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1120-410600355-A-06.09.2018

FIRAT

FITTINGS

ELBOW (45°)

SINGLE BRANCH (45°)

ELBOW (87°)

T-PIECE

VERTICAL SOUNDPROOF PIPE CLAMP WITH NUTS

HORIZONTAL SOUNDPROOF PIPE CLAMP WITH NUTS

VERTICAL SOUNDPROOF PIPE CLAMP WITH TRIPHONE

HORIZONTAL SOUNDPROOF PIPE CLAMP WITH TRIPHONE

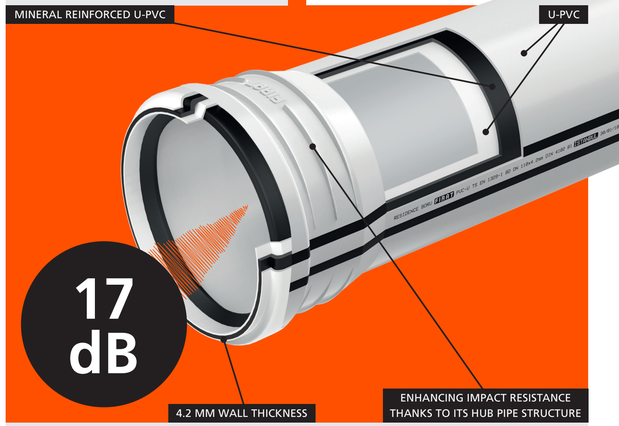
- PLUG
- SLIDING SOCKET
- T BRANCH
- CLEANOLT T-PIECE
- REDUCER
- S SIPHON
- REA AIR SOCKET LENGTHENING PIPE
- S SIPHON WITH SOCKET

FUDEL ACCREDITED LABORATORY

The quality of plastic pipe systems used in infrastructure and superstructure investments is subject to international standards and compliances to these standards is a significant input in relation to the export capability of the Turkish industry. Systems, which are awarded quality approvals without performance of the required tests, cause the country's resources to be wasted due to incurrence of much higher costs. Turkey's lack of accredited test laboratories with high testing capacity, in which plastic pipe systems tests could be performed independently and impartially, was an important drawback for the country. Now, there is a major laboratory in the country which is accredited by TÜRKAK, the only public institution in Turkey with international validity, which will eliminate this drawback and enable the national resources to be used more efficiently. FUDEL, which has the largest technological infrastructure in the country and the capability to deliver results to its customers in the shortest time possible, through an expert and competent staff, is the leading laboratory in the sector with a capacity for 22 different types of tests.

For your comfort more soundproof, for your safety it is fireproof.

RESIDENCE NEW SILENT PIPE



RESIDENCE SOUNDPROOF RESIDENCE PIPES & FITTINGS

FIRATPIPE

GENERAL DESCRIPTION

Fluids passing through the pipes at different flow velocities result in vibrations by hitting the pipe sides and obstacles in the pipes which causes disturbing noises in buildings. The emerging modern developments in the construction sector expedite the housing delivery time. Construction firms need soundproof pipes in order to reduce additional labor and time costs regarding installations insulation.

USAGE AREAS OF SOUND-PROOF PIPES

Due to its characteristics of being ecological, economic and soundproof Residence Pipe and Fittings is a preferable choice to be used in villas and multi-floor residences, hospitals, schools, hotels and industrial or sportive structures, etc. These products ensure for the sewage from the foundation and interior structures of the building to be drained in an ideal and safe way without any leakage for a long term use (50 years).

