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Director
Prof. Dr. Klaus Peter Sedlbauer

Test Report P-BA 105/2015e

Determination of the Acoustic Performance of a Wastewater Installation System in the Laboratory

Client: Dizayn Teknik Boru ve Elemanları Sanayi ve Ticaret A.Ş.
Atatürk Mahallesi Adnan Menderes Cad.No:6
34522 Kıraç-Esenyurt / İSTANBUL
TURKEY

Test object: Wastewater installation system consisting of plastic pipes and fittings "DIZAYN TRIPLEXTRA 110X5.3mm" (manufacturer: DIZAYN) with acoustic pipe clamps (double clamps) "BAYKARA 4'' 110-115" (made by Baykara).

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Test date: The measurement was carried out on May 13, 2015 in the test facilities of the Fraunhofer Institute for Building Physics in Stuttgart.

Stuttgart, June 24, 2015

Responsible Test Engineer: Head of Laboratory:

Dipl.-Ing.(FH) J. Mohr M.BP. Dipl.-Ing.(FH) S. Öhler

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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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Fraunhofer-Institut für Bauphysik
Nobelstraße 12 · D-70569 Stuttgart
Telefon +49 (0) 711/970-00
Telefax +49 (0) 711/970-3395
www.ibp.fraunhofer.de

Prüfstelle Bauakustik und Schallimmissionsschutz
Nobelstraße 12 D-70569 Stuttgart
Telefon +49(0) 711/970-3314; Fax -3406
akustik@ipb.fraunhofer.de
www.ibp.fraunhofer.de/de/pruefstellen/bauakustik.html

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

Determination of the Installation Sound Level L_{In} in the Laboratory

P-BA 105/2015e
Results sheet 1

Client: Dizayn Teknik Boru ve Elemanları Sanayi ve Ticaret A.Ş., Atatürk Mahallesi Adnan Menderes Cad. No:6, 34522 Kıraç-Esenyurt / İSTANBUL, TURKEY

Test specimen: Wastewater installation system consisting of plastic pipes and fittings "DIZAYN TRIPLEXTRA 110X5.3mm" (manufacturer: DIZAYN) with acoustic pipe clamps (double clamps) "BAYKARA 4'' 110-115" (made by Baykara). Test object no.: 10819-01; see figures 4, 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, 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: 3 layer pipes "DIZAYN TRIPLEXTRA 110X5.3mm", material PVC, size OD 110, wall thickness 5.3 mm, weight 2.70 – 2.80 kg/m, density 1.6 g/cm³. Single layer fittings, material PP, size OD 110, wall thickness 2.7 mm, density 1.23 g/cm³ (values are manufacturers' information). Connection of the pipes by plug-on socket connection.
  - Pipe clamps: "BAYKARA 4'' 110-115" (figure 5): Acoustic double clamps consisting of BAYKARA 4'' guidance clamps (above) and BAYKARA 4'' socket clamps (below). In each storey (EG and UG) double clamps were installed in the lower wall area. To prevent contact to the pipe, the guidance clamps were mounted with 15 mm space between the locking tabs of the clamp (two spacers on each side). In the upper wall area "BAYKARA 4''" guidance clamps were mounted without contact to the pipe (figure 5). The clamps were fixed to the installation wall with an adjustable wall plate with dowels and thread rods.

The wastewater installation system was mounted by a technical firm 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 following European standard EN 14366 and German standard DIN 4109; noise excitation by constant water flow with 0.5 l/s, 1.0 l/s, 2.0 l/s and 4.0 l/s (details in Annexes A and F).

Result:

"DIZAYN TRIPLEXTRA 110X5.3mm" (manufacturer: DIZAYN) with acoustic pipe clamps (double clamps) "BAYKARA 4'' 110-115" (made by Baykara).

Flow rate [l/s]	0.5	1.0	2.0	4.0
Installation sound level $L_{AFeq,n}$ (L_{In}) [dB(A)] **according to DIN 4109** measured in the basement test-room UG front	47	50	52	54
Installation sound level $L_{AFeq,n}$ (L_{In}) [dB(A)] **according to DIN 4109** measured in the basement test-room UG rear	11	14	16	19
Installation sound level $\overline{L_{AFeq,nT}}$ (L_{In}) [dB(A)] **according to VDI 4100** measured in the basement test-room UG front	45	48	49	52
Installation sound level $\overline{L_{AFeq,nT}}$ (L_{In}) [dB(A)] **according to VDI 4100** measured in the basement test-room UG rear	<10	11	13	16
Airborne sound pressure level $L_{a,A}$ [dB(A)] **according to EN 14366** in the basement test-room UG front	47	50	52	54
Structure-borne sound characteristic level $L_{sc,A}$ [dB(A)] **according to EN 14366** in the basement test-room UG rear	<10	10	12	15

Test date: May 13, 2015

Notes:
- The requirements of DIN 4109 and VDI 4100 only apply for the test room UG rear.
- For the experimental setup investigated in the test facility the used acoustic pipe clamps (double clamps) "BAYKARA 4'' 110-115" normally doesn't guarantee a realistic load transmission. Consequently, in case of practical application in a real building, significant higher levels of installation noise may be expected.
- Sound levels below 10 dB(A) are not mentioned in the test report, since they are subject to an increased measurement uncertainty and moreover are not noticeable in a normal living environment.

Fraunhofer IBP

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Stuttgart, June 24, 2015
Head of Laboratory: