

NATIONAL DECLARATION OF PERFORMANCE

No. 072/1.

1. **Name and type of the construction product:**

Magnaplast drainage pipes, DN 50–160 mm

2. **Type designation of the construction product:**

Polypropylene (PP) drainage pipes

3. **Intended use(s):**

4. For the construction of drainage, seepage and drainage systems, also in communication engineering

5. **Name and address of manufacturer's head office and product manufacturing location:**

Magnaplast Sp. z o.o., Sieniawa Żarska 69, 68-213 Lipinki Łużyckie, Poland

6. **Name and address of the authorised representative's head office, if any:**

Not applicable

7. **National system used to assess and verify the constancy of performance**

System no.: 4

8. **National technical specification:**

7a. Relevant Polish standard:

NOT APPLICABLE

Name of accredited certification body, accreditation number and national certificate number or name of accredited laboratory/laboratories and accreditation number:

NOT APPLICABLE

7b. National Technical Assessment:

NATIONAL TECHNICAL ASSESSMENT IBDiM-KOT-2019/0272, rev. 2

Unplasticized polyvinyl chloride (PVC-U), polypropylene (PP), and polyethylene (PE) drainage pipes and fittings

Notified body/National technical assessment body:

Road and Bridge Research Institute

Name of accredited certification body, accreditation number and certificate number:

NOT APPLICABLE

9. Declared performance characteristics:

Essential characteristics of the construction product for the intended use(s)	Declared performance	Comments
Material properties	Polypropylene (PP) with additional components as necessary for the production of pipes	
Dimensions	According to the marking on the product: Z - DN50-1.2, DN80-1.2, DN100-1.2, DN125-1.5, DN160-1.5	
Ring stiffness	SN \geq 4 kN/m ² for pipes: DN80, DN100, DN125, DN160 SN \geq 8 kN/m ² for pipes: DN50	
Impact strength	TIR \leq 10%, area A	
Creep indicator	\leq 2,7	

10. The performance of the above-mentioned product are in accordance with all the performance claims as declared in section 8. This national declaration of performance is issued in accordance with the Act of 16 April 2004 on the construction products, under the sole responsibility of the manufacturer


Signed on behalf of the manufacturer by:

Paweł Grześkowiak – Quality Control Manager

.....
(name and position)

Sieniawa Żarska 26.04.2014

.....
(place and date of issue)



.....
(signature of authorized person)



ROAD AND BRIDGE RESEARCH INSTITUTE

ul. Instytutowa 1, 03-202 Warsaw, Poland

Warsaw, 24 April 2024.

NATIONAL TECHNICAL ASSESSMENT

No. IBDiM-KOT-2019/0272 revision 2

Pursuant to Article 9(2) of the Act of April 16, 2004 on the construction products (Journal of Laws 2021.1213), and having conducted the proceedings in accordance with the provisions of the Regulation of the Minister of Infrastructure and Construction of 17 November 2016 on national technical assessments (Journal of Laws 2016.1968), by the request of:

MAGNAPLAST Ltd.

based at:

**Sieniawa Żarska 69
68-213 Lipinki Łużyckie, Poland**

the Road and Bridge Research Institute

declares that the construction product:

**Unplasticized polyvinyl chloride (PVC-U), and polypropylene (PP) drainage pipes
and fittings**

bearing the trade name of: **MAGNAPLAST drainage pipes and fittings**

has received positive assessment of performance with regard to its intended use in
transportation engineering
within the scope stated in this IBDiM National Technical Assessment.



INSTYTUT BADAWCZY DRÓG I MOSTÓW
Zastępca Dyrektora
Prokurent
M
dr hab. inż. Janusz Rymaszka, prof. IBDiM
DYREKTOR
Instytutu Badawczego Dróg i Mostów

National Technical Assessment issue date:

21 January 2019.

National Technical Assessment validity date:

21 January 2029.

1 TECHNICAL DESCRIPTION OF THE PRODUCT

1.1 Technical and trade names

This National Technical Assessment relates to a construction product referred to by its technical name as: **Unplasticized polyvinyl chloride (PVC-U), and polypropylene (PP) drainage pipes and fittings** and bearing the trade name of: **MAGNAPLAST drainage pipes and fittings**, hereinafter also referred to as: **MAGNAPLAST pipes and fittings**.

