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Technical Report No.

713166143Rev.1

dated

28.01.2020

Client:	Stamer Musikanlagen GmbH Magdeburger Str. 8 66606 St. Wendel
Manufacturer and / or location of manufacturing:	see client
Unit under test (UUT):	HK Audio SI Series Column Loudspeaker P10i (TR) and P10j (TR)
Test specification:	Sealing test resp. test of degree of protection provided by enclosure to DIN EN 60529/VDE 0470 part 1: 2014
Test scope:	Verification of suitability for intended application according the under position 3 detailed test specification
Test result:	The units under test were opened. The visual inspection showed no ingress of dust and water (see notes position 5 - test sequence). The presented units met the requirements of the protection test IP 55 and IP 66.

Editor: Norbert Drescher

Date of issue: 28.01.2020

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1 Unit under test (UUT)

The units under test were Speakers:

UUT No.	Type	Identity-No.	Serial No.	Test performed
1	HK Audio SI Series Column Loudspeakers	SI P10i TR	TR #1	IP 5X / 6X (dust)
2			TR #2	
3			TR #3	IP X5 (water)
4			TR #4	IP X6 (water)
5		SI P10j TR	TR #1	IP 5X / 6X (dust)
6			TR #2	
7			TR #3	IP X5 (water)
8			TR #4	IP X6 (water)

2 Order

2.1 Date of order, initial of client

Company Stamer Musikanlagen GmbH orders from TÜV SÜD Product Service GmbH with order sheet dated 29.07.2019, order No. 21024144 to test a.m. UUT.

2.2 Receipt of UUT

The samples were delivered by forwarding agent on 07.01.2020.

2.3 Reconsignment of UUT

The samples 2 - 8 were taken by the client on 21.02.2020.
Sample 1 is deposed of by the test laboratory.

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3 Test specification

3.1 Degree of protection

3.1.1 IP 5X

- Protected against access to hazardous parts with a wire
- Protection against dust

The wire with 1.0 mm diameter shall be pressed with 1 N against every opening of the housing.

The access probe of 1 mm Ø shall not penetrate.

Housing category 1:

Housing of UUT connected to a vacuum pump with a low air pressure at 2 kPa (20 mbar)

Test dust:	talcum powder
Test duration	2 h; flow rate of air volume 80-fold, < 60-fold per h
or:	8 h; flow rate of air volume < 40-fold per h

3.1.2 IP 6X

- Protected against access to hazardous parts with a wire
- Dust tight

The wire with 1.0 mm diameter shall be pressed with 1 N against every opening of the housing.

The access probe of 1 mm Ø shall not penetrate.

Housing of UUT connected to a vacuum pump with a low air pressure at ≤ 2 kPa (≤ 20 mbar)

Test dust:	talcum powder (< 75 µm)
Test duration	2 h; flow rate of air volume 80-fold, < 60-fold per h
or:	8 h; flow rate of air volume < 40-fold per h

No ingress of dust.

3.1.3 IP X5

- Protected against water jets high-velocity water

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Distance nozzle to UUT:	2.5 m to 3 m
Water flow rate:	12.5 l/min ± 5%
Nozzle opening:	6.3 mm
Test duration:	1 min/m^2, at least 3 min

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3.1.4 IP X6

- Protected against powerful water jets strong high-velocity water

Water projected in powerful jets against the enclosure from any direction shall have no harmful effects.

Distance nozzle to UUT:	2.5 m to 3 m
Water flow rate:	100 l/min ± 5%
Nozzle opening:	12.5 mm
Test duration:	1 min/m^2, at least 3 min

4 Test equipment

Equipment	Type	Ser. No.	Manufacturer	Cali-brated until
Dust chamber 1	DST 2100	38011	Primus & Brandt GmbH	—
Flow rate measuring instrument	FMA 1718	284319-1 (07-10/41-11-001)	Omega	02/2020
Mass flow rate measuring instrument	FMA 1728	278430-1 (07-10/41-11-002)	Omega	02/2020
Test probe	wire: Ø 1.0 mm	SD01003 07-10/99-10-001	Primus & Brandt GmbH	07/2022
Force sensing device	M5-10	3484278; 07-10/15-12-001	Mark-10 Corporation	09/2022
Flow meter	DA10A11	002053; 07-10/41-02-001	ABB	10/2020
Flow meter	DA10A11	007045; 07-10/41-03-001	ABB	01/2021
Hosing nozzle X5, X6K	6.3 mm Ø	n/a	TÜV SÜD Product Service	n/a
Hosing nozzle X6	12.5 mm Ø	n/a	TÜV SÜD Product Service	n/a
Stopwatch	n/a	381 1140	Testo	06/2021

