

Test Report P-BA 63/2019e

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

Client: Wavin T&I
Rollepaal 20
7701 BS Dedemsvaart, Netherlands

Test object: Wastewater system "Wavin AS+, DN/OD 110 x 5.3, 05.11.2018"
(manufacturer: Wavin). The wastewater system consisted of straight
plastic pipes and fittings and pipe clamps "Wavin Low Noise bracket"
with elastic inlay and spacers (manufactured by Walraven) mounted as
sliding and fixing clamps.

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
	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 April 17, 2019 in the test facilities
of the Fraunhofer Institute for Building Physics in Stuttgart.

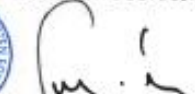
Stuttgart, May 14, 2019

Responsible Test Engineer



Dipl.-Ing.(FH) J. Mohr

Head of Laboratory:



M.BP. 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.

Any publication of this document in part is subject to written permission by the Fraunhofer Institute for
Building Physics (IBP).

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

P-BA 63/2019e

Results sheet 1

Client: Wavin T&I, Rollepaal 20, 7701 BS Dedemsvaart, Netherlands

Test specimen: Wastewater system "Wavin AS+, DN/OD 110 x 5.3, 05.11.2018" (manufacturer: Wavin). The wastewater system consisted of straight plastic pipes and fittings and pipe clamps "Wavin Low Noise bracket" with elastic inlay and spacers (manufactured by Walraven) mounted as sliding and fixing clamps. Test object no.: 11065-10; 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 plugs supplied by the manufacturer.
- Pipe system: "Wavin AS+, DN/OD 110 x 5.3, 05.11.2018": Three-layer pipes: Material PP, wall thickness 5.7 mm, weight 3.45 kg/m, density 1.87 g/cm³, values measured by IBP. One-layer fittings: Material PP, wall thickness 4.8 mm, density 1.85 g/cm³, values measured by IBP. Plug connection of the pipes and fittings (shaped pipe sockets).
- Pipe clamps: Steel pipe clamps "Wavin Low Noise bracket" with elastic inlay and with spacers (manufactured by Walraven) mounted as sliding and fixing clamps. In every storey (EG and UG) two pipe clamps were installed. In the upper wall area one clamp was mounted as a sliding clamp with one white spacer (15.3 mm) on both sides of the clamp. In the lower wall area one clamp was mounted as a fixing clamp with one black spacer (10 mm) on both sides of the clamp. 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/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 14366:2005-02; 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:

Wastewater system "Wavin AS+, DN/OD 110 x 5.3, 05.11.2018" (manufacturer: Wavin). The wastewater system consisted of straight plastic pipes and fittings and pipe clamps "Wavin Low Noise bracket" with elastic inlay and spacers (manufactured by Walraven) mounted as sliding and fixing clamps.		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	41	46	48	50
Structure-borne sound characteristic level $L_{S,C,A}$ [dB(A)] according to EN 14366 for the basement test-room	UG rear	<10	<10	12	17
Installation sound level $L_{A,eq,n}$ [dB(A)] following DIN 4109 in the basement test-room	UG front	41	46	48	50
	UG rear	<10	10	14	19
Installation sound level $\overline{L}_{A,eq,n,T}$ [dB(A)] following VDI 4100 in the basement test-room	UG front	39	43	45	48
	UG rear	<10	<10	11	16

Test date: April 17, 2019

Notes: - For comparing test results with requirements note Annex A.



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, May 14, 2019
Head of Laboratory:



Test Report P-BA 64/2019e

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

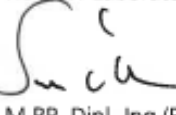
- Client:** Wavin T&I
Rollepaal 20
7701 BS Dedemsvaart, Netherlands
- Test object:** Wastewater system "Wavin AS+, DN/OD 110 x 5.3, 05.11.2018"
(manufacturer: Wavin). The wastewater system consisted of straight
plastic pipes and fittings and pipe clamps "Wavin Low Noise bracket"
with elastic inlay and spacers (manufactured by Walraven) mounted as
acoustic double clamps.
- 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
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 April 17, 2019 in the test facilities
of the Fraunhofer Institute for Building Physics in Stuttgart.

Stuttgart, May 14, 2019

Responsible Test Engineer


Dipl.-Ing.(FH) J. Mohr

Head of Laboratory:


M.BP. 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.

Any publication of this document in part is subject to written permission by the Fraunhofer Institute for
Building Physics (IBP).

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

P-BA 64/2019e

Results sheet 1

Client: Wavin T&I, Rollepaal 20, 7701 BS Dedemsvaart, Netherlands

Test specimen: Wastewater system "Wavin AS+, DN/OD 110 x 5.3, 05.11.2018" (manufacturer: Wavin). The wastewater system consisted of straight plastic pipes and fittings and pipe clamps "Wavin Low Noise bracket" with elastic inlay and spacers (manufactured by Walraven) mounted as acoustic double clamps. Test object no.: 11065-11; 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 plugs supplied by the manufacturer.
- **Pipe system:** "Wavin AS+, DN/OD 110 x 5.3, 05.11.2018": Three-layer pipes: Material PP, wall thickness 5.7 mm, weight 3.45 kg/m, density 1.87 g/cm³, values measured by IBP. One-layer fittings: Material PP, wall thickness 4.8 mm, density 1.85 g/cm³, values measured by IBP. Plug connection of the pipes and fittings (shaped pipe sockets).
- **Pipe clamps:** Steel pipe clamps "Wavin Low Noise bracket" with elastic inlay and with spacers (manufactured by Walraven) mounted as acoustic double clamps. In every storey (EG and UG) two pipe clamps were mounted: In the upper wall area a single guidance clamp with one white spacer (15.3 mm) on both sides of the clamp. In the lower wall area a double clamp consisting of a supporting/guidance clamp with one white spacer (15.3 mm) on both sides of the clamp and above a fixing clamp with one black spacer (10 mm) on both sides of the clamp. The supporting and guidance clamps were fixed to the installation wall with dowels and thread rods. The fixing clamp had no contact to the wall (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 14366:2005-02; 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:

Wastewater system "Wavin AS+, DN/OD 110 x 5.3, 05.11.2018" (manufacturer: Wavin). The wastewater system consisted of straight plastic pipes and fittings and pipe clamps "Wavin Low Noise bracket" with elastic inlay and spacers (manufactured by Walraven) mounted as acoustic double clamps.		Flow rate [l/s]			
		0.5	1.0	2.0	4.0
Airborne sound pressure level $L_{p,A}$ [dB(A)] according to EN 14366 for the basement test-room	UG front	41	45	48	50
Structure-borne sound characteristic level $L_{s,A}$ [dB(A)] according to EN 14366 for the basement test-room	UG rear	<10	<10	<10	10
Installation sound level $L_{Aeq,T}$ [dB(A)] following DIN 4109 in the basement test-room	UG front	41	45	48	50
	UG rear	<10	<10	<10	13
Installation sound level $\overline{L}_{Aeq,T}$ [dB(A)] following VDI 4100 in the basement test-room	UG front	38	43	45	48
	UG rear	<10	<10	<10	10

Test date: April 17, 2019

Notes:

- For comparing test results with requirements note Annex A.
- The above-mentioned measurement results require careful assembly of the pipe clamps (see test set-up).



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-1140-11-01.

Stuttgart, May 14, 2019
Head of Laboratory:

