



THE BUILDING RESEARCH INSTITUTE
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NATIONAL TECHNICAL ASSESSMENT ITB-KOT-2017/0167 revision 4

This National Technical Assessment was issued in accordance with the Regulation of the Minister of Infrastructure and Construction of November 17, 2016 on national technical assessments (Journal of Laws of 2016, item 1968) by the Building Research Institute in Warsaw, at the request of:

Magnaplast Ltd.
Sieniawa Żarska 69, 68-213 Lipinki Łużyckie

The National Technical Assessment ITB-KOT-2017/0167 revision 4 constitutes a positive assessment of the performance of the following construction products for their intended use:

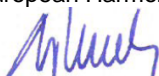
Ultra dB System Polypropylene (PP) Pipes and Fittings for Low-Noise Internal Sewerage Systems

National Technical Assessment validity date:

13 August 2025.



DIR DIRECTOR
pp.
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for Technical Assessment
and European Harmonization


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Warsaw, 13 August 2020.

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1. TECHNICAL DESCRIPTION OF THE PRODUCT

This National Technical Assessment covers the Ultra dB System Polypropylene (PP) Pipes and Fittings for Low-Noise Internal Sewerage Systems

The Ultra dB system pipes and fittings are manufactured by: Magnaplast Sp. z o.o., Sieniawa Źarska 69, 68-213 Lipinki Łużyckie, Poland; Gebr. Ostendorf Kunststoffe GmbH & Co. KG, Rudolf Diesel Strasse 6-8, 49377 Vechta, Germany, and Gebr. Ostendorf Kuststoffe GmbH Wilhelm, Bunsen, Strasse 6, 49685 Emstek, Germany, at production facilities in Poland and Germany.

The authorized representative of the manufacturers in Poland is Magnaplast Sp. z o.o., Sieniawa Źarska 69, 68-213 Lipinki Łużyckie.

The National Technical Assessment covers the types of products as specified by the manufacturer and resulting from the performance characteristics given in Section 3 and from the combination of relevant materials and components.

This National Technical Assessment covers the following products:

1. Socket pipes, extrusion molded, the outer layer made of polypropylene (PP), the inner layer made of polypropylene (PP) with mineral filler, external diameters DN 50, 75, 110, 125, 160 and 200, straight sections with lengths of 150, 250, 315, 500, 1000, 1500, 2000, 3000 and 5000 mm as per Figure A1.
2. Socket fittings with homogeneous wall structure, injection molded, made of polypropylene (PP) with mineral filler:
 - Elbows 15°, 30°, 45°, 67° and 87° , external diameters of DN 50 ÷ DN 200, as per Figure A2;
 - Reducers (as per Figure A3), external diameters of DN 75/20 ÷ 250/200, as per Figure A3;
 - Tees, 45°, 67° and 87°, nominal diameters of DN 50/50 ÷ 200/200, as per Figure A4;
 - Sliding muffs, external diameters of DN 50 ÷ DN 200, as per Figure A5;
 - Stoppers, external diameters DN 75/50 ÷ 250/200, as per Figure A6;
 - Double-socket connectors, external diameters of DN 50 ÷ 200, as per Figure A7;
 - Revision pipes, external diameters of DN 50 ÷ DN 200, as per Figure A8;
 - Quadruples, 67°, external diameters of DN 50/50/50 ÷ 110/110/110 as per Figure A9;
 - Angled quadruples, 67°, external diameters of DN 110/110/110 ÷ 250/110/110 as per Figure A10;
 - Sewerage/vent manifold (aerator), external diameters of DN 110 and DN 160, as per Figure A11;

Ultra dB system pipes and fittings are factory sealed with thermoplastic elastomer lip seals.

The dimensions of the pipes and fittings of the Ultra dB system are given in Appendix A. The tolerance deviations dimensions correspond to the medium accuracy class *m* as per the PN-EN 22768-1:1999 standard.

