



BELGIAN BUILDING RESEARCH INSTITUTE

ESTABLISHMENT RECOGNISED BY APPLICATION OF THE DECREE LAW OF 30 JANUARY 1947

- Test centre : B-1342 Limelette, avenue P. Holoffe, 21
- Offices : B-1932 Sint-Stevens-Woluwe, Lazenberg 1, 7
- Head office : B-1000 Bruxelles, rue de la Violette, 21-23

Tel. : (32) 2 655 77 11

Fax : (32) 2 653 07 29

Tel. : (32) 2 716 42 11

Fax : (32) 2 725 32 12

Tel. : (32) 2 502 66 90

Fax : (32) 2 502 81 80

VAT n° BE 407.695.057

Page : 1/7

LABORATORY : Acoustics (AC)

TEST REPORT

N° DE, DAT, RE

DE 631X857

N° Laboratory

AC 3208-E

N° Sample

16/46/6

REQUESTED BY : JOINT VENTURE PRODUCTION S.r.l.,

Via dell'Industria, 19

I- 35028 - Piove di Sacco- Italy

Contact persons:

- Requested by -

- BBRI -

M. F. Tilkin, Technical Manager

Ir. I. Pissens

Tests performed : Measurement of the normalized level difference between two rooms equipped with a continuous technical floor, reference JVP type 4x4 - C4TTJO.

References :

ISO 717-1: 1996 - Rating of sound insulation in buildings and of building elements
- Part 1 : Airborne sound insulation.

NBN EN 20140-9: 1995 - Laboratory measurement of room to room airborne sound insulation of a suspended ceiling with a plenum above it

NBN S01-400 : 1977 - Acoustical insulation criteria

Date and reference of the request : 2 march 2000, reference FT/SL-L00.123

Date of receipt of the sample(s) : 20 march 2000

Test date : 22 march 2000

Drafting date of the report : 17 april 2000

This report contains 7 pages, numbered from 1 to 7. It may only be reproduced in its entirety.

It contains also 5 figures in annex.

Each page of the original report has been stamped in red by the laboratory and initialed by the head of laboratory.

The results and findings are only valid for the tested samples.

No sample

Sample(s) submitted to a destructive test

Sample(s) to be removed from our laboratories 10 calendar days after sending of the report, unless a written request is received by the demander of the test

In charge of the test

Ph. Wattiez

Technical assistance : /

The head of Laboratory



Ir. B. Ingelaere



1. MEASUREMENT METHOD

The measurements are performed on the basis of the international standard ISO 140 : "Measurement of sound insulation in buildings and of building elements - Part 9: Laboratory measurement of room to room airborne sound insulation of a suspended ceiling with a plenum above it" - corresponding to the European reference standard cited earlier, NBN EN ISO 20140-9 : 1995.

The focus here is on transmission from room to room with a continuous raised floor (plenum of 10 cm). A 6 cm joint separates the external walls of the two transmission chambers.

1.1. Test setup

The dimensions of the rooms, the heights of the partition and the plenum are given in figure 5.

Partition :

The partition, designed to ensure the maximum possible insulation, is built on the technical floor - to a height of at least 3.4 m - and thus divides the test installation into two rooms of 47 and 49 m³. The surface area of the partition corresponds to 12.6m².

The partition (interior height of 3.41 m) has a total thickness of 31 cm and is constituted of a light wall composed as follows:

- two structures of metal profiles (of the Metal Stud type, 75 mm wide) positioned with 200 mm of exterior clearance;
- on either side of this structure, an assembly of two sheets of 12.5 mm gypsumboard was applied and repointed;
- inside the metal structure, sheets of rock wool of the Rockwool 433 type - 50 and 100 mm thick and weighing 45 kg/m³ - were installed, there thus remains a space of 50 mm;
- on an external face (side C2), an acoustical lining of the type CALIBEL 50 + 10 mm was adhesively bonded.

Technical floor :

The technical floor to be tested rests on adjustable jackscrews ; it does not occupy the entire ground surface of each of the rooms (broadcast-reception) : it remains possible for a person to pass through the inner door (half-open) - (see figure 5).

The upper level of the floor is 14 cm from the level of the ground. The air space is around 10 cm. No absorbent is inserted into the space.

In the case of the test with "acoustical barrier", mattresses of mineral wool are installed below the partition under the floor, over a width of 50 cm.

The floor slabs supporting the partition remained the same for all the tests (floor slabs of the type 4x4 - C4TTJO).

A more complete description of the installation is given in §3.





1.2. Procedure

The sound source is constituted by a loudspeaker, so as to produce a field as diffuse as possible and is placed at a distance from the floor such that the direct emission on the latter is not predominant. There are no diffusing elements.

The acoustical field is sampled, in each room, using a microphone attached to a rotating arm. One complete rotation takes 64 seconds and corresponds to the integration time of the measurement. The measurement is repeated in another plane.

This procedure is then repeated by reversing the emission and reception rooms, the value indicated for the normalized level difference of the technical floor $D_{n,f}$ is the arithmetic average of the two results.

This quantity, called the technical floor normalized level difference and having the symbol $D_{n,f}$ (the index f indicates the floor) is determined from normalized level difference, measured in each direction, by the relation:

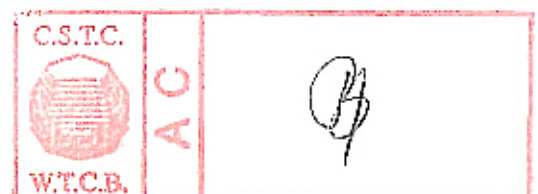
$$D_n = L_1 - L_2 - 10 \log_{10} \frac{A}{A_0} \text{ en dB}$$

where :

- L_1 : is the level of the average quadratic acoustical pressure in the emission room, expressed in dB;
- L_2 : is the level of the average quadratic acoustical pressure in the reception room, expressed in dB;
- A : is the equivalent absorption in the reception room. It will be calculated as of reverberation time T (in seconds) in the reception room (of volume V in m^3), using the Sabine formula : $A = 0.16 V/T$
- A_0 : is the reference absorption area taken, equal to $10 m^2$.

2. MEASUREMENT EQUIPMENT

- A noise generator - Bruël and Kjær - type 1405;
- An equaliser Klark Teknik DN 27;
- A power amplifier STUDER A 68;
- A loudspeaker - BOSE 802;
- Two microphones - Bruël and Kjær - type 4165 with preamplifier BK 2639 and power supply BK 2804;
- Two rotating arms - Bruël and Kjær - type 3923;
- A piston phone - Bruël and Kjær - type 4220;
- A digital frequency analyser - Bruël and Kjær - type 2131;
- A BMX computer, IBM compatible with HP plotter.





3. DESCRIPTION OF THE TEST INSTALLATION

The entire test installation (floor and partition) was created by DYNABAT, rue des Champles, 50 B- 1301 – Bierges Wavre.

The JVP brand floor slabs are installed on a finished height of 14 cm and on a surface of ± 22 m² (see sketch in figure 5). The installation includes the slabs and jackscrews described in detail below. The barrier and the carpet used are also described. These descriptions were provided by DYNABAT.

The partition described in § 1.1 is placed on this floor upon the separation of the two transmission chambers.

3.1 Description of the slabs

3.1.1. JVP brand type 4x4 – CATTJO

The panels have a dimension of 600/600 mm and are 29 mm thick. A total jacketing in 0.5 mm galvanised steel was performed. The 4 sides of the slabs include a peripheral reinforcement integrated by a quadruple fold of galvanised sheet.

N.B. : The slabs have a mass of 10.0 ± 0.1 kg per slab.

3.2 Description of the jackscrews with a height of 100 mm.

The jackscrews are made of a BACO metal material of type 70/56 NB/2.

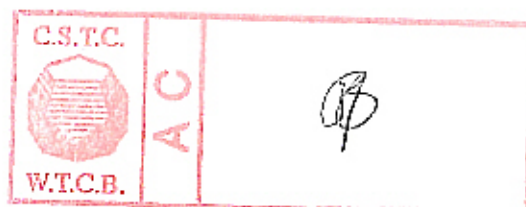
They are attached to the concrete support by a two-component epoxy adhesive.

3.3 Description of the acoustical barrier

The acoustical barrier - 500 mm wide and 80 mm thick, at the base of the partition - was created with the aid of rock wool mattresses of the Rockwool-Rockfon Soundstop RH-95 type weighing 70 kg/m³ and installed between the concrete floor and the slabs of technical floor.

3.4 Description of the carpet

Brand: Louis De Poortere
Type: Missouri II Conn.
Dimensions: 50 cm x 50 cm
Weight of the pile: 735 g/m²
Back: Bitumen



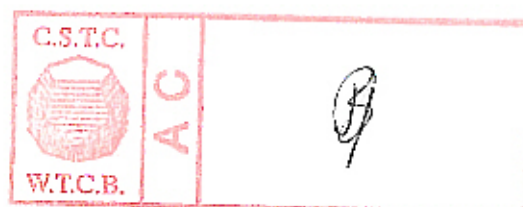


4. DESCRIPTION OF THE TESTS PERFORMED

Four different test conditions formed the object of measurements of the technical floor normalized level difference.

The following table includes the four configurations tested on 22 March 2000, and gives the ambient conditions of the measurements:

Test $D_{n,f}$ and figure	characteristic	temperature (°C)	Atmosph. pressure (hPa)	relative humidity (%)
N°1	with barrier, with carpet	20	1013	57
N°2	with barrier, without carpet	20	1013	57
N°3	without barrier, with carpet	21	1006	54
N°4	without barrier or carpet	21	1006	54



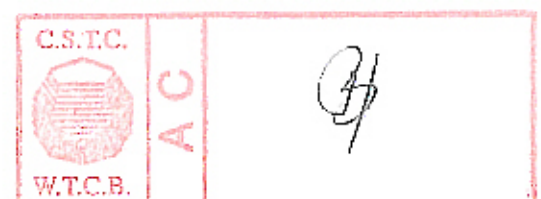


5. RESULTS OF THE MEASUREMENTS

The figures 1 to 4 include the results of measurements performed i.e. the spectrum of the technical floor normalized level difference as a function of the frequency by thirds of an octave from 100 to 5000 Hz. Each third is represented by its rated frequency (in Hz).

The following table gives the spectrum of the normalized level difference measured between the two rooms provided with the technical floor with plenum, equipped or not with barrier, with or without carpet, as indicated.

Rated frequency 1/3 octave (Hz)	Normalized level difference between rooms with technical floor (dB)			
	D_{nf}			
	Test N°1	Test N°2	Test N°3	Test N°4
100	30.0	33.2	23.7	25.9
125	34.8	32.3	27.4	24.8
160	45.2	41.7	35.8	30.9
200	46.2	47.0	40.0	33.7
250	47.8	46.4	41.4	35.4
315	49.9	48.5	44.0	40.8
400	50.9	51.3	45.3	42.5
500	52.2	50.5	46.0	42.5
630	54.6	53.5	47.3	43.7
800	52.0	52.2	48.5	45.6
1000	52.5	50.0	50.4	47.7
1250	57.5	52.4	57.7	51.2
1600	63.5	55.5	63.8	54.9
2000	67.9	58.5	68.2	56.0
2500	72.0	61.2	71.2	56.8
3150	70.9	62.8	69.9	56.8
4000	66.6	64.9	66.8	57.6
5000	66.9	66.7	66.8	59.3





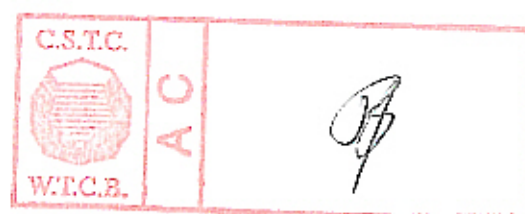
6. INTERPRETATION OF THE RESULTS

The following table summarises the situations measured and gives the criteria obtained :

- the category obtained for D_n according to the standard NBN S01-400;
- the weighted technical floor normalized level difference $D_{n,f,w}$ obtained according to the international standard ISO717-Part 1;
- the sound reduction index against pink noise in dB(A) according to the French standard NF S31-051.

Reference standard	Category and insulation indices	Test Nber 1	Test Nber 2	Test Nber 3	Test Nber 4
NBN S01-400	category (D_n)	I _b	II _a	II _b	III _a
ISO 717-1	$D_{n,f,w}$ (C ; Ctr) in dB	55 (-2 ; -8)	53 (-1 ; -6)	49 (-2 ; -8)	46 (-2 ; -6)
NF S31-051	R pink dB(A)	54	52.5	48.1	45.2

12/4/2000 1799/-



NORMALIZED LEVEL DIFFERENCE

Dn

Laboratory measurement following:

NBN EN 20140-9 (1995)

Rating following:

ISO 717-1 (1996)

Requested by:

-Joint Venue Production S.p.A.
E- 35028 - Pieve di Sacca - Italy

Datum: 12-04-2000

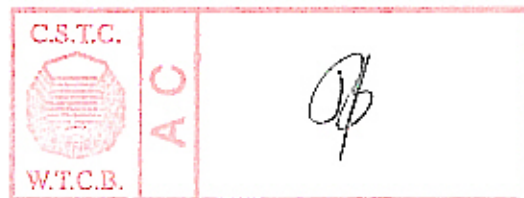
Date:

PW: AC 32118-E

File: DE 621x357

Test description:

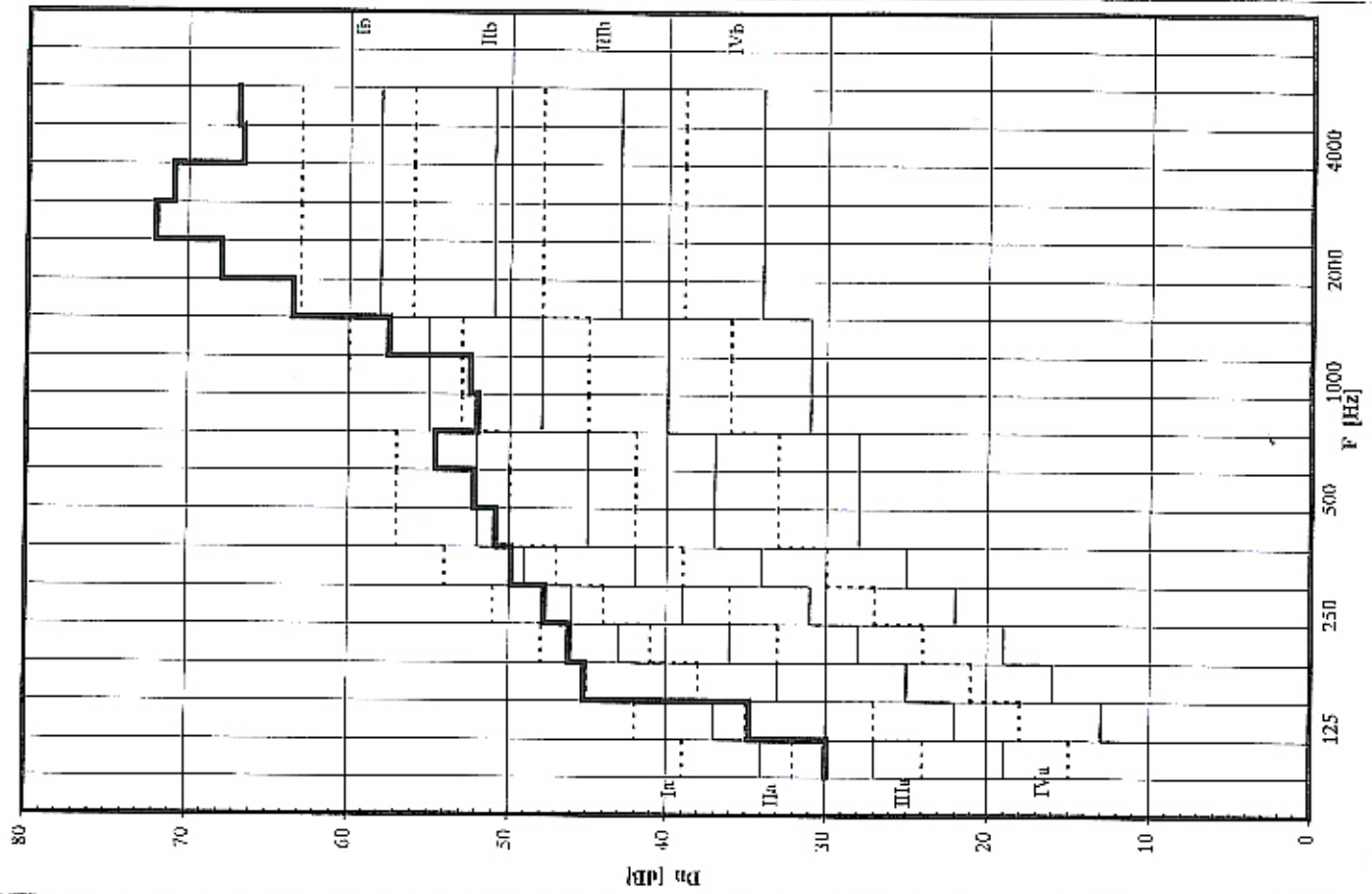
Hall K - Cells C1 & C2 - LIMELITE
Arithmetic average of floor Dn measures with barrier and carpet
Test Number 1



F Hz	Dn dB
100	30,0
125	34,8
160	45,2
200	46,2
250	47,8
315	49,9
400	50,9
500	52,2
630	54,6
800	52,0
1000	52,5
1250	57,5
1600	63,5
2000	67,9
2500	72,0
3150	70,9
4000	66,6
5000	66,9

NBN S91-400
cat. Ib

EN-ISO 7171
D_{n,w} = 55 dB
C = -2 dB
Ctr = -8 dB



BELGIAN BUILDING
RESEARCH INSTITUTE

Acoustics Laboratory
Rue de la Violette 21-23
B-1000 BRUXELLES



CENTRE SCIENTIFIQUE
ET TECHNIQUE DE LA
CONSTRUCTION
Laboratoire Acoustique
Rue de la Violette 21-23
B-1000 BRUXELLES

NORMALIZED LEVEL DIFFERENCE

Dn

Laboratory measurement following:

NBN EN 201 40-9 (1995)

Rating following:

ISO 717-1 (1996)

Requested by:

-Joint Venture Production S.r.l.-
P-35028 - Pieve di Sacco - Italy

Date:

12-04-2000

PV:

AC 3208-E

File:

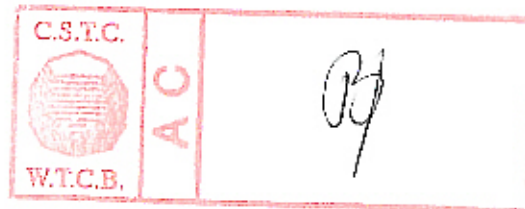
DE 631x857

Test description:

Hall K - Cells C1 & C2 - 1342 LIMELETTE

Arithmetic average of floor Dn measures with barrier, without carpet

Test Number 2



F Hz	Dn dB
100	33,2
125	32,3
160	41,7
200	47
250	46,4
315	48,5
400	51,3
500	50,5
630	53,5
800	52,2
1000	50,0
1250	52,4
1600	55,5
2000	58,5
2500	61,2
3150	62,8
4000	64,9
5000	66,7