1.2 Name and address of manufacturer's head office and the name and address of the authorised representative's head office, if any:

The product is manufactured by **MAGNAPLAST Sp. z o.o.**, based at: **Sieniawa Żarska 69, 68-213 Lipinki Łużyckie, Poland**

1.3 Product manufacturing location

- a. **MAGNAPLAST Sp. z o.o., Sieniawa Żarska 69, 68-213 Lipinki Łużyckie, Poland**

1.4 Product type(s) and technical description of the product

1.4.1 Product type(s)

1. MAGNAPLAST drainage pipes;
2. MAGNAPLAST drainage fittings.

1.4.2 Technical description of the product and the raw materials and components used. Identification of the product

This National Technical Assessment covers, within the scope of types given in Section 1.4.1, the following poly(vinyl chloride) (PVC-U) pipes and polypropylene (PP) fittings:

- MAGNAPLAST drainage pipes with corrugated, single-layer, perforated (TP, LP, MP) walls, having rated diameters of DN/OD 50 to DN/OD 160, made of unplasticized poly(vinyl chloride) (PVC-U), complete with no filter lagging, geotextile filter lagging, or coir fiber or other natural fiber filters.
- MAGNAPLAST drainage pipes with corrugated, single-layer, unperforated (IP) walls, having rated diameters of DN/OD 50 to DN/OD 160, made of unplasticized poly(vinyl chloride) (PVC-U), complete with no filter lagging, geotextile filter lagging, or coir fiber or other natural fiber filters.
- MAGNAPLAST fittings for drainage pipes, with structured or solid walls made of polypropylene (PP): muffs, couplings, elbows, tees, reductions, PVC socket couplings, smooth pipe transition couplings, end caps and non-standard fittings.

Depending on the geometry of perforations, the drainage pipes are manufactured in the following varieties (Figure 1):

- TP (totally perforated) – full seepage pipe, with perforations evenly distributed around the circumference to form at least four rows of seepage slits along the entire pipe length;
- LP (locally perforated) – partial seepage pipe, with perforations distributed on the top of the pipe as well as symmetrically with respect to the vertical pipe axis and evenly around the circumference within an angular interval of about 220° (±10°), the bottom of the pipe presenting with no seepage slits; the LP pipes present with at least three rows of seepage slits;

- MP (multipurpose) – multipurpose seepage and transportation pipe with holes distributed on the top of the pipe as well as symmetrically with respect to the vertical pipe axis within a maximum angular interval of 120° . MP pipes present with at least two rows of seepage slits. The bottom part of the multipurpose (MP) pipe can be used as a running water transportation channel. The pipes can be connected in a watertight manner.
- UP (unperforated) – pipes with no seepage slits.

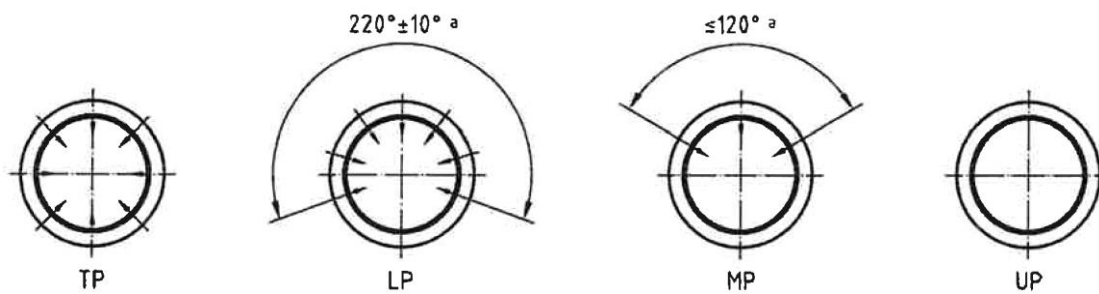


Figure 1 – Varieties of drainage pipes (^a – other angular intervals between seepage slits are available upon agreement with the manufacturer)

Proper positioning of LP and MP pipes within the drainage system can be unambiguously determined from alignment markings on the pipe surface.

The depth of insertion of the bare ends of drainage pipes into the sockets of pipes and fittings should equal at least 30% of the rated diameter of the pipe up to DN 160.

