



ADVANCED FLOW
SYSTEMS™



ULTRA SILENT™

Soundproof Drainage Piping Systems

Tel : 77 77 24 25

HEATAIRCON

LTD

Catalog and Technical Manual



<> **ULTRA SILENT™**

<> **ULTRA SILENT+™**

**Vision without a task is only a dream.
A task without a vision is but drudgery.
But vision with a task is a dream fulfilled.**

Anonymous

Dear Customers,

All important pursuits begin with a vision. At Huliote, every day we focus our energies on giving practical meaning to our Corporate Vision, which we refashioned **in September 2008**. The company's vision appears on the wall at the entrance of all of our manufacturing plants and logistics centers. All Huliote staff, from management to production and logistics, share and embrace the same strategic vision.

Extracts from Huliote's Corporate Vision

- Huliote will excel in the development and production of innovative solutions, creating added value for its customers.
- Huliote will act to protect the physical environment, and to raise awareness about environmental protection.

Huliote's development of our <> **ULTRA SILENT™** and <> **ULTRA SILENT+™** acoustically insulated drainage systems is an expression of our commitment to make our 'vision' a reality. Noise reduced drainage in the home is not only about environmental quality, but indeed about quality of life.

In our personal lives, we have all learned that we are capable of adapting to almost any situation, and we can learn to live with many hardships and disturbances, when faced with no choice. However, when we become aware of superior and readily available alternatives, most of us are no longer prepared to be deprived of them.

Huliote's <> **ULTRA SILENT™** and <> **ULTRA SILENT+™** systems are so effective and so affordable that it makes no sense to install anything else in a new construction project. Beyond our commitment to realizing our 'vision', these product lines are also about leadership. We didn't just decide to make a better drainage system and reduce the noise of drainage flow...we decided and committed ourselves to producing the best acoustically insulated drainage system available in the world today. A challenging, yet achievable mission.

Over the past five years, we have implemented the largest investment plan in the company's 67 year history. We purchased the most sophisticated production technology available, and invested in cutting-edge mold technology. We executed a relentless and uncompromising material development program to create the highest performing material compound available for its purpose.

Five years later, I am proud to declare: **"MISSION ACCOMPLISHED"**.



Paul Steiner
C.E.O.
Huliote A.C.S. Ltd.

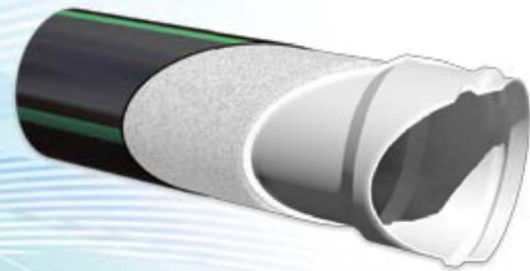
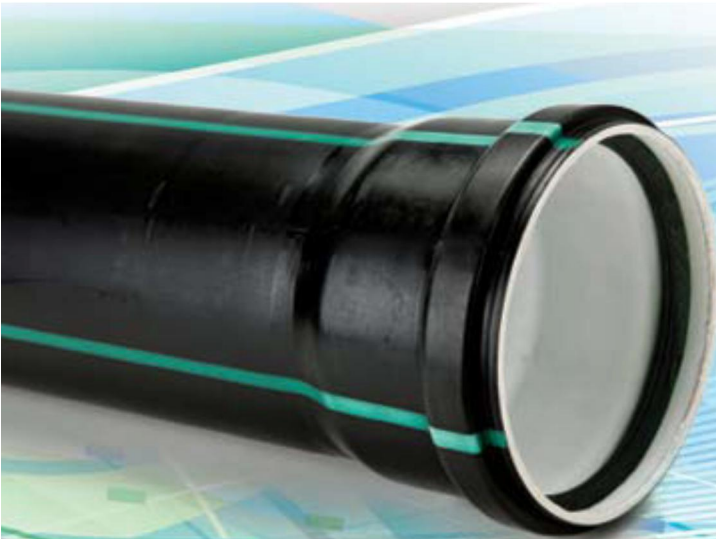
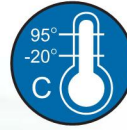
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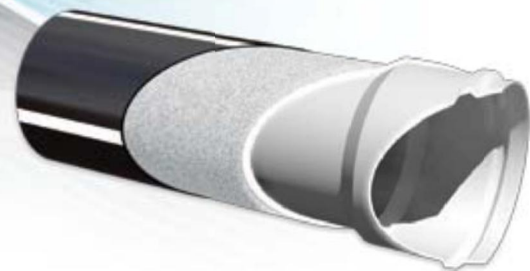


▶ **ULTRA SILENT™**

▶ **ULTRA SILENT+™**



▶ **ULTRA SILENT™**



▶ **ULTRA SILENT+™**

Measurement test results according to EN14366 (with Müpro "Yellow" clamps)

System / Flow rate	0.5 l/s	1.0 l/s	2.0 l/s	4.0 l/s
▶ ULTRA SILENT™	10 db	13 db	15 db	19 db
▶ ULTRA SILENT+™	10 db	11 db	13 db	15 db

ULTRA ring stiffness strength / **ULTRA** acoustic insulation - combining the most advanced production technology with Huliote's uniquely formulated compound.

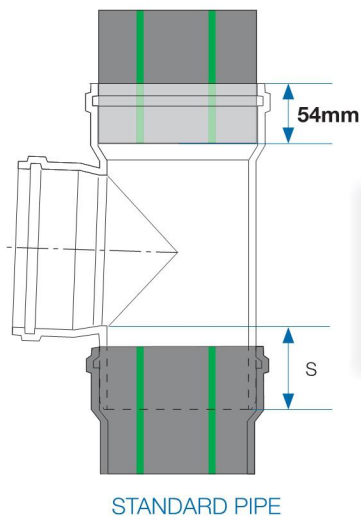
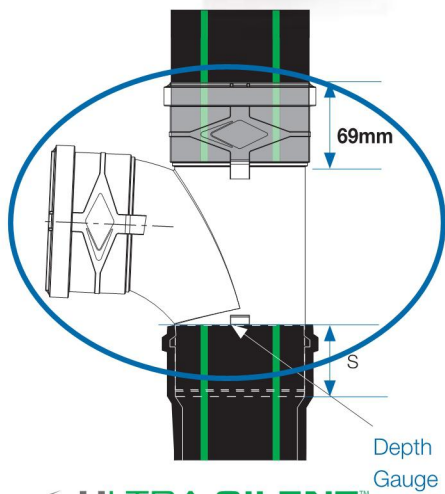




Clever Design

ULTRA Discharge Rate

ULTRA Smooth Flow



Extra Socket Depth

ULTRA Stable

ULTRA Solid



Depth Gauge

ULTRA Fit



Easy Assembly

ULTRA Easy Assembly

ULTRA Simple Handling

Anti-slip ergonomic finger grips

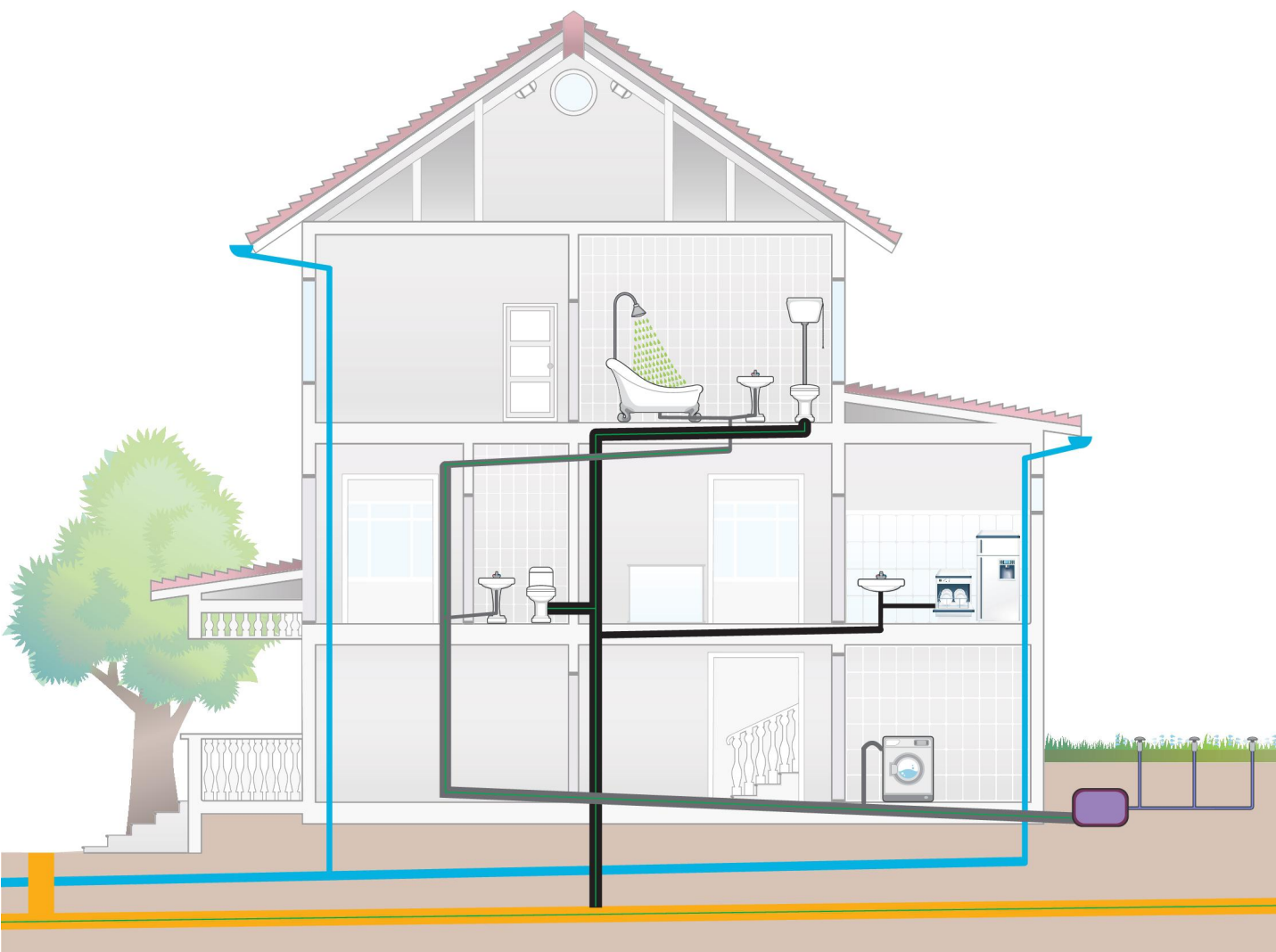


ULTRA SILENT™

ULTRA SILENT+™

1. Applications:

- 1.1. **ULTRA SILENT™** Soundproof pipes and fittings for drainage, soil and waste water discharge, low and high temperature, made of PP-MD (Polypropylene and mineral field polypropylene compounds) in diameters Ø32-160 with push-fit connection method.
Application area "BD" according to SKZ specification for test and inspection HR 3.43.
- 1.2. **Waste water, drainage and sewerage applications**
 - 1.2.1. **Grey waste water** - Collecting water from bathroom sinks, baths and showers and from washing machines. Applicable systems: **ULTRA SILENT™**, HT System and **THREADLOCK™**.
 - 1.2.2. **Waste water** - Collecting waste water from toilets and kitchen sinks. Applicable systems: **ULTRA SILENT™** and HT System.
 - 1.2.3. **Rain water drainage** - Collecting rain water from roofs, gutters, balconies and outdoor surfaces. Applicable systems: **ULTRA SILENT™** and HT System.
 - 1.2.4. **Sewerage** - Collecting water from building waste water discharge systems to the municipal infrastructure. Applicable systems: **ULTRA SWG™** and KG System.
 - 1.2.5. **Grey water recycling system** - For garden irrigation systems and for toilet flushing systems. Applicable systems: **CLEARGREY™** and **GREYFLOW™**.

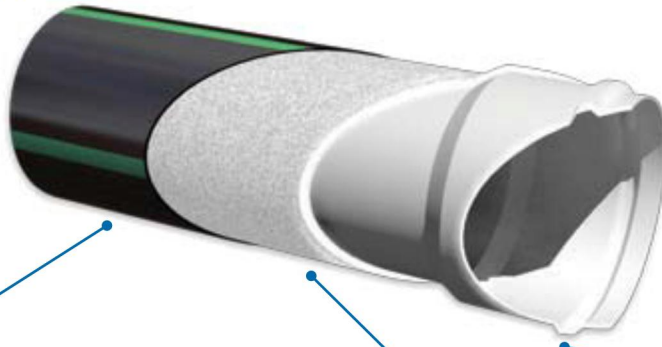


2. Technical data

2.1. Materials:

All materials comply with RoHS directive and are Halogen and Cadmium free (see appendix 2).

Triple layer pipe



External layer made from black PP (Polypropylene) marked with HULIOT's trademark 4 stripes - Green for the **ULTRA SILENT™** or white for the **ULTRA SILENT+™** - that provides excellent UV resistant performance.

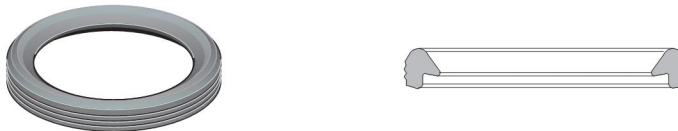
Middle layer made from PP-MD (Polypropylene and minerals compound) that provides the acoustic insulation.

Internal layer made from white PP (Polypropylene) providing the best flow performance and high-definition contrast for visual monitoring and control.

Fittings made from black PP-MD (Polypropylene and minerals compound) for outstanding acoustic insulation.

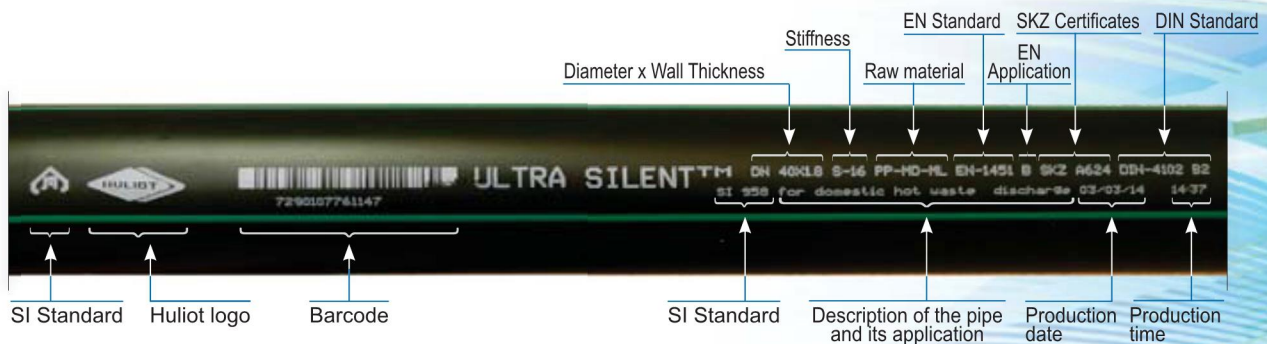
2.2. Method of connection:

All products are connected by means of push-fit insertion, with single-lip high quality seals made of SBR-NR, for guaranteed sealing and leak-proof performance.