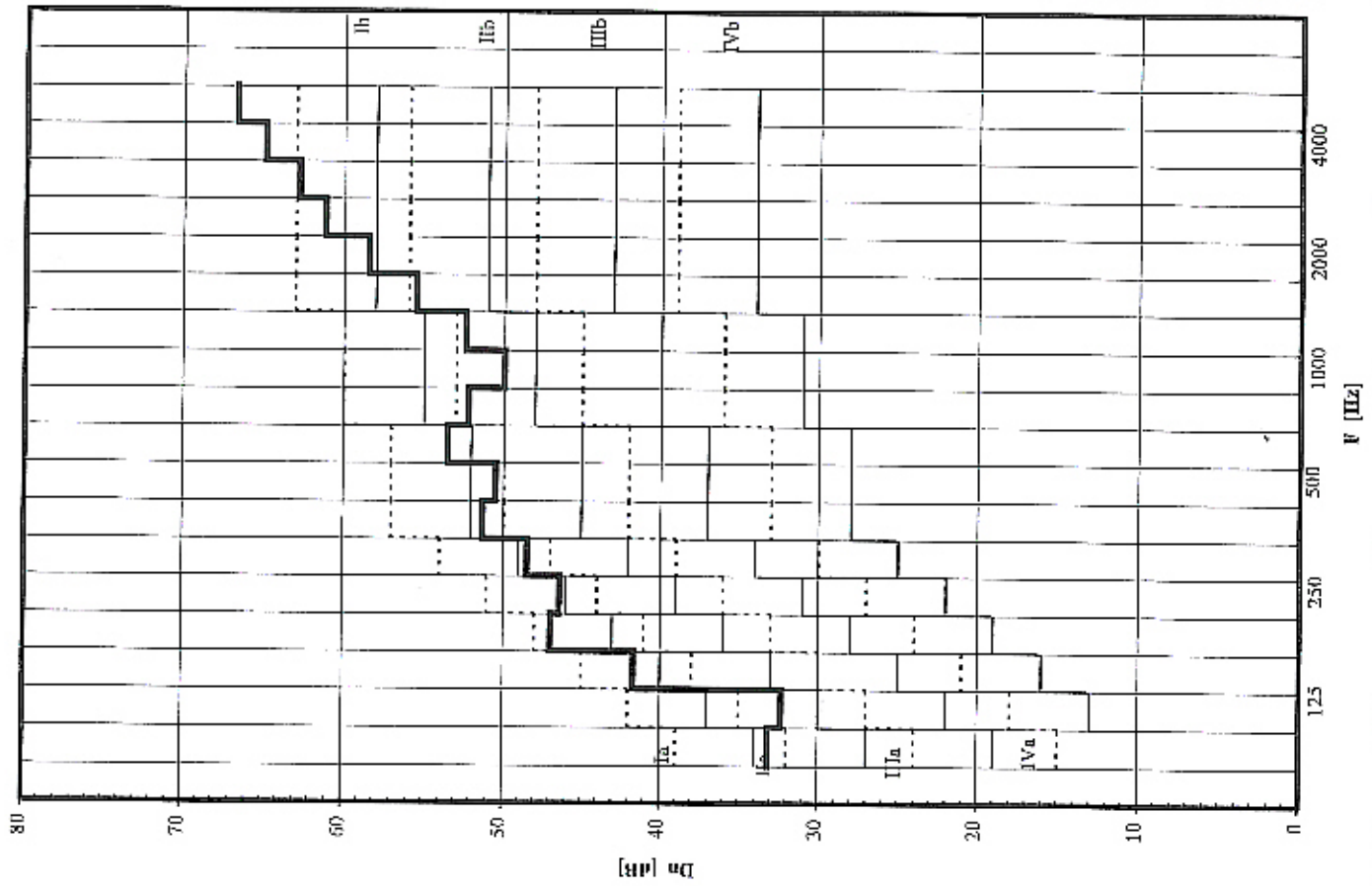
NBN S01-400
cat. IIa

EN-ISO 717/1

D_{n,w} = 53 dB

C = -1 dB

Ctr = -6 dB



BELGIAN BUILDING
RESEARCH INSTITUTE

Acoustics Laboratory

Rue de la Violette 21-23
B-1000 BRUXELLES



CENTRE SCIENTIFIQUE
ET TECHNIQUE DE LA
CONSTRUCTION

Laboratoire Acoustique

Rue de la Violette 21-23
B - 1000 BRUXELLES

NORMALIZED LEVEL DIFFERENCE

Dn

Laboratory measurement following:

NBN EN 20140-9 (1995)

Rating following:

ISO 717-1 (1996)

Requested by:

-Joint Venture Production S.r.l.-
I- 35028 - Piove di Sacco - Italy

Datum:
Date:

12-04-2000

PV: AC 9208
File: DE 631xR57

Dn
dB

Test description:

Hall K - Cells C1 & C2 - 1343 LIMELTTE
Arithmetic average of floor Dn measures without barrier, with carpet
Test Number 3

F Hz	Dn dB
100	23,7
125	27,4
160	35,8
200	40,0
250	41,4
315	44,0
400	45,3
500	46,0
630	47,3
800	48,5
1000	50,4
1250	57,7
1600	63,8
2000	68,2
2500	71,2
3150	69,9
4000	66,8
5000	66,8

NBN S01-400
cat. IIb

EN-ISO 7171
Dn,av - 49 dB
C = -2 dB
Ctr = -8 dB

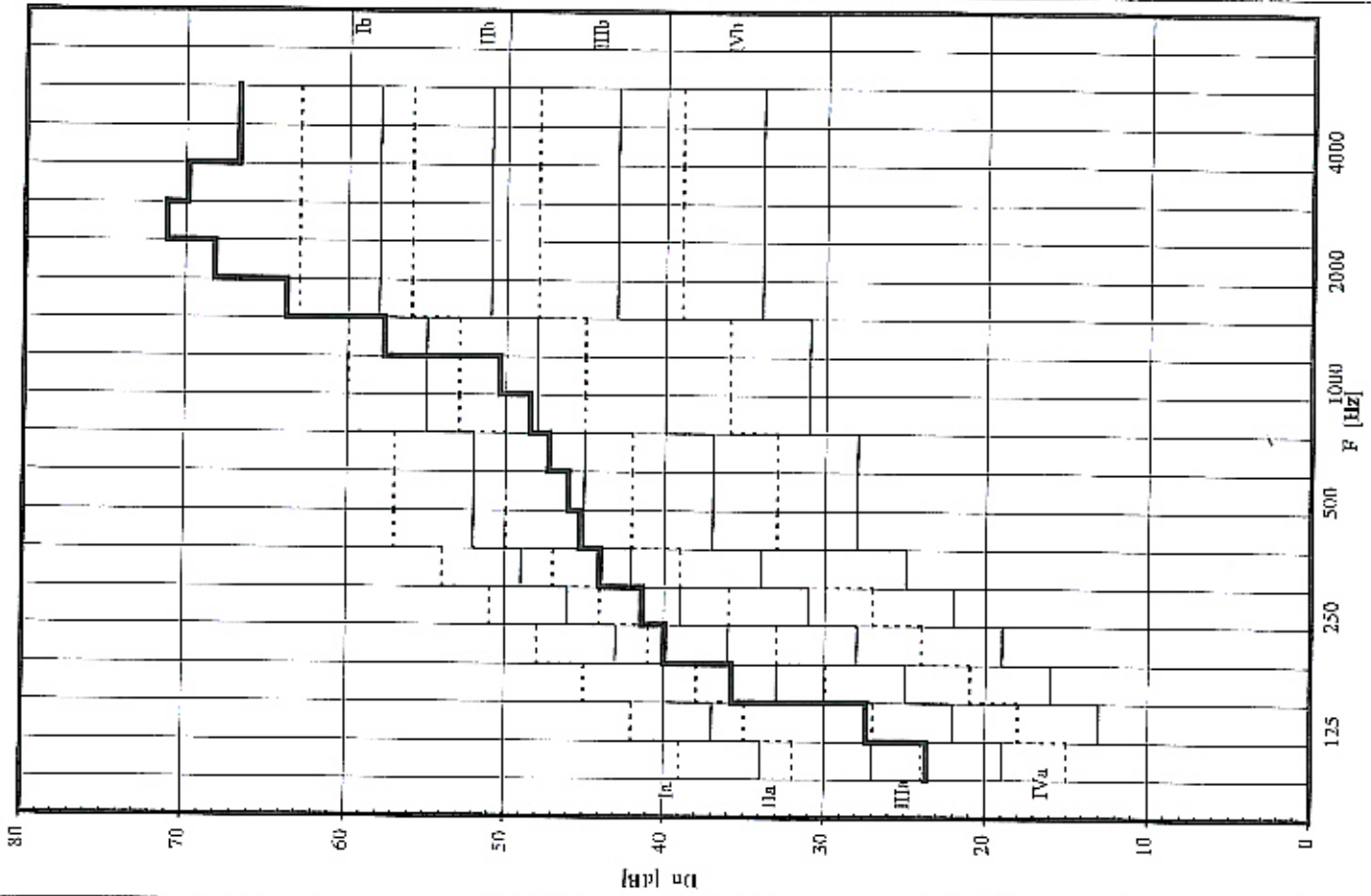


BELGIAN BUILDING
RESEARCH INSTITUTE

Acoustics Laboratory
Rue de la Violette 21-23
B-1000 BRUXELLES



CENTRE SCIENTIFIQUE
ET TECHNIQUE DE LA
CONSTRUCTION
Laboratoire Acoustique
Rue de la Violette 21-23
B-1000 BRUXELLES



NORMALIZED LEVEL DIFFERENCE

Dn

Laboratory measurement following:

NBN EN 20140-B (1985)

Rating following:

ISO 717-1 (1996)

Requested by:

Joint Venture Production S.r.l.
I-35028 - Piove di Sacco - Italy

Datum:

12-04-2000

Date:

PV: AC 3208

File: DE 631x857

Test description:

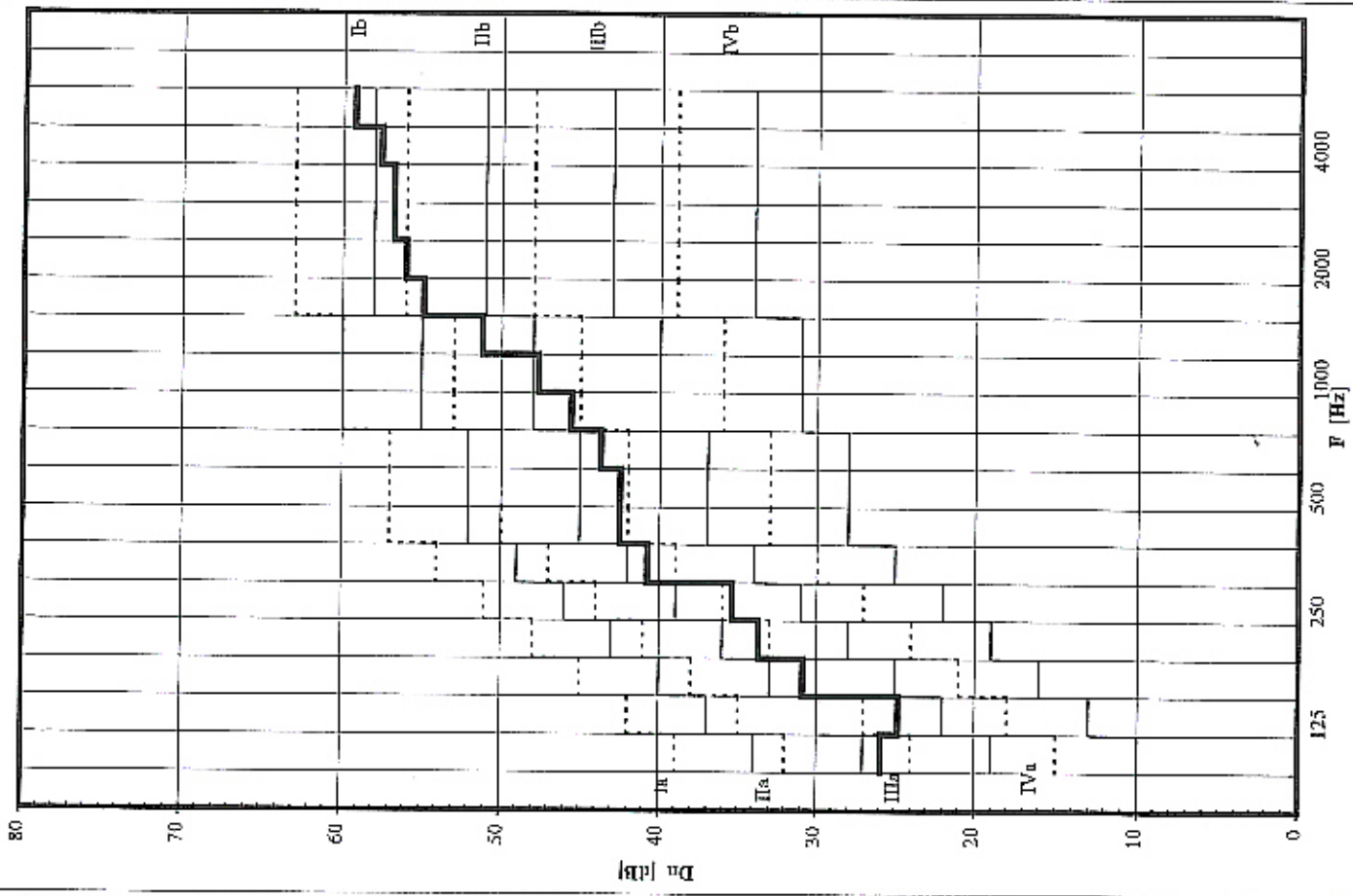
Hall K - Cells C1 & C2 - 1342 LIMELETTE
Arithmetic average of floor Dn measures without barrier, nor carpet
Test Number 4



F Hz	Dn dB
100	25,9
125	24,8
160	30,9
200	33,7
250	35,4
315	40,8
400	42,5
500	42,5
630	43,7
800	45,6
1000	47,7
1250	51,2
1600	54,9
2000	56,0
2500	56,8
3150	56,8
4000	57,6
5000	59,3

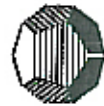
NBN S01-400
cat. IIIa

EN-ISO 717/1
Dn,w - 46 dB
C = -2 dB
Cb = -6 dB



BELGIAN BUILDING
RESEARCH INSTITUTE

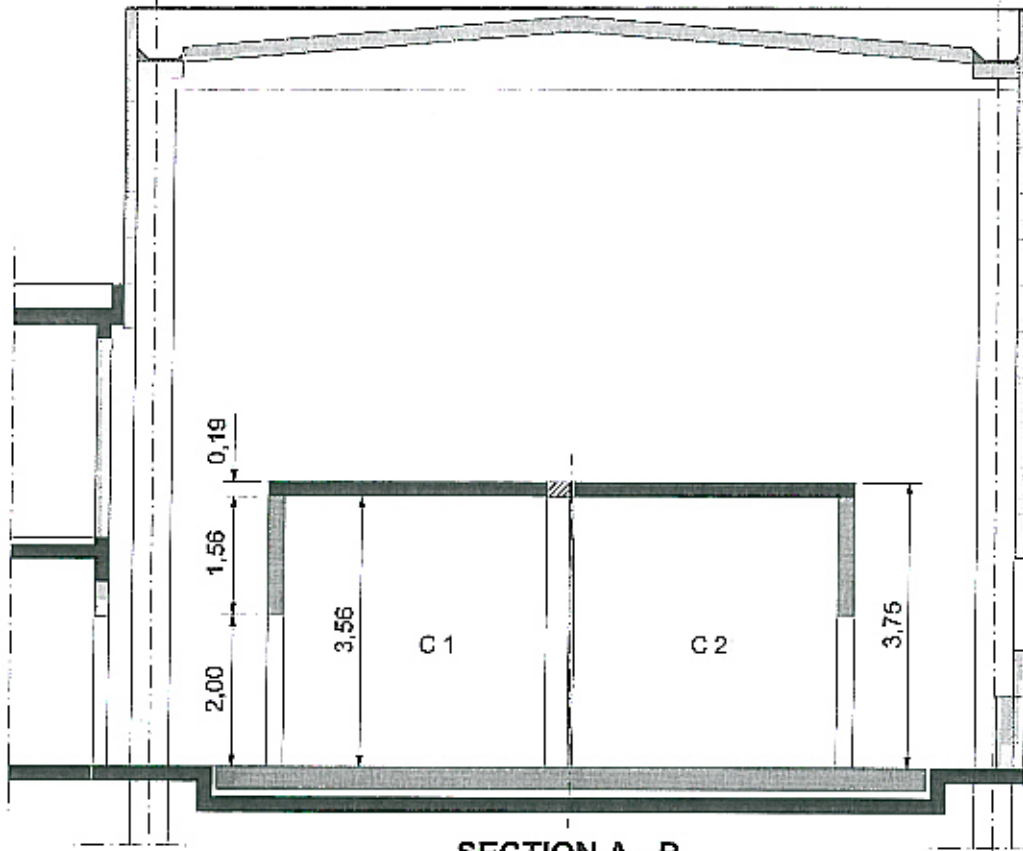
Acoustics Laboratory
Rue de la Violette 21-23
B-1000 BRUXELLES



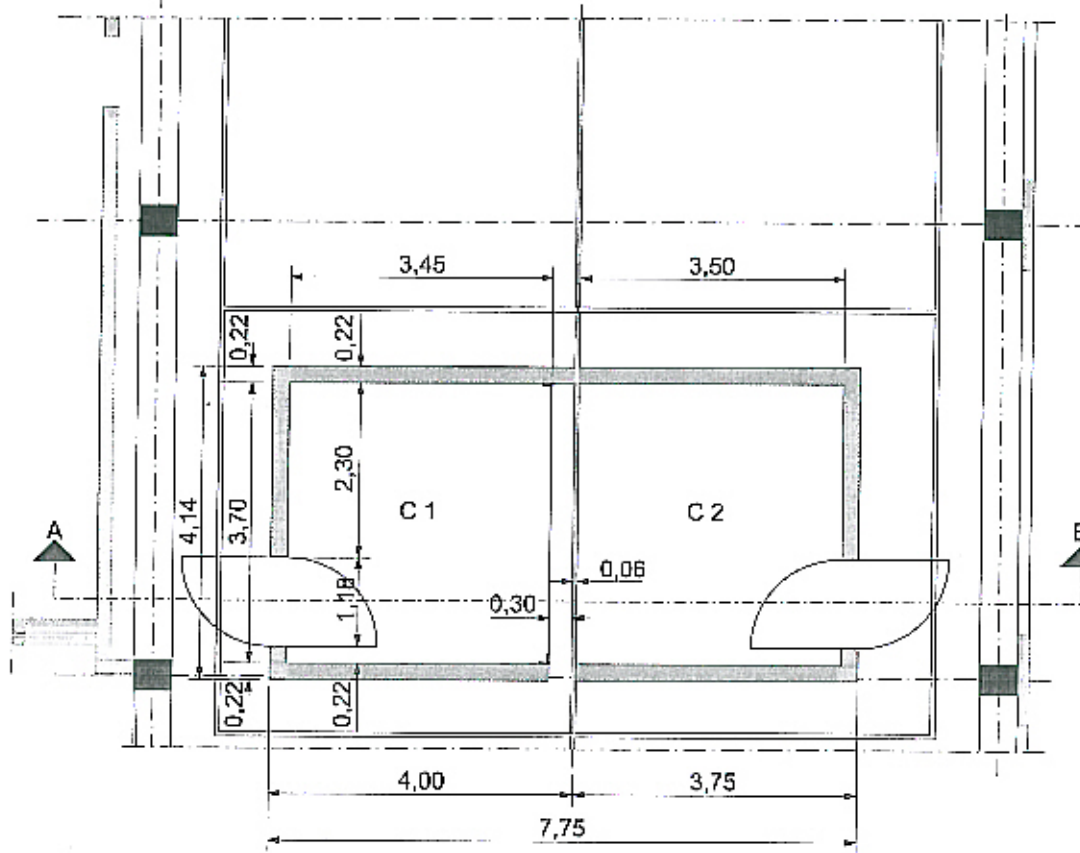
GENTRE SCIENTIFIQUE
ET TECHNIQUE DE LA
CONSTRUCTION
Laboratoire Acoustique
Rue de la Violette 21-23
B - 1000 BRUXELLES



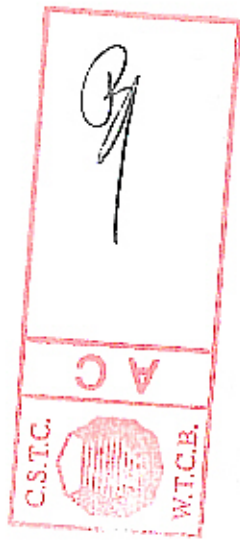
BUILDING K : Measuring cells C



SECTION A - B



PLAN



BUILDING K GROUND FLOOR





BELGIAN BUILDING RESEARCH INSTITUTE

ESTABLISHMENT RECOGNISED BY APPLICATION OF THE DECREE LAW OF 30 JANUARY 1947

- Test centre : B-1342 Limelette, avenue P. Holoffe, 21
- Offices : B-1932 Sint-Stevens-Woluwe, Lozenberg l, 7
- Head office : B-1000 Bruxelles, rue de la Violette, 21-23

Tel. : (32) 2 655 77 11

Fax : (32) 2 653 07 29

Tel. : (32) 2 716 42 11

Fax : (32) 2 725 32 12

Tel. : (32) 2 502 66 90

Fax : (32) 2 502 81 80

VAT n° BE 407.695.057

Page : 1/7

LABORATORY : Acoustics (AC)

TEST REPORT

N° DE, DAT, RE : DE 631X857

N° Laboratory : AC 3207-E

N° Sample : 16/46/6

REQUESTED BY : JOINT VENTURE PRODUCTION S.r.l.,
Via dell'Industria, 19
I- 35028 - Piove di Sacco- Italy

Contact persons:

- Requested by -

- BBRI -

M. F. Tilkin, Technical Manager

Ir. I. Pissens

Tests performed : Measurement of the normalized impact sound pressure level between two rooms equipped with a continuous technical floor, reference JVP type 4x4 - C4TTJO.

