

## Allgemeine bauaufsichtliche Zulassung

Zulassungsstelle für Bauprodukte und Bauarten

Bautechnisches Prüfamt

Eine vom Bund und den Ländern  
gemeinsam getragene Anstalt des öffentlichen Rechts  
Mitglied der EOTA, der UEAtc und der WFTAO

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**Z-42.1-223**

Validity

from: **13 February 2017**

to: **2 December 2021**

Applicant:

**REHAU AG + Co.**

Ytterbium 4

91058 Erlangen-Eltersdorf, Germany

Subject of approval:

**'RAUPIANO PLUS' drainage pipes and fittings made from mineral-reinforced PP with nominal sizes DN/OD 40 to DN/OD 200 inside and outside buildings**

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

This national technical approval (*allgemeine bauaufsichtliche Zulassung*) contains nine pages and six annexes.

This national technical approval (*allgemeine bauaufsichtliche Zulassung*) replaces national technical approval (*allgemeine bauaufsichtliche Zulassung*) no. Z-42.1-223 of 26 August 2008, extended through the decision of 7 November 2011.

Translation authorised by DIBt

DIBt

## I GENERAL PROVISIONS

- 1 With the national technical approval (*allgemeine bauaufsichtliche Zulassung*) the fitness for use and the applicability of the subject of approval in accordance with the Building Codes of the federal states (*Landesbauordnungen*) have been verified.
- 2 If in the national technical approval (*allgemeine bauaufsichtliche Zulassung*) requirements are made concerning the special expertise and experience of persons entrusted with the manufacture of construction products and types of construction in accordance with the provisions of the relevant federal state following Section 17 Sub-section 5 of the Model Building Code (*Musterbauordnung*), it shall be noted that this expertise and experience can also be proven by equivalent verifications from other Member States of the European Union. If necessary, this also applies to equivalent verifications presented within the framework of the Agreement on the European Economic Area (EEA) or other bilateral agreements.
- 3 The national technical approval (*allgemeine bauaufsichtliche Zulassung*) does not replace the permits, approvals and certificates prescribed by law for carrying out building projects.
- 4 The national technical approval (*allgemeine bauaufsichtliche Zulassung*) is granted without prejudice to the rights of third parties, in particular private property rights.
- 5 Notwithstanding further provisions in the 'Special Provisions', manufacturers and distributors of the subject of approval shall make copies of the national technical approval (*allgemeine bauaufsichtliche Zulassung*) available to the user and point out that the national technical approval (*allgemeine bauaufsichtliche Zulassung*) shall be available at the place of use. Upon request, copies of the national technical approval (*allgemeine bauaufsichtliche Zulassung*) shall be placed at the disposal of the authorities involved.
- 6 The national technical approval (*allgemeine bauaufsichtliche Zulassung*) may be reproduced in full only. Partial publication requires the consent of Deutsches Institut für Bautechnik. Texts and drawings of advertising brochures may not be in contradiction to the national technical approval (*allgemeine bauaufsichtliche Zulassung*). In the event of a discrepancy between the German original of the national technical approval (*allgemeine bauaufsichtliche Zulassung*) and this authorised translation, the German version shall prevail.
- 7 The national technical approval (*allgemeine bauaufsichtliche Zulassung*) is granted until revoked. The provisions of the national technical approval (*allgemeine bauaufsichtliche Zulassung*) can subsequently be supplemented and amended, in particular if this is required by new technical findings.

## II SPECIAL PROVISIONS

### 1 Subject of approval and field of application

This national technical approval (*allgemeine bauaufsichtliche Zulassung*) applies to the manufacture and use of triple-wall drainage pipes and fittings made from mineral-reinforced polypropylene (PP) with nominal sizes DN/OD 40 to DN/OD 200.

The drainage pipes and fittings are building materials of class 'B2' (flammable) in accordance with DIN 4102-1<sup>1</sup>. If such drainage pipes are routed through walls or ceilings, measures shall be taken to prevent fire and smoke from spreading in accordance with the regulatory provisions (e.g. DIN 4102-11<sup>2</sup>).

