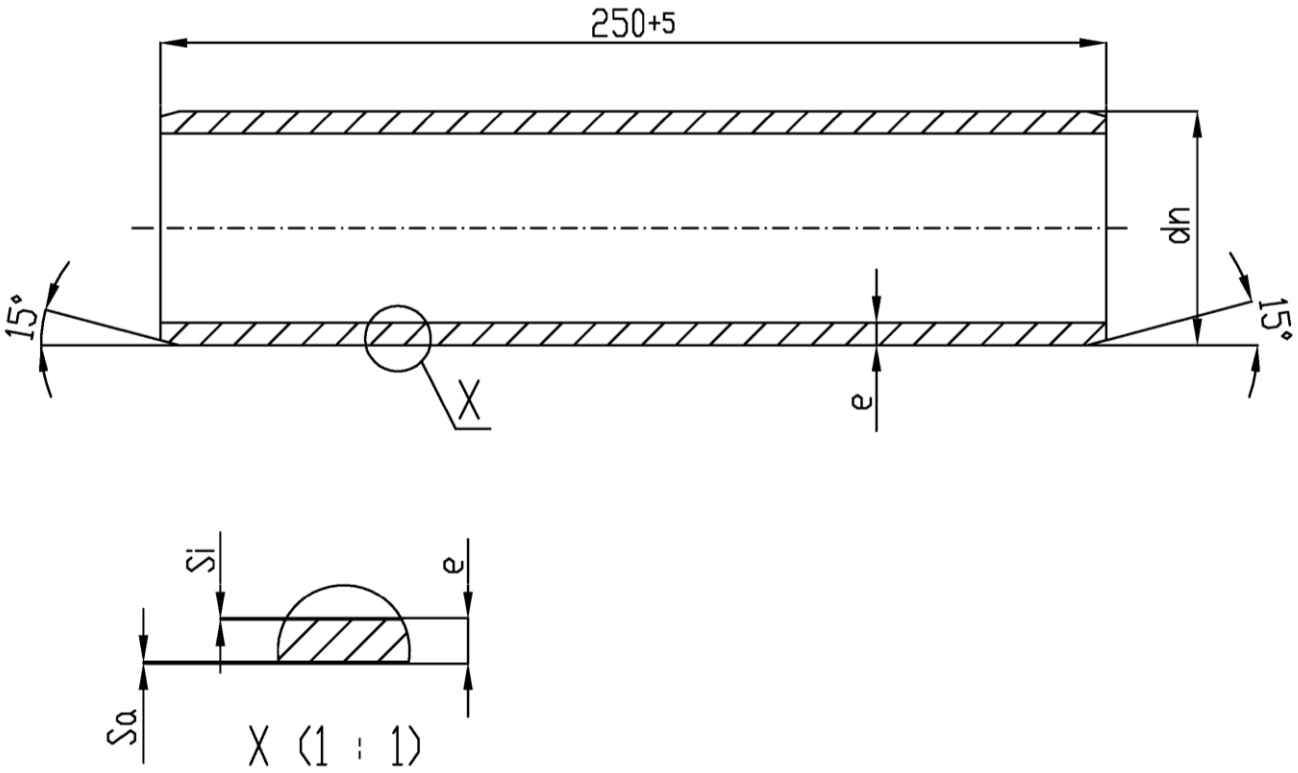
Fittings

DN	110	125	160 *	160	200
e	4.0	4.6	5.0	5.8	6.2
Tol. e	+0.6	+0.7	+0.6	+0.8	+0.9

* Elbow DN/OD 160/15° and DN/OD 160/30°
Transition DN/OD 160/125
Socket end cap DN/OD 160

In the area between the socket and the spigot end, the fittings may have wall thickenings towards the outside corresponding to a maximum of twice the respective wall thickness.

Other fittings DN 32 to DN 160 corresponding to pipe series S20 in accordance with DINEN 1451-1



	d_n	e	$S_{i\ min}$	$S_{a\ min}$
DN 40	$40^{+0.3}$	$3.0^{+0.3}$	0.05	0.1
DN 50	$50^{+0.3}$	$3.0^{+0.3}$	0.05	0.1
DN 75	$75^{+0.4}$	$3.0^{+0.3}$	0.05	0.1
DN 90	$90^{+0.4}$	$3.1^{+0.6}$	0.05	0.1
DN 110	$110^{+0.4}$	$3.4^{+0.6}$	0.05	0.1

Drainage pipes and fittings made of mineral-reinforced PP in nominal sizes DN/OD 32 to DN/OD 200 within buildings as well as underground within the building structure, designated "RAUPIANO PLUS"