The description of raw materials and components as well as the external appearance, color and marking of the products covered by this National Technical Assessment are given in Appendix B.

2. INTENDED USE OF THE PRODUCT

Pipes and fittings of the Ultra dB system are designed for the discharge of non-pressurized soil and waste with a temperature of up to 90°C (up to 95°C in short term) via sewerage systems.

Pipes and fittings of the Ultra dB system are intended for use in the "BD" application area according to PN-EN 1451-1:2018, i.e. for use in systems inside the buildings and fixed to external building walls as well as in underground systems buried in ground or embedded in concrete within the building structure.

The pipes and fittings of the Ultra dB system can also be used as sewerage vent risers and rainwater drains.

Pipe sections should be connected using sockets with thermoplastic elastomer lip seals.

The sewerage/vent manifold (aerator) included in the Ultra dB system's facilitates the the venting of the risers and reduces pressure fluctuations within the system.

Pipes should be fixed using steel clamps with elastomeric damping inserts or Walraven's "BISMAT 1000" clamps as available in the market and in accordance with current regulations and the intended uses.

The Ultra dB system pipes and fittings with "BISMAT 1000" clamps should be installed within the plumb lines as fixed points on every other floor. Owing to the use of "BISMAT 1000" clamps, the acoustic characteristics of the Ultra dB system as given in Table 2 can be achieved.

The Ultra dB system pipes and fittings with steel clamps with elastomeric damping inserts should be installed within the plumb lines as fixed and sliding points, two per floor. Owing to the use of steel clamps with elastomeric damping inserts allow, the acoustic characteristics of the Ultra dB system as given in Table 3 can be achieved.

Pipes and fittings of the Ultra dB system can be used for the drainage of roof surfaces of buildings where the installation height does not exceed 45 m.

The products covered by this National Technical Assessment should be used in accordance with:

- technical design as developed for a specific facility, taking into account Polish standards and technical and construction regulations, in particular the Regulation of the Minister of Infrastructure of April 12, 2002 on the technical conditions to which buildings and their location should conform (Journal of Laws of 2019, item 1065, as amended);
- the requirements of this National Technical Assessment;
- user manuals as developed and provided to customers by the manufacturer.

3. PERFORMANCE CHARACTERISTICS AND ASSESSMENT METHODS

The performance characteristics of Ultra dB system pipes and fittings and the methods used in the assessment of these characteristics are given in Tables 1 ÷ 3.

No.	Basic characteristics	Performance characteristics	Assessment method
1	2	3	4
1	Dimensions of pipes and fittings	compliant with PN-EN 1451-1:2018, PN-EN 14758-1:2012 and Annex A	PN-EN ISO 3126:2006
2	Longitudinal shrinkage of pipes, %	≤ 2 No damage in the form of blisters, delaminations, or cracks	PN-EN ISO 2505:2006 test conditions: temp. 150°C; time: 60 min, method B
3	Mass flow rate MFR(230°C / 2.16 kg), g / 10 min	maximum change in MFR as the result of raw material processing is ± 20%	PN-EN ISO 1133-1:2011
4	Shape changes due to heating	the depth of cracks, delaminations or blisters around the injection point is not greater than 20% of the wall thickness; no dilations greater than 20% of the wall thickness are present along the joint line	PN-EN ISO 580:2006 test conditions: as per PN-EN 1451-1:2018
5	Resistance of pipes to external impact, %	TIR ≤ 10	PN-EN ISO 3127:2017 test conditions: temperature 23 ± 1°C, time ≥ 60 minutes, type, weight and height of weight drop as per PN-EN 1451-1:2018.
6	Pipe impact strength (Staircase method)	H50 ≥ 1 m max. 1 crack less than 0.5 m	PN-EN 150 1173:2017 test conditions: temperature -20 ± 1°C, time ≥ 120 minutes, type, weight and height of weight drop as per PN-EN 1451-1:2018.
7	Water-tightness of joints	no leaks	PN-EN ISO 13254:2017
8	Air-tightness of joints	no leaks	PN-EN ISO 13255:2017
9	The tightness of socket joints with elastomeric ring seals;	compliant with PN-EN 1451-1:2018	PN-EN ISO 13259:2018 test conditions: method 4, conditions B and C
10	Resistance of joints to cyclic exposure to elevated temperatures	compliant with PN-EN 1451-1:2018	PN-EN ISO 13257:2019
11	Ring stiffness of pipes , kN/m ²	SN 4 ≥ 4 kN/m ²	PN-EN ISO 9969:2016
12	Ring stiffness of fittings, kN/m ²		PN-EN ISO 13967:2011
13	Resistance of fittings to external impact (drop method)	no damage	PN-EN ISO 13263:2017 test conditions: as per PN-EN 14758-1:2012
14	Acoustic properties	see tables 2 and 3	PN-EN 14366+A1:2020

Table 2

Parameter	Ultra dB system pipes and fittings with "BISMAT 1000" clamps			
	0.5	1.0	2.0	4.0
Flow rate, L/s	0.5	1.0	2.0	4.0
Airborne sound level A, L _{a, A} dB ¹⁾	44	48	52	54
Structure-borne sound level A, L _{sc, A} dB ¹⁾	< 10	< 10	13	16

¹⁾ determined in accordance with PN-EN 14366+A1:2020 for installations using DN 110 pipes

Table 3

Parameter	Ultra dB system pipes and fittings with steel clamps with elastomeric damping inserts			
	0.5	1.0	2.0	4.0
Flow rate, L/s	0.5	1.0	2.0	4.0
Airborne sound level A, $L_{a,A}$ dB ¹⁾	43	47	49	52
Structure-borne sound level A, $L_{sc,A}$ dB ¹⁾	11	14	16	20

¹⁾ determined in accordance with PN-EN 14366+A1:2020 for installations using DN 110 pipes

4. PACKAGING, TRANSPORTATION AND STORAGE, AND PRODUCT MARKINGS

The Ultra dB system fittings and pipes up to 500 mm in length should be packed in carton boxes. Pipes of 750 mm and longer should be placed in wooden frames.

Products should be protected from moisture, dirt and direct sunlight. Storage should not cause deformation of ends and sockets of pipes.

Products should be transported in a manner ensuring their protection from damage and destruction as specified in the manufacturer's transportation instructions.

The method of marking the products with construction marks should comply with 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 of 2016, item 1966, as amended).

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 characteristics (ITB-KOT-2017/0167 revision 4);
- the number of the national declaration of performance;
- the level or class of declared performance;
- the manufacturer's website address, if the national declaration of performance is available thereon.

Along with the national declaration of performance, a safety data sheet and/or information on hazardous substances contained in the construction product, as referred to in Article 31 or 33 of Regulation (EC) No. 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) and establishing the European Chemicals Agency, should be provided or made available, as appropriate.

In addition, the labeling of a construction product constituting a hazardous mixture under REACH should comply with the requirements of Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labeling and packaging of substances and mixtures (CLP), amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC)

No. 1907/2006.

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 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 of 2016, item 1966, as amended), System 4 of assessment and verification of constancy of performance is applicable.

5.2. Type testing

The performance characteristics as presented in section 3 constitute the product type testing parameters as long as no changes are introduced with regard to raw materials, components, production lines or production facilities.

5.3. Plant production control

A plant production control system should be in place at the manufacturer's production site. All elements of the system as well as the requirements and provisions as adopted by the manufacturer should be documented in a systematic way in the form of rules and procedures, including records of tests performed. The plant production control system should be adapted to the production technology and ensure that the declared product performance is maintained in serial production.

The plant production control includes relevant specification and verification of raw materials and components, the inspection and testing of the manufacturing process, as well as quality control tests (as per section 5.4) carried out by the manufacturer in accordance with the established testing schedule and in line with the principles and procedures specified in the plant production control documents.