The drainage pipes and fittings shall be permitted for use as drainage pipes inside buildings (application category 'B') and as underground pipes within the building structure (application category 'BD') normally operated as gravity (non-pressure) pipes in accordance with the specifications set forth in DIN EN 1451-1<sup>3</sup>.

The drainage pipes and fittings shall only be used for drainage of wastewater in accordance with DIN 1986-3<sup>4</sup> with a temperature not exceeding the specifications given in DIN EN 476<sup>5</sup>.

### 2 Provisions for drainage pipes and fittings

#### 2.1 Properties and composition

##### 2.1.1 General

Unless otherwise specified below, the requirements of DIN EN 1451-1<sup>3</sup> in connection with DIN CEN/TS 1451-2<sup>6</sup> shall apply.

##### 2.1.2 Dimensions

The dimensions of the pipes and fittings shall correspond to the specifications and illustrations given in Annexes 1 to 4 or (where applicable) in DIN EN 1451-1<sup>3</sup>.

##### 2.1.3 Material

The composition of the mineral-reinforced polypropylene shall correspond to the formulation deposited with Deutsches Institut für Bautechnik and the external surveillance body.

Material of undetermined composition shall not be used.

Use of process scrap of the same formulation from the applicant's factories shall be permitted.

1	DIN 4102-1:	Fire behaviour of building materials and building components – Part 1: Building materials; concepts, requirements and tests, Sections 3 and 6; issue: 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; issue: 1985-12
3	DIN EN 1451-1	Plastics 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 1451-1:1998; issue: 1999-03
4	DIN 1986-3	Drainage systems on private ground – Part 3: Specifications for service and maintenance; issue: 2004-11
5	DIN EN 476	General requirements for components used in drains and sewers; German version EN 476:2011; issue: 2011-04
6	DIN CEN/TS 1451-2	Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Polypropylene (PP) – Part 2: Recommendations for assessment of conformity; German version CEN/TS 1451-2:2012; issue: 2012-05

#### 2.1.4 Density

During testing in accordance with Section 2.3.2, the densities of the drainage pipes and fittings shall correspond to the specifications given in Annexes 5 and 6.

#### 2.1.5 Dimensional stability in accordance with Vicat

During testing of the dimensional stability in accordance with procedure B/50 of DIN EN ISO 306<sup>7</sup>, the mean Vicat softening temperature for drainage pipes and fittings shall be  $VST/B/50 \geq 70$  °C.

#### 2.1.6 Colour

The pipes and fittings shall be uniformly coloured white throughout.

#### 2.1.7 Impact resistance

##### 2.1.7.1 Impact resistance of drainage pipes

In ball drop tests conducted using the 'staircase' method in accordance with the specifications given in Section 2.3.2, the drainage pipes shall have a maximum of one failure below 0.5 m at  $0\text{ °C} \pm 1\text{ °C}$  and an  $H_{50}$  value of  $\geq 1$  m. In ball drop tests conducted using the 'round-the-clock' method in accordance with the specifications given in Section 2.3.2, the drainage pipes shall exhibit a failure rate of  $\leq 10\%$  at  $0\text{ °C} \pm 1\text{ °C}$ .

##### 2.1.7.2 Impact resistance of fittings

The injection-moulded fittings (including lifting system connection elements) shall not exceed the failure rate specified in Section 2.3.2 during drop testing.

#### 2.1.8 Reaction to fire

The drainage pipes and fittings shall meet the requirements for building materials of building class 'B2' (flammable) in accordance with DIN 4102-1<sup>1</sup>.

#### 2.1.9 Elastomeric seals

The elastomeric seals for the socket joints for the drainage pipes and fittings shall correspond to the specifications set forth in DIN EN 681-1<sup>8</sup>.

#### 2.1.10 Melt mass-flow rate (MFR)

During testing in accordance with Section 2.3.2, the melt-mass flow rate (MFR 230°C / 2.16 kg) of the processed polypropylene of the drainage pipes and fittings shall have the following values:

- intermediate layer (of pipe)  $\leq 3.0$
- fittings  $\leq 3.0$

#### 2.1.11 Oxidation induction time (OIT)

During testing in accordance with Section 2.3.2, the OIT of the intermediate pipe layer and the fittings shall be at least 8 min at 200 °C.

#### 2.1.12 Ring stiffness

During testing in accordance with Section 2.3.2, the short-term ring stiffness shall be at least 4.0 kN/mm<sup>2</sup>.

### 2.2 Manufacture, packaging, transport, storage and marking

#### 2.2.1 Manufacture

The drainage pipes and fittings described in Section 2.1 shall be made using the extrusion or injection-moulding process in consideration of the specifications given in Section 2.3.2. During manufacture the following production parameters shall be calibrated and recorded for

<sup>7</sup> DIN EN ISO 306      Plastics – Thermoplastic materials – Determination of Vicat softening temperature (VST) (ISO 306:2004); German version EN ISO 306:2004; issue: 2004-10

<sup>8</sup> 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; issue: 2006-11

each new batch and each time the machine is started:

- extruder or injection-moulding head temperature,
- screw speed,
- torque (via motor output or power consumption),
- 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 cardboard boxes are used for transport and storage of 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 wooden 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*) including the approval number Z-42.1-223 in accordance with the Conformity Marking Ordinances (*Übereinstimmungszeichen-Verordnungen*) of the federal states. The mark shall only be applied if the requirements for attestation of conformity given in Section 2.3 are met.

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 in accordance with DIN EN 1451-1
- house drainage pipe 'B' or 'BD' in accordance with DIN EN 1451-1
- building material class B2 (flammable in accordance with DIN 4102-1).

## 2.3 Attestation of conformity

### 2.3.1 General

The attestation of conformity of the drainage pipes and fittings with the provisions of this national technical approval (*allgemeine bauaufsichtliche Zulassung*) 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 to be carried out in the process, the manufacturer of the drainage pipes and fittings shall use an appropriately recognised certification body and an appropriately recognised inspection body.

The declaration that a certificate of conformity has been granted shall be given by the manufacturer through marking of the construction products with the national conformity mark (*Ü-Zeichen*), stating the intended use.

The certification body shall send a copy of the certificate of conformity issued by it to Deutsches Institut für Bautechnik.

### 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 manufactured construction products satisfy the provisions of this national technical approval (*allgemeine bauaufsichtliche Zulassung*).

Factory production control shall at least include the measures listed below.

#### Specification and verification of the starting material and the components:

The mineral-reinforced polypropylene used shall correspond to the specifications given in Section 2.1.1 and the formulation specifications deposited with Deutsches Institut für Bautechnik and the external surveillance body.

To verify the quality of the raw materials, the manufacturer shall obtain a test report 'type 2.2' in accordance with DIN EN 10204<sup>9</sup> in which the mineral filler content is also determined by means of ash testing in accordance with DIN EN 3451-1<sup>10</sup> from the upstream supplier for every delivery. The filler content shall be determined for pipes by means of density determination as described in Section 2.1.4 for every production lot.

For each delivery the applicant shall ensure that the elastomeric seals and the respective accompanying documents bear the CE conformity mark as well as the specific information required in accordance with DIN EN 681-1<sup>7</sup> to verify compliance with the specifications given in Section 2.1.9 pertaining to the elastomeric sealants.

#### Checks and tests to be carried out during manufacture:

The specifications given in Section 2.2.1 shall be checked.

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

Compliance with the requirements of DIN EN 1451-1<sup>3</sup> as well as any other specifications in the following sections shall be checked:

1. Compliance with the specifications given in Section 2.1.2 pertaining to the dimensions of the pipes and fittings shall be checked continuously and successively during production.
2. Adherence to the drainage pipe and fitting density limits specified in Section 2.1.4 shall be checked in accordance with DIN EN ISO 1183-1<sup>11</sup> procedure A at least once per material batch for each machine and dimension.
3. Adherence to the specifications pertaining to the dimensional stability in accordance with Vicat of the drainage pipes and fittings given in Section 2.1.5 shall be checked in accordance with DIN EN ISO 3067 at least once per material batch for each machine and dimension.
4. Adherence to the specifications pertaining to the colouration of the pipes and fittings given in Section 2.1.6 shall be checked for the pipes at least every two hours of production for each machine and dimension and for the fittings at least every eight hours of production.

9	DIN EN 10204	Metallic products - Types of inspection documents; German version EN 10204:2004; issue: 2005-01
10	DIN EN ISO 3451-1	Plastics - Determination of ash – Part 1: General methods (ISO 3451-1:1997); German version EN ISO 3451-1:1997; issue: 1997-10
11	DIN EN ISO 1183-1	Plastics - Methods for determining the density of non-cellular plastics – Part 1: Immersion method, liquid pycnometer method and titration method (ISO 1183-1:2004); German version EN ISO 1183-1:2004; issue: 2004-05

5. Adherence to the specifications pertaining to impact resistance given in Section 2.1.7.1 shall be checked at least once per month of production for each extrusion machine using the 'staircase' method in accordance with DIN EN 1411<sup>12</sup> and at least once per week of production for each extrusion machine using the 'round-the-clock' method in accordance with DIN EN 744<sup>13</sup>.

6. Adherence to the specifications in Section 2.1.7.2 pertaining to the impact resistance of the injection-moulded fittings shall be checked at least once every week of production for each injection-moulding machine and dimension or after each start-up of the machine by means of the drop test.

Ten fittings shall be taken as specimens. Five of these ten fittings shall be stored for at least two hours at a temperature of 23 °C ± 2 °C. At the same temperature these five fittings shall each be dropped with a different orientation on to a level concrete floor from a height of 1 m ± 0.05 m.

If no failure is found to occur, the test shall be deemed successful (passed). However, if one fitting fails, the test shall be carried out on the other five fittings. If more than 10% of the specimens fail, all of the parts produced after the last passed test shall be discarded.

7. Adherence to the specifications pertaining to the melt-mass flow rate (MFR) of the drainage pipes and fittings given in Section 2.1.10 shall be checked in accordance with DIN EN ISO 1133-1<sup>14</sup> at least once per material batch.

8. Adherence to the specifications pertaining to the OIT of the drainage pipes and fittings given in Section 2.1.11 shall be checked in accordance with DIN EN ISO 11357-6<sup>15</sup> at least once per material batch.

9. Adherence to the specifications pertaining to the ring stiffness of the drainage pipes given in Section 2.1.12 shall be checked in accordance with DIN EN ISO 9969<sup>16</sup> at least once every quarter.

10. Compliance with the specifications pertaining to manufacture given in Section 2.2.1 shall be checked continuously and successively during production.

11. Compliance with the specifications pertaining to marking given in Section 2.2.3 shall be checked continuously and successively during production.

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 product and the components,
- 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.

12	DIN EN 1411	Plastics piping and ducting systems - Thermoplastics pipes - Determination of resistance to external blows by the staircase method; German version EN 1411:1996; issue: 1996-03
13	DIN EN 744	Plastics piping and ducting systems - Thermoplastics pipes - Test method for resistance to external blows by the round-the-clock-method; German version EN 744:1995; issue: 1995-08
14	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-Regula1:2011); German version EN ISO 1133-1:2011; issue: 2012-03
15	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 11357-6:2008); German version EN ISO 11357-6:2013; issue: 2013-04
16	DIN EN ISO 9969	Thermoplastics pipes - Determination of ring stiffness (ISO 9969:2007); German version EN ISO 9969:2007; issue: 2008-03

The records shall be kept for at least five years and submitted to the inspection body used for external surveillance. The documents 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 which do not meet the requirements shall be handled in such a manner that they cannot be confused with compliant products. After the defect has been remedied the relevant test shall be repeated immediately - where technically practicable and necessary for demonstration that the defect has been eliminated.

### 2.3.3 External surveillance

The factory production control system at each manufacturing plant shall be inspected regularly, at least twice a year, by means of external surveillance.

Within the scope of external surveillance spot checks shall be carried out on random samples to assess adherence to the requirements set forth in DIN EN 1451-1<sup>3</sup> as well as in Sections

- 2.1.2 Dimensions,
- 2.1.4 Density,
- 2.1.5 Vicat,
- 2.1.6 Colour,
- 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.

In particular, the adherence to the dimensional stability requirements specified in Section 2.1.5 and the requirements pertaining to reaction to fire specified in Section 2.1.8 shall also be checked.

Sampling and testing shall be carried out by the recognised inspection body in accordance with DIN CEN/TS 1451-2<sup>6</sup>.

The results of certification and external surveillance shall be kept for at least five years. They shall be presented by the certification or inspection body to Deutsches Institut für Bautechnik and the competent supreme building authority upon request.

## 3 Provisions for execution

### 3.1 General

Unless otherwise specified below, the specifications set forth in DIN 1986-100<sup>17</sup> and DIN 1986-4<sup>18</sup> in connection with DIN EN 12056-1<sup>19</sup> shall apply to the execution.

17	DIN 1986-100	Drainage systems on private ground – Part 100: Specifications in relation to DIN EN 752 and DIN EN 12056; issue: 2008-05
18	DIN 1986-4	Drainage systems on private ground – Part 4: Fields of application of sewage pipes and fittings of different materials; issue: 2003-02
19	DIN EN 12056-1	Gravity drainage systems inside buildings – Part 1: General and performance requirements; German version EN 12056-1:2000; issue: 2001-01



The drainage pipes and fittings shall be permitted for use as drainage pipes inside buildings (application category 'B') and as underground pipes within the building structure (application category 'BD') in accordance with the specifications set forth in DIN EN 1451-1<sup>3</sup>.

The laying instructions in the technical information provided by the manufacturer shall be followed.

### 3.2 Verification of stability

The following values for ring stiffness shall be used for verification of the stability:

- $S_{R \text{ short-term}}$  (24h value) = 20.8 kN/m<sup>2</sup>
- $S_{R \text{ long-term}}$  = 5.1 kN/m<sup>2</sup>

The vertical diameter change shall not exceed

- 4% for the short-term verification and
- 6% for the long-term verification.

### 3.3 Measures to prevent fire and smoke from spreading

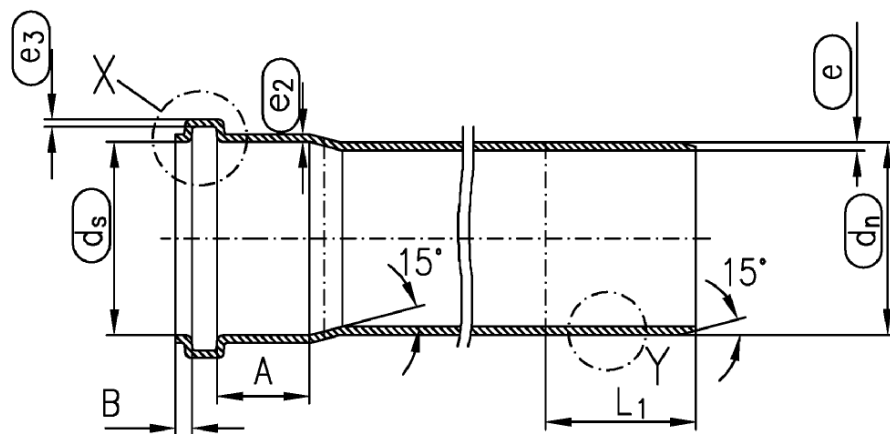
Should piping comprising pipes in accordance with this national technical approval (*allgemeine bauaufsichtliche Zulassung*) be passed through walls or ceilings for which fire resistance rating requirements are imposed by building provisions,

- the building provisions pertaining to the fire protection design of piping systems or the encasement of flammable piping shall be complied with or
- pipe encasements shall be arranged in accordance with the national technical approvals (*allgemeine bauaufsichtliche Zulassungen*) granted for this purpose or
- further encasement measures, the suitability of which shall be verified through a national technical test certificate based on testing in accordance with DIN 4102-11<sup>2</sup>, shall be taken.

The building provisions and guidelines pertaining to flammable building materials used in buildings shall remain unaffected.

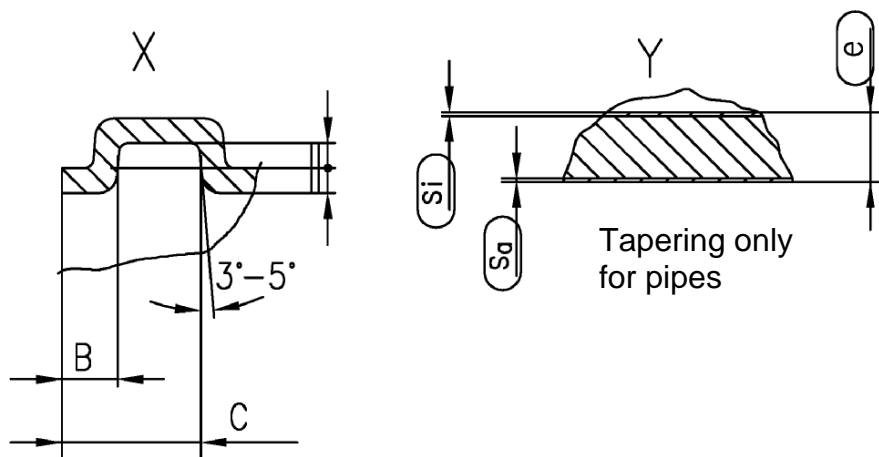
Rudolf Kersten  
Head of Section

Drawn up by



Slip-on socket

Spigot end



'RAUPIANO PLUS' drainage pipes and fittings made from mineral-reinforced PP with nominal sizes DN/OD 40 to DN/OD 200 inside and outside buildings

Dimensional drawing

Annex 1

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
	Slip-on socket	$d_s$ min.
$e_2$ min.		*
$e_3$ min.		*
$L_1$ min.		85
$A$ min.		*
$B$ min.		*
$C$ max.		*

\* Double socket installed

$s_i$  min. = 0.05mm for DN 40 to DN 160

$s_a$  min. = 0.1mm for DN 40 to DN 160

DN 40 to DN 160 pipes corresponding to pipe series S20 in accordance with  
 DIN EN 1451-1

'RAUPIANO PLUS' drainage pipes and fittings made from mineral-reinforced PP with  
 nominal sizes DN/OD 40 to DN/OD 200 inside and outside buildings