Drainage pipes are connected through pipe sockets, couplings, or clamping rings, as well as by means of pipe welding. Joints requiring watertight connection are equipped with elastomeric seals that meet the requirements of PN-EN 681-1:2002, PN-EN 681-2:2003 or PN-EN 681-3:2003 standards.

The synthetic fiber filter lagging for drainage pipes is made of a material meeting the requirements of PN-EN 13252:2016-11 standard.

Unlagged MAGNAPLAST drainage pipes are manufactured in yellow while MAGNAPLAST fittings are manufactured in black.

The MAGNAPLAST drainage pipes are manufactured in straight sections up to the length of 6 m and up to the length of 250 m in reels. Pipes of other lengths can be manufactured depending on an arrangements between the customer and the manufacturer.

The dimensions of MAGNAPLAST pipes and fittings with tolerances measured in accordance with PN-EN ISO 3126:2006 are provided in the Annex.

The finish and the appearance of drainage pipes and fittings meet the requirements of PN-EN 13476-1:2008 and PN-EN 61386-1:2011 standards.

2 INTENDED USE OF THE PRODUCT

2.1 Intended use of the product

MAGNAPLAST pipes and fittings are intended for use in transportation engineering within the scope of Section 2.2, for the construction of seepage and drainage systems for the drainage of roads, roadway lands, and transportation engineering areas.

2.2 Application areas

2.2.1 public roads , unlimited

within the meaning of and in accordance with the conditions set forth in the Regulation of the Minister of Infrastructure dated 24 June 2022 on technical and construction regulations regarding public roads (Journal of Laws 2022.1518).

2.2.2 internal roads , unlimited

within the meaning of the provisions of the Act of 21 March 1985 on public roads (Journal of Laws 2023.645 as amended).

2.2.3 road engineering structures , unlimited

within the meaning of and in accordance with the conditions set forth in the Regulation of the Minister of Infrastructure dated 24 June 2022 on technical and construction regulations regarding public roads (Journal of Laws 2022.1518).

2.2.4 railroad engineering structures , unlimited

within the meaning of and in accordance with the conditions set forth in the Regulation of the Minister of Transport and Maritime Economy of 10 September 1998 on the technical conditions to be met by railroad structures and their locations (Journal of Laws 1998.987 as amended).

2.2.5 railroad ancillary structures limited to passenger service facilities:

- a) platforms,
- b) aisles

within the meaning of and in accordance with the conditions set forth in the Regulation of the Minister of Transport and Maritime Economy of 10 September 1998 on the technical conditions to be met by railroad structures and their locations (Journal of Laws 1998.987 as amended).

2.2.6 railroad earth structures limited to:

- a) embankments,
- b) retrenchments,
- c) embankment and retrenchment slopes

within the meaning of and in accordance with the conditions set forth in the Regulation of the Minister of Transport and Maritime Economy of 10 September 1998 on the technical conditions to be met by railroad structures and their locations (Journal of Laws 1998.987 as amended).

2.2.7 subway structures limited to:

- a) stations,
- b) tunnels,
- c) subway bridges, overpasses and flyovers,

within the meaning of and in accordance with the conditions set forth in the Regulation of the Minister of Infrastructure of 27 September 2023 on the technical conditions to be met by subway structures and their locations (Journal of Laws 2023.1210).

2.2.8 other roadway construction objects

within the meaning of the provisions of the Act of 21 March 1985 on public roads (Journal of Laws 2023.645 as amended).

2.3 Application conditions

MAGNAPLAST pipes and fittings can be laid underground in accordance with the conditions specified in the technical design at depths of 0.8 m to 8 m on the base (or bedding) and surrounded by properly compacted soils permitted for use in road construction as per the PN-

S-02205:1998 standard in accordance with the rules for the construction of sewers lines established in PN-EN 1610:2015-10, in particular in relation to the rules for the compaction of soil in the pipe laying zones and to the selection of soil susceptible to compaction and – in the case of drainage pipes – soils with granularity appropriate for the size of seepage slits or the type of filter lagging used.

MAGNAPLAST pipes and fittings with ring stiffness of $SN \geq 8\text{kN/m}^2$ should be used under roadway lanes whereas pipes with ring stiffness of $SN \geq 4\text{kN/m}^2$ can be used outside the roadway lanes. In justified cases, pipes with ring stiffness of $SN \geq 4\text{kN/m}^2$ can be used under roadway lanes provided that conditions for the installation of the pipe while avoiding excessive deformation have been met.