2.3. Marking:

2.3.1. Pipe markings - On each pipe, the following details will be clearly printed at least once every meter, with indelible ink: Producer - HULIOT, system type, dimensions, materials, stiffness level, number of the applicable standard and category of application, date of manufacture and Standards Institute symbols.



2.3.2. Fittings markings - Every fitting will be marked with all required information as follows: Producer - HULIOT, system type, dimensions, materials, stiffness level, number of the applicable standard and category of application, date of manufacture and Standards Institute symbols.





 **ULTRA SILENT™**

 **ULTRA SILENT+™**

2.4. Temperature performance:

2.4.1. Hot water resistance

95°C for long term (3000 hours/50 years = 10 min/day).
98°C for short term (200 hours/50 years = 40 sec/day).
60°C for permanent load (90,000 hours/50 years = 5 hours/day).

2.4.2. Low temperature impact strength


2.4.2.1. -25°C for permanent load after assembly.


2.4.2.2. Approved by SKZ (TR 104959/13) according to DIN EN ISO 291:2008-08 for impact resistance in -20°C conditions (for transportation, assembly and short-term storage).

2.5 Chemical resistance:

System materials are resistant to aggressive discharge media in the range of pH 2 to pH 12 according to DIN 8078 (for chemical list - see appendix 3; page 32).

2.6 Fire resistance:


2.6.1. The  **ULTRA SILENT™** system tested and certified by IBS according to EN 13501-1:2009 and classified D-s2,d2 (see appendices).

2.6.2. The  **ULTRA SILENT™** system meets the requirements of EN 4102-2 with fire classification B2, smoke development category Q1 (low smoke development) and drip formation category TR1 (no drip formation).



2.7 Ring stiffness:

Ring stiffness was tested according to ISO 9969 and reached the following results for dimensions Ø32-160:



 **ULTRA SILENT™** pipes - SN6 (at least 6.0 kN/m²).

 **ULTRA SILENT+™** pipes - SN12 (at least 12.0 kN/m²).

2.8 Elastic modulus:

E-modulus tested according to ISO 178 and reached the results of 2300-3000 for  **ULTRA SILENT™** pipes and 2600-3200 for  **ULTRA SILENT+™** pipes.

2.9 Elongation:

Coefficient of elongation was tested and reached the results of 0.09 mm/°K for  **ULTRA SILENT™** pipes and 0.05 mm/°K for  **ULTRA SILENT+™** pipes.

2.10 Quality, Environmental, Occupational Health and Safety management:

Quality Management according to ISO 9001:2008, Environmental Management according to ISO 14001:2004 and Occupational Health and Safety Management according to OHSAS 18001:2007 approved and certified by SII.



2.11 Standards:

EN 1451-1: Polypropylene (PP) piping systems for soil and waste discharge (low and high temperature) within the building structure.

EN13501-1:2009: Classification of system's fire behavior, smoke emission, flaming and droplets

EN 4102-2: Reaction to fire tests - Ignitability of building products subjected to direct impingement of flame.

EN 14366: Laboratory measurement of noise from waste water installations.

IGTD 116 Based on standards TSC 29:

Huliot is licensed to mark the following products with the Green Label:

- License No. 70304 for Ultra Silent products
- License No. 70305 for Ultra SWG products

2.12 System approvals:

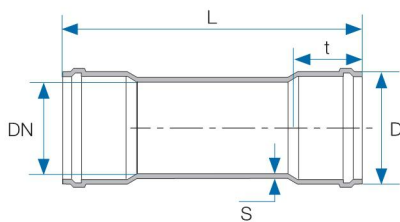
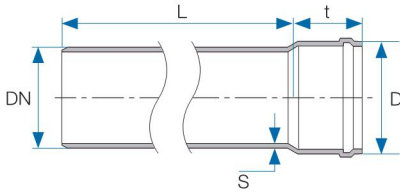
SKZ mark approval certification No. A624 (see appendix 2; page 30).

Fraunhofer IBP test reports P-BA 78-81/2012e (see chapter 4.5; page 23).

3. Product Range

Pipes

ULTRA SILENT™ Pipes



USEM Silent Pipe With One Socket	USDM Silent Pipe With Two Sockets	DN	L	D	S	t	pcs.	pcs.
5753200015	-	32	150	45	1.8	42	20	1440
5753200025	-	32	250	45	1.8	42	20	960
5753200050	5753232050	32	500	45	1.8	42	20	480
5753200100	5753232100	32	1000	45	1.8	42	15	300
5753200150	5753232150	32	1500	45	1.8	42	15	300
5753200200	5753232200	32	2000	45	1.8	42	15	300
5753200300	5753232300	32	3000	45	1.8	42	15	300
5754000015	-	40	150	55	1.8	44	20	1440
5754000025	-	40	250	55	1.8	44	20	960
5754000050	5754040050	40	500	55	1.8	44	20	480
5754000100	5754040100	40	1000	55	1.8	44	15	420
5754000150	5754040150	40	1500	55	1.8	44	15	420
5754000200	5754040200	40	2000	55	1.8	44	15	420
5754000300	5754040300	40	3000	55	1.8	44	15	420
5755000015	-	50	150	65	1.8	46	20	960
5755000025	-	50	250	65	1.8	46	20	540
5755000050	5755050050	50	500	65	1.8	46	20	400
5755000075	-	50	750	65	1.8	46	15	270
5755000100	5755050100	50	1000	65	1.8	46	15	270
5755000150	5755050150	50	1500	65	1.8	46	15	270
5755000200	5755050200	50	2000	65	1.8	46	15	270
5755000300	5755050300	50	3000	65	1.8	46	15	270
5757500015	-	75	150	90	2.2	49	20	360
5757500025	-	75	250	90	2.2	49	20	240
5757500050	5757575050	75	500	90	2.2	49	20	160
5757500075	-	75	750	90	2.2	49	10	120
5757500100	5757575100	75	1000	90	2.2	49	10	120
5757500150	5757575150	75	1500	90	2.2	49	10	120
5757500200	5757575200	75	2000	90	2.2	49	10	120
5757500300	5757575300	75	3000	90	2.2	49	10	120
5759000015	-	90	150	107	2.8	54	16	384
5759000025	-	90	250	107	2.8	54	20	160
5759000050	5759090050	90	500	107	2.8	54	10	100
5759000100	5759090100	90	1000	107	2.8	54	10	100
5759000150	5759090150	90	1500	107	2.8	54	10	100
5759000200	5759090200	90	2000	107	2.8	54	10	100
5759000300	5759090300	90	3000	107	2.8	54	10	100

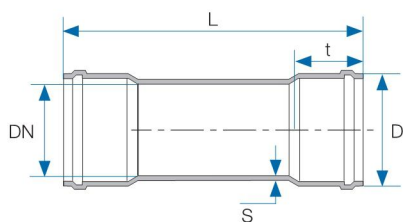
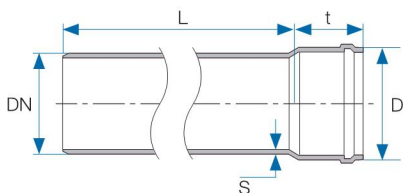


ULTRA SILENT™

ULTRA SILENT+™

Pipes

ULTRA SILENT™ Pipes

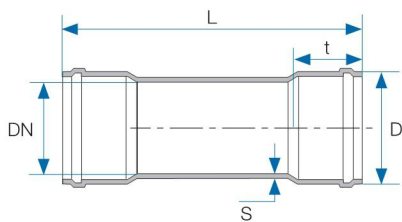
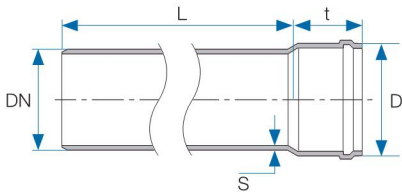


USEM Silent Pipe With One Socket	USDM Silent Pipe With Two Sockets	DN	L	D	S	t	pcs.	pcs.
5751100015	-	110	150	130	3.4	65	20	180
5751100025	-	110	250	130	3.4	65	20	120
5751100050	5751111050	110	500	130	3.4	65	20	80
5751100075	-	110	750	130	3.4	65	10	80
5751100100	5751111100	110	1000	130	3.4	65	10	80
5751100150	5751111150	110	1500	130	3.4	65	10	80
5751100200	5751111200	110	2000	130	3.4	65	10	80
5751100300	5751111300	110	3000	130	3.4	65	10	80
5751200015	-	125	150	149	3.9	72	6	180
5751200025	-	125	250	149	3.9	72	6	108
5751200050	5751212050	125	500	149	3.9	72	6	48
5751200100	5751212100	125	1000	149	3.9	72	10	80
5751200150	5751212150	125	1500	149	3.9	72	10	80
5751200200	5751212200	125	2000	149	3.9	72	10	80
5751200300	5751212300	125	3000	149	3.9	72	10	80
5751600015	-	160	150	186	4.9	75	8	48
5751600025	-	160	250	186	4.9	75	8	48
5751600050	-	160	500	186	4.9	75	8	32
5751600100	-	160	1000	186	4.9	75	6	24
5751600150	-	160	1500	186	4.9	75	6	24
5751600200	-	160	2000	186	4.9	75	6	24
5751600300	-	160	3000	186	4.9	75	6	24



Pipes

ULTRA SILENT+™ Pipes



USEM Silent Pipe With One Socket	USDM Silent Pipe With Two Sockets	DN	L	D	S	t	pcs.	pcs.
5857500050	-	75	500	93	3.8	57	10	120
5857500075	-	75	750	93	3.8	57	10	120
5857500100	5857575100	75	1000	93	3.8	57	10	120
5857500150	-	75	1500	93	3.8	57	10	120
5857500200	5857575200	75	2000	93	3.8	57	10	120
5857500300	5857575300	75	3000	93	3.8	57	10	120
5859000050	-	90	500	109	4.5	59	10	100
5859000100	5859090100	90	1000	109	4.5	59	10	100
5859000150	-	90	1500	109	4.5	59	10	100
5859000200	5859090200	90	2000	109	4.5	59	10	100
5859000300	5859090300	90	3000	109	4.5	59	10	100
5851100050	-	110	500	132	4.8	65	10	80
5851100075	-	110	750	132	4.8	65	10	80
5851100100	5851111100	110	1000	132	4.8	65	10	80
5851100150	-	110	1500	132	4.8	65	10	80
5851100200	5851111200	110	2000	132	4.8	65	10	80
5851100300	5851111300	110	3000	132	4.8	65	10	80
5851200050	-	125	500	150	5.3	72	10	80
5851200100	5851212100	125	1000	150	5.3	72	10	80
5851200150	-	125	1500	150	5.3	72	10	80
5851200200	5851212200	125	2000	150	5.3	72	10	80
5851200300	5851212300	125	3000	150	5.3	72	10	80
5851600100	-	160	1000	191	7.5	75	6	24
5851600150	-	160	1500	191	7.5	75	6	24
5851600200	-	160	2000	191	7.5	75	6	24
5851600300	-	160	3000	191	7.5	75	6	24





ULTRA SILENT™

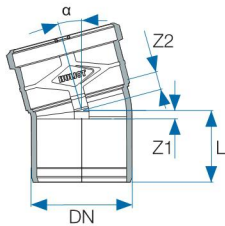
ULTRA SILENT+™

Bends

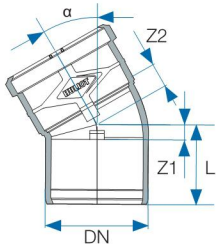
ULTRA SILENT™ Bend



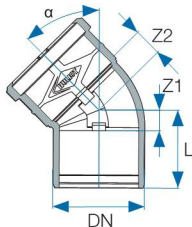
15°



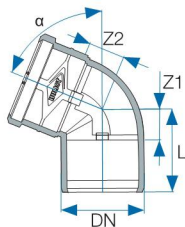
30°



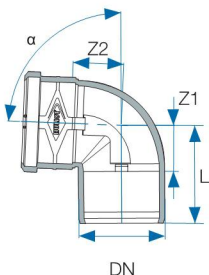
45°



67.5°



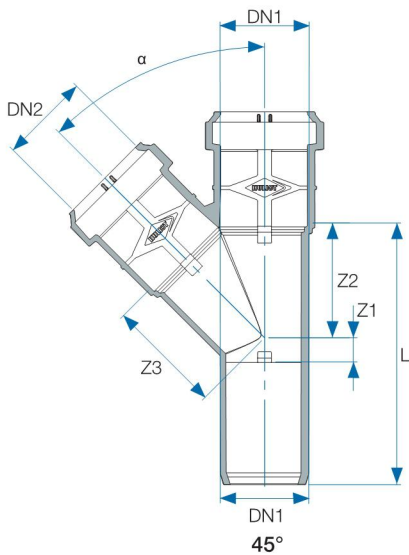
87.5°



Code	Item Description	α	\varnothing / DN	L	Z1	Z2	pcs.	pcs.
707000170	USB Bend	15°	32.0	44.5	4.0	9.0	40	4800
7070010170	USB Bend		40.0	51.5	4.0	10.0	40	2400
7070020170	USB Bend		50.0	56.5	5.0	11.0	40	1200
7070030170	USB Bend		75.0	63.5	7.0	14.0	20	600
7070090170	USB Bend		90.0	68.0	8.0	16.0	20	480
7070040170	USB Bend		110.0	78.0	6.0	19.0	20	240
7070050170	USB Bend		125.0	87.0	12.0	21.9	10	160
7070060170	USB Bend		160.0	99.0	8.0	22.0	5	120
7070000370	USB Bend	30°	32.0	47.5	5.0	10.0	40	4800
7070010370	USB Bend		40.0	54.5	7.0	13.0	40	2400
7070020370	USB Bend		50.0	59.5	8.0	14.0	40	1200
7070030370	USB Bend		75.0	68.5	12.0	18.0	20	600
7070090370	USB Bend		90.0	74.0	14.0	20.5	20	320
7070040370	USB Bend		110.0	85.0	16.0	25.5	20	240
7070050370	USB Bend		125.0	104	29.0	30.0	10	160
7070060370	USB Bend		160.0	105.0	27.0	29.0	5	120
7070000470	USB Bend	45°	32.0	53.0	8.0	13.0	40	4800
7070010470	USB Bend		40.0	58.5	11.0	17.0	40	2400
7070020470	USB Bend		50.0	64.0	13.0	19.0	40	1200
7070030470	USB Bend		75.0	74.5	18.0	24.0	20	600
7070090470	USB Bend		90.0	81.0	21.0	27.5	20	320
7070040470	USB Bend		110.0	94.0	25.0	33.5	20	240
7070050470	USB Bend		125.0	104.0	29.0	38.0	10	160
7070060470	USB Bend		160.0	116.0	36.0	44.0	5	120
7070000670	USB Bend	67.5°	32.0	58.0	13.0	18.0	40	2400
7070010670	USB Bend		40.0	65.5	18.0	24.0	40	1600
7070020670	USB Bend		50.0	72.5	21.0	27.0	40	1200
7070030670	USB Bend		75.0	85.5	29.0	35.0	20	480
7070090670	USB Bend		90.0	94.0	34.0	40.0	20	320
7070040670	USB Bend		110.0	110.0	44.0	48.0	20	240
7070050670	USB Bend		125.0	118.0	48.0	52.0	10	160
7070000870	USB Bend		87.5°	32.0	64.0	20.0	24.0	40
7070010870	USB Bend	40.0		73.5	26.0	32.0	40	1600
7070020870	USB Bend	50.0		79.5	28.5	35.0	40	1200
7070030870	USB Bend	75.0		99.5	43.0	49.0	20	480
7070090870	USB Bend	90.0		110.0	50.0	56.0	20	320
7070040870	USB Bend	110.0		129.0	60.0	66.0	20	240
7070050870	USB Bend	125.0		142.0	67.0	73.0	10	160
7070060870	USB Bend	160.0		162.0	79.5	81.0	5	120

