

**Test Report P-BA 138/2022e****Determination of the Acoustic  
Performance of a Wastewater  
Installation System in the Laboratory  
according to DIN EN 14366**

**Client:** Firat Plastik Kauçuk San. ve Tic. A.Ş.  
Address: Türkoba Mah.Firat Plastik Cad. No:23 Büyükçekmece İstanbul  
TÜRKİYE

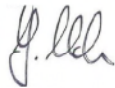
**Test object:** Wastewater system made of plastic "FIRAT RESIDENCE PIPE, 110x3.5, PVC-U, 06/06/22" with fittings "FIRAT DN 110, PVC-U" (manufacturer: Firat Plastik) and with acoustic pipe clamps with elastic inlay (double clamps) "FIRAT 4"" , 110-115 with spacers 42 mm" (manufacturer: Firat Plastik).

<b>Content:</b>	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
	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 August 9, 2022 in the test facilities of the Fraunhofer Institute for Building Physics in Stuttgart.

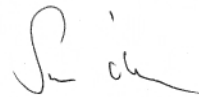
Stuttgart, August 25, 2022

Responsible Test Engineer:



Dipl.-Ing.(FH) J. Mohr

Head of Laboratory:



M.BP. Dipl.-Ing.(FH) S. Öhler

The mentioned measuring results exclusively refer to the investigated test object. The test was carried out in a laboratory, accredited according to DIN EN ISO/IEC 17025:2018 by DAkks. The accreditation certificate is D-PL-11140-11-01.

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

P-BA 138/2022e

Results sheet 1

**Client:** Firat Plastik Kauçuk San. ve Tic. A.Ş.  
Address: Türkoba Mah.Firat Plastik Cad. No:23 Büyükçekmece İstanbul, TÜRKİYE

**Test specimen:** Wastewater system made of plastic "FIRAT RESIDENCE PIPE, 110x3.5, PVC-U, 06/06/22" with fittings "FIRAT DN 110, PVC-U" (manufacturer: Firat Plastik) and with acoustic pipe clamps with elastic inlay (double clamps) "FIRAT 4"" , 110-115 with spacers 42 mm" (manufacturer: Firat Plastik). Test object no.: S 11961-03; see figure 4 and 5.

**Test set-up:**

- The pipe system was mounted according to figure 4 and 5 (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, 110x3.5, PVC-U, 06/06/22". Three layer pipes: Material PVC-U, wall thickness 3.7 mm, weight 2.42 kg/m, density 2.05 g/cm<sup>3</sup>, values measured by IBP. One-layer fittings: Material PVC-U, wall thickness 3.4 mm, density 1.85 g/cm<sup>3</sup>, values measured by IBP. Plug connection of the pipes and fittings (shaped pipe sockets).
- Pipe clamps: Acoustic pipe clamps (double clamps) "FIRAT 4"" , 110-115, with spacers 42 mm" (manufacturer: Firat Plastik) with elastomer inlay (Shore-A 65). In every storey (EG and UG) respectively two clamps were installed. At the lower wall area one double clamp consisting of supporting clamp (with two elastomer spacer 2 x 21 mm on both sides) and fixing clamp was installed. At the upper wall area one loose clamp (with two elastomer spacer 2 x 21 mm on both sides) was mounted. To reduce contact to the pipe, the loose clamps and the supporting clamps were mounted with spacers (2 x 21 mm) between the locking tabs of both sides of the clamp. The clamps were closed with a tightening torque of 1 Nm for the supporting and loose clamps and with 2 Nm for the fixing clamps. The clamps were fixed to the installation wall 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/m<sup>2</sup>, mass per unit area of the ceiling: 440 kg/m<sup>2</sup>. 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 DIN EN 14366: 2020-02)

**Test method:** The measurements were performed according to DIN EN 14366:2020-02; 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 4109:2018-01 and VDI 4100:2012-10 (details in Annexes A, F and V).

**Result:**

Test specimen: Wastewater system made of plastic "FIRAT RESIDENCE PIPE, 110x3.5, PVC-U, 06/06/22" with fittings "FIRAT DN 110, PVC-U" (manufacturer: Firat Plastik) and with acoustic pipe clamps with elastic inlay (double clamps) "FIRAT 4"" , 110-115 with spacers 42 mm" (manufacturer: Firat Plastik).	Flow rate [l/s]				
	0.5	1.0	2.0	4.0	
Airborne sound pressure level $L_{a,A}$ [dB(A)] according to <b>DIN EN 14366</b> for the basement test-room	UG front	43	47	49	52
Structure-borne sound characteristic level $L_{s,A}$ [dB(A)] according to <b>DIN EN 14366</b> for the basement test-room	UG rear	<10	<10	<10	11
Installation sound level $L_{A,eq,n}$ [dB(A)] following <b>DIN 4109</b> in the basement test-room	UG front	43	47	49	52
	UG rear	<10	<10	10	15
Installation sound level $\overline{L}_{A,eq,nT}$ [dB(A)] following <b>VDI 4100</b> in the basement test-room	UG front	40	45	47	50
	UG rear	<10	<10	<10	11

**Test date:** August 9, 2022

**Notes:**

- For comparing test results with requirements according to DIN 4109 and VDI 4100 note Annex A.
- The above-mentioned measurement results require careful assembly of the pipe clamps (see test set-up).
- 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 test was carried out in a laboratory, accredited according to DIN EN ISO/IEC 17025:2018 by DAkkS. The accreditation certificate is D-PL-11140-11-01.

Stuttgart, August 25, 2022  
Head of Laboratory: