

GIORDANO INSTITUTE S.p.a.

RESEARCH AND CERTIFICATION POLYTECHNIC CENTRE

Test Report no. 178090

Place and date of issue: Bellaria, 04.12.2003

Customer: EMMEDUE S.r.l. – Via Toniolo, 39/B – Zona Industriale Bellocchi - 61032 FANO (PU)

Date of application for the test: 19.09.2003

Number and date of the job: 23414, 23.09.2003

Date of reception of the sample: 08.10.2003

Date of test execution: 25.11.2003

Test subject: Definition of the wall sound insulation power according to the ISO regulations 140 3rd part of 1995 and ISO 717 1st part of 1996.

Place of the test: Giordano Institute S.p.A. – Section 3 – Via Verga, 19 – 47030 Gatteo (FO).

Origin of the sample: supplied by the Customer

Identification of the sample accepted: no. 2003/1413.

Name of the sample*

The panels used for the realization of the sample undergoing the test are called “PSME80”.

Drawn up by PB Revision ed by AB	This test report consists of no. 8 sheets.	Sheet no. 1 of 8
-------------------------------------	--	------------------

* according to the Customer's statements

Sample description*

The sample undergoing the test consists of a wall realized with “PSME80” panels of foamed polystyrene and steel mesh reinforcement, plastered on both faces, having the following dimensional characteristics:

Nominal width of the standard “PSME80” panel = 1125 mm;

Nominal length of the standard “PSME80” panel = 3580 mm;

Average nominal thickness of the standard “PSME80” panel = 80 mm;

Wall total nominal width = 3600 mm;

Wall total nominal height = 3000 mm;

Wall total nominal thickness = 174 mm;

Wall working acoustic surface = 10,80 m².

The “PSME80” panels, in particular, are made up of:

- Self-extinguishing foamed polystyrene slabs, density 15 kg/m³, undulated on both faces, waviness height 10 mm, coupled on the direction of width;
- Square mesh sheet applied on both faces and realized with galvanized steel wires, wire diameter 2,5 mm and length on the mesh side 65 mm.

Both faces of the sample have been protected with plaster, total thickness 42 mm, consisting – starting from the inside – of:

- Cement-based undercoat of plaster, thickness 30 mm;
- Cement-based coat of insulating plaster with hydrate air-hardening lime, special lightened aggregates and cellulose, 10 mm thick, applied two days after applying the undercoat of plaster;
- Finishing shaving with polymers and marble fines, 2 mm thick, applied three days after applying the coat of insulating plaster.

* according to Customer's statements

DRAWING OF THE TESTED SAMPLE

(DETAIL OF THE SECTION)

Legend

Symbol	Description
1	Finishing shaving with polymers and marble fines, 2 mm thick.
2	Coat of cement-based insulating plaster with hydrate air-hardening lime, lightened special aggregates and cellulose, 10 mm thick.
3	Cement-based undercoat of plaster, 30 mm thick.
4	Square mesh sheet with galvanized steel wires, diameter of wires 2,5 mm and length on mesh side 65 mm.
5	Self-extinguishing foamed polystyrene slab, density 15 kg/m ³ , undulated on both faces, waviness height 10 mm.

Photograph of the tested sample during the realization

References to regulations

The test has been carried out according to the instructions of the regulations below:

- ISO 140 3rd part of 1995 “Acoustics Measurement of sound insulation in buildings and of building elements.

Part 3: Laboratory measurements of airborne sound insulation of building elements”;

- ISO 717 1st part of 1996 “Acoustics. Rating of sound insulation in buildings and of building elements. Part 1: Airborne sound insulation in buildings and of interior building elements”.

Test equipment

To carry out the test, the following equipment has been used:

- 1000 W power amplifier, model “ENERGY 2” made by the firm LEM;
- all-direction acoustic diffuser;
- acoustic diffuser in reception chamber;
- third-octave equalizer, model “HD-31” made by the firm Applied Research & Technology Inc;
- \varnothing ½ microphones, model “4192” by the firm Brüel & Kjaer;
- microphonic preamplifiers, model “2669” by the firm Brüel & Kjaer;
- real time analyzer, model “Symphonie” by the firm 01 dB – Steel;
- signal amplifier – conditioner, model “Nexus” by the firm Brüel & Kjaer;
- power measurer for microphones, model “4231” by the firm Brüel & Kjaer;
- finishing accessories.

How the test is carried out

The place of the test consists of two rooms, one of which, defined as “emission room”, contains the source of noise; the other one, defined as “reception room”, is acoustically characterized by the area of equivalent acoustic absorption.

After placing the sample to be examined at the opening between the two rooms of the test place, the level of sound pressure has been measured at various frequencies, at the spacing included between 100 Hz and 5000 Hz, both in the emission room and in the reception one; also, the reverberation time of the reception room in the same range of operation has been verified.

The “ R_w ” rating strength of the “R” sound insulation power is equal to the dB value of the reference curve at 500 Hz according to the procedure of the ISO 717 regulation, 1st part.

The “R” sound insulation power, equal to no.10 times the decimal logarithm of the ratio between incident sound power and the sound power transmitted by the sample, has been calculated using the formula below:

$$R = L_1 - L_2 + 10 \cdot \log \frac{S}{A}$$

where: R= sound insulation power, expressed in dB;

L_1 = sound pressure average level in the emission room, expressed in dB;

L_2 = sound pressure average level in the reception room, expressed in dB;

S= measurement working surface of the tested sample, expressed in m^2 ;

A= area of equivalent acoustic absorption of the reception room, expressed in m^2 , calculated using the following formula:

$$A = \frac{0,16 \cdot V}{T}$$

where: V= volume of the reception room, expressed in m^3 ;

T= reverberation time, expressed in sec.

As proposed by the regulation ISO 717, 1st part, no.2 corrective terms in dB have been calculated; these take the features of special source sound spectrums into account, in particular:

- “C” corrective term to be added to the “ R_w ” rating strength with source spectrum related to A weighted pink noise;
- “ $C\pi$ ” corrective term to be added to the “ R_w ” rating strength with source spectrum related to A weighted traffic noise.

Environmental conditions while testing

Average ambient temperature = 13 °C

Relative humidity = 60 %

Measurement working surface of the sample
10,80 m²

Volume of the emission room
57,0 m³

Volume of the reception room:
88,0 m³

Type of noise:
Pink

Type of filter:
1/3 octave

Result of the test:
Rating index at 500 Hz in the frequency band included between 100 Hz and 3150 Hz:
R_w = 41 dB

"R" sound insulation power (dB)

Frequency bands with unfavourable deviation above 8 dB:
800 Hz

Terms of correction:
C = -1 dB
C_p = -3 dB

Frequency (Hz)

_____ Experimental measurements
----- Reference curve

The Person in Charge
Test Engineer
(Mr. Omar Nanni)

The Acoustic and
Vibration Laboratory
Person in charge
(Mr. Andrea Bruschi)

The Chairman or
General Manager
(Mr. Eng. Vincenzo Iommi)