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

Directors
Prof. Dr. Philip Leistner
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Test Report P-BA 227/2017e

Noise behaviour of a pipe clamp with elastomer inlay for waste water systems in the laboratory

Client: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI.
Ataturk Sanayi Bolgesi General Mustafa Ozyanar Caddesi No.2
34555/Hadimkoy – ISTANBUL
TURKEY

Test object: Steel pipe clamp "NORM, 4", 109-119, 116-125" (Article No. xxxxx) with elastomer inlay, manufacturer: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI., mounted with a commercial plastic wastewater system OD 110.

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Figure 4 and 5:	Test specimen, measurement set-up
Annex H:	Measurement set-up, evaluation of measurements
Annex P:	Description of the test facility

Test date: The measurement was carried out on July 13, 2017 in the test facilities of the Fraunhofer Institute for Building Physics in Stuttgart.

Stuttgart, August 8, 2017

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

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

Determination of the Installation Sound Level $L_{AFeq,n}$ and the insertion loss D_e in the Laboratory

P-BA 227/2017e

Results sheet 1

Client: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI., Ataturk Sanayi Bolgesi General Mustafa Ozyanar Caddesi No.2, 34555/Hadimkoy – ISTANBUL, TURKEY

Test specimen: Steel pipe clamp "NORM, 4", 109-119, 116-125" (Article No. xxxxx) with elastomer inlay, manufacturer: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI., mounted with a commercial plastic wastewater system OD 110. (test object no.: 11093-1; see figure 4 and 5).

Test set-up: Steel pipe clamp "NORM, 4", 109-119, 116-125" (Article No. xxxxx) with elastomer inlay, manufacturer: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI. The pipe clamps were closed with a tightening torque of 3 Nm (completely closed).
Pipe system: Commercial wastewater system (one-layer pipes: Material PP. Wall thickness 4.6 mm, weight 2.7 kg/m, density 1.8 g/cm³, values measured by IBP.) consisting 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 (see figure 4 and 5). The wastewater system was installed in the installation test facility P12 (installation rooms: attics, EG front, UG front and lower basement; see Annex H and P).

- **Reference set-up**: Rigid attachment of the waste water pipe system with 4" steel pipe clamps without elastomer inlays, closed with a tightening torque of 3 Nm (completely closed).
- **Test set-up**: Attachment of the waste water pipe system with 4" steel pipe clamp "NORM, 4", 109-119, 116-125" (Article No. xxxxx) with elastomer inlay, manufacturer: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI. The pipe clamps were closed with a tightening torque of 3 Nm (completely closed).

The pipe clamps were fixed to the installation wall with dowels and thread rods.
The test set-up was mounted by a technician under the authority of Fraunhofer IBP. (see fgure 4 and 5 and Annex H and P).

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: top floor (DG), ground floor (EG) front, basement (UG) front and sub-basement (KG); measuring room: basement UG front and UG rear. (For further details, please refer to Annex H and P.)

Test method: The measurements were performed following 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. Evaluation for comparison with requirements following German standards DIN 4109-1:2016-07 (details in Annex H).

Result:

Test specimen: Steel pipe clamp "NORM, 4", 109-119, 116-125" (Article No. xxxxx) with elastomer inlay, manufacturer: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI. mounted with a commercial plastic wastewater system OD 110. The pipe clamps were closed with a tightening torque of 3 Nm (completely closed).	Flow-rate [l/s]			
	0.5	1	2	4
A-sound pressure level reduction $\Delta L_{AFeq,n}$ [dB], measured and calculated for the basement test-room UG rear	6	4	4	4
Installation Sound Level $L_{AFeq,n}$ [dB(A)], following DIN 4109 for the basement test-room UG rear	11	16	20	25

Test date: July 13, 2017

Notes:
- The reduction of the A-weighted sound level represents a measure for the decrease of noise felt by human ear using elastic mounting elements. It refers exclusively to the noise spectrum while exciting the pipe system by stationary water flow (as used at the measurements) and can't be transferred directly to other types of noise sources.

Fraunhofer IBP

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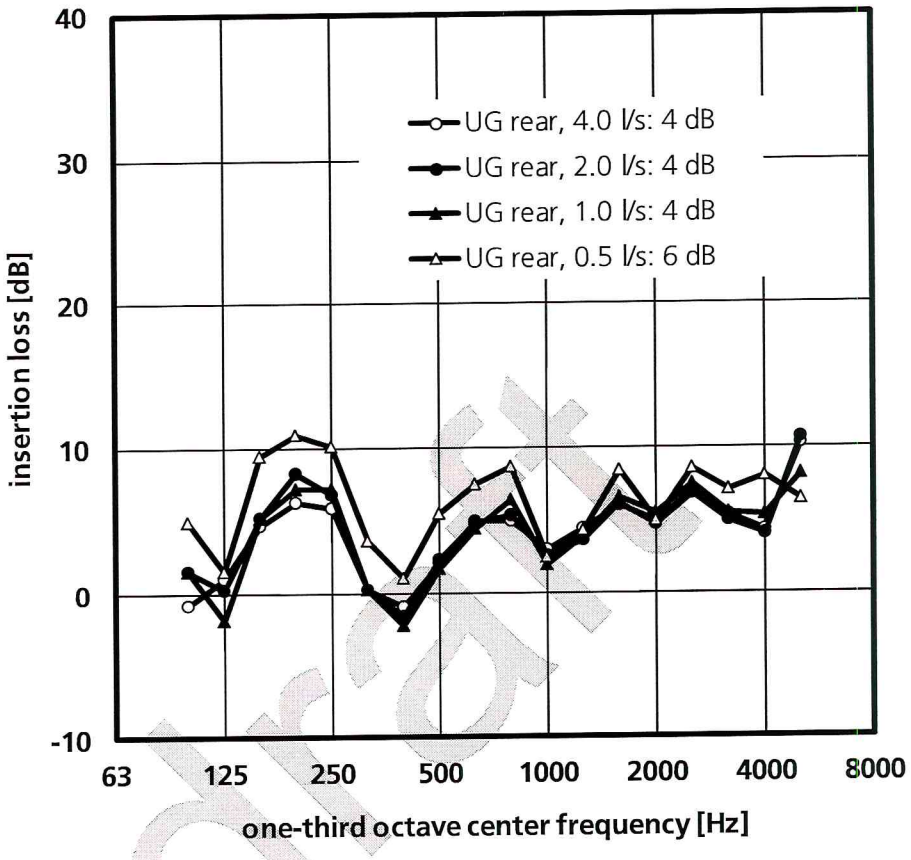
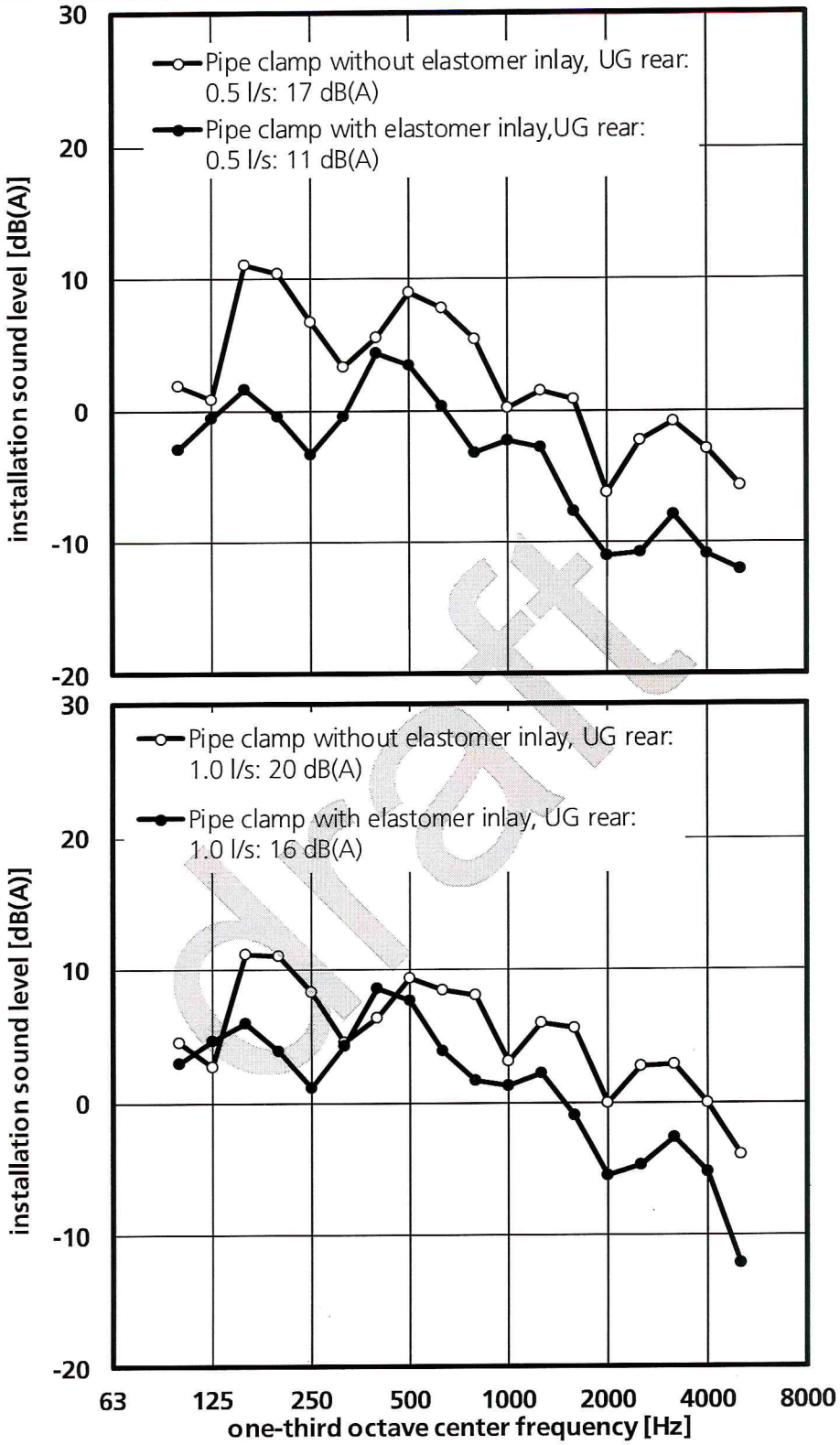
Stuttgart, August 8, 2017
Head of Laboratory:

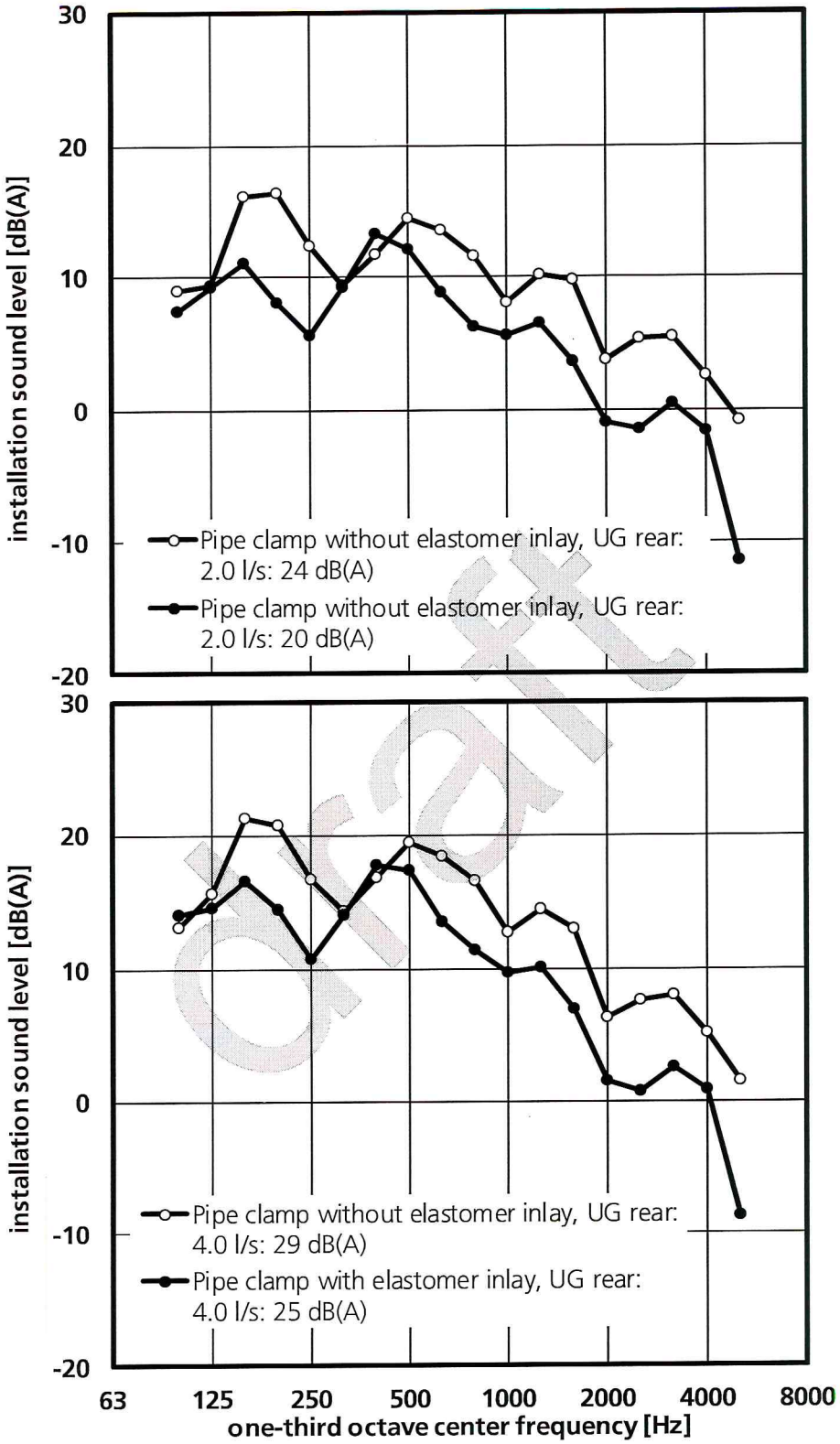


Frequency response of the insertion loss D_e by noise excitation at various flow rates 4.0 l/s, 2.0 l/s, 1.0 l/s and 0.5 l/s, measured in the test room UG rear. The A-weighted reduction of sound level $\Delta L_{AFeq,n}$ (referring to excitation by the various flow rates), for the reproduced frequency range from 100 to 5000 Hz, are represented in the legend.

Test specimen: Steel pipe clamp "NORM, 4", 109-119, 116-125" (Article No. xxxxx) with elastomer inlay, manufacturer: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI. mounted with a commercial plastic wastewater system OD 110. The pipe clamps were closed with a tightening torque of 3 Nm (completely closed). Details about the test set-up in results sheet 1.



Frequency response of the installation-sound level L_{In} for the reference set-up (pipe clamps without elastomer inlay) and for the test set-up (pipe clamps with elastomer inlay) for a flow rate of 0.5 l/s (upper picture) and 1.0 l/s (lower picture) measured in the room UG rear behind the installation wall. Test specimen: Steel pipe clamp "NORM, 4", 109-119, 116-125" (Article No. xxxxx) with elastomer inlay, manufacturer: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI. mounted with a commercial plastic wastewater system OD 110. The pipe clamps were closed with a tightening torque of 3 Nm (completely closed). Details about the test set-up in results sheet 1.



Frequency response of the installation-sound level L_{In} for the reference set-up (pipe clamps without elastomer inlay) and for the test set-up (pipe clamps with elastomer inlay) for a flow rate of 2.0 l/s (upper picture) and 4.0 l/s (lower picture) measured in the room UG rear behind the installation wall. Test specimen: Steel pipe clamp "NORM, 4", 109-119, 116-125" (Article No. xxxxx) with elastomer inlay, manufacturer: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI. mounted with a commercial plastic wastewater system OD 110. The pipe clamps were closed with a tightening torque of 3 Nm (completely closed). Details about the test set-up in results sheet 1.

Test specimen, measurement set-up

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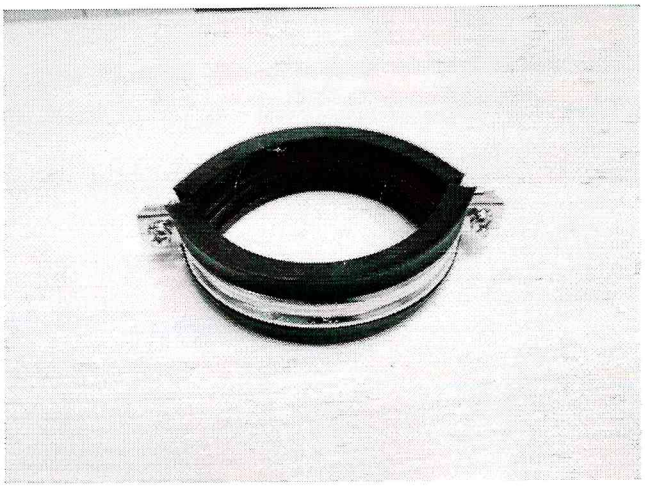
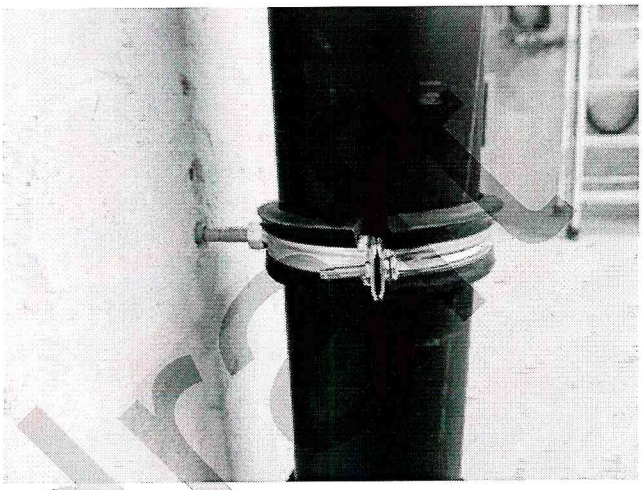
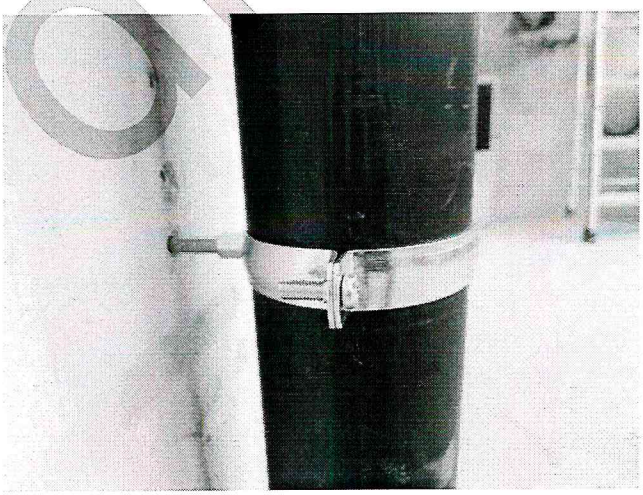
figure 4







Upper picture: Test specimen: Steel pipe clamp "NORM, 4", 109-119, 116-125" (Article No. xxxxx) with elastomer inlay, manufacturer: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI.

Middle picture: Test set-up, wastewater system with pipe clamps "NORM, 4", 109-119, 116-125" with elastomer inlay. The pipe clamps were closed with a tightening torque of 3 Nm.