Pipe dimensions

Annex 2

### 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

\* DN/OD 160/15° and DN/OD 160/30° elbows

DN/OD 160/125 transition (reducing) pipe

DN/OD 160 socket end cap

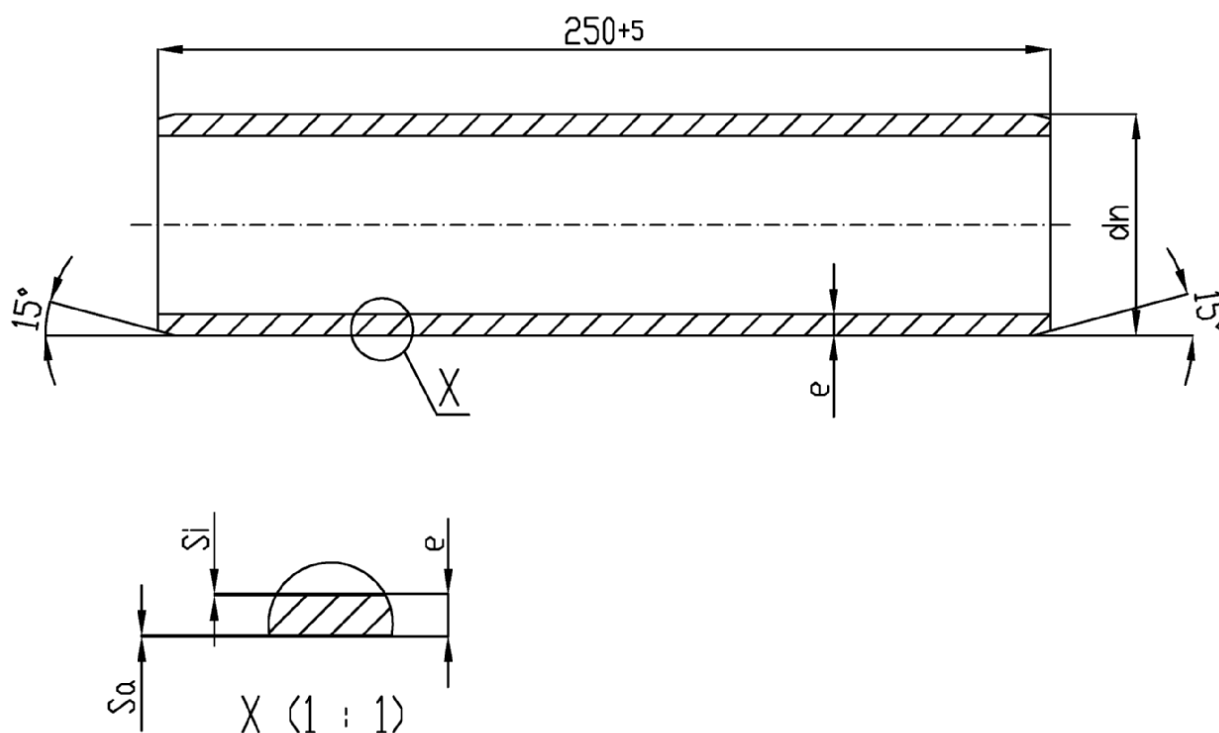
In the region between the socket and the spigot end the fitting can exhibit external wall thickening corresponding to twice the wall thickness at maximum.

Other DN 40 to DN 160 fittings corresponding to pipe series S20 in accordance with DIN EN 1451-1

'RAUPIANO PLUS' drainage pipes and fittings made from mineral-reinforced PP with nominal sizes DN/OD 40 to DN/OD 200 inside and outside buildings

Fitting dimensions

Annex 3



	$d_n$	$e$	$S_i$ 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

A comma is used as the decimal marker.

'RAUPIANO PLUS' drainage pipes and fittings made from mineral-reinforced PP with nominal sizes DN/OD 40 to DN/OD 200 inside and outside buildings