All measuring equipment is calibrated regularly according the calibration instructions of TÜV SÜD PRODUCT SERVICE GmbH. All calibrations are traced back to national standards.

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5 Test sequence

Test date: from 07.01.2020 to 22.01.2020

No.	Test specification	Period	Notes
1	Degree of protection against solid bodies - IP 5X / 6X	07.01.2020	**UUT 1, UUT 2, UUT 5, UUT 6:** There was no ingress possible with the test probe Ø 1mm.
		08.01.2020 to 22.01.2020	**UUT 1, UUT 2, UUT 5, UUT 6:** The visual inspection showed no ingress of dust.
2	Degree of protection against water - IP X5 / X6	08.01.2020 and 21.01.2020	**UUT 3, UUT 4, UUT 7, UUT 8:** The visual inspection showed no ingress of water.

6 Assessment criteria

The following areas of the UUT were checked after the performed tests:

UUT	Type	Test	Results – checked housing area			
			transformer	connector	pcb	speaker
1	P10i TR#1	IP 5X / 6X	no dust	no dust	no dust	no dust
2	P10i TR#2	IP 5X / 6X	no dust	no dust	no dust	no dust
3	P10i TR#3	IP X5	no water	no water	no water	no water
4	P10i TR#4	IP X6	no water	no water	no water	no water
5	P10j TR#1	IP 5X / 6X	no dust	no dust	no dust	no dust
6	P10j TR#2	IP 5X / 6X	no dust	no dust	no dust	no dust
7	P10j TR#3	IP X5	no water	no water	no water	no water
8	P10j TR#4	IP X6	no water	no water	no water	no water

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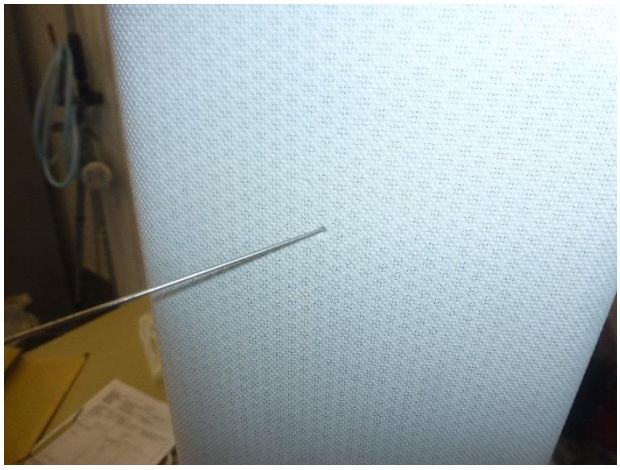
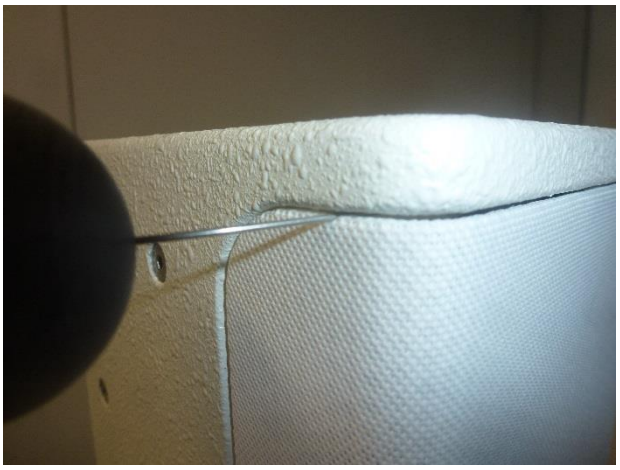
7 Photo documentation