Lower picture: Reference set-up, Wastewater system with steel pipe clamps without elastomer inlay

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Test specimen, measurement set-up

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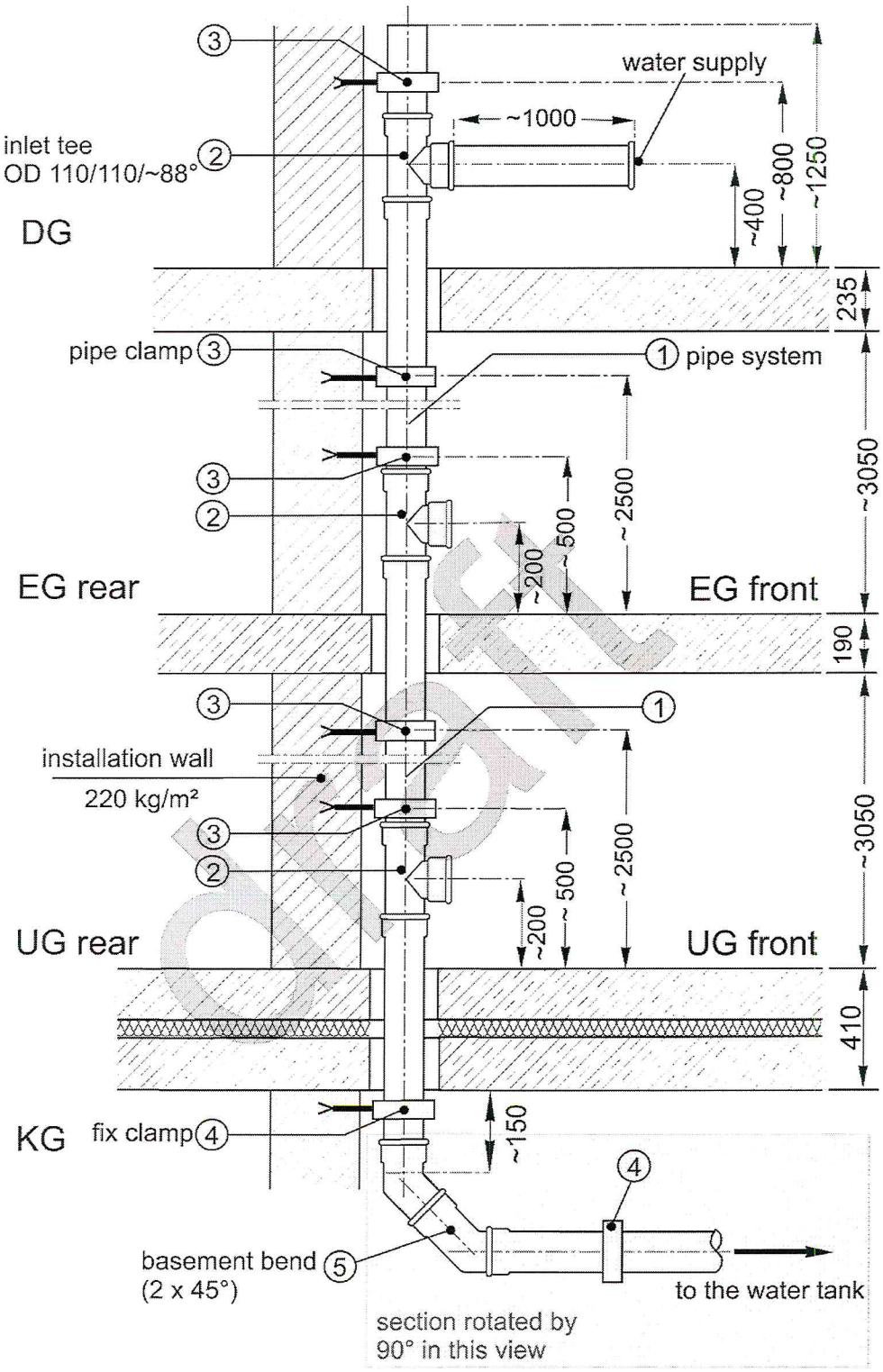
P-BA 227/2017e
figure 5



Installation plan of the test set-up in the test facility.
Test specimen: Steel pipe clamp "NORM, 4", 109-119, 116-125" (Article No. xxxxx) with elastomer inlay, manufacturer: NORM BAGLANTI VE TESBIT ELEMANLARI SAN.TIC.LTD.STI. mounted with a commercial plastic wastewater system OD 110. The pipe clamps were closed with a tightening torque of 3 Nm (completely closed). Details about the test set-up in results sheet 1.

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