Dimensions of pump station connecting pieces

Annex 4

Product	Description		Density in g/cm³
Drainage pipes	DN/OD 160 and DN/OD 200		1.500 ± 0.200
Drainage pipes and pump station connecting pieces	DN/OD 32 to DN/OD 125		1.900 ± 0.200
Elbow	DN/OD 32/15° DN/OD 32/30° DN/OD 32/45° DN/OD 32/87° DN/OD 40/67° DN/OD 50/15° DN/OD 50/30° DN/OD 50/45° DN/OD 50/67° DN/OD 50/87° DN/OD 75/15° DN/OD 75/30° DN/OD 75/45° DN/OD 75/67° DN/OD 75/87° DN/OD 90/15° DN/OD 90/30°	DN/OD 90/45° DN/OD 90/67° DN/OD 90/87° DN/OD 110/15° DN/OD 110/30° DN/OD 110/45° DN/OD 110/67° DN/OD 110/87° DN/OD 110/87.5° DN/OD 125/15° DN/OD 125/30° DN/OD 125/45° DN/OD 125/67° DN/OD 125/87° DN/OD 160/45° DN/OD 160/87°	1.800 ± 0.200
Socket and double socket	DN/OD 32 DN/OD 50 DN/OD 75 DN/OD 90	DN/OD 110 DN/OD 125 DN/OD 160 DN/OD 160	
Short pipes	DN/OD 32/150 mm DN/OD 32/250 mm DN/OD 40/150 mm DN/OD 40/250 mm DN/OD 50/150 mm DN/OD 50/250 mm DN/OD 75/150 mm	DN/OD 75/250 mm DN/OD 90/150 mm DN/OD 90/250 mm DN/OD 110/150 mm DN/OD 110/250 mm DN/OD 125/150 mm DN/OD 125/250 mm	
Branch	DN/OD 32/32/45° DN/OD 32/32/87° DN/OD 40/40/45° DN/OD 40/40/87° DN/OD 50/40/45° DN/OD 50/40/87° DN/OD 50/50/45° DN/OD 50/50/87° DN/OD 75/50/45° DN/OD 75/50/87° DN/OD 75/75/45° DN/OD 90/50/45° DN/OD 90/50/87° DN/OD 90/75/45° DN/OD 90/75/87° DN/OD 90/90/45° DN/OD 90/90/87°	DN/OD 110/50/45° DN/OD 110/50/87° DN/OD 110/75/45° DN/OD 110/75/87° DN/OD 110/90/45° DN/OD 110/90/87° DN/OD 110/110/45° DN/OD 110/110/87° DN/OD 125/110/45° DN/OD 125/110/87° DN/OD 125/125/45° DN/OD 125/125/87° DN/OD 160/110/45° DN/OD 160/110/87° DN/OD 160/160/45° DN/OD 160/160/87°	
Double branch	DN/OD 110/110/110/45°	DN/OD 125/110/110/45°	
Transition pipes	DN/OD 40/32 DN/OD 50/32 DN/OD 50/40 DN/OD 75/50 DN/OD 90/50 DN/OD 90/75	DN/OD 110/50 DN/OD 110/75 DN/OD 110/90 DN/OD 125/110 DN/OD 160/110	
Long socket	DN/OD 90	DN/OD 110	
Cleanout pipe	DN/OD 50 DN/OD 75 DN/OD 90	DN/OD 110 DN/OD 125 DN/OD 160	
Socket end cap	DN/OD 32 DN/OD 40 DN/OD 50	DN/OD 75 DN/OD 90 DN/OD 110	

Drainage pipes and fittings made of mineral-reinforced PP in nominal sizes DN/OD 32 to DN/OD 200 within buildings as well as underground within the building structure, designated "RAUPIANO PLUS"

Density of the mineral-reinforced PP of the drainage pipes and fittings

Annex 5

Product	Description		Density in g/cm³
Elbow	DN/OD 40/15° DN/OD 40/30° DN/OD 40/45° DN/OD 40/87°	DN/OD 160/15° DN/OD 160/30° DN/OD 200/45° DN/OD 200 87°	1.300 ± 0.300
Branch	DN/OD 75/75/87° DN/OD 200/160/45°	DN/OD 200/200/45°	
Transition pipes	DN/OD 160/125	DN/OD 200/160	
Connecting piece	DN/OD 40/40-30	DN/OD 50/40-30	
Socket and double socket	DN/OD 40	DN/OD 200	
Siphon elbow	DN/OD 40/40-30 DN/OD 50/40-30	DN/OD 50/50	
Socket end cap	DN/OD 125 DN/OD 160	DN/OD 200	
Handcrafted moulded parts			
Branch	DN/OD 110/75/45° DN/OD 110/75/87° DN/OD 110/110/45° DN/OD 110/110/87°	DN/OD 160/125/45° DN/OD 160/125/87° DN/OD 200/160/87°	1.800 ± 0.200
Elbow	DN/OD 75/45°	DN/OD 110/45°	
Connecting piece for ventilation duct	DN/OD 75/80		
Double branch	DN/OD 110/110/110/87°	DN/OD 160/110/110/87°	
Bend	DN/OD 75/87°		1.300 ± 0.300 / 1.800 ± 0.200
Bend	DN/OD 75/45° DN/OD 90/45° and 87°	DN/OD 110/45° and 87°	1.800 ± 0.200
Double branch one-sided max flow	DN/OD 90/90/50/87°	DN/OD 110/110/50/87°	
Stepped double branch right max flow	DN/OD 90/90/50/87° DN/OD 110/90/75/87°	DN/OD 110/110/75/87°	
Stepped double branch left max flow	DN/OD 90/90/50/87° DN/OD 110/90/75/87°	DN/OD 110/110/75/87°	
Double branch max flow	DN/OD 90/90/90/87°		
Corner double branch max flow	DN/OD 90/90/90/87°		
Corner double branch	DN/OD 110/110/110/87°		
Inspection chamber branch right	DN/OD 90/75/90/87°	DN/OD 110/75/110/87°	1.300 ± 0.300 / 1.800 ± 0.200
Inspection chamber branch left	DN/OD 90/75/90/87°	DN/OD 110/75/110/87°	1.300 ± 0.300 / 1.800 ± 0.200
Parallel branch	DN/OD 90/90	DN/OD 110/110	1.800 ± 0.200

Drainage pipes and fittings made of mineral-reinforced PP in nominal sizes DN/OD 32 to DN/OD 200 within buildings as well as underground within the building structure, designated "RAUPIANO PLUS"

Density of the mineral-reinforced PP of the drainage pipes and fittings

Annex 6