Branch

ULTRA SILENT™ Branch



Code	Item Description	α	DN1	DN2	Z1	Z2	Z3	L	Box pcs.	Pallet pcs.
7070600470	USEA Branch	45°	32.0	32.0	9.0	42.0	42.0	95.0	20	1200
7070611470	USEA Branch		40.0	40.0	11.0	52.0	52.0	111.0	20	800
7070621470	USEA Branch		50.0	40.0	13.0	64.0	57.0	129.0	20	600
7070622470	USEA Branch		50.0	50.0	13.0	64.0	64.0	129.0	20	600
7070632470	USEA Branch		75.0	50.0	18.0	95.0	100.0	170.0	20	320
7070633470	USEA Branch		75.0	75.0	18.0	95.0	95.0	170.0	20	320
7070691470	USEA Branch		90.0	40.0	33.0	113.0	89.0	206.0	10	120
7070692470	USEA Branch		90.0	50.0	33.0	113.0	89.0	206.0	10	120
7070699470	USEA Branch		90.0	90.0	33.0	113.0	112.5	206.0	10	160
7070641470	USEA Branch		110.0	40.0	25.0	137.0	103.0	231.0	10	120
7070642470	USEA Branch		110.0	50.0	25.0	137.0	103.0	231.0	10	120
7070643470	USEA Branch		110.0	75.0	25.0	137.0	116.0	231.0	10	120
7070649470	USEA Branch		110.0	90.0	25.0	137.0	137.0	231.0	10	96
7070644470	USEA Branch		110.0	110.0	25.0	137.0	137.0	231.0	10	96
7070654470	USEA Branch		125.0	110.0	18.0	145.0	149.0	238.0	10	96
7070655470	USEA Branch		125.0	125.0	31.0	152.0	152.0	258.0	8	72
7070664470	USEA Branch		160.0	110.0	39.0	159.0	169.0	284.0	5	60
7070666470	USEA Branch		160.0	160.0	39.0	194.0	194.0	319.0	5	60



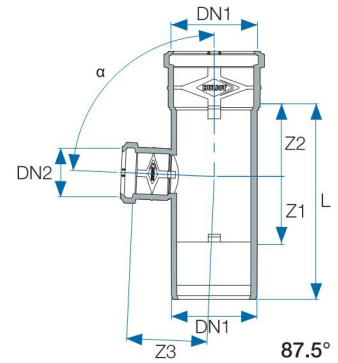


ULTRA SILENT™

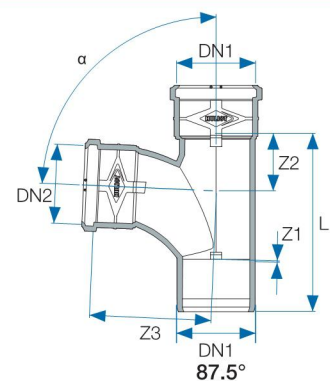
ULTRA SILENT+™

Branch

ULTRA SILENT™ Branch



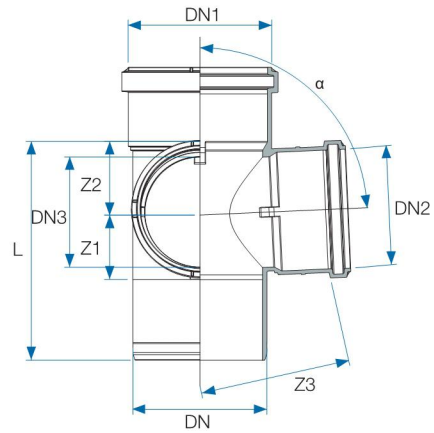
Code	Item Description	α	DN1	DN2	Z1	Z2	Z3	L	pcs.	pcs.
7070600870	USEA Branch	87.5°	32.0	32.0	90.0	42.0	42.0	0.65	20	1280
7070611870	USEA Branch		40.0	40.0	13.0	64.0	64.0	64.5	20	800
7070621870	USEA Branch		50.0	40.0	32.3	31.0	62.0	112.5	20	600
7070622870	USEA Branch		50.0	50.0	31.0	30.0	62.0	112.5	20	600
7070632870	USEA Branch		75.0	50.0	58.0	55.0	60.0	170.0	20	320
7070633870	USEA Branch		75.0	75.0	58.0	55.0	55.0	114.5	20	320
7070692870	USEA Branch		90.0	50.0	69.0	76.0	50.0	205.0	10	120
7070642870	USEA Branch		110.0	50.0	77.0	85.0	60.0	231.0	10	120
7070666870	USEA Branch		160.0	160.0	39.0	194.0	279.0	319.0	4	48



Code	Item Description	α	DN1	DN2	Z1	Z2	Z3	L	pcs.	pcs.
7070799870	US Swept Branch	87.5°	90.0	90.0	79.0	66.0	97.0	205.0	10	160
7070743870	US Swept Branch		110.0	75.0	82.0	60.0	97.0	211	10	120
7070749870	US Swept Branch		110.0	90.0	82.0	60.0	97.0	211.0	10	120
7070744870	US Swept Branch		110.0	110.0	82.0	60.0	97.0	211.0	10	120
7070754870	US Swept Branch		125.0	110.0	100.0	65.0	117.0	240	6	72
7070764870	US Swept Branch		160.0	110.0	96.0	84.0	117.0	266	4	48

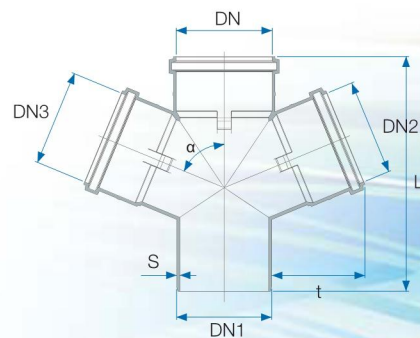
Branch

ULTRA SILENT™ Branch



Code	Item Description	α	DN1	DN2	Z1	Z2	Z3	L	d3	Box pcs.	Pallet pcs.
7071244870	US Corner Branch	87.5°	110.0	110.0	62.0	70.0	69.0	198.0	110	5	72
7071254870	US Corner Branch		125.0	110.0	62.0	64.0	69.0	202.0	110	5	60

ULTRA SILENT™ Double Branch



Code	Item Description	α	DN	DN1	DN2	DN3	t	S	L	Box pcs.	Pallet pcs.
7071042670	USDA Double Branch	67.5°	110.0	110.0	50.0	50.0	68.24	3.6	140.0	10	120
7071244670	USDA Double Branch		110.0	110.0	110.0	110.0	107.95	3.6	205.0	6	72



ULTRA SILENT™

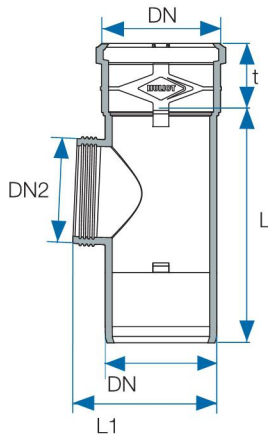
ULTRA SILENT+™

Branch

■ **ULTRA SILENT™** Inspection Pipe



Code	Item Description	Ø / DN	Ø / DN2	t	L	L1	Box pcs.	Pallet pcs.
7079120070	USRE Inspection Pipe	50.0	45.0	55.0	140.0	65.0	20	800
7079130070	USRE Inspection Pipe	75.0	45.0	71.0	140.0	98.0	20	800
7079190070	USRE Inspection Pipe	90.0	45.0	60.5	202.0	118.0	10	240
7079140070	USRE Inspection Pipe	110.0	97.0	64.0	231.0	142.0	10	120
7079150070	USRE Inspection Pipe	125.0	97.0	73.0	222.0	158.0	10	120
7079160070	USRE Inspection Pipe	160.0	97.0	84.0	236.0	192.0	5	60

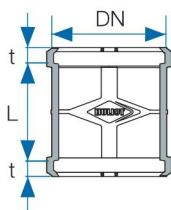


Sleeve

■ **ULTRA SILENT™** Sleeve

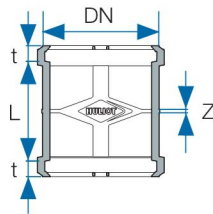


Code	Item Description	Ø / DN	t	L	Box pcs.	Pallet pcs.
7071710070	USU Sleeve	40.0	14.0	60.0	30	1440
7071720070	USU Sleeve	50.0	14.0	68.0	20	1200
7071730070	USU Sleeve	75.0	14.0	77.0	20	800
7071790070	USU Sleeve	90.0	14.0	85.0	20	480
7071740070	USU Sleeve	110.0	17.0	97.0	20	320
7071750070	USU Sleeve	125.0	16.8	118.6	10	240
7071760070	USU Sleeve	160.0	17.0	131.0	10	180



Double Socket

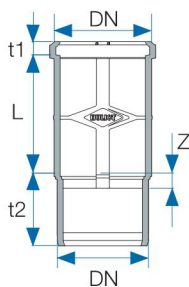
ULTRA SILENT™ Double Socket



Code	Item Description	Ø / DN	t	L	Z	Box pcs.	Pallet pcs.
7071700270	USMM Double Socket	32.0	14.0	64.0	2.0	30	1800
7071710270	USMM Double Socket	40.0	14.0	60.0	2.0	30	1440
7071720270	USMM Double Socket	50.0	14.0	68.0	2.0	20	1200
7071730270	USMM Double Socket	75.0	14.0	77.0	2.3	20	800
7071790270	USMM Double Socket	90.0	14.0	85.0	1.4	20	480
7071740270	USMM Double Socket	110.0	17.0	97.0	3.3	20	320
7071750270	USMM Double Socket	125.0	16.8	118.6	4.1	10	240
7071760270	USMM Double Socket	160.0	17.0	131.0	4.5	10	180

Long Socket

ULTRA SILENT™ Long Socket



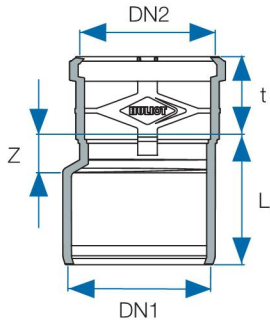
Code	Item Description	Ø/DN	t1	t2	L	Z	Box pcs.	Pallet pcs.
7072210070	USTL Long Socket	40.0	13.1	107.0	66.0	13.0	30	1800
7072220070	USTL Long Socket	50.0	13.1	99.0	61.0	7.0	20	1200
7072230070	USTL Long Socket	75.0	13.1	113.0	69.0	10.0	20	360
7072290070	USTL Long Socket	90.0	13.1	131.0	76.0	13.0	20	320
7072240070	USTL Long Socket	110.0	16.0	141.0	87.0	14.0	20	240
7072250070	USTL Long Socket	125.0	19.1	189.0	91.0	16.0	10	160
7072260070	USTL Long Socket	160.0	23.1	107.0	160.0	20.5	5	80



ULTRA SILENT™
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Reducer

ULTRA SILENT™ Reducer



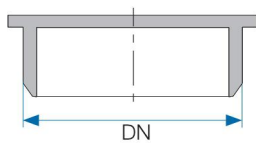
Code	Item Description	DN1	DN2	L	t	Z	Box pcs.	Pallet pcs.
7072110070	USR Reducer	40.0	32.0	48.0	42.0	14.0	30	3600
7072120070	USR Reducer	50.0	32.0	65.0	42.0	15.0	30	3600
7072121070	USR Reducer	50.0	40.0	64.0	42.0	15.0	30	1800
7072191070	USR Reducer	90.0	40.0	93.0	47.0	35.0	20	800
7072132070	USR Reducer	75.0	50.0	85.0	47.0	26.0	20	800
7072192070	USR Reducer	90.0	50.0	97.0	47.0	34.0	20	800
7072142070	USR Reducer	110.0	50.0	118.0	47.0	46.0	20	480
7072147070	USR Reducer	110.0	63.0	107.0	52.0	39.0	20	360
7072143070	USR Reducer	110.0	75.0	106.0	52.0	34.0	20	360
7072149070	USR Reducer	110.0	90.0	101.0	55.0	29.0	20	360
7072154070	USR Reducer	125.0	110.0	106.0	64.0	29.0	10	240
7072164070	USR Reducer	160.0	110.0	137.0	64.0	84.0	10	160
7072165070	USR Reducer	160.0	125.0	140.0	55.0	74.0	10	80

End Cap

ULTRA SILENT™ End Cap



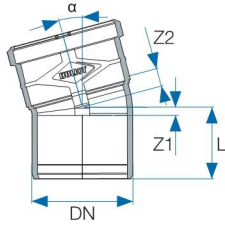
Internal



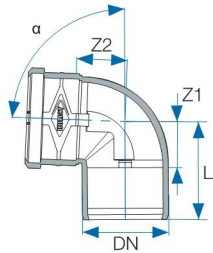
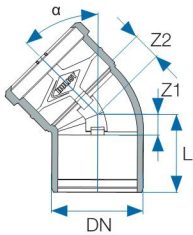
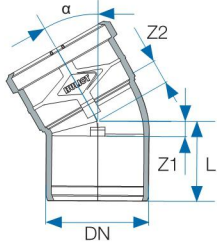
Code	Item Description	Ø / DN	L	Box pcs.	Pallet pcs.
7071610070	USM End Cap	40.0	40.0	40	4800
7071620070	USM End Cap	50.0	44.0	30	3600
7071630070	USM End Cap	75.0	51.0	20	2400
7071690070	USM End Cap	90.0	60.0	20	1600
7071640070	USM End Cap	110.0	62.0	20	800
7071650070	USM End Cap	125.0	75.0	10	480
7071660070	USM End Cap	160.0	86.0	10	320

Bend

ULTRA SILENT+™ Bend



Code	Item Description	α	$\text{Ø} / \text{DN}$	L	Z1	Z2	Box pcs.	Pallet pcs.
7870040170	USPB Bend	15°	110	78	6	19	20	240
7870040370	USPB Bend	30°	110	85	16	25.5	20	240
7870040470	USPB Bend	45°	110	94	25	33.5	20	240
7870050470	USPB Bend		125	104	29	38	10	160
7870060470	USPB Bend		160	116	36	44	5	120
7870040870	USPB Bend	87.5°	110	129	60	66	20	240