Eater and soil conditions, expected loads and the effects of settlement of the pavement bed due to possible deformation of the flexible pipes should be taken into account each time when laying the MAGNAPLAST pipes and fittings. The selection of the appropriate type of pipes and fittings to be laid in the ground can be made by the designer in accordance with the PN-EN 1295-1:2002 standard on the basis of the manufacturer's guidelines and declaration regarding the ring stiffness of the pipes.

The construction product should be used in accordance with its intended use(s), application area, and conditions given in this National Technical Assessment as well as in the technical and construction regulations applicable to specific types of construction objects in transportation engineering.

Prior to using a construction product in a manner that does not comply with technical and construction regulations, a waiver must be obtained to deviate from these regulations as per the procedure set forth in Article 9 of the Act of 7 July 1994 – Construction Law (Journal of Laws 2023.682 as amended).

2.4 Use, installation and maintenance conditions

Manufacturer's recommendations recommendations should be followed with regard to the use, installation and maintenance of the construction products.

3 PERFORMANCE CHARACTERISTICS AND ASSESSMENT METHODS

The performance characteristics of the construction product are summarized in Table 1.

Table 1

No.	Product type	Essential characteristics of the construction product for the intended use(s)	Performance characteristics: level, class or description	Unit	Testing and calculation methods
1	2	3	4	5	6
1	MAGNAPLAST drainage pipes	True impact rate (TIR), round-the-clock method: – temperature (0±1)°C; – specimen length (200±10) mm; – impactor with the mass of 250 g and curvature radius of 12.5 mm); – impactor dropping height “h” depending on the rated diameter DN: – DN ≤ 50: h = 0,8 m – 50 < DN ≤ 90: h=1.0 m – 90 < DN ≤ 125: h=1.8 m – DN > 125: h = 2.0 m	TIR ≤ 10	%	PN-EN ISO 3127-2017:12
2		Ring stiffness of pipes classified to rated stiffness class SN ¹⁾ : – SN2 – SN3.2 – SN4 – SN6.3 – SN8	≥ 2.0 ≥ 3.2 ≥ 4.0 ≥ 6.3 ≥ 8.0	kN/m ²	PN-EN ISO 9969-2016:02
3		Pipe creep ratio – for PVC-U – for PP	≤ 2.7 ≤ 4.7	–	PN-EN ISO 9967-2016:02
4	MAGNAPLAST drainage fittings.	Resistance to external impact (drop method): – impact site: socket inlet – test temperature 0°C – impactor dropping height “h” depending on the diameter d _e : d _e ≤ 125 – 1000 mm; d _e > 125 – 500 mm	wall cracks: none	–	PN-EN ISO 13263-2017:12
5		Change in the appearance of injection molded fittings due to heating: test temperature 150°C – e ≤ 8 mm, time 60 min – 8 mm ≤ e ≤ 16 mm, time 120 min e > 16 mm, time 210 min	no cracks deeper than 20% of the thickness around the injection point	–	PN-EN ISO 580:2006 method A (air oven)

¹⁾ For drainage pipes, the property is determined on pipe samples without filters or filter lagging.

4 PACKAGING, TRANSPORTATION AND STORAGE, AND PRODUCT MARKINGS

4.1 Packaging guidelines

MAGNAPLAST drainage pipes do not require packaging; they can be bundled (on pallets) or reeled. MAGNAPLAST drainage fittings can be packaged in bulk or delivered in bulk.

4.2 Transportation and storage guidelines

MAGNAPLAST drainage pipes should be stored horizontally on level ground, on wooden sleepers, or pallets.

MAGNAPLAST drainage fittings should be stored in bulk packaging or on flat, level surfaces in a damage-preventing manner.

MAGNAPLAST drainage pipes and fittings in can be stored in open storage yards for periods not exceeding 1 year.

MAGNAPLAST drainage pipes and fittings should be transported in a horizontal position, protected from displacement and damage. Care should be taken to avoid damage during the loading and unloading of pipes. MAGNAPLAST drainage pipes and fittings must not be dragged.

4.3 Construction product marking method

The product should be marked with a construction mark as per the requirements set forth in the Regulation of the Minister of Infrastructure and Construction of 17 November 2016, on the on the method for declaring the performance of construction products and the method for marking them with construction marks (Journal of Laws 2023.873 as amended).

Prior to the marking or the product with the construction mark, a national declaration of performance must be drawn up for the construction product in accordance to the template provided in Annex 2 to the aforementioned regulation and made available in the manner specified in the regulation.

The marking of a product with the construction mark should be accompanied by the following information:

- the last two digits of the year in which the construction mark was first placed on the construction product;
- the name and address of the manufacturer's registered office or an identification mark allowing for unambiguous determination of the name and address of the manufacturer's registered office;
- the name and type of the construction product;
- the number and year of issue of the national technical assessment used as the basis for declaration of performance;
- the number of the national declaration of performance;
- the level or class of declared performance;
- the name of the certification body, if involved in the assessment and verification of the constancy of performance of the construction product;
- the manufacturer's website address, if the national declaration of performance is available thereon.

5 ASSESSMENT AND VERIFICATION OF THE CONSTANCY OF PERFORMANCE

5.1 National system for the assessment and verification of the constancy of performance

Pursuant to Annex 1 to the Regulation of the Minister of Infrastructure and Construction of 17 November 2016, on the on the method for declaring the performance of construction products and the method for marking them with construction marks (Journal of Laws 2023.873 as amended), **System 4 of assessment and verification of constancy of performance** is applicable to the construction product covered by this National Technical Assessment.

The manufacturer's duties related to the assessment and verification of the constancy of performance of the construction product are specified in §4 of the aforementioned regulation.

5.2 Type designation of the construction product.

Type designation consists in the assessment of the performance in relation to the essential characteristics and intended use of the product as defined in section 3 and in relation to the identification characteristics as per section 1.4.2 of this National Technical Assessment; type designation remains valid for as long as no changes are introduced to raw materials, components, production lines or production facilities.

5.3 Plant production control

The construction product covered by this National Technical Assessment should be manufactured in accordance with the plant production control system.

The manufacturer shall establish, document, implement and maintain a system of plant production control to ensure the constancy of performance of the construction product as defined in this National Technical Assessment.

The following information should be provided in the plant production control documentation:

- a) organizational structure;
- b) staffing requirements (qualifications, authorizations, responsibility for individual elements of plant production control, training);
- c) internal audits, corrective and preventive actions;
- d) supervision of documentation and records;
- e) raw material inspection and testing plans, requirements;
- f) final product inspection and testing plans;
- g) supervision of production equipment;
- h) supervision of inspection and testing equipment to maintain consistency of measurements;
- i) supervision of the production process, including inter-operational inspections and tests;
- j) description of subcontracted tasks and relevant supervision modes;
- k) management of nonconforming products and complaints;
- l) description of the packaging, transportation and storage methods and product markings;
- m) product assembly instructions.

The plant production control documentation should be complete with technical documentation, technical specifications (product standards, testing standards, European or national technical assessments, etc.), and legal regulations.

A quality management system implemented in accordance to the requirements of PN-EN ISO 9001:2015-10 can be considered a plant production control system provided that the requirements of this National Technical Assessment are also met.

5.4 Quality control

5.4.1 Testing program and test frequencies

Control tests should be carried out in accordance with the testing program established in the plant production control documentation, but not less frequently than as specified in Table 2.

Table 2

No.	Testing scope	Frequency	Reference
1	Dimensions of pipes and fittings	For each batch of products ¹⁾	sect. 1.4.2.
2	Finish and appearance of pipes and fittings	For each batch of products ¹⁾	sect. 1.4.2.
3	True impact rate (TIR)	For each batch of products but not less than once a year	Table 1
4	Ring stiffness of pipes	For each batch of products but not less than once a year	Table 1
5	Pipe creep ratio	Once every 2 years	Table 1
6	Resistance of fittings to external impact (drop method)	For each batch of products but not less than once a year	Table 1
7	Change in the appearance of injection molded fittings due to heating	Once every 2 years	Table 1

¹⁾ The size of the batch should be specified in the plant's control documentation.

5.4.2 Collection of pipe test pieces

Samples for control tests should be taken in accordance with the arrangements specified in the plant production control documentation.

5.5 Evaluation of test results

The performance and identification characteristics of the construction product should comply with the relevant performance and identification characteristics as specified in this IBDiM National Technical Assessment.

6 INSTRUCTIONS

6.1 This National Technical Assessment does not authorize the construction product for being marked with a construction mark.

6.2 The National Technical Assessment is revoked by the issuing entity on their own initiative, at the request of the Chief Inspector of Construction Supervision following relevant investigation being conducted with the participation of the applicant, or at the request of the manufacturer.

6.3 This National Technical Assessment does not infringe the rights arising from the provisions on the protection of industrial property, in particular the Act of 30 June 2000 – Industrial Property Law (Journal of Laws 2023.1170). Ensuring these rights is the responsibility of the users of this National Technical Assessment.

7 LIST OF DOCUMENTS USED IN THE PROCEEDINGS

7.1 Regulations

- a) Act of 16 April 2004 on construction products (Journal of Laws 2021.1213 as amended);
- b) Act of 7 July 1994 – Construction Law (Journal of Laws 2023.682 as amended);
- c) Regulation of the Minister of Infrastructure and Construction of 17 November 2016 on national technical assessments Laws, 2016.1968 as amended);

- d) Regulation of the Minister of Infrastructure and Construction of 17 November 2016, on the method for declaring the performance of construction products and the method for marking them with construction marks (Journal of Laws 2023.873 as amended).

7.2 Polish and other standards

- a) PN-EN 681-1:2002 Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Part 1: Vulcanized rubber
- b) PN-EN 681-2:2003 Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Part 2: Thermoplastic elastomers
- c) PN-EN 681-3:2003 Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Part 3: Cellular materials of vulcanized rubber
- d) PN-EN 1295-1:2002 Structural design of buried pipelines under various conditions of loading – Part 1: General requirements
- e) EN 1610:2015-10 Construction and testing of drains and sewers
- f) EN 13252:2016-11 Geotextiles and geotextile-related products – Characteristics required for use in drainage systems
- g) PN-EN 13476-1:2008 Plastics piping systems for non-pressure underground drainage and sewerage – Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene

(PE) – Part 1: Material specification and performance criteria for pipes, fittings and systems
- h) PN-EN 61386-1:2011 Conduit systems for cable management – Part 1: General requirements
- i) PN-EN ISO 580:2006 Plastics piping and ducting systems – Injection-moulded thermoplastics fittings – Methods for visually assessing the effects of heating
- j) PN-EN ISO 3126:2006 Plastics piping systems – Plastics components – Determination of dimensions
- k) PN-EN ISO 3127:2017-12 Thermoplastics pipes – Determination of resistance to external blows – Round-the-clock method
- l) PN-EN ISO 9001:2015-10 Quality management systems – Requirements
- m) PN-EN ISO 9967:2016-02 Thermoplastics pipes – Determination of creep ratio
- n) PN-EN ISO 9969:2016-02 Thermoplastics pipes – Determination of ring stiffness
- o) EN ISO 13263:2017-12 Thermoplastics piping systems for non-pressure underground drainage and sewerage – Thermoplastics fittings – Test method for impact strength
- p) PN-S-02205:1998 Motorways – Earthwork – Specifications and testing

7.3 Test and calculation reports

- a) Test Report No. GT/53/2024. Łukasiewicz Research Network. Institute for Engineering of Polymer Materials & Dyes, Paints and Plastics Division. 09.10.2024

Annexes:

Annex 1: Geometric characteristics of MAGNAPLAST drainage pipes and fittings

CC:

1. Manufacturer: **MAGNAPLAST Sp. z o.o.**, based at: **Sieniawa Żarska 69, 68-213 Lipinki Łużyckie, Poland** (1 copy),
2. ad acta: Technical Assessment Unit of the **Road and Bridge Research Institute**, ul. Instytutowa 1, 03-302 Warsaw, Poland; phone no. (22) 39 00 220÷227; e-mail: jot@ibdim.edu.pl (1 copy).

ANNEX 1

Geometric characteristics of MAGNAPLAST drainage pipes and fittings

The characteristic dimensional parameters and tolerance ranges for the MAGNAPLAST drainage pipes are given in Table Z-1.