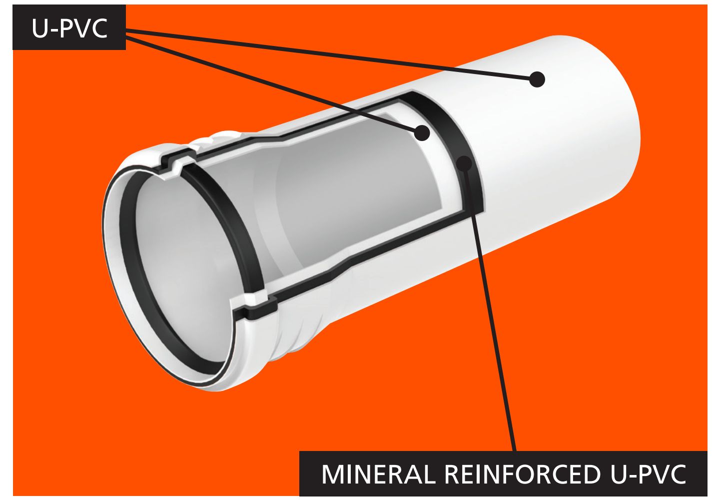
MATERIAL FEATURES

RESIDENCE PIPES AND FITTINGS are produced three-layered with a mixture of U-PVC and vinyl-copolimer (FRvinylflex) raw materials.

Inner Layer: Made of U-PVC having smooth inner surface

Middle layer: FRvinylflex® is a mineral-based additive developed in Frat R&D laboratories which provides Residence Pipes with soundproof features.

Outer Layer: Made of U-PVC protecting the pipes against external impacts



GASKET

The O-ring seals used in Residence Pipes and Fittings are made from EPDM and thanks to their unidirectional and special exterior shape they provide 100% leakproofing. Manufactured according to TS EN 681-1 standard.

APPEARANCE

→ Residence Pipes and Fittings are manufactured in gray color.

→ Reinforcing are added in order to reinforce impact resistance of the pipe muff structure.

PHYSICAL AND CHEMICAL PROPERTIES

Residence Pipes and Fittings meets the mechanical and chemical properties mentioned in TS EN 1329-1 standard.

Serial	Test	Test Method	Test period	Test Temperature	Required Performance
1	Impact Resistance	ISO 3127	-	0°C	Max. 10%
2	Vicat Softening Temperature	ISO 2507-1	-	-	Min. 79°C
3	Lengthwise Dimensional Change	EN ISO 2505	30 min.	150°C	Max. 5%
4	Resistance to Dichloromethane	ISO 9852	30 min.	15°C	Any break downs must not be observed.
5	Temperature Influence Test (Fitting)	EN ISO 580	30 min.	150°C	Any break downs must not be observed.
6	Leakage Test (0,5 bar) (System)	TS EN ISO 13254	15 min.	23°C	Any leakage must not be observed.

DIAMETER AND WALL THICKNESS OF RESIDENCE PIPES

Pipe outer diameter (mm)	Wall Thickness (mm)
50	3,6
75	3,6
110	4,2
125	4,2
160	5,0

FIREPROOF PERFORMANCE CLASSES FOR THE BUILDING MATERIALS, OTHER THAN FLOORINGS

According to the EU Commision decision 2002/4390 the fire resistence classes of all construction materials, speciried accoroimo to the flamema bility classes ofthe comstructions materials, specified in the regulation on the protection of buldings from fires are as follows

Inflammability of the Materials	Europe Classification (According to TS EN 13501-1)
Non Combustible	A1
Not Easily Combustible	A2 - s1, d0
Non-Flammable	B,C - s1, d0
	A2 - s2, d0
	A2, B, C - s3, d0
	A2, B,C - s1, d1
	A2, B,C - s1, d2
(minimum)	A2, B, C – s3, d2
Normal Flammable	D - s1, d0
	D - s2, d0
	D - s3, d0
	E
	D - s1, d2
	D - s2, d2
	D - s3, d2
(minimum)	E - d2
Easily Flammable	F

STANDARDS AND TEST REPORTS OF RESIDENCE PIPES AND FITTINGS

→ The products meet the mechanical and physical requirements of BD class of TS EN 1329-1 standards. BD application class; includes, The indoor surface-mounted applications, indoor under surface applications and the sewerage connections of the buildings.

→ Residence Pipes and Fittings are categorized as Non-Flammable according to "Turkish Building Fire Safety Regulations" in the scope of 2007/12937 decision of the Ministry of public works and settlement.

→ As a result of the fire response performance test carried out at UL, an independent US-based product safety certification agency, Residence Pipes and Fittings are categorized as V-0 NON-COMBUSTIBLE.

→ According to the INSPECTION AND TEST REPORT PREPARED BY TSI DIRECTORATE OF TESTING AND CALIBRATION LABORATORIES, the results from reaction to fire tests show that Residence Pipes and Fittings are categorized as B S2 D0 in the scope of TS EN 13501-1 +A1:2013-04 Fire Classification of Construction Products and Building Elements: classification using data from reaction to fire tests. Fire class B, Smoke generation S2, Flaming droplets D0.

RESIDENCE PIPE AND FITTINGS ARE SOUNDPROOF.

According to the results of the sound level measurement test, done at the Fraunhofer Institut Bauphysik (Germany) Residence Pipe and its fittings meet all national and international standard requirements.

Flow Rate (liters per second)	0,5	1,0	2,0	4,0
Characteristic Sound Level Decibel (dB (A)) (Clamp Pipe System)	3	8	12	17

Fraunhofer IBP

Institution for testing, supervision and certification, officially recognized by the building supervisory authority. Approvals of new building materials, components and types of construction

Director
Prof. Dr. Philip Leistner
Prof. Dr. Klaus Peter Sedlbauer

Test Report P-BA 87/2018e

Determination of the Acoustic Performance of a Wastewater Installation System in the Laboratory according to EN 14366

Client: FIRAT PLASTIK KAUCUK SAN. VE. TIC. AS.
Türkoba Mah. Firat Plastik
cad. No:23 Büyükçekmece
İstanbul / TÜRKİYE

Test object: Wastewater system "FIRAT, RESIDENCE PIPE, PVC-U, 110x4.2, 11/02/18" (manufacturer: Firat Plastik). The wastewater system consisted of straight plastic pipes and fittings and acoustic pipe clamps "Bismat 1000" (manufacturer: Walraven).

Content:
Results sheet 1: Summary of test results
Figures 1 to 3: Detailed results
Figures 4 and 5: Test set-up
Annex A: Measurement set-up, noise excitation, acoustic parameters, compliance with requirements
Annex F: Evaluation of measurements
Annex P: Description of the test facility
Annex V: Assessment according to VDI 4100

Test date: The measurement was carried out on July 2, 2018 in the test facilities of the Fraunhofer Institute for Building Physics in Stuttgart.

Stuttgart, July 16, 2018

Responsible Test Engineer: Dipl.-Ing.(FH) J. Mohr
Head of Laboratory: Dipl.-Ing.(FH) S. Öhler

The test was carried out in a laboratory, accredited according to DIN EN ISO/IEC 17025:2005 by DAkkS. The accreditation certificate is D-PL-11140-11-01.

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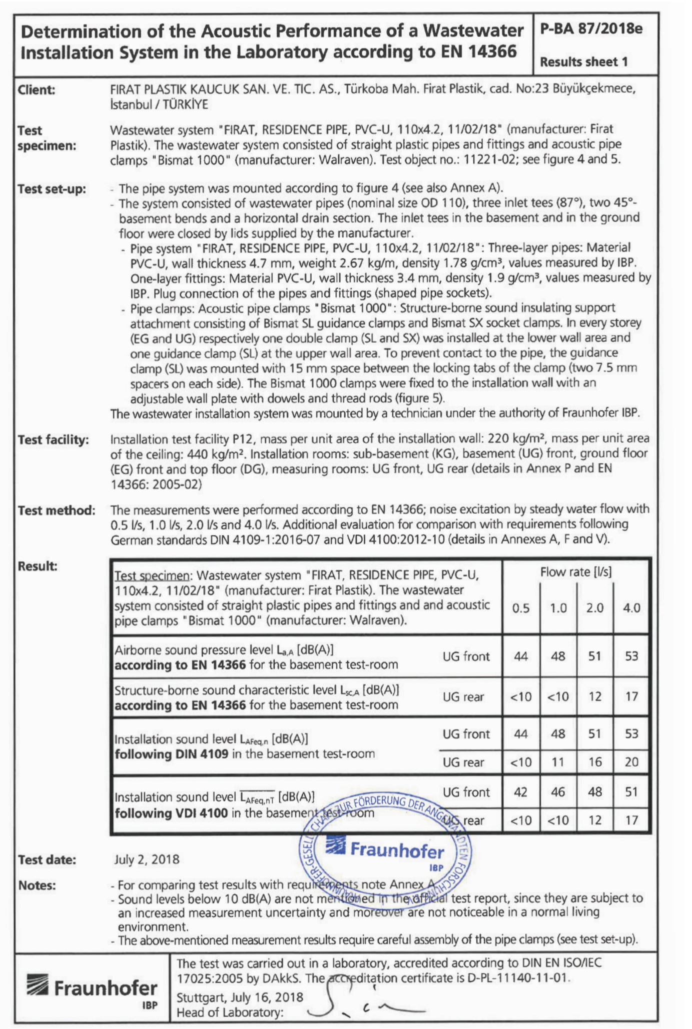
DAkkS Deutsche Akkreditierungsstelle D-PL-11140-11-01



Determination of the Acoustic Performance of a Wastewater Installation System in the Laboratory according to EN 14366 | **P-BA 87/2018e** **Results sheet 1**

Client: FIRAT PLASTIK KAUCUK SAN. VE. TIC. AS., Türkoba Mah. Firat Plastik, cad. No:23 Büyükçekmece, İstanbul / TÜRKİYE

Test specimen: Wastewater system "FIRAT, RESIDENCE PIPE, PVC-U, 110x4.2, 11/02/18" (manufacturer: Firat Plastik). The wastewater system consisted of straight plastic pipes and fittings and acoustic pipe clamps "Bismat 1000" (manufacturer: Walraven). Test object no.: 11221-02; see figure 4 and 5.

Test set-up:
- The pipe system was mounted according to figure 4 (see also Annex A).
- The system consisted of wastewater pipes (nominal size OD 110), three inlet tees (87°), two 45°-basement bends and a horizontal drain section. The inlet tees in the basement and in the ground floor were closed by lids supplied by the manufacturer.
  - Pipe system "FIRAT, RESIDENCE PIPE, PVC-U, 110x4.2, 11/02/18": Three-layer pipes: Material PVC-U, wall thickness 4.7 mm, weight 2.67 kg/m, density 1.78 g/cm³, values measured by IBP. One-layer fittings: Material PVC-U, wall thickness 3.4 mm, density 1.9 g/cm³, values measured by IBP. Plug connection of the pipes and fittings (shaped pipe sockets).
  - Pipe clamps: Acoustic pipe clamps "Bismat 1000": Structure-borne sound insulating support attachment consisting of Bismat SL guidance clamps and Bismat SX socket clamps. In every storey (EG and UG) respectively one double clamp (SL and SX) was installed at the lower wall area and one guidance clamp (SL) at the upper wall area. To prevent contact to the pipe, the guidance clamp (SL) was mounted with 15 mm space between the locking tabs of the clamp (two 7.5 mm spacers on each side). The Bismat 1000 clamps were fixed to the installation wall with an adjustable wall plate with dowels and thread rods (figure 5).

The wastewater installation system was mounted by a technician under the authority of Fraunhofer IBP.

Test facility: Installation test facility P12, mass per unit area of the installation wall: 220 kg/m², mass per unit area of the ceiling: 440 kg/m². Installation rooms: sub-basement (KG), basement (UG) front, ground floor (EG) front and top floor (DG), measuring rooms: UG front, UG rear (details in Annex P and EN 14366: 2005-02)

Test method: The measurements were performed according to EN 14366; noise excitation by steady water flow with 0.5 l/s, 1.0 l/s, 2.0 l/s and 4.0 l/s. Additional evaluation for comparison with requirements following German standards DIN 4109-1:2016-07 and VDI 4100:2012-10 (details in Annexes A, F and V).

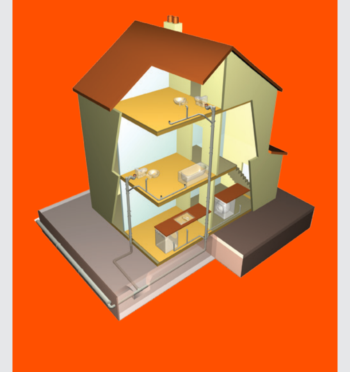
Result:

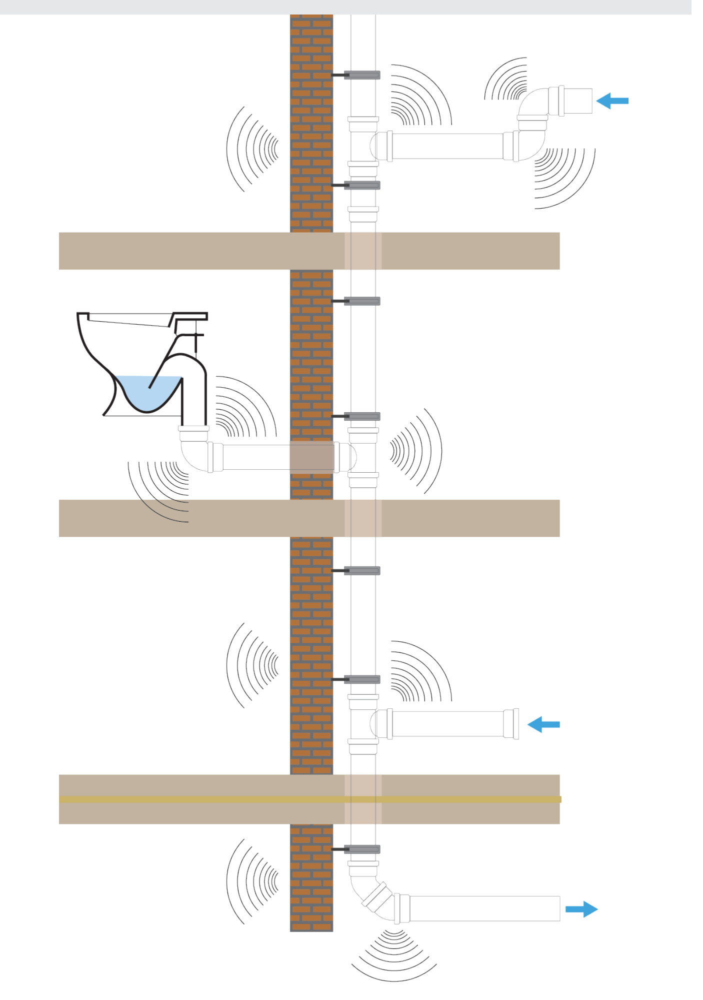
Test specimen: Wastewater system "FIRAT, RESIDENCE PIPE, PVC-U, 110x4.2, 11/02/18" (manufacturer: Firat Plastik). The wastewater system consisted of straight plastic pipes and fittings and and acoustic pipe clamps "Bismat 1000" (manufacturer: Walraven).		Flow rate [l/s] 0.5	1.0	2.0	4.0
Airborne sound pressure level $L_{a,A}$ [dB(A)] **according to EN 14366** for the basement test-room	UG front	44	48	51	53
Structure-borne sound characteristic level $L_{sc,A}$ [dB(A)] **according to EN 14366** for the basement test-room	UG rear	<10	<10	12	17
Installation sound level $L_{AFeq,n}$ [dB(A)] **following DIN 4109** in the basement test-room	UG front	44	48	51	53
	UG rear	<10	11	16	20
Installation sound level $\overline{L_{AFeq,nT}}$ [dB(A)] **following VDI 4100** in the basement test-room	UG front	42	46	48	51
	UG rear	<10	<10	12	17

Test date: July 2, 2018

Notes:
- For comparing test results with requirements note Annex A.
- Sound levels below 10 dB(A) are not mentioned in the official test report, since they are subject to an increased measurement uncertainty and moreover are not noticeable in a normal living environment.
- The above-mentioned measurement results require careful assembly of the pipe clamps (see test set-up).

Fraunhofer IBP | The test was carried out in a laboratory, accredited according to DIN EN ISO/IEC 17025:2005 by DAkkS. The accreditation certificate is D-PL-11140-11-01.
Stuttgart, July 16, 2018
Head of Laboratory:





Features of Soundproof Residence Pipe Sewage Systems