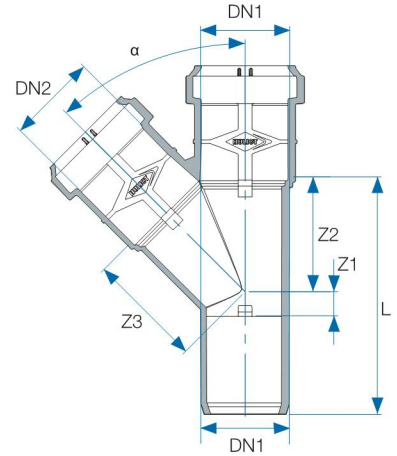


▶ **ULTRA SILENT™**

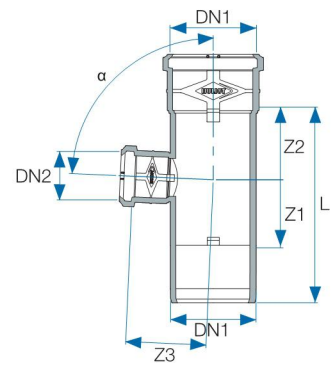
▶ **ULTRA SILENT+™**

Branch

▶ **ULTRA SILENT+™ Branch**



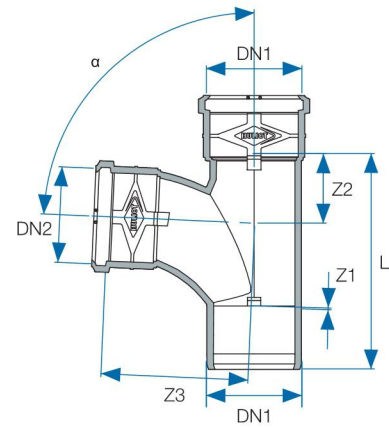
Code	Item Description	α	DN1	DN2	Z1	Z2	Z3	L	Box pcs.	Pallet pcs.
7870642470	USPEA Branch	45°	110	50	25	137	103	231	10	120
7870644470	USPEA Branch		110	110	25	137	137	231	10	96
7870654470	USPEA Branch		125	110	18	145	149	238	10	96



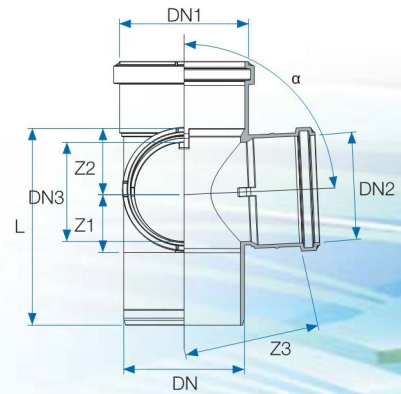
Code	Item Description	α	DN1	DN2	Z1	Z2	Z3	L	Box pcs.	Pallet pcs.
7870642870	USPEA Branch	87.5°	110	50	77	85	60	231	10	120

Branch

ULTRA SILENT+™ Branch



Code	Item Description	α	DN1	DN2	Z1	Z2	Z3	L	Box pcs.	Pallet pcs.
7870744870	USPEA Swept Branch	87.5°	110	110	82	60	97	211	10	120
7870754870	USPEA Swept Branch		125	110	100	65	117	240	6	72
7870764870	USPEA Swept Branch		160	110	96	84	117	266	4	48



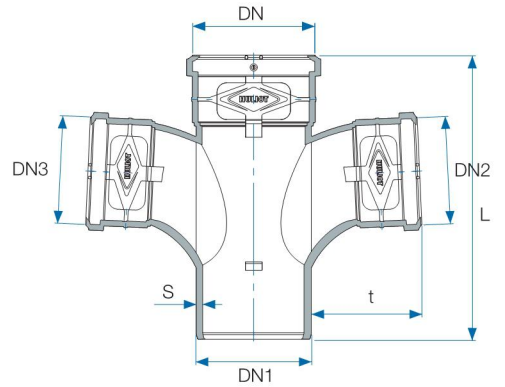
Code	Item Description	α	DN1	DN2	Z1	Z2	Z3	L	d3	Box pcs.	Pallet pcs.
7871244870	USP Corner Branch	87.5°	110	110	62	70	69	198	110	5	72
7871254870	USP Corner Branch		125	110	62	64	69	202	110	5	60



ULTRA SILENT™
ULTRA SILENT+™

Branch

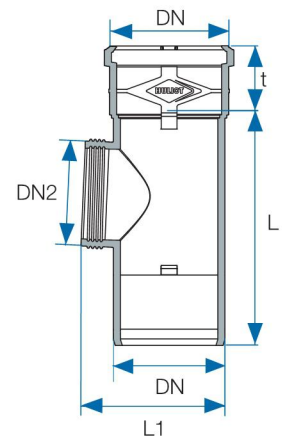
ULTRA SILENT+™ Double Branch



Code	Item Description	α	DN	DN1	DN2	DN3	t	S	L	pcs.	pcs.
7871042670	USPDA Double Branch	67.5°	110.0	110.0	50.0	50.0	68.24	3.6	140.0	10	120
7871044670	USPDA Double Branch		110.0	110.0	110.0	110.0	107.95	3.6	205.0	6	72

Branch

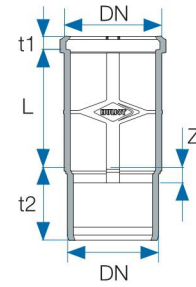
ULTRA SILENT+™ Inspection Pipe



Code	Item Description	DN1	DN2	t	L	L1	pcs.	pcs.
7879140070	USRE Inspection Pipe	110	97	64	231	142	10	120
7879150070	USRE Inspection Pipe	125	97	73	222	158	10	120
7879160070	USRE Inspection Pipe	160	97	84	236	192	5	60

Long Socket

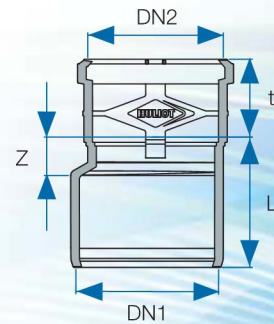
ULTRA SILENT+™ Long Socket



Code	Item Description	DN	t1	t2	L	Z	Box pcs.	Pallet pcs.
7872240070	USTL Long Socket	110	16	141	87	14	20	240

Reducer

ULTRA SILENT+™ Reducer



Code	Item Description	DN1	DN2	L	t	Z	Box pcs.	Pallet pcs.
7872154070	USR Reducer	125	110	106	64	29	10	240
7872164070	USR Reducer	160	110	137	64	84	10	160

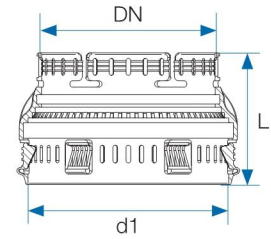


▶ **ULTRA SILENT™**

▶ **ULTRA SILENT+™**

LOCKSEAL™

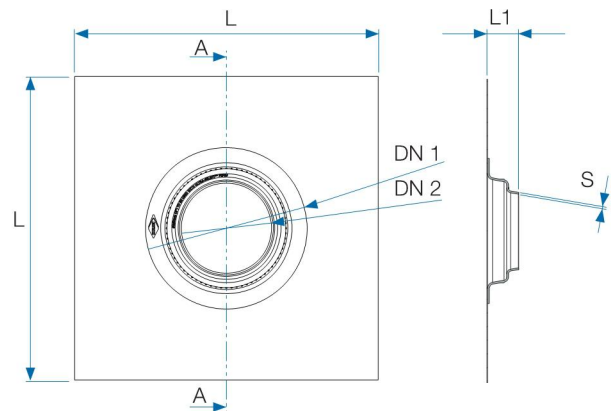
■ ◀ LOCKSEAL™



Code	Item Description	DN	d1	L	pcs.	pcs.
707234000	LS Ø110	110	130.0	85.0	30	480
707235000	LS Ø125	125	147.0	97.0	30	480
707236000	LS Ø160	160	179.0	120.0	8	192

ULTRASEAL™

■ ◀ ULTRASEAL™





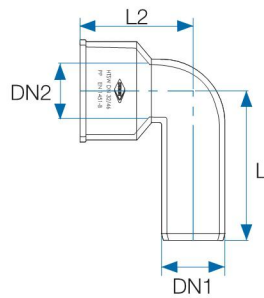
Code	Item Description	DN1	DN2	L	A	S	L1	pcs.	pcs.
7981100000	Ultra Seal 110	220	102	340	340	3	52	5	30
7981250000	Ultra Seal 125	239	121	500	500	3	52	5	20
7981600000	Ultra Seal 160	266	149	500	500	3	52	5	20

Technical Bend

ULTRA SILENT™ Technical Bend



Code	Item Description	DN1	DN2	L1	L2	 pcs.	 pcs.
7074010970	USSW Technical Bend	32.0	46.0	76.0	58.0	20	2400
7074021970	USSW Technical Bend	40.0	50.0	82.0	56.0	20	1200
7074011970	USSW Technical Bend	40.0	46.0	76.0	56.0	20	2400
7074022970	USSW Technical Bend	50.0	50.0	82.0	60.0	20	1200
7074021971	USSW Technical Bend	40.0	50.0	140.0	56.0	20	1200
7074011971	USSW Technical Bend	40.0	46.0	140.0	57.0	20	1200



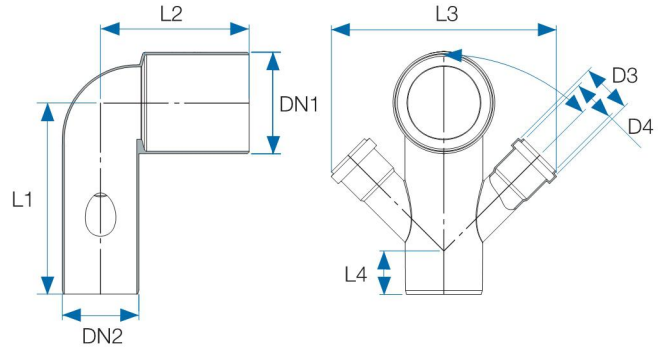


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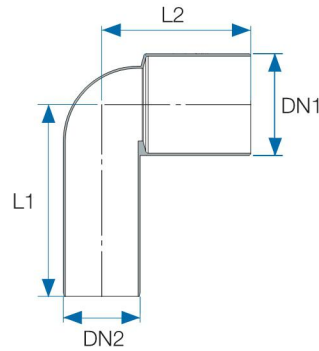
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WC Bend

ULTRA SILENT™ WC Bend



Code	Item Description	DN1	DN2	L1	L2	Z	L3	L4	D3	D4	Box pcs.	Pallet pcs.
7154040490	USSBL WC Bend Ø110+Double Ø40/45°	90.0	40.0	225.0	185.0	60.0	250.9	50.9	50.1	41.1	8	96
7155050490	USSBL WC Bend Ø110+Double Ø50/45°	110.0	50.0	225.0	185.0	60.0	264.0	50.9	60.1	51.1	8	96



Code	Item Description	DN	L1	L2	Z	Box pcs.	Pallet pcs.
7195000070	USSBL Long WC Bend	90.0	175.0	225.0	60.0	10	120
7155000070	USSBL Long WC Bend	110.0	185.0	226.0	60.0	10	120



4. Sound Insulation

4.1. Why soundproof insulation:

The human aspiration to improve quality of life has led to the treatment all types of pollution, most of which are created by humanity itself. Noise is a treatable pollution in almost every living environment, particularly noise generated by humankind.

Disruptive noises in buildings have triggered the pursuit of the minimization of that noise pollution. People should be protected from disturbing airborne and structure-borne sound. Architectural sound protection measures are most relevant in buildings where people spend relatively long time periods (e.g. residences, offices, etc). Disturbing noise is mainly caused by sources within the construction itself (structure-borne noise), generally deriving from building engineering systems, that either directly or indirectly give rise to noise.

4.2. Noise sources and sound levels:

DIN 4109: **Sound insulation in buildings**, specifies the requirements for the sound insulation of rooms requiring protection against noise and the permissible noise levels in rooms requiring protection against noise in residential and non-residential buildings. Compliance with these requirements is necessary in order to achieve the stated noise protection goals. The requirements of DIN 4109 apply to the protection against noise emanating from other rooms (e.g. neighboring apartments) which arises during normal use, noise emanating from building services and from commercial and industrial businesses in the same building or in structurally connected buildings, outdoor noise, e.g. traffic noise and noise from commercial and industrial businesses that are not structurally connected with rooms requiring noise protection (see table 4.2.1). The requirements form the basis for the design of new buildings and alterations to existing ones. The standard only applies to refurbishment work if the noise protection measures are technically feasible.

4.2.1.

Table of sound levels <i>L</i> (loudness) and corresponding sound pressure and sound intensity		
Sound Sources (Noise) Examples with distance	Sound Pressure Level L_p dB SPL	Sound Pressure W/m^2 Sound energy quantity
Jet aircraft, 50 m away	140	100
Chainsaw, 1 m distance	110	0.1
Disco, 1 m from speaker	100	0.01
Kerbside of busy road, 5 m	80	0.0001
Vacuum cleaner, distance 1 m	70	0.00001
Average home	50	0.0000001
Quiet library	40	0.00000001
Quiet bedroom at night	30	0.000000001
◀ ULTRA SILENT™ system	17	
◀ ULTRA SILENT+™ system	13	
Rustling leaves in the distance	10	0.00000000001
Threshold of hearing	0	0.0000000000001

4.3. Consideration of noise insulation in the planning phase:

For the best acoustic insulation, several topics must be considered during the planning phase of building construction and the waste water system:

4.3.1. The location and orientation of the building.

4.3.2. The design of the residence, the location and orientation of the rooms, particularly in multi-floor buildings.

4.3.3. Construction materials: walls, partitions, ceiling, doors and windows, etc. with attention to the acoustic insulation performances of each material.



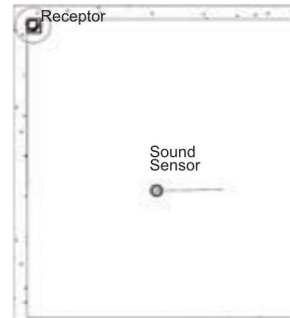
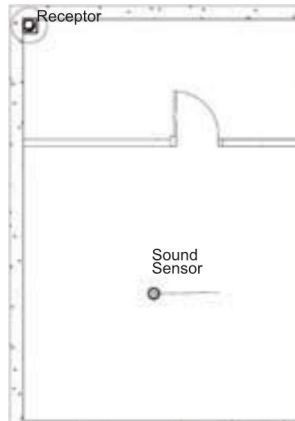
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4.3.4. Location of sanitary outlets and waste water installation in relation to living and sleeping areas. E.g. bedroom with attached bathroom separated by a partition, with the waste water receptor located on the back wall (Figure 1) or living room with waste water receptor within the room (Figure 2).

Figure 1: Receptor in the bathroom back wall

Figure 2: Receptor in the bedroom/living room



4.3.5. Select the waste water system siding, covering and coating materials required to reach the desired acoustic insulation, considering the receptor location, the acoustic performances of the waste water system and the estimated flow rate.

4.3.5.1. Thermoplastic foaming sheet (Figure 3) with acoustic performance of:

Hz	125	250	500	1k	2k	4k	8k
Insertion Loss Dw	-1.4	-0.3	4.1	15.1	22.7	29.2	31.8

Figure 3:

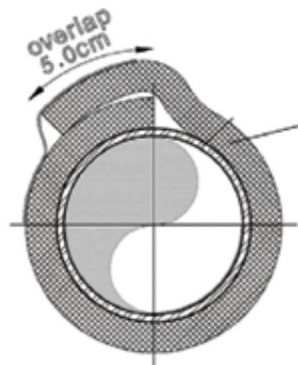
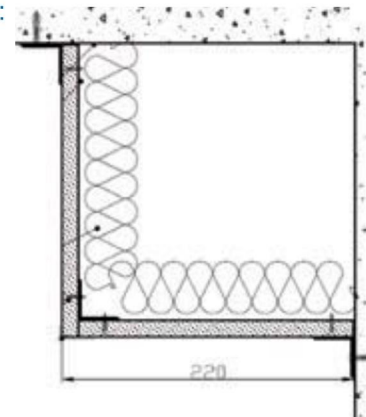


Figure 4:



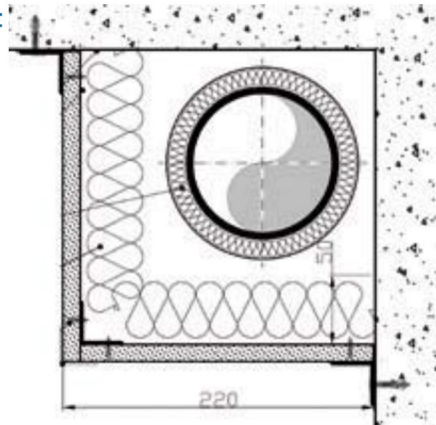
4.3.5.2. Gypsum (plaster board) wall (12.5mm/0.5") with sound absorbing material, e.g. mineral wool, (Figure 4) with acoustic performance (according to ISO 15665) of:

Hz	125	250	500	1k	2k	4k	8k
Insertion Loss Dw	2	1	10	24	25	30	46

4.3.5.3. Combination of gypsum wall (12.5mm/0.5") with sound absorbing material (e.g. mineral wool) and thermoplastic foaming sheet (Figure 5) with acoustic performance (according to ISO 15665) of:

Hz	125	250	500	1k	2k	4k	8k
Insertion Loss Dw	0.6	0.7	14.1	39.1	47.7	59.2	77.8

Figure 5:



4.4. The soundproof insulation of $\langle \rangle$ ULTRA SILENT™ and $\langle \rangle$ ULTRA SILENT+™

The system's acoustic performance was tested at the Fraunhofer Laboratory (Germany) in accordance with the DIN 4109 and the EN 14366 standards (see 4.4.1-3). Accordingly, several scenarios were tested and calculated (according to ISO 15665 and ISO 10140-2) (see 4.4.4-5).

4.4.1. The $\langle \rangle$ ULTRA SILENT™ pipe system assembly which was tested at the Fraunhofer Laboratory is represented in figure 6 with pipes and fittings with diameter of 110mm, with pipe clamps of several types (e.g. Müpro DAMMGLUST yellow, Bismat 2000 etc).

Figure 6:

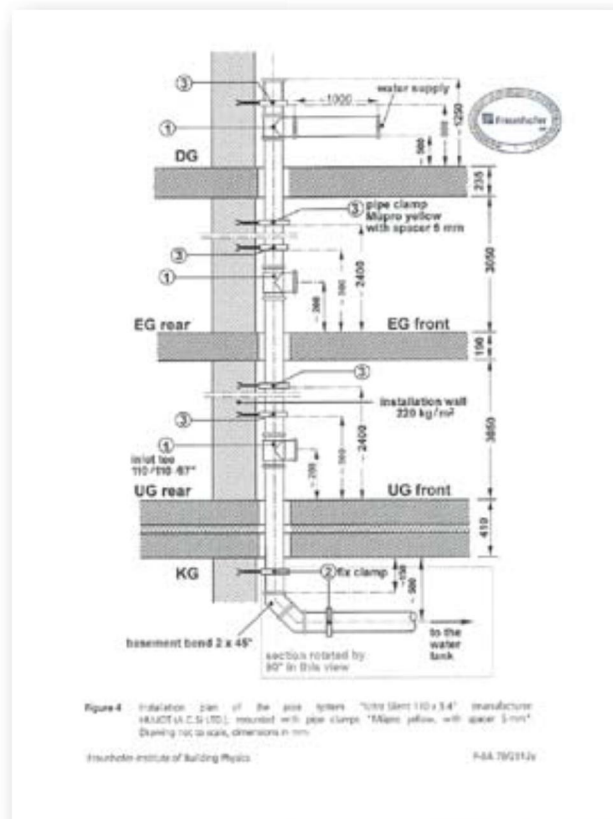


Figure 6: Installation plan of the pipe system "Ultra Silent 110 x 3.4" manufacturer HAASOT (A.C.S. LTD.), insulated with pipe clamps "Müpro yellow" with spacer 5 mm. Drawing not to scale, dimensions in mm.

Fraunhofer Institute of Building Physics

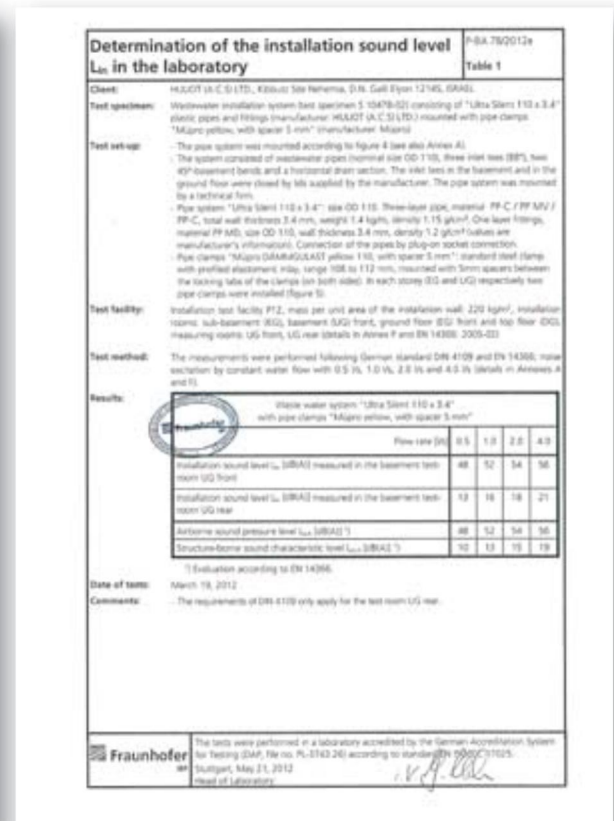
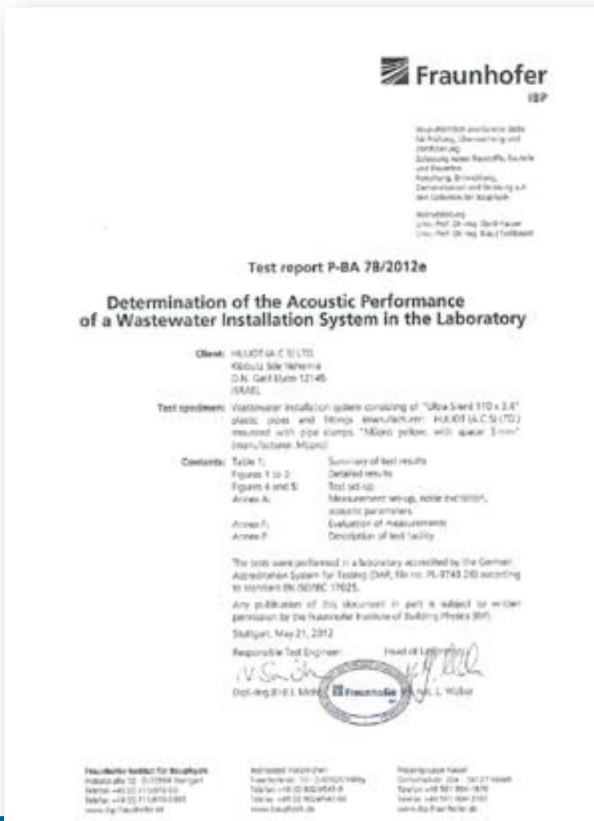
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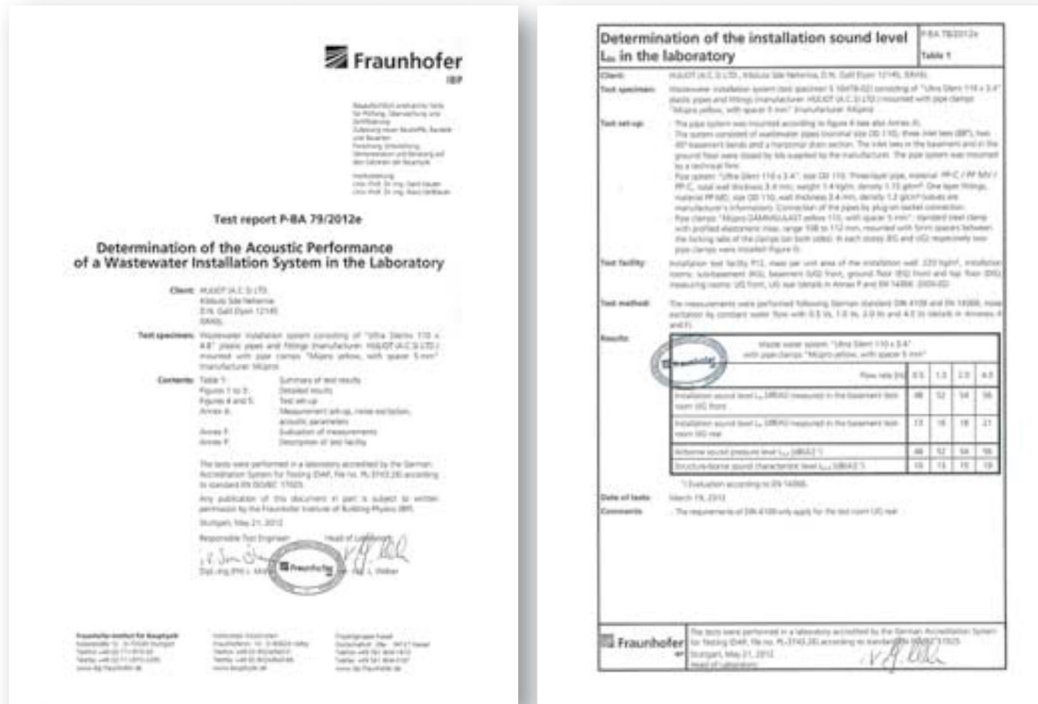
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4.4.2. The results of the Ultra Silent™ pipe system's noise reduction performance at various continuous water flow rates (0.5 l/s, 1.0 l/s, 2.0 l/s and 4.0 l/s) are detailed in the table below. The different measures represent readings taken of the sound level measured in the basement test room UG at the front and rear of the wall (according to standard EN ISO/IEC 17025); the airborne sound pressure and the characteristic structure-borne sound levels measured (according DIN EN 14366), as follows:

 ULTRA SILENT™ With Müpro DAMMGLUST Yellow clamps TR; P-BA 78/2012e	Flow rate [l/s]	0.5	1.0	2.0	4.0
	UG front sound level [dB(A)] (EN ISO/IEC 17025)	48	52	54	56
UG rear sound level [dB(A)] (EN ISO/IEC 17025)	13	16	18	21	
Airborne sound pressure level [dB(A)] (DIN EN 14366)	48	52	54	56	
Structure borne sound level [dB(A)] (DIN EN 14366)	10	13	15	19	
 ULTRA SILENT™ With BISMAT 2000 clamps TR; P-BA 77/2012e	UG front sound level [dB(A)] (EN ISO/IEC 17025)	48	51	54	55
UG rear sound level [dB(A)] (EN ISO/IEC 17025)	13	16	19	23	
Airborne sound pressure level [dB(A)] (DIN EN 14366)	48	51	54	55	
Structure borne sound level [dB(A)] (DIN EN 14366)	10	13	17	21	
 ULTRA SILENT+™ With Müpro DAMMGLUST Yellow clamps TR; P-BA 79/2012e	UG front sound level [dB(A)] (EN ISO/IEC 17025)	46	48	50	53
UG rear sound level [dB(A)] (EN ISO/IEC 17025)	10	13	15	18	
Airborne sound pressure level [dB(A)] (DIN EN 14366)	46	48	50	53	
Structure borne sound level [dB(A)] (DIN EN 14366)	<10	11	13	15	
 ULTRA SILENT+™ With BISMAT 2000 clamps TR; P-BA 80/2012e	UG front sound level [dB(A)] (EN ISO/IEC 17025)	42	47	49	52
UG rear sound level [dB(A)] (EN ISO/IEC 17025)	<10	13	18	20	
Airborne sound pressure level [dB(A)] (DIN EN 14366)	42	47	49	52	
Structure borne sound level [dB(A)] (DIN EN 14366)	<10	11	15	18	



4.4.3. The Fraunhofer test reports:



4.4.4. The first scenario is based on:

- 4.4.4.1. Bedroom area of 12m² including 4m² bathroom with partition and door, with the waste water receptor located at the bathroom's far corner, as appears in chapter 4.3.4 Figure 1.
- 4.4.4.2. Huliot ◀ **ULTRA SILENT™** Ø110 receptor with 2 l/s water flow rate.
- 4.4.4.3. The receptor is covered with gypsum wallboard (12.5mm/0.5") lined with sound absorbing material (e.g. mineral wool) as appears in chapter 4.3.5.2, Figure 4.
- 4.4.4.4. The calculated sound measurement results appear in the table below:

[Hz]	Noise measured on the pipe [dB(A)]	Noise reduction by the gypsum cover	Noise reduction by the door
100	19	1.8	26.5
125	20.5	1.7	17.5
160	22	2.1	18.3
200	22.5	0.8	14.5
250	25	0.7	15.9
315	27.5	0.1	12.7
400	34	6.3	15.0
500	35.5	13	16.4
630	37	14.3	16.6
800	37.5	24.2	15.9
1000	37.5	23	16.1
1250	37	25	15.7
1600	39.5	23.5	16.9
2000	42	26.1	15.5
2500	44	27	12.4
3150	45	26.5	10.7
4000	46.5	31	11.6
5000	48	39.4	13.6

4.4.4.5. The sound level measured [dB (A)] is LAF max = 19.4 dB



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4.4.5. The second scenario is based on:

4.4.5.1. Bedroom area of 12m², with the waste water receptor located at the corner of the room as appears in chapter 4.3.4 Figure 2.

4.4.5.2. Huliot  **ULTRA SILENT™** Ø110 receptor with 2 l/s water flow rate.

4.4.5.3. The receptor is covered with a combination of gypsum wallboard (12.5mm/0.5") lined with sound absorbing material (e.g. mineral wool) and thermoplastic foaming sheet, as appears in chapter 4.3.5.3 Figure 5.

4.4.5.4. The calculated sound measurement results appear in the table below:

[Hz]	Noise measured on the pipe [dB(A)]	Noise reduction by the gypsum cover	Noise reduction by the door
100	19	-0.21	0.48
125	20.5	-0.99	3.23
160	22	-2.69	4.46
200	22.5	-1.16	5.26
250	25	-0.12	5.64
315	27.5	0.42	6.73
400	34	1.56	6.24
500	35.5	4.53	5.21
630	37	9.60	5.85
800	37.5	12.49	6.60
1000	37.5	16.19	6.54
1250	37	18.68	6.93
1600	39.5	20.88	6.29
2000	42	23.07	6.24
2500	44	25.19	7.21
3150	45	28.27	7.28
4000	46.5	28.95	7.21
5000	48	30.66	7.21

4.4.5.5. The sound level measured [dB (A)] is LAF max = 27.2 dB

5. Transportation, storage and installation

5.1. Loading, transport and unloading

- 5.1.1. It is recommended to handle the pipes and fittings in their original sales packaging to protect them and prevent damage during loading and transporting.
- 5.1.2. Load and transport pipes in straight, horizontal position with the full length supported (note that the sockets are unencumbered all around), avoid extreme pressure on the pipes (straps or other heavy materials).
- 5.1.3. Unload and handle pipes carefully and lay them in a straight, horizontal position (pay attention to positioning of the sockets), on a smooth surface.

Figure 1



Figure 2



- 5.1.4. Short pipes (150/250 mm) and fittings should be packed in carton boxes. Protect them from rain and moisture and store them in a dry place.

5.2. Storage and protection

- 5.2.1. It is recommended to store the pipes and fittings in their original sales packaging and to protect them from damage.
- 5.2.2. **ULTRA SILENT**™ pipes are UV protected and can be stored outdoors for up to 3 years (depending on geographical location). The gasket material can withstand outdoor storage for up to 3 years and after this period must be replaced before installing.
- 5.2.3. When using mechanical tools and machines (forklifts, cranes etc.) extra caution should be taken to prevent damage to the products.
- 5.2.4. Optical defects (external scratches and pigment changes etc.) have no influence on the quality and/or functionality of the system.

5.3. Cutting to length and assembly preparations

- 5.3.1. Pipes are sold in various lengths with one or two sockets and gaskets and with plain ends pre-beveled. If cutting to length is needed, use only proper cutting tools for plastic pipes (manual or mechanical) and work according to all safety rules, using proper protective equipment.
- 5.3.2. It is recommend to bevel the cut pipe end for easier installation (angle of approximately 15° with bevel length of 5 mm). Removing chips, shavings and sawdust is necessary before installing.



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5.4. Push-fit connection method

- 5.4.1. Check the position and integrity of the lip seal in the socket gasket slot. Clean the seal and the socket.
- 5.4.2. Clean the plain pipe end from sawdust and scraps - it's recommended to apply a thin layer of lubricant around the plain pipe end.
- 5.4.3. Push the plain end into the socket while slightly turning until the end of the socket sleeve, then pull the pipe back approximately 10 mm (Figure 1).

Figure 1

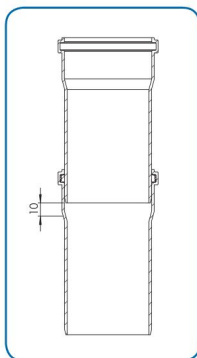
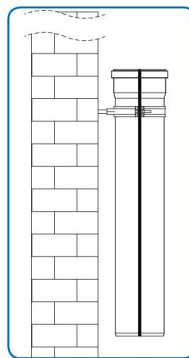


Figure 2

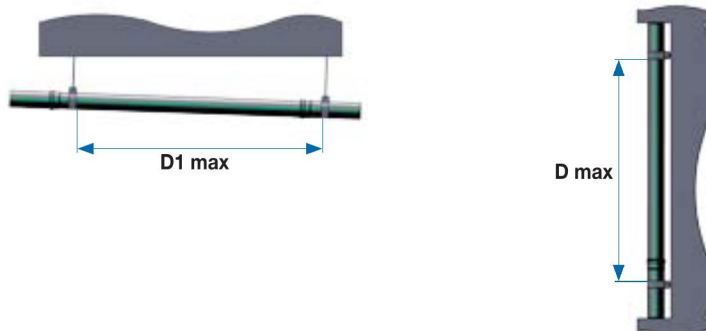


5.5. Mounting with clamps

- 5.5.1. For mounting **ULTRA SILENT™** system, use steel brackets with rubber inserts approved for acoustic insulation systems.
- 5.5.2. Where pipes are installed vertically, every pipe must be fastened with brackets directly under the socket, to prevent pipe movement (Figure 2).
- 5.5.3. Maximum distances between the brackets for horizontal and vertical installation, as below. (See table and Figure 3):

Pipe DN (external diameter)	Max. bracket distance for horizontal installation - D1 max	Max. bracket distance for vertical installation - D max
Ø 50	0.80	1.50
Ø 75	1.10	2.00
Ø 90	1.40	2.00
Ø 110	2.00	2.00
Ø 125	2.00	2.00
Ø 160	2.40	2.00

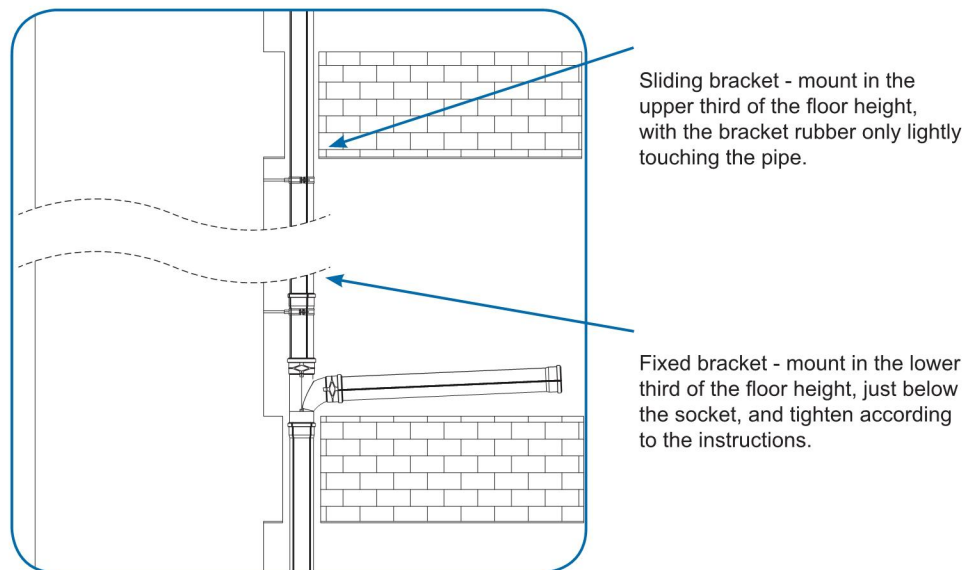
Figure 3



5.6. Installation instructions

- 5.6.1. For vertical wall mounting, 2 brackets will be assembled on every floor, taking into account the specified maximum distance between brackets as per table in 5.5.3.
- 5.6.2. Fixed bracket: The first of the two brackets on each floor should be installed in the lower third of the floor height, just below the pipe or fitting socket, and must be tightened according to the instructions in 5.6.4, below.
- 5.6.3. Sliding bracket: The second of the two brackets should be mounted in the upper third of the floor height, with the bracket rubber only lightly touching the pipe to enable linear expansion of the pipe system (Figure 4).

Figure 4

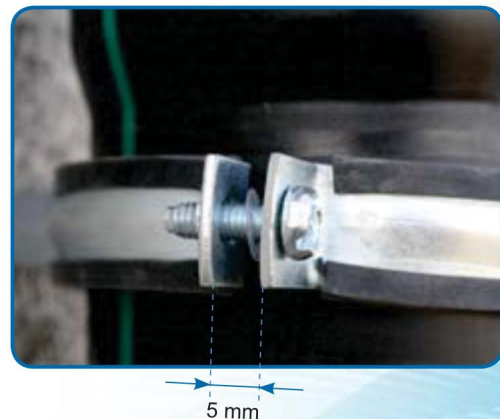


- 5.6.4. Bracket tightening: In order to prevent structure-borne noise transmission, use only recommended brackets with proper dimensions and leave space of 5 mm in the bracket aperture when screwing closed (Figures 5-6).

Figure 5 - **Incorrect tightening:**



Figure 6 - **Correct tightening:**





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5.7. Installing **ULTRA SILENT™** system through ceilings, floors and walls

- 5.7.1. It is important in acoustic insulated systems to avoid contact between system components and rigid elements, such as walls, ceilings, floors etc., in order to prevent structure-borne noise transmission.
- 5.7.2. For pipes traversing walls and ceilings, a space of at least 30 mm should be maintained between the pipe and any rigid material.
- 5.7.3. If the spaces around the pipes traversing walls and floors must be filled, use only soft construction materials such as foam or glass fiber (Figure 7).
- 5.7.4. For improved hydraulic flow and reduced noise, 87° bends are not recommended to be used for changing flow direction from vertical to horizontal. It is preferable to use two 45° bends, with 250 mm minimum length of connecting pipe between them (Figure 8).

Figure 7

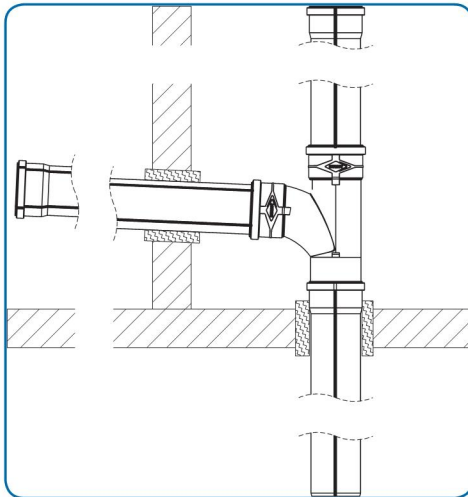
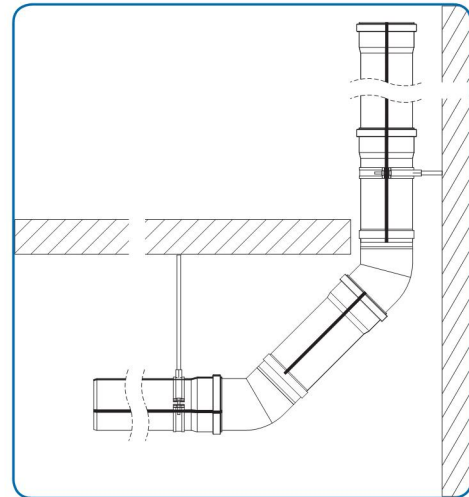
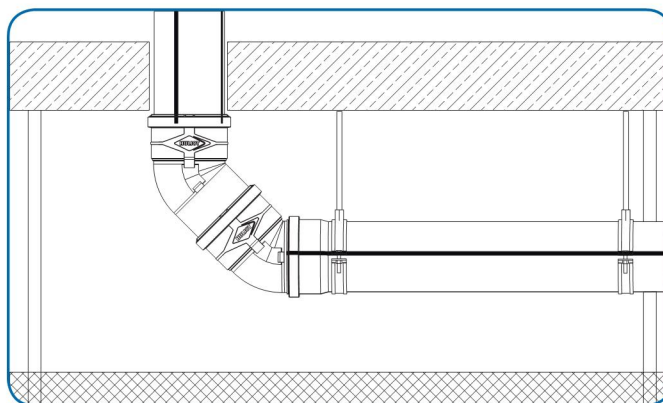


Figure 8



- 5.7.5. When installing pipes in open spaces (such as basements, parking garages etc.), above suspended ceilings or behind screen walls, prevent any contact of other material (such as suspended ceiling, electrical, water, ventilation and air conditioning systems etc.) with the pipes (Figure 9).

Figure 9



5.8. Repairs and irregular installation

- 5.8.1. To add a branch (USEA) to an existing pipe with long socket (USTL) and sleeve (USU), insert the long socket plain end into the branch socket, cut the equivalent of the socket length from the existing pipe piece. Insert the long socket into the upper pipe all the way. Fix the sleeve on the lower pipe and slide the branch and long socket down into the sleeve (Figure 10). An alternative possibility is to use two sleeves and plain pipe (the minimum plain pipe length must be more than double that of the external pipe diameter DN, as in Figure 11).
- 5.8.2. To fix punctured or damaged pipe, the same methods can apply with one socket pipe (USEM) instead of the branch and for adding inspection pipe (USRE) or double branch (USDA).

Figure 10

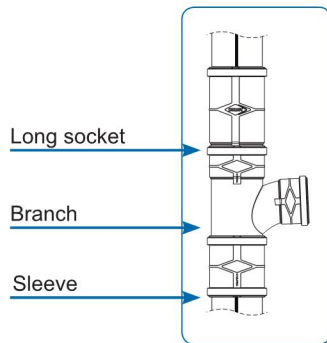
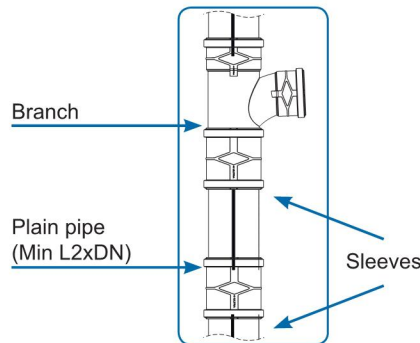
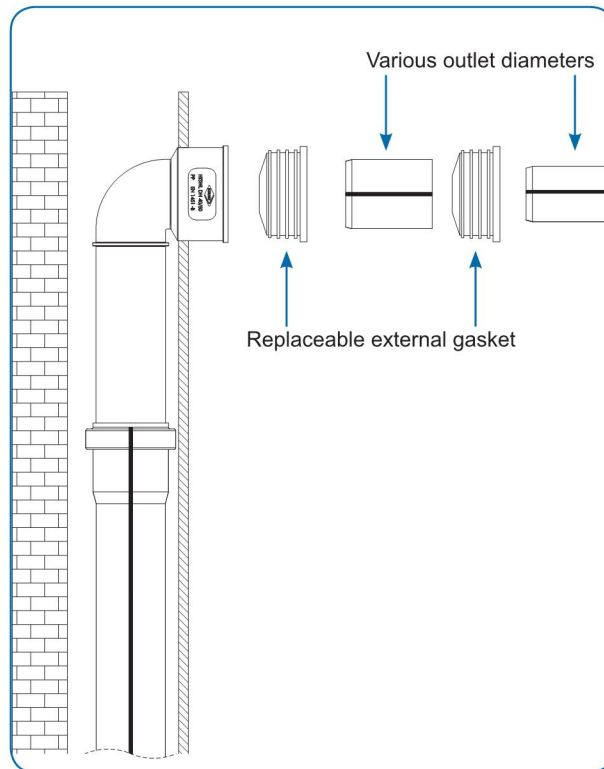


Figure 11



- 5.8.3. Installing technical bends/siphon connectors can facilitate connection to various types of siphons or drainage outlets (air conditioning condensation water, washing machine etc.), by replacing only the external gasket (provided separately). See Figure 12.