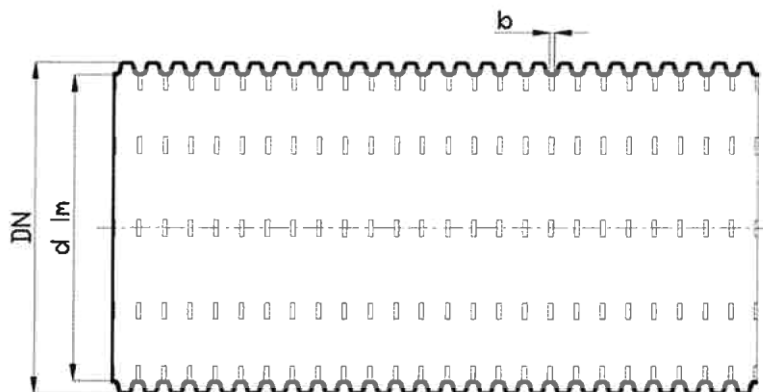


Table Z-1

Rated diameter DN, mm	Permissible deviation, mm	Internal diameter d_{im} , mm	Minimum number of rows,	Perforation dimensions, mm	Number of perforations per 1 running meter	Perforation area, cm^2 per 1 running meter
50	± 0.5	44.0	6	1.2	500	30
80	± 0.5	72.0	6	1.2	400	24
100	± 0.5	91.0	6	1.2	400	24
125	± 1.0	115.0	6	1.5	300	31.5
160	± 1.0	144.0	6	1.5	300	31.5

The characteristic dimensional parameters and tolerance ranges for the MAGNAPLAST drainage fittings are given in Table Z-2.

Table Z-2

dimensions in mm			
Fitting	Inner diameter	Inner diameter	Wall thickness
1	2	3	4
Sliding muff DN 50	51.3 ± 0.5		1.5
Sliding muff DN 80	81.0 ± 0.5		2.0
Sliding muff DN 100	101.5 ± 0.5		2.0
Sliding muff DN 125	126.0 ± 0.5		2.5
Sliding muff DN 160	161.0 ± 0.5		2.5
Elbow DN 50 – 45°/90°	51.3 ± 0.5		1.5
Elbow DN 80 – 45°/90°	81.0 ± 0.5		2.0
Elbow DN 100 – 45°/90°	101.5 ± 0.5		2.0
Elbow DN 125 – 45°/90°	126.0 ± 0.5		2.5

Fitting	Inner diameter	Inner diameter	Wall thickness
1	2	3	4
Elbow DN 160 – 45°/90°	161.0 ± 0.5		2.5
Tee DN 50/50 – 45°/90°	51.3 ± 0.5		1.5
Tee DN 80/80 – 45°/90°	81.0 ± 0.5		2.0
Tee DN 100/80 – 45°/90°	101.5 ± 0.5	81.0 ± 0.5	2.0
Tee DN 100/100 – 45°/90°	101.5 ± 0.5		2.0
Tee DN 125/125 – 45°/90°	126.0 ± 0.5		2.5
Tee DN 160/160 – 45°/90°	161.0 ± 0.5		2.5
Reduction 80/110 (for smooth pipe connection)	81.0 ± 0.5	110.0 ± 0.5	2.0
Reduction 100/110 (for smooth pipe connection)	101.5 ± 0.5	110.0 ± 0.5	2.0
End cap DN 50	51.3 ± 0.5		1.5
End cap DN 80	81.0 ± 0.5		2.0
End cap DN 100	101.5 ± 0.5		2.0
End cap DN 125	126.0 ± 0.5		2.5
End cap DN 160	161.0 ± 0.5		2.5

Geometry of drainage pipe perforations

Inlet perforations must be slit-shaped and ensure free inflow and outflow of water. The slits must be evenly spaced and running in perpendicular to the axis of the pipe. The permissible slit width (b) deviation is ± 0.4 mm. Custom slit spacings intervals, custom slit widths and the related tolerance ranges, as well as custom perforation shapes can be agreed upon between the customer and the manufacturer.

The MAGNAPLAST drainage pipes with unperforated (UP), multipurpose (MP), totally perforated (TP) and locally perforated (LP) walls must have the minimum water inflow area of $50 \text{ cm}^2/\text{m}$ or $100 \text{ cm}^2/\text{m}$ for perforation width of ≥ 5 mm regardless of the pipe diameter. In the case of multipurpose (MP) pipes, the minimum water inflow area for perforation width of ≥ 5 mm can be reduced to $75 \text{ cm}^2/\text{m}$.