The results of plant production control tests should be recorded systematically. Registry entries should confirm that the products meet the criteria for the assessment and verification of the constancy of performance. Individual products or batches of products and related production details must be fully identifiable and traceable.

5.4. Quality control

5.4.1. Testing Program. The testing program includes:

- a) ongoing tests,
- b) periodic tests.

5.4.2. Ongoing tests. Ongoing tests cover the inspection of:

- a) external appearance;
- b) dimensions;
- c) longitudinal shrinkage of pipes;
- d) MFR mass flow rate;
- e) fitting shape changes upon heating;

- f) Impact strength;
- g) ring stiffness of pipes and fittings;
- h) resistance of fittings to external impact (drop method).

5.4.3. Periodic tests. Periodic tests cover the inspection of:

- a) the tightness of socket joints with elastomeric ring seals;
- b) the tightness of joints (tested with water and air);
- c) the resistance of joints to cyclic exposure to elevated temperatures.

5.5. Frequency of testing

Ongoing tests should be carried out as per the established testing schedule but not less frequently than once per each product batch. The size of the batch should be specified in the plant's control documentation.

Periodic tests should be performed at least once every 3 years.

6. INSTRUCTIONS

6.1. The National Technical Assessment ITB-KOT-2017/0167 revision 4 replaces the National Technical Assessment ITB-KOT-2017/0167 revision 3.

6.2. The National Technical Assessment ITB-KOT-2017/0167 revision 4 constitutes a positive assessment of the performance of those essential characteristics of Ultra dB system pipes and fittings, which, when used as intended on the basis of the provisions of this Assessment, have an impact on the fulfillment of the basic requirements by the construction facilities in which the product will be used.

6.3. The National Technical Assessment ITB-KOT-2017/0167 revision 4 is not a document authorizing the construction product being marked with a construction mark.

According to the Act of 16 April 2004 on construction products (Journal of Laws of 2020, item 215 as amended), products covered by this National Technical Assessment may be marketed or made available on the domestic market if the manufacturer has performed the assessment and verification of the constancy of performance, prepared a national declaration of performance in accordance with the National Technical Assessment ITB-KOT-2017/0167 revision 4, and marked the products with the construction mark pursuant to applicable regulations.

6.4. The National Technical Assessment ITB-KOT-2017/0167 revision 4 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 of 2020, item 286, as amended). Ensuring these rights is the responsibility of the users of this Building Research institute (ITB) National Technical Assessment.

6.5. By issuing this National Technical Assessment, the Building Research institute (ITB) does not take responsibility for any infringement of exclusive and acquired rights.

6.6. The National Technical Assessment does not release the manufacturer of products from

responsibility for their proper quality, and the construction contractors from responsibility for their proper application.

6.7. The validity of the National Technical Assessment may be renewed for successive periods of not more than 5 years.

7. LIST OF DOCUMENTS USED IN THE PROCEEDINGS

7.1. Test reports, reviews, assessments, classifications

1. Test Report No. BT/K/07/2020. Testing of Ultra dB DN 200 fittings. Magnaplast. Sieniawa Źarska, 2020.
2. Test Report No. BT/K/07/2020. Testing of Ultra dB DN 200 pipes. Magnaplast. Sieniawa Źarska, 2020.
3. Test Report No. DWF116/2018. Testing of Ultra dB DN 125 pipes and fittings. Institute for Engineering of Polymer Materials & Dyes, Paints and Plastics Division. Department of Research and Analysis, Toruń, 2018.
4. Test Report No. DWF116/2018. Testing of Ultra dB DN 125 pipes and fittings. Institute for Engineering of Polymer Materials & Dyes, Paints and Plastics Division. Department of Research and Analysis, Toruń, 2018.
5. Expert opinion on the Ultra dB system of polypropylene (PP) pipes and fittings for low-noise internal sewerage systems, ITB Thermal Physics, Acoustics and Environment Department, Warsaw, 2018.
6. Prufbericht P-BA 351/2017. Ultra dB sewerage system acoustic testing report. Laboratory of Fraunhofer-Institut fur Bauphysik, Stuttgart, Germany, January 2018.
7. Test Report No. 9/2016. Testing of fittings for sewerage systems. Institute for Engineering of Polymer Materials & Dyes, Paints and Plastics Division. Department of Research and Analysis, Toruń, 2016.
8. Test Report No. 82/2016. Testing of Ultra dB sewerage system fittings. Institute for Engineering of Polymer Materials & Dyes, Paints and Plastics Division. Department of Research and Analysis, Toruń, 2016.
9. Technical Opinion No. 133/16 on the use of Ultra dB pipes and fittings for building drainage. Department of Materials Engineering, Central Mining Institute GIG, Katowice, 2016.
10. Test Report No. 133/16/ SM1. Inspection tests of the Ultra dB system of pipes and fittings for building drainage. Department of Materials Engineering, Central Mining Institute GIG, Katowice, 2016.
11. Test Report No. 169/14/ SM1. Inspection tests of Ultra dB PP-MD fittings according to PN-EN 14758-1:2012. Central Laboratory for Plastic Pipe Testing. Department of Materials Engineering, Central Mining Institute GIG, Katowice, 2014.
12. Prufbericht P-BA 165/2014. Ultra dB sewerage system acoustic testing report. Laboratory of Fraunhofer-Institut fur Bauphysik, Stuttgart, Germany, January 2014.
13. Survey no. NA/05012/MN/14. Expert opinion on the acoustic characteristics of the Ultra dB

system of polypropylene pipes and fittings for low-noise internal sewerage systems. ITB Department of Acoustics, 2014.

14. Test Report No. 151/14/SM1. Inspection tests of polypropylene (PP) Ultra dB pipes and fittings according to PN-EN 1451-1:2001. Central Laboratory for Plastic Pipe Testing. Department of Materials Engineering, Central Mining Institute GIG, Katowice, 2014.

7.2. Standards and related documents

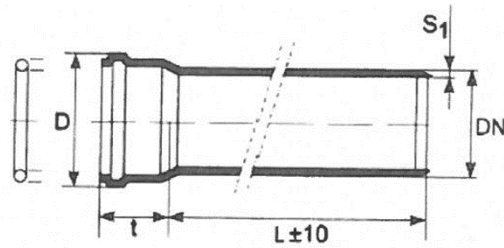
PN-EN ISO 580:2006	<i>Plastics piping and ducting systems. Injection-moulded thermoplastics fittings. Methods for visually assessing the effects of heating</i>
PN-EN 681-1:2002	<i>Elastomeric seals. Material requirements for</i>
PN-EN 681-1:2002/A3:2006	<i>pipe joint seals used in water and drainage applications. Part 1: Vulcanized rubber</i>
PN-EN 681-2:2003/A2:2006	<i>Part 2: Thermoplastic elastomers</i>
PN-EN ISO 1133-1:2011	<i>Plastics. Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics.</i>
PN-EN 1451-1:2018	<i>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</i>
PN-EN ISO 2505:2006	<i>Thermoplastics pipes. Longitudinal reversion. Test method and parameters</i>
PN-EN ISO 3126:2006	<i>Plastics piping systems. Plastics components. Determination of dimensions</i>
PN-EN ISO 3127:2017	<i>Thermoplastics pipes. Determination of resistance to external blows. Round-the-clock method</i>
PN-EN ISO 9852:2017	<i>Unplasticized poly(vinyl chloride) (PVC-U) pipes. Dichloromethane resistance at specified temperature (DCMT). Test method</i>
PN-EN ISO 9969:2016	<i>Thermoplastics pipes. Determination of ring stiffness</i>
PN-EN ISO 13254:2017	<i>Thermoplastics piping systems for non-pressure applications. Test method for watertightness</i>
PN-EN ISO 13255:2017	<i>Thermoplastics piping systems for soil and waste discharge inside buildings Test method for air-tightness of joints</i>
PN-EN ISO 13257:2019	<i>Thermoplastics piping systems for non-pressure applications. Test method for resistance to elevated temperature cycling</i>
PN-EN ISO 13259:2018	<i>Plastics piping systems. Thermoplastics piping systems for underground non-pressure applications. Test method for leak-tightness of elastomeric sealing ring type joints</i>
PN-EN ISO 13263:2017	<i>Thermoplastics piping systems for non-pressure underground drainage and sewerage. Thermoplastic fittings. Test method for impact strength</i>

PN-EN 14366+A1:2020	<i>Laboratory measurement of noise from waste water installations</i>
PN-EN 22768-1:1999	<i>General Tolerances. Tolerances for linear and angular dimensions without individual tolerance indications</i>
ITB-KOT-2017/0167 revision 3	<i>Ultra dB System Polypropylene (PP) Pipes and Fittings for Low-Noise Internal Sewerage Systems</i>

ANNEXES

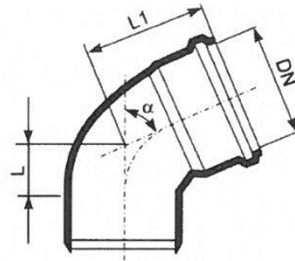
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Annex A. Shapes and dimensions



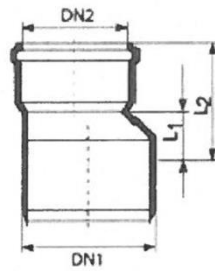
DN, mm	S ₁ , mm	D, mm	t, mm	L, mm
50	2,0	64	56	150, 250, 315, 500, 1000, 1500, 2000, 3000, 5000
75	2,3	89	61	150, 250, 315, 500, 1000, 1500, 2000, 3000, 5000
110	3,4	128	72	150, 250, 315, 500, 1000, 1500, 2000, 3000, 5000
125	3,9	145,8	80	150, 250, 315, 500, 1000, 1500, 2000, 3000, 5000
160	4,9	186,6	95	150, 250, 315, 500, 1000, 1500, 2000, 3000, 5000
200	6,2	233,5	123	150, 250, 315, 500, 1000, 1500, 2000, 3000, 5000

Fig. A1. Ultra dB socket pipes

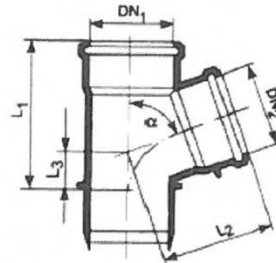


DN, mm	Angle, °	L, mm	L1, mm
50	15	10	70
	30	9	68
	45	17	87
	67	28	77
	87	28	84
75	15	23	91
	30	11	80
	45	18	92
	67	29	86
	87	42	94
110	15	9	77
	30	17	85
	45	26	94
	67	41	109
	87	59	127
125	15	10	99
	30	19	107,5
	45	29	116
	67	44	134
	87	66	152
160	15	13	102
	30	24	113
	45	37	126
	67	59	142
	87	84	173
200	15	15	155
	30	29	170
	45	46	180
	87	105	236

Fig. A2. 15°, 30°, 45°, 67° and 87° Ultra dB elbows



DN ₁ /DN ₂ , mm	L ₁ , mm	L ₂ , mm
75/50	19	73
110/50	37	93
110/75	22	87
125/110	15	95
160/125	26	106
160/110	34	135
200/160	48	155
250/200	61	185

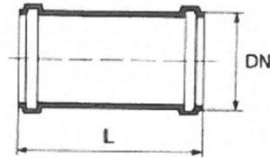
Fig. A3. Ultra dB reducers


DN ₁ /DN ₂ , mm	Angle, °	L ₁ , mm	L ₂ , mm	L ₃ , mm
50/50	45	133	116	12
75/50	45	147	145	1
75/75	45	183	159	18
110/50	45	150	158	17
110/75	45	186	186	50
110/110	45	134	134	26
125/75	45	171	153	45
125/110	45	171	151	81
125/125	45	232	160	29
160/125	45	257	179	10
160/110	45	162	168	2
160/160	45	194	194	37
200/110	45	311	267	94
200/160	45	360	316	118
200/200	45	413	367	168
50/50	67	19	40	40
75/50	67	14	53	45
75/75	67	27	59	59
110/50	67	8	71	51
110/110	67	40	85	85
50/50	87	117	91	28
75/50	87	158	115	40
110/50	87	150	125	23
110/75	87	186	126	36
110/110	87	64	62	59
125/110	87	171	73	81
125/125	87	232	73	29

Fig. A4. 45°, 67° and 87° Ultra dB tees

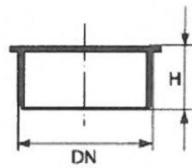
DN ₁ /DN ₂ , mm	Angle, °	L1, mm	L2, mm	L3, mm
160/125	87	257	125	10
160/110	87	140	141	15
160/160	87	91	91	81
200/110	87	305	180	80
200/160	87	305	210	80

Fig. A4,continued. 45°, 67° and 87° Ultra dB tees



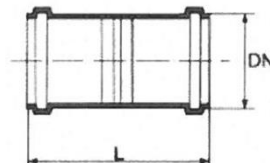
DN, mm	L, mm
50	103
75	109
110	136
125	152
160	185
200	196

Fig. A5. Ultra dB sliding muffers



DN, mm	H, mm
50	39
75	39
110	46
125	55
160	70
200	95

Fig. A6. Ultra dB stoppers

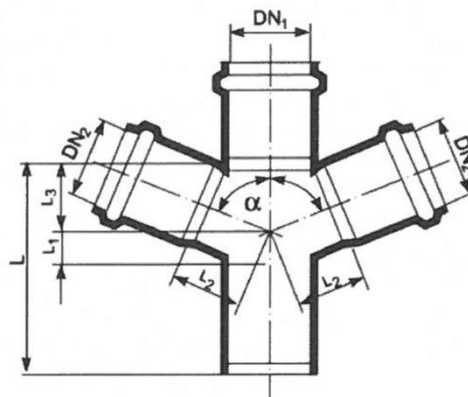


DN, mm	L, mm
50	112
75	118
110	136
125	152
160	185
200	196

Fig. A7. Ultra dB double-socket connectors

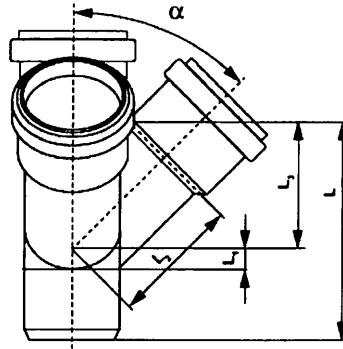


DN, mm	D, mm	L, mm
50	-	115
75	-	142
110	230	308
125	250	313
160	280	380
200	260	412