Figure 12





5.9. ◀ LOCKSEAL™ and installing in concrete

5.9.1. ◀ LOCKSEAL™ Applications

- Installing pipes in concrete (locking): Use of ◀ LOCKSEAL™ prevents the concrete lift force and vibrations from separating the pipes.
- Installing pipes in concrete (sealing): Use of ◀ LOCKSEAL™ prevents the concrete slurry from infiltrating to the gasket and negatively impacting sealing.
- Installing pipes with long-span suspension: Use of ◀ LOCKSEAL™ creates a firmer connection between the pipes providing additional safety for the system, especially for horizontal configuration in open spaces with vehicle traffic (e.g. parking garages, warehouses, plants, airports etc.)



5.9.2. ◀ LOCKSEAL™ Advantages

- Easy and fast assembly
- Can replace welded connection methods
- Increased safety margin
- Tool-free installation

5.9.3. Installing ◀ ULTRA SILENT™ system in concrete

The ◀ ULTRA SILENT™ system can be installed in concrete walls, columns and floors, when carried out in strict accordance with the installation instructions, as they appear in this chapter. It is essential to insulate the entire system, inclusive of all components, with suitable noise reduction materials that prevent any direct contact between rigid construction elements and the ◀ ULTRA SILENT™ system.

5.9.4. \leftrightarrow LOCKSEAL™ Assembly instructions

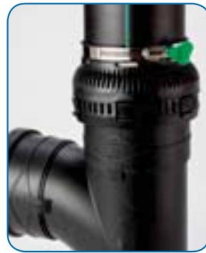
- Push the wide opening of the \leftrightarrow LOCKSEAL™ onto the fitting or pipe socket and push lightly but firmly until the locking grips pass the socket and you hear a "click".
- Insert the plain end of the fitting or pipe into the socket through the narrow part of the \leftrightarrow LOCKSEAL™ (normal push-fit connection method) and tighten the metal clamp by turning the key all the way until it stops.
- For disassembling - open the clamp and pull the pipe, while simultaneously pulling the \leftrightarrow LOCKSEAL™ from the socket and with flat end tool (e.g. screwdriver). Release the grips one at a time, until dismantled.



1
Assemble the narrow part of the Lockseal™ socket to the extremity of the pipe or the socket.



4
Tighten the metal band until the key is released.



2
Insert the plain end of the fitting or pipe into the socket (normal push-fit connection method).



5
For disassembly, release the band and open the clips to pull off the Lockseal™.



3
Insert the plain end of the fitting or pipe into the socket (normal push-fit connection method).



6
To facilitate the assembly, it is recommended to use Huliote's pipe lubricant.

- Lockseal™ is designed for use with PP pipes whose resilience to hydrostatic pressure and annular strength are suitable for concrete casting. **Ultra Silent™ is currently the only piping system that meets these conditions.**



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6. Fire safety

6.1. Fire behavior

The ◀ **ULTRA SILENT™** system has been tested and certified according to the most stringent European standards of building materials fire safety:

6.1.1. EN 13501-1:2009 by IBS and classified D - s2, d2.

This standard defines classes of burning behavior for building materials, and specifies the requirements and test methods for each class. The classification of reaction to fire and valid practical range of application is contained in the representational classification report.

6.1.2. DIN 4102-1 by SKZ and classified B2.

This standard defines classes of fire behavior for building materials, and specifies the requirements and test methods for each class. The test method measures the ignitability of building products when exposed to a small flame.

6.2. Fire collars

◀ **ULTRA SILENT™** and PP-ML pipes can be protected with ◀ **ESHCOLLAR™**, fire stopping collars for plastic pipes made from stainless steel with an inlaid graphite-based intumescent.

◀ **ESHCOLLAR™** has a starting temperature of approximately 150°C, with highly efficient performance and non-ageing certification.

6.2.1. ◀ **ESHCOLLAR™** Standards and Approvals:

- Tested and approved according to EN 1366.
- ◀ **ESHCOLLAR™** tested and approved with ◀ **ULTRA SILENT™** and PP-ML pipes according to EN 13501.

6.2.2. ◀ **ESHCOLLAR™** advantages:

- Collar housing made of stainless steel.
- Tested and approved with U/U (open/open) positioning and EI 120.
- Tested and approved with noise insulation materials in wall and ceiling, with most common construction and partition types.
- Optional assembly with contact (no gaps) between collars.
- Tested and approved with omega (Ω) installation method.

6.2.3. ◀ **ESHCOLLAR™** standard sizes:

- V30 - for ◀ **ULTRA SILENT™** and PP-ML pipes with diameter up to Ø135 mm
- V60 - for ◀ **ULTRA SILENT™** and PP-ML pipes with diameter up to Ø250 mm



◀ **ESHCOLLAR™** V30



◀ **ESHCOLLAR™** V60

7. Appendices

ZERTIFIKAT

Certificate



SKZ - TeConA GmbH awards the following company

HULIOT A.C.S. Ltd.
Kibbutz Sde Nehemia
12145 D.N. GALIL ELYON
ISRAEL

Production plant: HULIOT A.C.S. Ltd, IL-12145 D.N. GALIL ELYON

the right to use the SKZ - testing and inspection mark



A 624

for the following plastic products

Waste water pipes and –fittings, group 1 and 2
Pipes made of polypropylene PP/PP-MD/PP
Fittings made of polypropylene PP-MD
within the building structure

Trade name: **ULTRA SILENT**

SKZ specification for tests and inspection **HR 3.43**

Users of the SKZ - mark are obliged to observe the required regulations for the production and testing of these products.

Date of initial certification: ---
 Date of expiry: 19 February 2018



Würzburg, 20 February 2013

The original language of this certificate is German. In case of doubt, the German version is obligatory.



Das Kunststoff Zentrum

Test report no.: 99804/12

Customer: HULIOT A.C.S. Ltd.
Kibbutz Sde Nehemia
12145 D.N. Galil Elyon
ISRAEL

Order: Initial type test on a push fit system "ULTRA SILENT", pipes made of PP/PP-MD/PP, fittings made of PP-MD, for soil and waste discharge (see drawings) (see drawings), specification HR 3.43, for dimension groups 1 and 2, according to SKZ-Specification for Test and Inspection HR 3.43 (November 2011).

Trade name: "ULTRA SILENT"

Assessment of test results: see item 7

Letter of: 2012-09-19


Receipt of samples: see item 2

Test period: from 2012-12-03 to 2013-01-16

This test report comprises 15 pages.

Würzburg, 2013-01-17

Dr.-Ing. Mas Samir (author)



Page: 3 of 15
Test report no.: 99804/12


Order

By its letter of 19 October 2012 the company HULIOT A.C.S. Ltd., Kibbutz Sde Nehemia, 12145 D.N. Galil Elyon, ISRAEL, instructed SKZ - TeConA GmbH to execute an initial type test on a push fit system "ULTRA SILENT", pipes made of PP/PP-MD/PP, fittings made of PP-MD, for soil and waste discharge (low and high temperature), application area "B0", for dimension groups 1 and 2, according to SKZ-Specification for Test and Inspection HR 3.43 (November 2011).

2 Test material

On 30 November and 12 December 2012 SKZ - TeConA GmbH received following samples for testing:

Sample no.	DN	Wall thickness [mm]	Quantity	Description
Pipe with socket				
1	32	1.8	6 x 1.0 m	made of PP/PP-MD/PP
2	40	1.8	6 x 1.0 m	
3	50	1.8	6 x 1.0 m	
4	50	1.8	6 x 2.0 m	
5	75	2.4	6 x 1.0 m	
6	50	2.8	6 x 1.0 m	
7	110	3.4	6 x 1.0 m	
8	110	3.4	6 x 2.0 m	
9	125	3.9	6 x 1.0 m	
10	100	4.0	6 x 1.0 m	
Pipe without socket				
11	32	1.8	12 x 1.0 m	made of "basis polymer" (continued)
12	50	1.8	12 x 0.3 m	
13	50	1.8	50 x 0.2 m	
14	50	1.8	6 x 1.0 m	made of PP/PP-MD/PP
15	75	2.4	12 x 0.3 m	
16	75	2.4	50 x 0.2 m	



Page: 13 of 15
Test report no.: 99804/12

4.13 Airtightness

Sample no.	Air pressure [bar]	Test period [min]		Remark
		Mean value	Set value	
1, 2, 3, 4, 7, 8, 10	0.1	> 5	± 5	no leakage
Maximal angular deflection at 0°, 90°, 180° and 270°				
1, 2, 3, 4, 7, 8, 10	0.1	> 1	± 1	no leakage

4.14 Elevated temperature cycling

Sample no.	Sample	Cycles	Sagging [mm]		Remarks
			Actual value	Set value	
4	pipe	1500	2.0	± 2.0	no leakage before and after the test
7, 8	pipe	1500			
21	elbow	1500			
23	branch	1500			
34	reducer	1500			

4.15 Tightness of elastomeric ring seal joints

Sample no.	Characteristics	Pressure [bar]	Mean value [mm]		Remark
			Mean value	Set value	
2, 6	Water pressure	0.05	> 15	± 15	no leakage
	Air pressure	-0.30			

5 Assessment of test results

All tested pipes and fittings for soil and waste discharge have met the requirements of SKZ-Specification for Test and Inspection HR 3.43 (November 2011) "Plastic pipes and fittings made of mineral filled PP for soil and waste discharge within the building structure".



ULTRA SILENT™
ULTRA SILENT+™

IBS INSTITUT FÜR
BRANDSCHUTZTECHNIK UND SICHERHEITSFORSCHUNG
GESELLSCHAFT M.B.H.
AKKREDITIERTE PRÜF- UND INSPEKTIONSSTELLE

ZENTRALE: A 4017 LINZ, PETZOLDSTRASSE 45/48, POSTSCHNITZ, TELEFON: 01232/617 850, FAX: 01232/617 89
ZWEIGSTELLEN: A 1300 WIEN FLUGHAFEN, OFFICE PARK I, TOP 802, TELEFON: 0122737330, A 5020 SALZBURG, GRUOKENPLATZ 10/1, TELEFON: 0662 826222
A 9100 VOLKERMARKT, GRIFFFNERSTRASSE 6, TELEFON: 04232/37026, A 6020 INNESBRUCK, GRABENWEG 68, TELEFON: 0512/348509 0
A 6900 BREGENZ, RÖMERTSTR. 12, TELEFON: 05574/44670
www.ibs.at/office/office@ibs.at/central (DVR: 0559958) FN 391164 REGISTRIERUNGSLINZ, UID NR. ATU 23289765

Classification of Reaction to Fire Performance

Report on classification of the burning behaviour of the building product
"Huliot Ultra Silent"

Report no.: 12112903A
Date: 27.05.2013
Official in charge: H. Aglas/ko
DD: 818

Applicant/manufacturer: Huliot
Kibbutz Sde Nehemia
IL-12145 D.N. Galil Elyon

Date of application: 01.02.2013

Specimen of classification: Plastic piping system "Huliot Ultra Silent"

Short evaluation: In accordance with EN 13501-1:2009 the above mentioned building product is ranked into the European Class D – s2, d2 because of its fire behaviour. The classification of reaction to fire and the therefore valid practical range of application is obvious by the representational classification report.

This report contains: 5 text pages

The duplication of this classification report in extracts is only allowed with written authorisation from the IBS.



IBS – Institut für Brandschutstechnik und
Sicherheitsforschung Gesellschaft m. B. H.
A-4017 Linz, Petzoldstraße 45, Postbox 27
Akkreditierte Prüf-, Inspektions- und Zertifizierungsstelle
classification report no.: 12112903-A
date: 27.05.2013
page 4 of 8
applicant: Huliot

1.) Introduction:

This classification report defines the classification which is assigned to the building product Plastic piping system "Huliot Ultra Silent" in agreement with the in EN 13501-1:2007 stated method.

2.) Details of the classified building product:

2.1) Type and application range:

The building product Plastic piping system "Huliot Ultra Silent" is defined as a type of classified product. This classification applies to the field of application mentioned under 5.).

2.2) Description:

The building product Plastic piping system "Huliot Ultra Silent" completely described in the test reports mentioned under 3.1) which are based on the classification.

3.) Test reports and results in support of classification:

3.1) Test reports:

Name of the laboratory	Holder of test report	Number of the test reports	Test method
IBS Linz	Huliot	12112903-1	ONORM EN 13823:2011
IBS Linz	Huliot	12112903-2	ONORM EN ISO 11929-2:2011

3.2) Test results:

Test method	Parameter	Number of tests	Test result	
			Constant parameter average (%)	Discrete parameter
ONORM EN 13823	FIGRA _{fl} (W/kg)	3 (test series)	645,8	(-)
	FIGRA _{av} (W/kg)		645,8	(-)
	THR _{flav} (M)	29,3	(-)	
	LFS < edge	(-)	J	
	SMOGR _{av} (m ³ /s ²)	18,1	(-)	
ONORM EN ISO 11929-2 Flame impingement of angle 30 s time impingement	TSP _{ext} (m ³)	141,6	(-)	
	Fl < 150 mm Flame impingement of angle 30 s time impingement Ignition of filler paper	(-)	J (-)	

4.) Classification and direct field of application:

4.1) Reference and direct field of application:

This classification has been carried out in accordance to the sections 6, 7, 8 and 10.4 of the European standard EN 13501-1:2009.

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A-4017 Linz, Petzoldstraße 45, Postbox 27
Akkreditierte Prüf-, Inspektions- und Zertifizierungsstelle
classification report no.: 12112903-A
date: 27.05.2013
page 4 of 8
applicant: Huliot

4.2) Classification:

The building product Plastic piping system "Huliot Ultra Silent" in relation to its reaction to fire behaviour is classified as follows:

D

The additional classification in relation to smoke emission is:

S2

The additional classification in relation to flaming droplets/particles is:

D2

The format of the classification of the burning behaviour for building products without coating is:

Fire behaviour	Smoke emission	No flaming droplets/particles
D	s 2	d 2

i.e.: D – s2, d2

5.) Field of application:

This classification is valid for the following product parameters and use conditions:

As tested under the basic conditions of the product standard

GUARANTEE DECLARATION

Valid for the following areas of application:

1. **ULTRA SILENT™** (pipes & fittings) noise insulated above-ground drainage.
2. **ULTRA SILENT+™** (pipes & fittings) noise insulated above-ground drainage.
3. HT-PP (pipes & fittings) above-ground drainage.
4. **THREADLOCK™** TL system - waste water pipes & fittings.



Periods and Scope of Coverage

Huliot A.C.S. Ltd. warrants to each end-user purchaser, (excluding the USA and Canada) that its products will be free from defects in materials and workmanship under normal use and service (liability for damages resulting from manufacturing errors, material defects, deficiencies caused by incorrect storage, laying and installation instructions), for a period of 10 years from the date of manufacture in accordance with the terms of this warranty.

Huliot A.C.S. Ltd. will repair or supply an equivalent replacement product in the event that the product is determined by Huliot A.C.S. Ltd. to be defective within the warranty period. Any replaced or repaired product will be warranted only for the unexpired portion of the original warranty period, up to a sum of 1,000,000€ per occurrence in the event of damage.

Exclusions from Coverage

This warranty will not apply or will be voided at the manufacturer's sole discretion if the product in question was not manufactured by Huliot A.C.S. Ltd., even if it is sold by Huliot A.C.S. Ltd., and also excludes defects or failures caused after shipment by:

1. Improper installation (including, without limitation, misalignment) and unless all the measures necessary for damage minimization were initiated immediately.
2. Use in improper applications or conditions or in conjunction with improper materials (including, without limitation, improper lubricants, pastes, solvents or sealants).
3. Contact with aggressive chemical agents, freezing or overheating of liquids in the product, or unusual pressure, surges or pulsation.
4. Vibration.
5. Temperature shock.
6. U.V. degradation.
7. Failure to adhere to Huliot A.C.S. Ltd.'s instructions concerning the proper handling, installation, testing and use of the product.
8. Failure to adhere to applicable standards set forth by local laws, codes, or regulations and the applicable 'Industry standards' OR
9. Any other improper activities not listed above or damage caused by the fault or negligence of anyone other than Huliot A.C.S. Ltd.

Every claim for breach under this warranty shall be void unless it is made in writing to Huliot A.C.S. Ltd. and postmarked within five business (5) days of the date the defect was discovered or in the exercise of ordinary care should have been discovered and, in any event, the claim must also be made within ten (10) years of the date of the Huliot A.C.S. Ltd. invoice. As noted above, products manufactured by Huliot A.C.S. Ltd. are marked with a Huliot A.C.S. Ltd. stencil. This limited warranty excludes any product not manufactured by Huliot A.C.S. Ltd. even if it is sold by Huliot A.C.S. Ltd.

Any claim for breach of warranty must be sent to:

Huliot Export Department: Fax: +972-4-6959698, Email: info@huliot.com

No claim under this limited warranty will be valid unless (1) proof of purchase with the date thereof as well as a description of the alleged defect in reasonable detail is presented to the satisfaction of Huliot A.C.S. Ltd. (2) written permission and/or a Return Goods Authorization (RGA) is obtained from Huliot A.C.S. Ltd. (3) Huliot A.C.S. Ltd. is given a meaningful and reasonable opportunity to inspect the allegedly defective product and its installation at the site and (4) at Huliot A.C.S. Ltd.'s request, representative samples/photos of the allegedly defective product are returned to Huliot A.C.S. Ltd. in accordance with HULIOT A.C.S. Ltd.'s instructions.



ULTRA SILENT™

ULTRA SILENT+™

Chemical resistance

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Acetic acid	Up to 40%	S	S	-
Acetic acid	50%	S	S	L
Acetic acid, glacial	> 96%	S	L	NS
Acetic anhydride	100%	S	-	-
Acetone	100%	S	S	-
Acetophenone	100%	S	L	-
Acrylonitrile	100%	S	-	-
Air	-	S	S	S
Allyl alcohol	100%	S	S	-
Almond oil	-	S	-	-
Alum	Sol	S	S	-
Ammonia, aqueous	Sat.sol	S	S	-
Ammonia, dry gas	100%	S	-	-
Ammonia, liquid	100%	S	-	-
Ammonium acetate	Sat. sol	S	S	-
Ammonium chloride	Sat.sol	S	S	-
Ammonium fluoride	Up to 20%	S	S	-
Ammonium hydrogen carbonate	Sat.sol	S	S	-
Ammonium metaphosphate	Sat.sol	S	S	S
Ammonium nitrate	Sat.sol	S	S	S
Ammonium persulphate	Sat.sol	S	S	-
Ammonium phosphate	Sat.sol	S	-	-
Ammonium sulphate	Sat.sol	S	S	S
Ammonium sulphide	Sat.sol	S	S	-
Amyl acetate	100%	L	-	-
Amyl alcohol	100%	S	S	S
Aniline	100%	S	S	-
Apple juice	-	S	-	-
Aqua regia	HCl/HNO ₃ =3/1	NS	NS	NS
Barium bromide	Sat.sol	S	S	S
Barium carbonate	Sat.sol	S	S	S
Barium chloride	Sat.sol	S	S	S
Barium hydroxide	Sat.sol	S	S	S
Barium sulphide	Sat.sol	S	S	S

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Beer	-	S	S	-
Benzene	100%	L	NS	NS
Benzoic acid	Sat.sol	S	S	-
Benzyl alcohol	100%	S	L	-
Borax	Sol	S	S	-
Boric acid	Sat.sol	S	-	-
Boron trifluoride	Sat.sol	S	-	-
Bormine, gas	-	NS	NS	NS
Bromine, liquid	100%	NS	NS	NS
Butane, gas	100%	S	-	-
Butanol	100%	S	L	L
Butyl acetate	100%	L	NS	NS
Butyl glycol	100%	S	-	-
Butyl phenols	Sat.sol	S	-	-
Butyl phthalate	100%	S	L	L
Calcium carbonate	Sat.sol	S	S	S
Calcium chlorate	Sat.sol	S	S	-
Calcium chloride	Sat.sol	S	S	S
Calcium hydroxide	Sat.sol	S	S	S
Calcium hypochlorite	Sol	S	-	-
Calcium nitrate	Sat.sol	S	S	-
Camphor oil	-	NS	NS	NS
Carbon dioxide, dry gas	-	S	S	-
Carbon dioxide, wet gas	-	S	S	-
Carbon disulphide	100%	S	NS	NS
Carbon monoxide, gas	-	S	S	-
Carbon tetrachloride	100%	NS	NS	NS
Castor oil	100%	S	S	-
Caustic soda	Up to 50%	S	L	L
Chlorine, aqueous	Sat.sol	S	L	-
Chlorine, dry gas	100%	NS	NS	NS
Chlorine, liquid	100%	NS	NS	NS
Chloroacetic acid	Sol	S	-	-
Chloroethanol	100%	S	-	-

Chemical resistance

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Chloroform	100%	L	NS	NS
Chlorosulphonic acid	100%	NS	NS	NS
Chrome alum	Sol	S	S	-
Chromic acid	Up to 40%	S	L	NS
Citric acid	Sat.sol	S	S	S
Coconut oil	-	S	-	-
Copper (II) chloride	Sat.sol	S	S	-
Copper (II) nitrate	Sat.sol	S	S	S
Copper (II)	Sat.sol	S	S	-
Corn oil	-	S	L	-
Cottonseed oil	-	S	S	-
Cresol	Greater than 90%	S	-	-
Cyclohexane	100%	S	-	-
Cyclohexanol	100%	S	L	-
Cyclohexanone	100%	L	NS	NS
Decalin (decahydronaphthalene)	100%	NS	NS	NS
Dextrin	Sol	S	S	-
Dextrose	Sol	S	S	S
Dibutyl phthalate	100%	S	L	NS
Dichloroacetic acid	100%	L	-	-
Dichloroethylene (A and B)	100%	L	-	-
Diethanolamine	100%	S	-	-
Diethyl ether	100%	S	L	-
Diethylene glycol	100%	S	S	-
Diglycolic acid	Sat.sol	S	-	-
Diisooctyl	100%	S	L	-
Dimethyl amine, gas	-	S	-	-
Dimethyl formamide	100%	S	S	-
Diocetyl phthalate	100%	L	L	-
Dioxane	100%	L	L	-
Distilled water	100%	S	S	S
Ethanolamine	100%	S	-	-
Ethyl acetate	100%	L	NS	NS
Ethyl alcohol	Up to 95%	S	S	S

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Ethyl chloride, gas	-	NS	NS	NS
Ethylene chloride (mono and di)	-	L	L	-
Ethyl ether	100%	S	L	-
Ethylene glycol	100%	S	S	S
Ferric chloride	Sat.sol	S	S	S
Formaldehyde	40%	S	-	-
Formic acid	10%	S	S	L
Formic acid	85%	S	NS	NS
Formic acid, anhydrous	100%	S	L	L
Fructose	Sol	S	S	S
Fruit juice	-	S	S	S
Gasoline, petrol (aliphatic hydrocarbons)	-	NS	NS	NS
Gelatine	-	S	S	-
Glucose	20%	S	S	S
Glycerine	100%	S	S	S
Glycolic acid	30%	S	-	-
Heptane	100%	L	NS	NS
Hexane	100%	S	L	-
Hydrobromic acid	Up to 48%	S	L	NS
Hydrochloric acid	Up to 20%	S	S	S
Hydrochloric acid	30%	S	L	L
Hydrochloric acid	From 35 to 36%	S	-	-
Hydrofluoric acid	Dil.sol	S	-	-
Hydrofluoric acid	40%	S	-	-
Hydrogen	100%	S	-	-
Hydrogen chloride, dry gas	100%	S	S	-
Hydrogen peroxide	Up to 10%	S	-	-
Hydrogen peroxide	Up to 30%	S	L	-
Hydrogen sulphide, dry gas	100%	S	S	-
Iodine, in alcohol	-	S	-	-
Isocane	100%	L	NS	NS
Isopropyl alcohol	100%	S	S	S
Isopropyl ether	100%	L	-	-
Lactic acid	Up to 90%	S	S	-



ULTRA SILENT™

ULTRA SILENT+™

Chemical resistance

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Lanoline	-	S	L	-
Linseed oil	-	S	S	S
Magnesium carbonate	Sat.sol	S	S	S
Magnesium chloride	Sat.sol	S	S	-
Magnesium hydroxide	Sat.sol	S	S	-
Magnesium sulphate	Sat.sol	S	S	-
Maleic acid	Sat.sol	S	S	-
Mercury (II) chloride	Sat.sol	S	S	-
Mercury (II) cyanide	Sat.sol	S	S	-
Mercury (I) nitrate	Sol	S	S	-
Mercury	100%	S	S	-
Methyl acetate	100%	S	S	-
Methyl alcohol	5%	S	L	L
Methyl amine	Up to 32%	S	-	-
Methyl bromide	100%	NS	NS	NS
Methyl ethyl ketone	100%	S	-	-
Methylene chloride	100%	L	NS	NS
Milk	-	S	S	S
Monochloroacetic acid	>85%	S	S	-
Naphtha	-	S	NS	NS
Nickel chloride	Sat.sol	S	S	-
Nickel nitrate	Sat.sol	S	S	-
Nickel sulphate	Sat.sol	S	S	-
Nitric acid	Up to 30%	S	NS	NS
Nitric acid	From 40 to 50%	L	NS	NS
Nitric acid, fuming (with nitrogen dioxide)	-	NS	NS	NS
Nitrobenzene	100%	S	L	-
Oleic acid	100%	S	L	-
Oleum (sulphuric acid with 60% of SO3)	-	S	L	-
Olive oil	-	S	S	L
Oxalic acid	Sat.sol	S	L	NS
Oxygen, gas	-	S	-	-
Paraffin oil (FL65)	-	S	L	NS
Peanut oil	-	S	S	-

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Peppermint oil	-	S	-	-
Perchloric acid	(2 N) 20%	S	-	-
Petroleum ether (ligroin)	-	L	L	-
Phenol	5%	S	S	-
Phenol	90%	S	-	-
Phosphine, gas	-	S	S	-
Phosphoric acid	Up to 85%	S	S	S
Phosphorus oxychloride	100%	L	-	-
Picric acid	Sat.sol	S	-	-
Potassium bicarbonate	Sat.sol	S	S	S
Potassium borate	Sat.sol	S	S	-
Potassium bromate	Up to 10%	S	S	-
Potassium bromide	Sat.sol	S	S	-
Potassium carbonate	Sat.sol	S	S	-
Potassium chlorate	Sat.sol	S	S	-
Potassium chlorite	Sat.sol	S	S	-
Potassium chromate	Sat.sol	S	S	-
Potassium cyanide	Sol	S	-	-
Potassium dichromate	Sat.sol	S	S	S
Potassium ferricyanide	Sat.sol	S	S	-
Potassium fluoride	Sat.sol	S	S	-
Potassium hydroxide	Up to 50%	S	S	S
Potassium iodide	Sat.sol	S	-	-
Potassium nitrate	Sat.sol	S	S	-
Potassium perchlorate	10%	S	S	-
Potassium permanganate	(2 N) 30%	S	-	-
Potassium persulphate	Sat.sol	S	S	-
Potassium sulphate	Sat.sol	S	S	-
Propane, gas	100%	S	-	-
Propionic acid	>50%	S	-	-
Pyridine	100%	L	-	-
Seawater	-	S	S	S
Silicon oil	-	S	S	S
Silver nitrate	Sat.sol	S	S	L

Chemical resistance

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Sodium acetate	Sat.sol	S	S	S
Sodium benzoate	35%	S	L	-
Sodium bicarbonate	Sat.sol	S	S	S
Sodium carbonate	Up to 50%	S	S	L
Sodium chlorate	Sat.sol	S	S	-
Sodium chloride	Sat.sol	S	S	-
Sodium chlorite	2%	S	L	NS
Sodium chlorite	20%	S	L	NS
Sodium dichromate	Sat.sol	S	S	S
Sodium hydrogen carbonate	Sat.sol	S	S	S
Sodium hydrogen sulphate	Sat.sol	S	S	-
Sodium hydrogen sulphite	Sat.sol	S	-	-
Sodium hydroxide	1%	S	S	S
Sodium hydroxide	From 10 to 60%	S	S	S
Sodium hypochlorite	5%	S	S	-
Sodium hypochlorite	10% - 15%	S	-	-
Sodium hypochlorite	20%	S	L	-
Sodium metaphosphate	Sol	S	-	-
Sodium nitrate	Sat.sol	S	S	-
Sodium perborate	Sat.sol	S	S	-
Sodium phosphate (neutral)	-	S	S	S
Sodium silicate	Sol	S	S	-
Sodium sulphate	Sat.sol	S	S	-
Sodium sulphide	Sat.sol	S	-	-
Sodium sulphite	40%	S	S	S
Sodium thiosulphate (hypo)	Sat.sol	S	-	-
Soybean oil	-	S	L	-
Succinic acid	Sat.sol	S	S	-
Sulphuric acid	Up to 10%	S	S	S
Sulphuric dioxide, dry or wet	100%	S	S	-
Sulphur acid	From 10 to 30%	S	S	-
Sulphuric acid	50%	S	L	L
Sulphuric acid	96%	S	L	NS
Sulphuric acid	98%	L	NS	NS

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Sulphurous acid	Up to 30%	S	-	-
Tartaric acid	Sat.sol	S	S	-
Tetrahydrofuran	100%	L	NS	NS
Tetralin	100%	NS	NS	NS
Thiophene	100%	S	L	-
Tin (IV) chloride	Sol	S	S	-
Tin (II) chloride	Sat.sol	S	S	-
Toluene	100%	L	NS	NS
Trichloroacetic acid	Up to 50%	S	S	-
Trichloroethylene	100%	NS	NS	NS
Triethanolamine	Sol	S	-	-
Turpentine	-	NS	NS	NS
Urea	Sat.sol	S	S	-
Vinegar	-	S	S	-
Water brackish, mineral, potable	-	S	S	S
Whiskey	-	S	S	-
Wines	-	S	S	-
Xylene	100%	NS	NS	NS
Yeast	Sol	S	S	S
Zinc chloride	Sat.sol	S	S	-
Zinc sulphate	Sat.sol	S	S	-

S - satisfied
L - limited
NS - non-satisfied



OHSAS 18001



ISO 14001



ISO 9001:2000



GREEN LABEL



RECYCLABLE

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