References :

ISO 717-2: 1996 - *Rating of sound insulation in buildings and of building elements*
Part 2 : Impact sound insulation

EN ISO 140-6: 1998 - *Laboratory measurements of impact sound insulation of floors*

NBN S01-400: 1977 - *Acoustical insulation criteria*

Date and reference of the request : 2 march 2000, reference FT/SL-L00.123
Date of receipt of the sample(s) : 20 march 2000
Test date : 22 march 2000
Drafting date of the report : 17 april 2000

This report contains 7 pages, numbered from 1 to 7. It may only be reproduced in its entirety.
It contains also 5 figures in annex.

Each page of the original report has been stamped in red by the laboratory and initialed by the head of laboratory.

The results and findings are only valid for the tested samples.

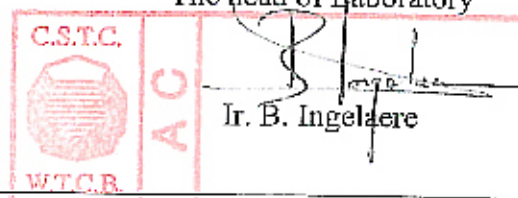
- No sample
 Sample(s) submitted to a destructive test
 Sample(s) to be removed from our laboratories 10 calendar days after sending of the report, unless a written request is received by the demander of the test

In charge of the test

Ph. Wattiez

Technical assistance : /

The head of Laboratory





1. MEASUREMENT METHOD

The method of measurement is used to determine the acoustical transmission of impact noises from room to room equipped with a continuous raised floor (plenum ± 10 cm).

The measures are performed in accordance with the European standard EN ISO 140 : "Measurement of sound insulation in buildings and of building elements - Part 6 : Laboratory measurements of impact sound insulation of floors " - edition of August 1998.

1.1. Test setup

The rooms dimensions, the partition and plenum heights are given in figure 5.

Partition :

The partition, designed to ensure the maximum possible insulation, is built on the technical floor - to a height of at least 3.4 m - and thus divides the test installation into two rooms of 47 and 49 m³. The surface area of the partition corresponds to 12.6m².

The partition (interior height of 3.41 m) has a total thickness of 31 cm and is constituted of a light wall composed as follows:

- two structures of metal profiles (of the Metal Stud type, 75 mm wide) positioned with 200 mm of exterior clearance;
- on either side of this structure, an assembly of two sheets of 12.5 mm gypsumboard was applied and repointed;
- inside the metal structure, sheets of rock wool of the Rockwool 433 type - 50 and 100 mm thick and weighing 45 kg/m³ - were installed, there thus remains a space of 50 mm;
- on an external face (side C2), an acoustical lining of the type CALIBEL 50 + 10 mm was adhesively bonded.

Technical floor :

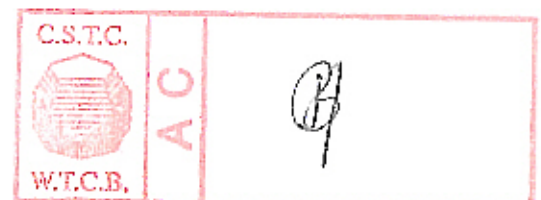
The technical floor to be tested rests on adjustable jackscrews ; it does not occupy the entire ground surface of each of the rooms (broadcast-reception) : it remains possible for a person to pass through the inner door (half-open) - (see figure 5).

The upper level of the floor is 14 cm from the level of the ground. The air space is around 10 cm. No absorbent is inserted into the space.

In the case of the test with "acoustical barrier", mattresses of mineral wool are installed below the partition under the floor, over a width of 50 cm.

The floor slabs supporting the partition remained the same for all the tests (floor slabs of the type 4x4 - C4TTJO).

A more complete description of the installation is given in §3.





1.2. Procedure

The sound source is constituted by the standardised tapping machine with steel-headed hammers; it is positioned in five different spots chosen at random in the "emission room" at a distance of at least 80 cm from the walls and such that the axis of the machine is positioned differently vis-à-vis the floor from one location to the next. There are no diffusing elements.

The acoustical field is sampled, in the reception (i.e. adjacent) room, with the aid of a microphone attached to a rotating arm. One complete rotation takes 64 seconds and corresponds to the integration time of the measurement. The measurement is repeated in another plane.

This procedure is then repeated by reversing the emission and reception rooms. The value indicated for the technical floor normalized impact sound pressure level between rooms equipped with the technical floor is noted as $L_{n,f}$ (the index f indicates the floor). This is the arithmetic average of the two results of normalized impact sound pressure level L_n .

It is given by the relationship :

$$L_n = L_{pm} + 10 \log_{10} \frac{A}{A_0} \quad \text{en dB}$$

where :

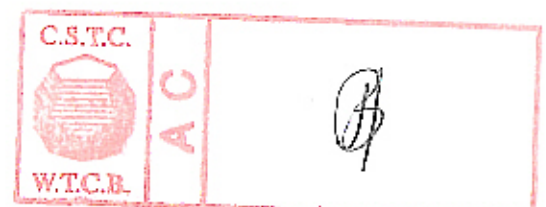
L_{pm} : is the level of the average quadratic acoustical pressure in the reception room, expressed in dB;

A : is the equivalent absorption in the reception room. It will be calculated as of reverberation time T (in seconds) in the reception room (of volume V in m^3), using the Sabine formula : $A = 0.16 V/T$

A_0 : is the reference absorption area taken, equal to $10 m^2$.

2. MEASUREMENT EQUIPMENT

- A noise generator - Bruël and Kjær - type 1405;
- An equaliser Klark Teknik DN 27;
- A power amplifier STUDER A 68;
- A loudspeaker - BOSE 802;
- Two microphones - Bruël and Kjær - type 4165 with preamplifier BK 2639 and power supply BK 2804;
- Two rotating arms - Bruël and Kjær - type 3923;
- A piston phone - Bruël and Kjær - type 4220;
- A digital frequency analyser - Bruël and Kjær - type 2131;
- A BMX computer, IBM compatible with HP plotter.





3. DESCRIPTION OF THE TEST INSTALLATION

The entire test installation (floor and partition) was created by DYNABAT, rue des Champles, 50 B- 1301 – Bierges Wavre.

The JVP brand floor slabs are installed on a finished height of 14 cm and on a surface of ± 22 m² (see sketch in figure 5). The installation includes the slabs and jackscrews described in detail below. The barrier and the carpet used are also described. These descriptions were provided by DYNABAT.

The partition described in § 1.1 is placed on this floor upon the separation of the two transmission chambers.

3.1 Description of the slabs

3.1.1. JVP brand type 4x4 – CATTJO

The panels have a dimension of 600/600 mm and are 29 mm thick. A total jacketing in 0.5 mm galvanised steel was performed. The 4 sides of the slabs include a peripheral reinforcement integrated by a quadruple fold of galvanised sheet.

N.B. : The slabs have a mass of 10.0 ± 0.1 kg per slab.

3.2 Description of the jackscrews with a height of 100 mm.

The jackscrews are made of a BACO metal material of type 70/56 NB/2.

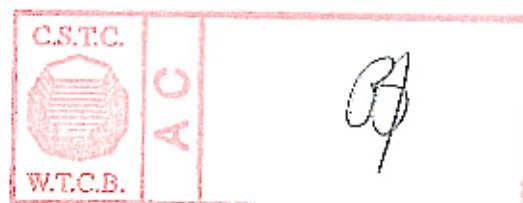
They are attached to the concrete support by a two-component epoxy adhesive.

3.3 Description of the acoustical barrier

The acoustical barrier - 500 mm wide and 80 mm thick, at the base of the partition - was created with the aid of mattresses of rock wool of the Rockwool-Rockfon Soundstop RH-95 type weighing 70 kg/m³ and installed between the concrete floor and the slabs of technical floor.

3.4 Description of the carpet

Brand: Louis De Poortere
Type: Missouri II Conn.
Dimensions: 50 cm x 50 cm
Weight of the pile: 735 g/m²
Back: Bitumen





4. DESCRIPTION OF THE TESTS PERFORMED

Four different test conditions formed the object of measurements of the normalized impact sound pressure level of the technical floor.

The following table includes the four configurations tested on 22 March 2000, and gives the ambient conditions of the measurements:

test $D_{n,f}$ and figure	Characteristic	temperature (°C)	Atmosph. pressure (hPa)	relative humidity (%)
N°1	with barrier, with carpet	20	1013	57
N°2	with barrier, without carpet	20	1013	57
N°3	without barrier, with carpet	21	1006	54
N°4	without barrier or carpet	21	1006	54



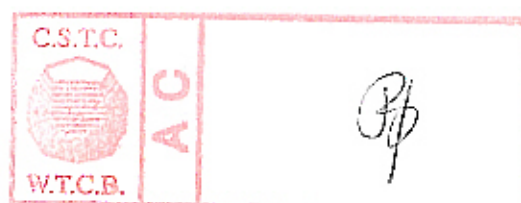


5. RESULTS OF THE MEASUREMENTS

The figures 1 to 4 include the results of measurements performed i.e. the spectrum of the normalized impact sound pressure level of the technical floor as a function of the frequency by thirds of an octave from 100 to 5000 Hz. Each third is represented by its rated frequency (in Hz).

The following table gives the spectrum of the normalized impact sound pressure level acoustical insulation measured between the two rooms provided with the technical floor with plenum, equipped or not with barrier, with or without carpet, as indicated.

Rated frequency 1/3 octave (Hz)	Normalized impact sound pressure level between rooms with technical floor (dB)			
	D _{nf}			
	Test Nber 1	Test Nber 2	Test Nber 3	Test Nber 4
100	60.0	60.6	67.2	69.5
125	56.3	61.7	64.3	73.2
160	55.6	63.9	63.1	75.6
200	49.8	60.8	57.2	72.7
250	48.1	62.3	52.6	71.2
315	43.2	60.2	47.8	69.1
400	38.1	57.6	46.2	71.6
500	35.6	60.0	43.5	71.7
630	29.2	57.5	37.2	72.9
800	24.7	57.0	30.8	71.8
1000	21.2	57.0	25.0	68.9
1250	17.0	53.9	21.1	62.7
1600	11.9	46.8	18.8	55.7
2000	09.5	41.8	17.1	52.7
2500	09.0	37.5	16.1	52.5
3150	08.4	30.6	15.1	46.0
4000	09.1	21.4	14.4	41.0
5000	09.3	19.0	14.8	39.0





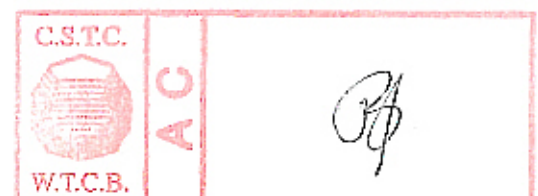
6. INTERPRETATION OF THE RESULTS

The following table summarises the situations measured and gives the criteria obtained :

- the category obtained (for L_n) following the standard NBN S01-400;
- the weighted pressure level of the weighted normalized impact sound pressure level $L_{n,f,w}$ obtained according to the international standard ISO 717-Part 2;
- the normalized impact sound pressure level in dB(A) according to the French standard NF S31-052.

Reference standard	Category and insulation indices	Test N°1	Test N°2	Test N°3	Test N°4
NBN S01-400	category (L_n)	I _a	II _a	II _a	III _a
ISO 717-2	$L_{n,f,w}$ (C _i) in dB	46 (2)	57 (-1)	53 (2)	69 (-1)
NF S31-052	L_n pink dB(A)	48.2	64.8	55.2	77.4

17/4/2000 1799/-



Normalized impact sound pressure levels according to ISO 140-6
Laboratory measurements of impact sound insulation of floors

Ln

Laboratory measurement following:

EN ISO 140-6 (1998)

Rating following:

ISO 717-2 (1996)

Requested by:

-Joint Venture Production S.r.l.-
I-35028 - Piove di Sacco - Italy

B- 1300 WAVRE

Datum:

4/17/2000

PV:

AC 3207-E

Filter:

DE 63 Lx857

Ln

dB

F

Hz

Test description:

Hall K - Cells C1 & C2 - 1342 LIMELETTE
Arithmetic average of floor Ln measures with barrier and carpet
Test number 1

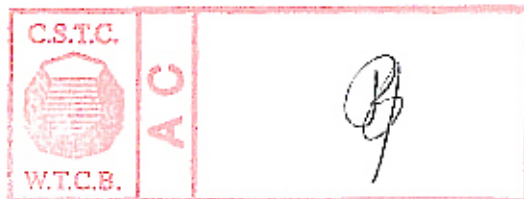
100	60,0
125	56,3
160	55,6
200	49,8
250	48,1
315	43,2
400	38,1
500	35,6
630	29,2
800	24,7
1000	21,2
1250	17,0
1600	11,9
2000	9,5
2500	9,0
3150	8,4
4000	9,1
5000	9,3

NBN S01-400
cat. Ia

EN-ISO 717/2

$L_{wp} = 46$ dB

$C_f = 2$ dB



BELGIAN BUILDING
RESEARCH INSTITUTE

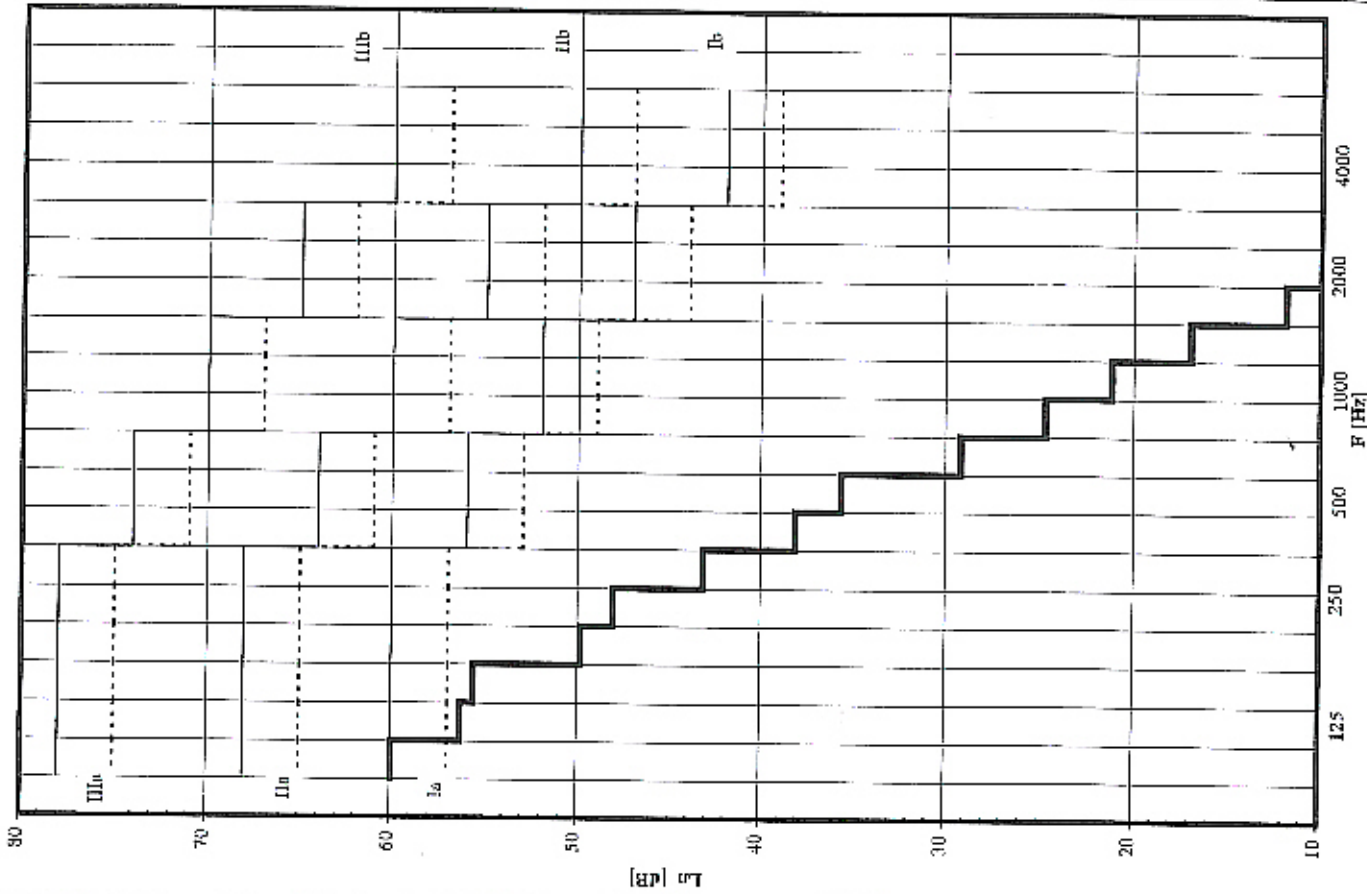
Acoustics Laboratory

Rue de la Violette 21-23
B-1000 BRUXELLES



GENTRE SCIENTIFIQUE
ET TECHNIQUE DE LA
CONSTRUCTION

Laboratoire Acoustique
Rue de la Violette 21-23
B - 1000 BRUXELLES



**Normalized impact sound pressure levels according to ISO 140-6
Laboratory measurements of impact sound insulation of floors**

L_n

Laboratory measurement following:

EN ISO 140-6 (1998)

Rating following:

ISO 717-2 (1996)

Requested by:

-Joint Venture Production S.r.l.-
I-35028 - Piove di Seneo - Italy

B. 1300 W.AYRE

Station:

PV: AC 3207-E

L_n dB

Date:

9/17/2000

Site:

DE 631x857

F

Hz

Test description:

Hall K - Cells C1 & C2 - 1343 LIMELETTE

Arithmetic average of floor L_n measures with barrier, without carpet

Test number 2

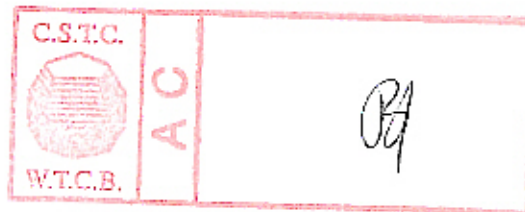
100	60,6
125	61,7
160	63,9
200	60,8
250	62,5
315	60,2
400	57,6
500	60,0
630	57,5
800	57,0
1000	57,0
1250	53,9
1600	46,8
2000	41,8
2500	37,5
3150	30,6
4000	21,4
5000	19,0