Fig. A8. Ultra dB revision pipes


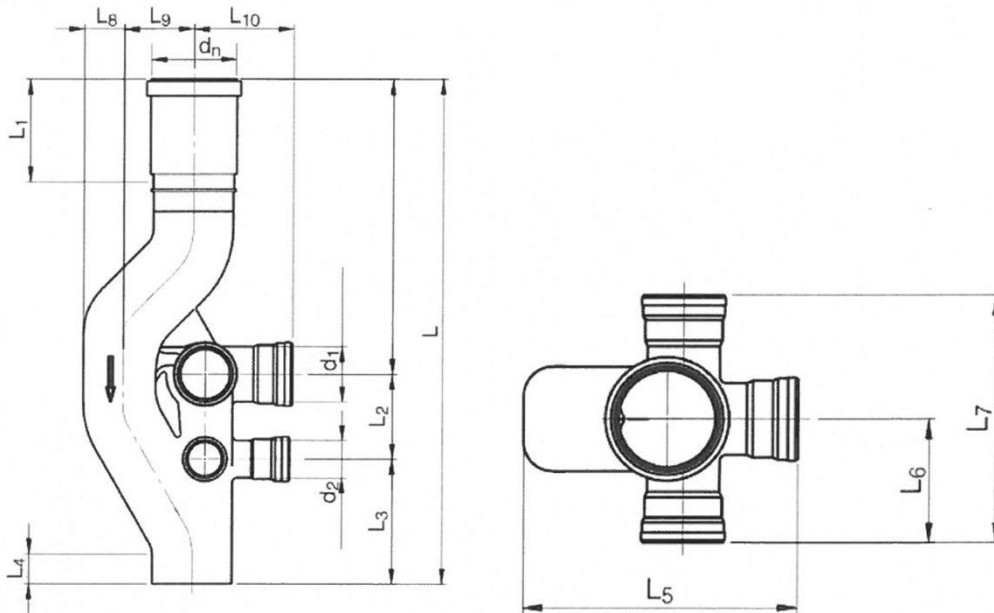
DN, mm	α , °	L1, mm	L2, mm	L3, mm	L, mm
50/50/50	67	20	41	41	124
75/75/75	67	28	59	59	153
110/50/50	67	8	73	54	135
110/110/110	67	40	85	85	201
125/110/110	67	35	113	115	231

Fig. A9. 67° Ultra dB quadruples



DN, mm	α , °	L ₁ , mm	L ₂ , mm	L ₃ , mm	L, mm
110/110/110	67	40	86	86	202
125/110/110	67	50	97	95	217

Fig. A10. 67° Ultra dB angled quadruples



DN	d1	d2	L	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
mm													
110	110	75	965	256	170	240	60	345	160	315	55	130	160
160	110	75	1010	256	170	240	60	405	180	360	80	140	185

Fig. A11. Ultra dB sewerage/vent manifold (aerator)

Annex B. Raw materials and components, external appearance and product markings

B.1. Raw materials and components

The raw material for the production of the outer layer of Ultra dB system pipes is polypropylene (PP-H) as per the PN-EN 1451-1:2018 standard whereas the raw material for the inner layer of Ultra dB system pipes and the Ultra dB system fittings is polypropylene with mineral modifiers (PP-M) as per the PN-EN 14758-1:2012 standard.

Primary raw material as originally packaged by the manufacturer should be used in the production of the pipes and fittings of the Ultra dB system. Secondary raw material of the same type, recovered from the manufacturer's own production of pipes and fittings, may be added, provided that its properties are not inferior to those of the primary raw material.

Lip seals to be factory-provided with the pipes and fittings of the Ultra dB system should be made of thermoplastic elastomer according to PN-EN 681-1:2002 and PN-EN 681-1:2002/A3:2006 standards.

B.2. External appearance and color

The external and internal surfaces of pipes and fittings should be smooth and free of defects such as inhomogeneities, blisters and inclusions of foreign bodies; the pipes and fittings should be uniformly colored over the entire surface. The color of the outer pipe layer should be blue while the color of the inner pipe layer should be white. The color of the fittings should be blue.

B.3. Marking

The markings of Ultra dB system pipes should be printed at intervals of not more than 1 m, in a permanent, non-cracking fashion to ensure legibility upon normal storage, exposure to the atmospheric conditions, installation and operation. The color of the markings of pipes should differ from the color of the product.

The marking on the Ultra dB system pipes should include at a minimum:

- the manufacturer's name or symbol;
- the system name;
- the nominal diameter;
- the material symbol,
- the application area code,
- the production date.

The marking on the Ultra dB system fittings should include at a minimum:

- the system name;
- the nominal diameter and angle,
- the material symbol,
- the application area code,
- the production date.