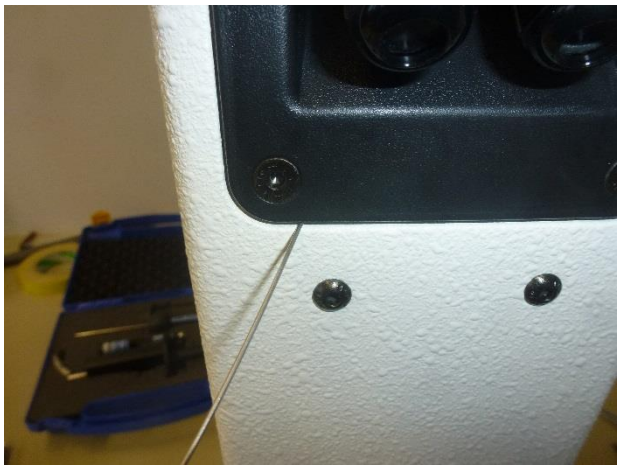
1. Penetration with the access probe Ø 1mm not possible



2. Penetration with the access probe Ø 1mm not possible



3. Penetration with the access probe Ø 1mm not possible



4. Penetration with the access probe Ø 1mm not possible

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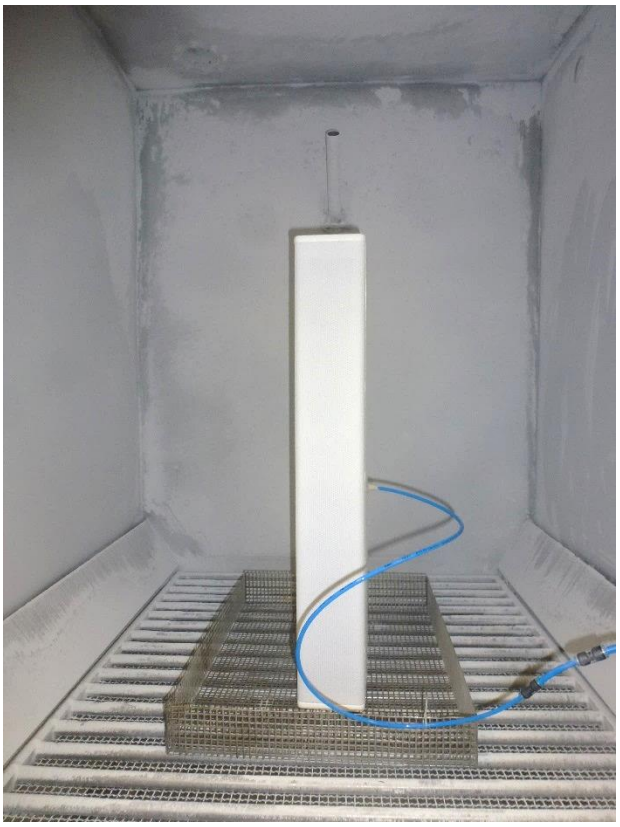
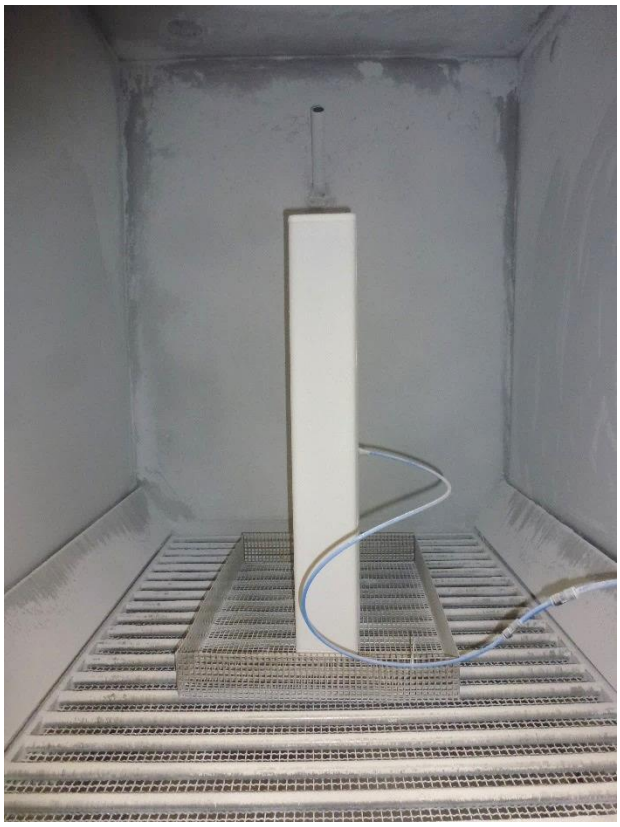
5. Penetration with the access probe Ø 1mm not possible

6. Pressure 1 N against housing



7. UUT before IP5X / 6X in the dust chamber



8. UUT after IP5X / 6X in the dust chamber

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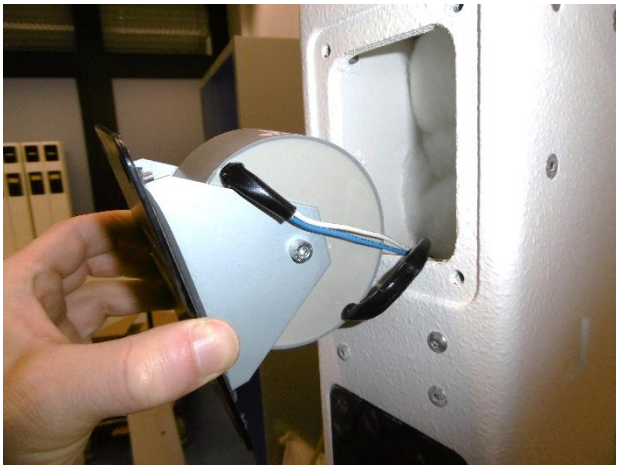
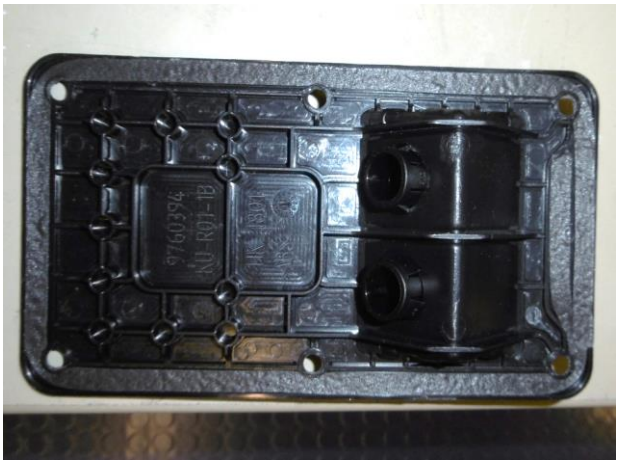
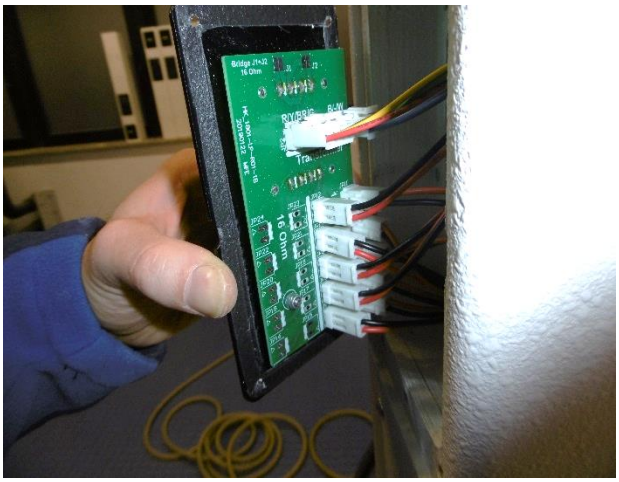


9. Transformer box – no penetration of dust visible



10. Cover connection box – no penetration of dust visible

11. Connection box - no penetration of dust visible



12. PCB box - no penetration of dust visible

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13. Speaker - no penetration of dust visible

14. Speaker - no penetration of dust visible

15. UUT during IP X5

16. UUT during IP X5

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17. UUT during IP X6

18. UUT during IP X6

19. UUT during IP X6

20. UUT during IP X6

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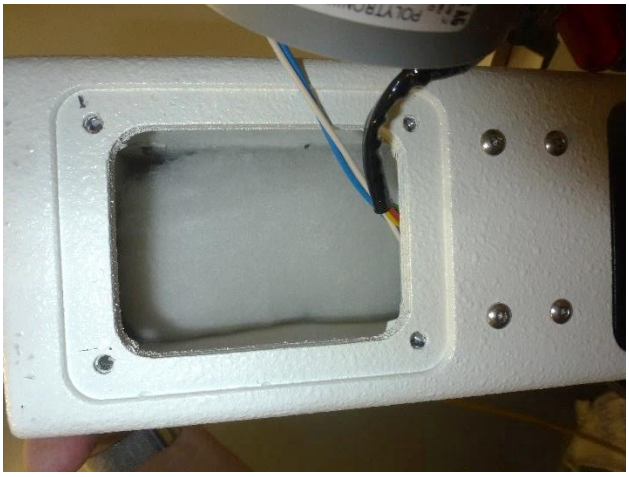
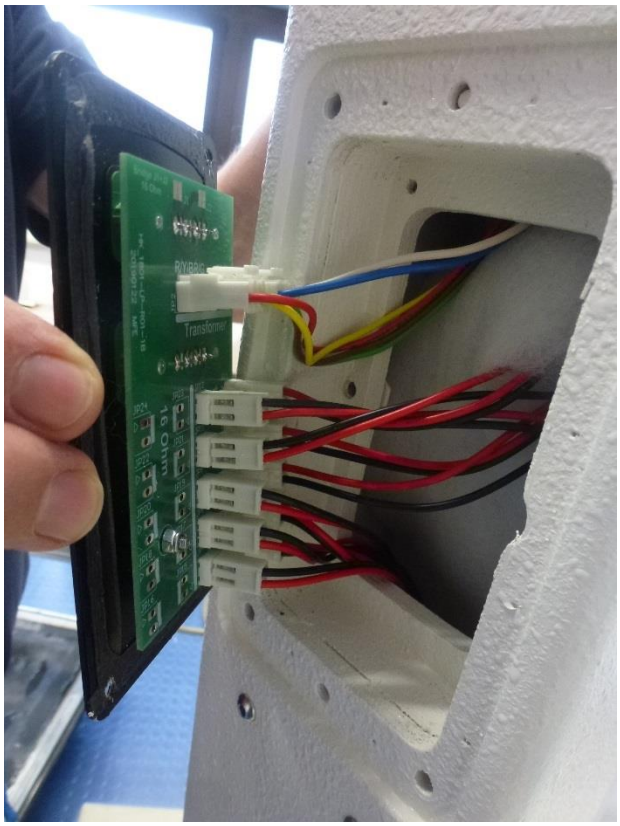


21. Transformer box – no penetration of water visible

22. Cover connection box – no penetration of water visible

23. Connection box - no penetration of water visible



24. PCB box - no penetration of water visible

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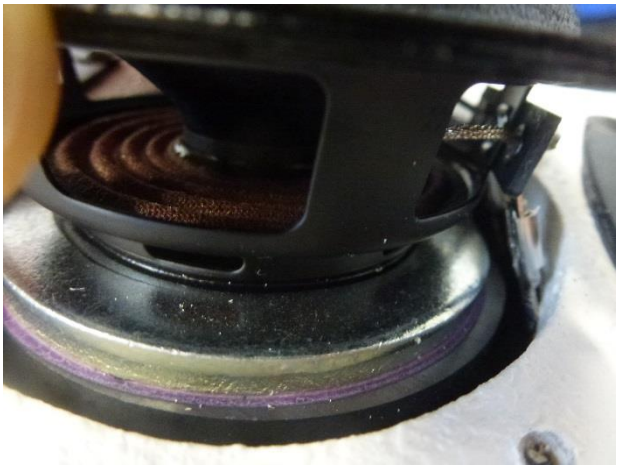
25. Speaker - no penetration of water visible



26. Speaker - no penetration of water visible

27. Speaker - no penetration of water visible

28. Speaker - no penetration of water visible

Verified
Signature

Uwe Marlok
Laboratory Manager

Edited
Signature

Norbert Drescher
Test Engineer

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