NBN S01-400
cat. IIa

EN-ISO 7172

$L_{n,w} = 57$ dB

$C_1 = -1$ dB



BELGIAN BUILDING
RESEARCH INSTITUTE

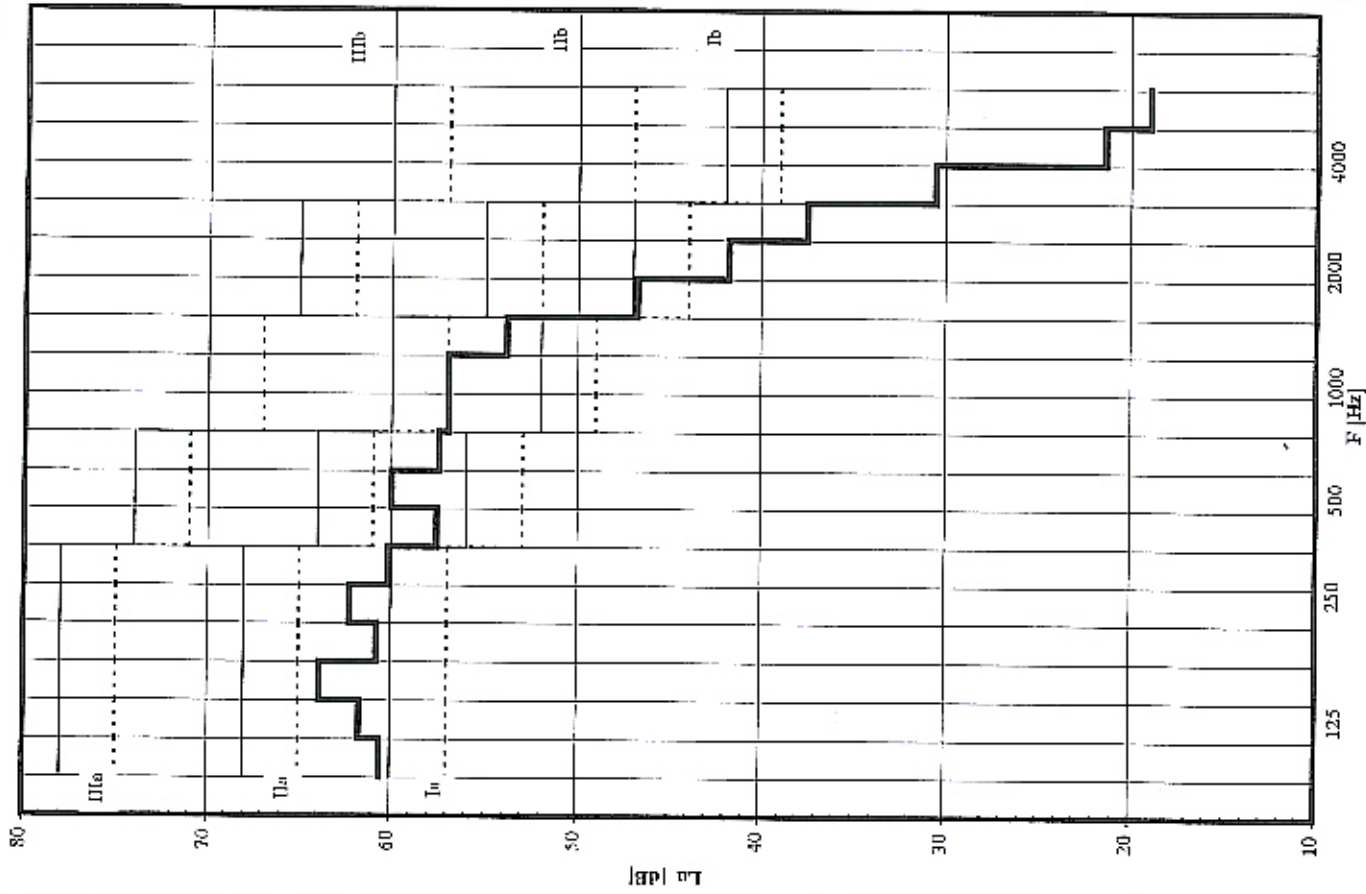
Acoustics Laboratory

Rue de la Violette 21-23
B - 1000 BRUXELLES



CENTRE SCIENTIFIQUE
ET TECHNIQUE DE LA
CONSTRUCTION

Laboratoire Acoustique
Rue de la Violette 21-23
B - 1000 BRUXELLES



**Normalized impact sound pressure levels according to ISO 140-6
Laboratory measurements of impact sound insulation of floors**

L_n

Laboratory measurement following:

EN ISO 140-6 (1998)

Rating following:

ISO 717-2 (1996)

Requested by:

-Joint Venture Produzioni S.r.l.
I-35028 - Piove di Sacco - Italy

B.-1300 WAVRE

Date:

4/17/2000

PV:

AC 3207-E
File: DE 631x887

L_n

dB

f

Hz

Test description:

Hall K - Cells C1 & C2 - 1542 LIMELETTE
Arithmetic average of floor L_n measures without barrier, with carpet
Test number 3

100	67,2
125	64,3
160	63,1
200	57,2
250	52,6
315	47,8
400	46,2
500	42,5
630	37,2
800	30,8
1000	25,0
1250	21,1
1600	18,8
2000	17,1
2500	16,1
3150	15,1
4000	14,4
5000	14,8

NBN S01-400
cat. IIa

EN-ISO 717/2

$L_{nsp} = 53$ dB

$C_1 = 2$ dB



BELGIAN BUILDING
RESEARCH INSTITUTE

Acoustics Laboratory

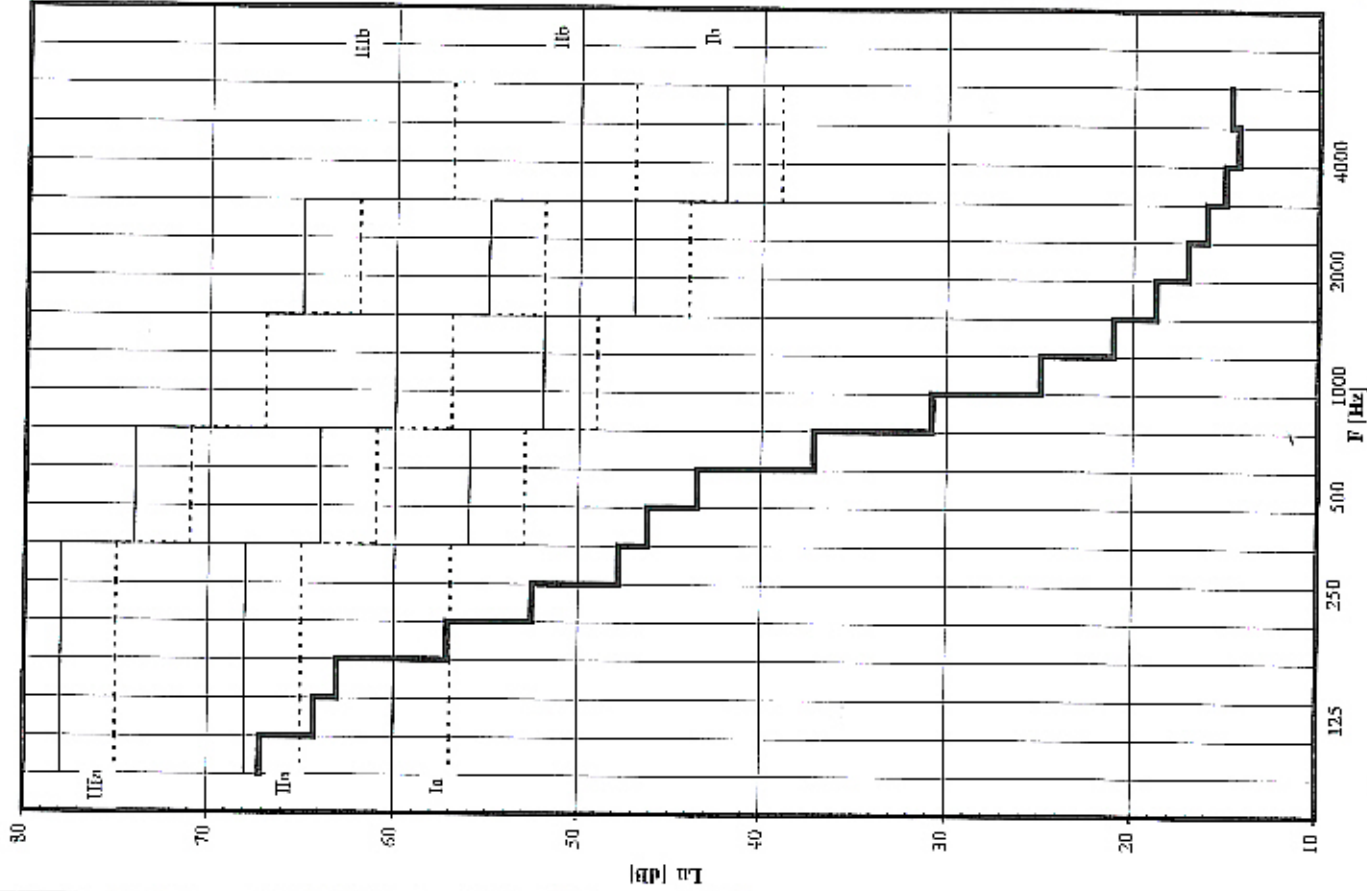
Rue de la Violette 21-23
B-1000 BRUXELLES



CENTRE SCIENTIFIQUE
ET TECHNIQUE DE LA
CONSTRUCTION

Laboratoire Acoustique

Rue de la Violette 21-23
B-1000 BRUXELLES



Normalized impact sound pressure levels according to ISO 140-6
Laboratory measurements of impact sound insulation of floors

L_n

Laboratory measurement following:

EN ISO 140-6 (1998)

Rating following:

ISO 717-2 (1996)

Requested by:

-Joint Venture Production S.r.l. -
I- 25028 - Pieve di Sacco - Italy E.- 1300 WAYRE

Date:

4/17/2001

PV:

AC 3307-E
DE 631x357

L_n

dB

F

Hz

Test description:

Hull K - Cells C1 & C2 - 1342 LIMELLETTA
Arithmetic average of floor L_n measures without barrier, nur carpet
Test number 4

100	69,5
125	72,2
160	73,6
200	72,7
250	71,2
315	69,1
400	71,6
500	71,7
630	72,9
800	71,8
1000	68,9
1250	62,7
1600	55,7
2000	52,7
2500	52,5
3150	46,0
4000	41,0
5000	39,0

NRN S01-100
cat. IIIa

EN-ISO 717/2

$L_{n,T} = 69$ dB

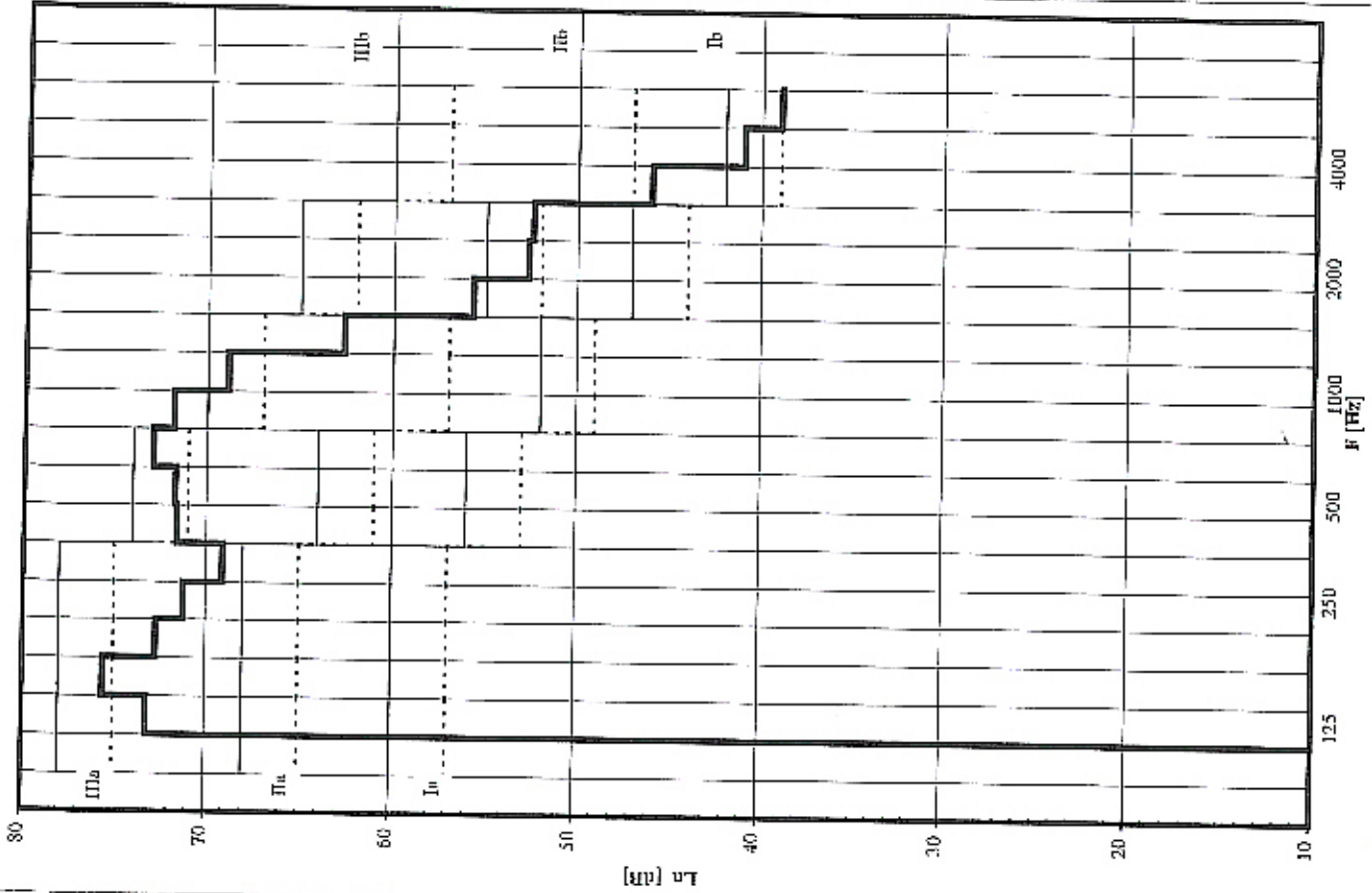
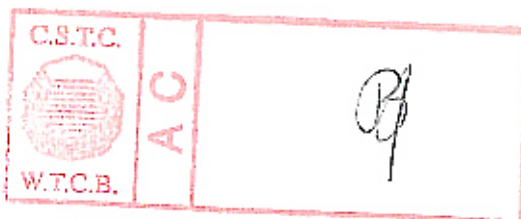
$C_1 = -1$ dB

BELGIAN BUILDING
RESEARCH INSTITUTE

Acoustics Laboratory
Rue de la Violette 21-23
B-1000 BRUXELLES

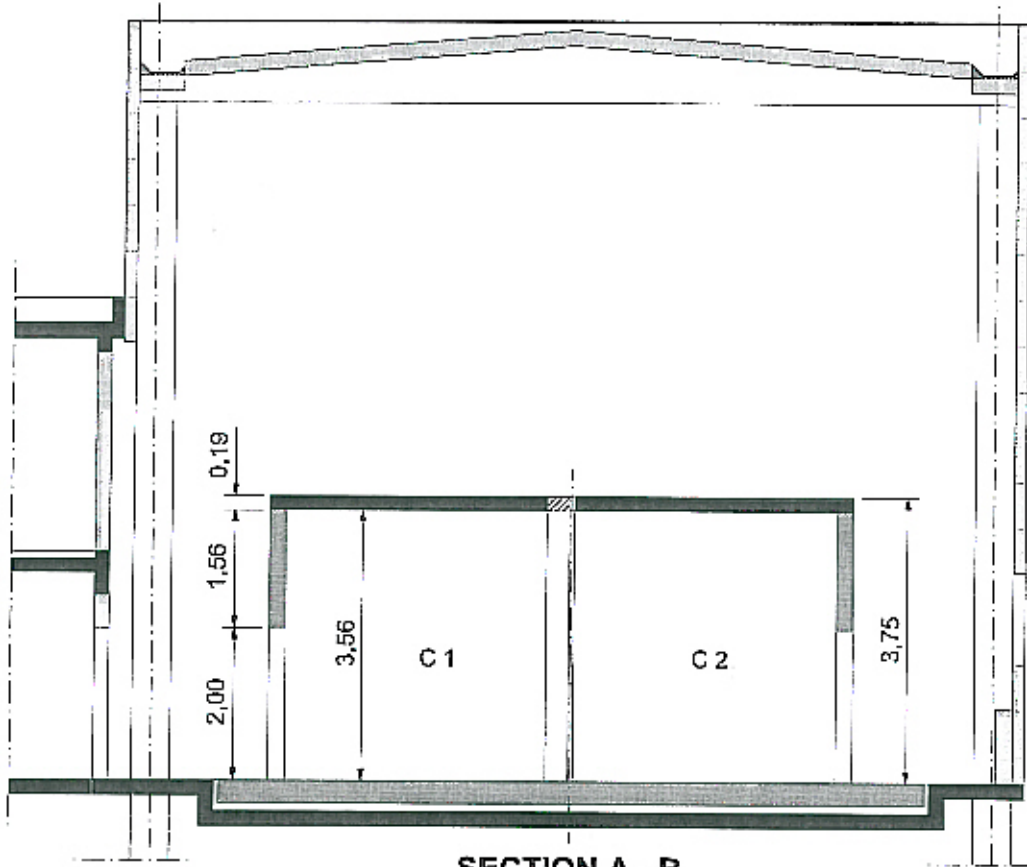


GENTRE SCIENTIFIQUE
ET TECHNIQUE DE LA
CONSTRUCTION
Laboratoire Acoustique
Rue de la Violette 21-23
B - 1000 BRUXELLES

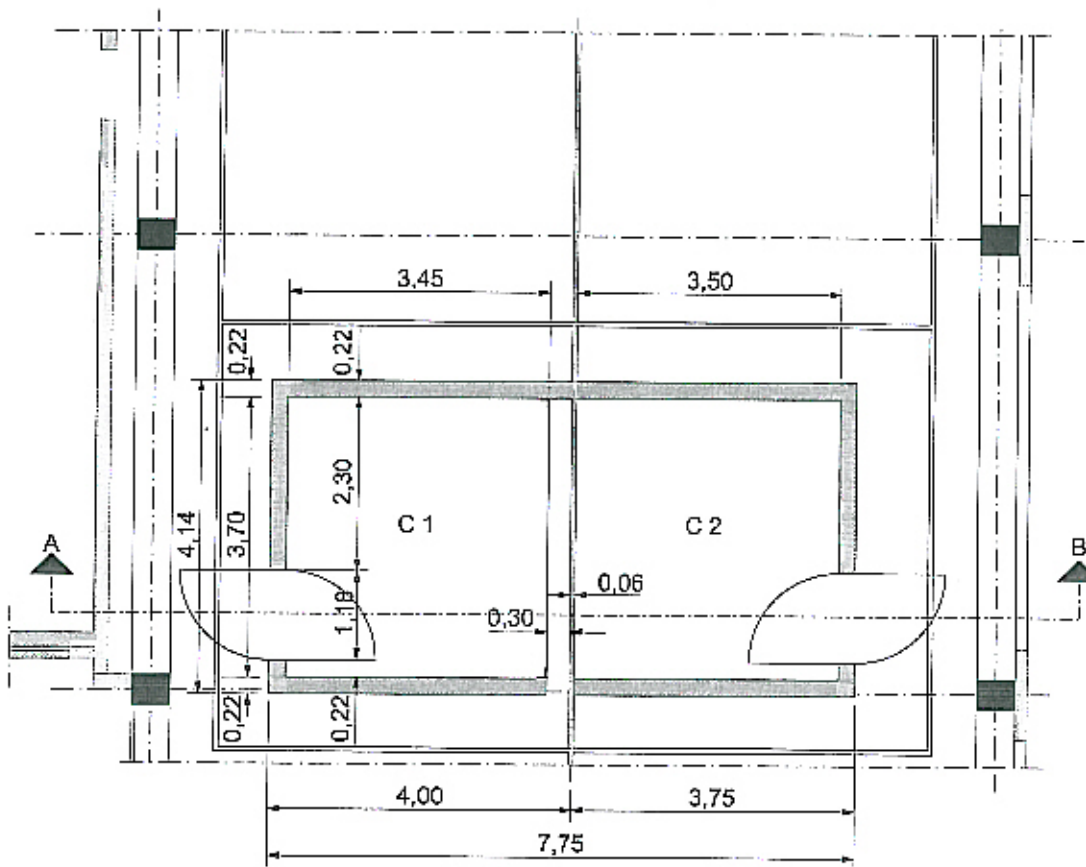




BUILDING K : Measuring cells C



SECTION A - B



PLAN



BUILDING K

GROUND FLOOR