Dimensions of the lifting system connection element

Annex 4

Product	Designation	Density in g/cm <sup>3</sup>
Drainage pipes	DN/OD 160 and DN/OD 200	1,500 ± 0,200
Drainage pipes and lifting system connection elements	DN/OD 40 to DN/OD 125	1,900 ± 0,200
Elbow	DN/OD 40/67°      DN/OD 110/67° DN/OD 50/45°      DN/OD 110/87° DN/OD 50/87°      DN/OD 110/87,5° DN/OD 90/15°      DN/OD 125/15° DN/OD 90/30°      DN/OD 125/30° DN/OD 90/45°      DN/OD 125/45° DN/OD 90/67°      DN/OD 125/67° DN/OD 90/87°      DN/OD 125/87° DN/OD 110/15°      DN/OD 160/45° DN/OD 110/30°      DN/OD 160/87° DN/OD 110/45°	1,800 ± 0,200
Slip-on socket and double socket	DN/OD 90      DN/OD 125 DN/OD 110      DN/OD 160	
Short pipes	DN/OD 40/150 mm      DN/OD 90/150 mm DN/OD 40/250 mm      DN/OD 90/250 mm DN/OD 50/150 mm      DN/OD 110/150 mm DN/OD 50/250 mm      DN/OD 110/250 mm DN/OD 75/150 mm      DN/OD 125/150 mm DN/OD 75/250 mm      DN/OD 125/250 mm	
Branch	DN/OD 50/40/45°      DN/OD 110/90/45° DN/OD 50/40/87°      DN/OD 110/90/87° DN/OD 50/50/45°      DN/OD 110/110/45° DN/OD 50/50/87°      DN/OD 110/110/87° DN/OD 75/75/45°      DN/OD 125/110/45° DN/OD 90/50/45°      DN/OD 125/110/87° DN/OD 90/50/87°      DN/OD 125/125/45° DN/OD 90/75/45°      DN/OD 125/125/87° DN/OD 90/75/87°      DN/OD 160/110/45° DN/OD 90/90/45°      DN/OD 160/110/87° DN/OD 90/90/87°      DN/OD 160/125/45° DN/OD 110/50/45°      DN/OD 160/125/87° DN/OD 110/50/87°      DN/OD 160/160/45° DN/OD 110/75/45°      DN/OD 160/160/87° DN/OD 110/75/87°      DN/OD 200/160/87°	
Double branch	DN/OD 110/110/110/45°      DN/OD 110/110/110/87°	
Transition pipes	DN/OD 90/50      DN/OD 110/90 DN/OD 90/75      DN/OD 125/110 DN/OD 110/75      DN/OD 160/110	
Connection element to vent pipe	DN/OD 75/80	
Long socket	DN/OD 90      DN/OD 110	
Clean-out pipe	DN/OD 50      DN/OD 110 DN/OD 75      DN/OD 125 DN/OD 90      DN/OD 160	

A comma is used as the decimal marker.

'RAUPIANO PLUS' drainage pipes and fittings made from mineral-reinforced PP with nominal sizes DN/OD 40 to DN/OD 200 inside and outside buildings

Density of the mineral-reinforced PP of the drainage pipes and fittings  
Table 1/2

Annex 5

Product	Designation	Density in g/cm <sup>3</sup>	
Elbow	DN/OD 40/15°	DN/OD 75/30°	1,300 ± 0,300
	DN/OD 40/30°	DN/OD 75/45°	
	DN/OD 40/45°	DN/OD 75/67°	
	DN/OD 40/87°	DN/OD 75/87°	
	DN/OD 50/15°	DN/OD 200/45°	
	DN/OD 50/30°	DN/OD 200 87°	
	DN/OD 50/67°	DN/OD 160/15°	
	DN/OD 75/15°	DN/OD 160/30°	
Branch	DN/OD 40/40/45°	DN/OD 75/75/87°	
	DN/OD 40/40/87°	DN/OD 200/160/45°	
	DN/OD 75/50/45°	DN/OD 200/200/45°	
	DN/OD 75/50/87°		
Transition pipes	DN/OD 50/40	DN/OD 160/125	
	DN/OD 75/50	DN/OD 200/160	
	DN/OD 110/50		
Connection element	DN/OD 40/40-30	DN/OD 50/40-30	
Slip-on socket and double socket	DN/OD 40	DN/OD 75	
	DN/OD 50	DN/OD 200	
Siphon element	DN/OD 40/40-30	DN/OD 50/50	
	DN/OD 50/40-30		
Socket end cap	DN/OD 40	DN/OD 110	
	DN/OD 50	DN/OD 125	
	DN/OD 75	DN/OD 160	
	DN/OD 90	DN/OD 200	

A comma is used as the decimal marker.

RAUPIANO PLUS' drainage pipes and fittings made from mineral-reinforced PP with nominal sizes DN/OD 40 to DN/OD 200 inside and outside buildings

Density of the mineral-reinforced PP of the drainage pipes and fittings  
 Table 2/2

Annex 6