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ESSAIS

ACOUSTICS AND LIGHTING DEPARTMENT

Acoustics test laboratory

TEST REPORT N° AC09-26021664 CONCERNING A RESILIENT FLOOR COVERING

The accreditation by the COFRAC Laboratory Section attests to the technical competence of the laboratories only for the tests covered by the accreditation.

Scope of accreditation available on request and on our web site.

This Test Report certifies only the characteristics of the object submitted for testing and does not prejudge the characteristics of similar products. So it does not constitute a product certification in the sense of Article L 115-27 of the Consumer Code and of the Law of June 3, 1994.

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It comprises ten pages.

REQUESTED BY: **IVC**
Nijverheidslaan 29
B-8580 AVELGEM
BELGIQUE

N/Réf. :BR-70018113
26021664
MM/GA

TEST REPORT N° AC09-26021664

SCOPE

Determination of the improvement of the impact sound insulation ΔL and the standardized impact sound level $L_{n,e}$ of a resilient floor covering.

REFERENCE TEXTS

- NF EN ISO 140-1 (1997), NF EN 20140-2 (1993) and NF EN ISO 140-8 (1997) for the determination of the improvement of the impact sound insulation ΔL supplemented by the standard NF EN ISO 717/2 (1997) and appendices.
- NF S 31-074 for the determination of the standardized impact sound level $L_{n,e}$, supplemented by the standard NF EN ISO 717/2 (1997),

NATURE OF THE FLOOR COVERINGS

Polyvinyl chloride floor coverings with foam layer (NF EN 651).

SAMPLE SUBMITTED TO THE TESTS

Date of reception in the laboratory : August, 19th 2009
Origin : Requester
Installation : CSTB

SUMMARY LIST OF TESTS

TEST N°	Object submitted for testing	Type of test
1	Resilient floor covering ref. I-TEC 350	ΔL
2	Resilient floor covering ref. I-TEC 350	$L_{n,e}$

Prepared at Marne-la-Vallée, 22 September 2009

Responsible for the test

Marc MAUTHÈS

The head of division

Jean-Baptiste CHÉNÉ

DESCRIPTION AND INSTALLATION OF A RESILIENT FLOOR COVERING

Test	1
Date	28/08/09
Station	DELTA

REQUESTER, MANUFACTURER **IVC**

NAME **I-TEC 350**

FITNESS FOR PURPOSE **Under certification NF UPEC A (certificat n° 345-006.1_00/09)**

MAIN CHARACTERISTICS

Thickness in mm: 3.00

Mass per unit area in g/m²: 2198

DESCRIPTION(*) (the dimensions are given in mm)

Polyvinyl chloride floor coverings with foam layer (NF EN 651).

Wear layer	Thickness: 0.50
Foam layer	Thickness: 1.90
Presentation	Roll width: 2000, 3000 and 4000

(*) *Given by the manufacturer*

INSTALLATION

Bonding all over, with an acrylic glue ref. THOMSIT K188 (HENKEL), on a reinforced concrete floor of 150 mm thickness.

TEST REPORT N° AC09-26021664

IMPROVEMENT OF THE IMPACT SOUND INSULATION ΔL OF A RESILIENT FLOOR COVERING

CD63

Test	1
Date	28/08/09
Station	DELTA

REQUESTER, MANUFACTURER IVC

NAME I-TEC 350

FITNESS FOR PURPOSE Under certification NF UPEC A (certificat n° 345-006.1_00/09)

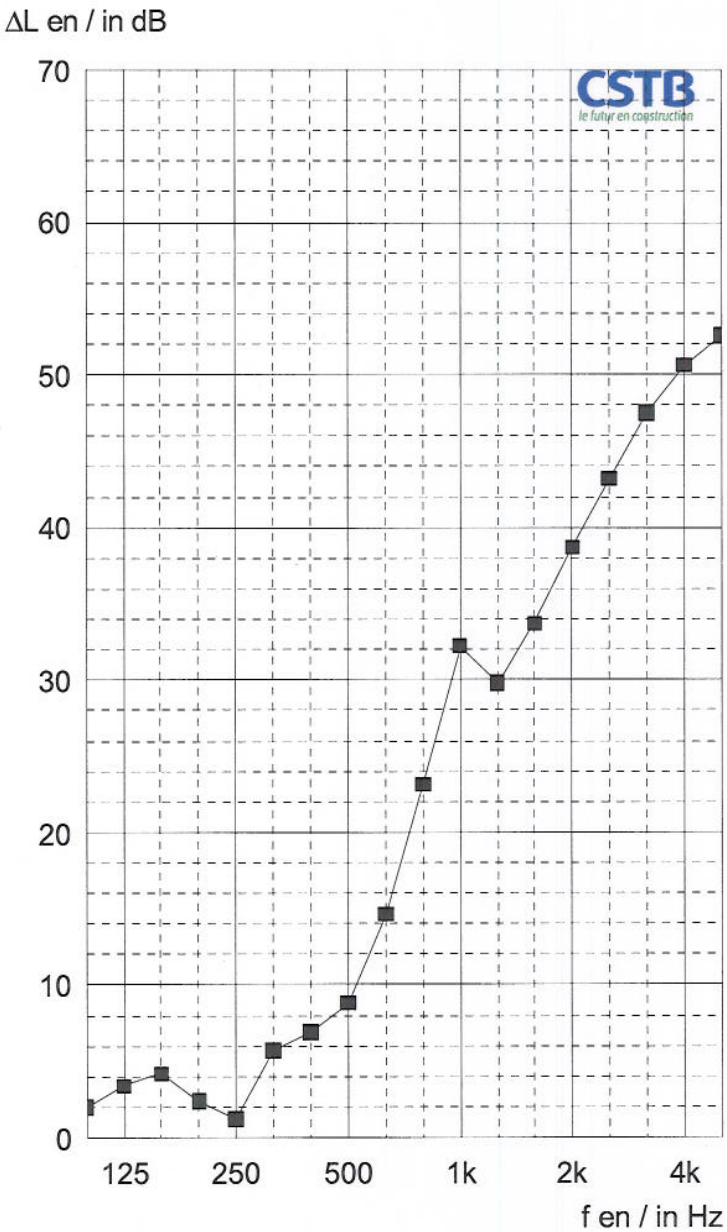
MAIN CHARACTÉRISTICS

Thickness in mm: 3.00
Mass per unit area in g/m²: 2198

MEASUREMENT CONDITIONS

Temperature of the concrete floor in °C: 22
Temperature in the emission room in °C: 24
Relative humidity in the emission room in %: 48

RESULTS



f	ΔL
100	2,0
125	3,4
160	4,2
200	2,4
250	1,2
315	5,7
400	6,9
500	8,8
630	14,6
800	23,1
1000	32,2
1250	29,8
1600	33,7
2000	38,7
2500	43,2
3150	47,5
4000	50,6
5000	52,5
Hz	dB

(*) : valeur corrigée/corrected value. (+) : limite de poste/station limit.

ΔL_w = 19 dB

TEST REPORT N° AC09-26021664

STANDARDIZED IMPACT SOUND LEVEL $L_{n,e}$ PRODUCED BY A RESILIENT FLOOR COVERING

CD62

Test	2
Date	28/08/09
Station	DELTA

REQUESTER, MANUFACTURER IVC

NAME I-TEC 350

FITNESS FOR PURPOSE Under certification NF UPEC A (certificat n° 345-006.1_00/09)

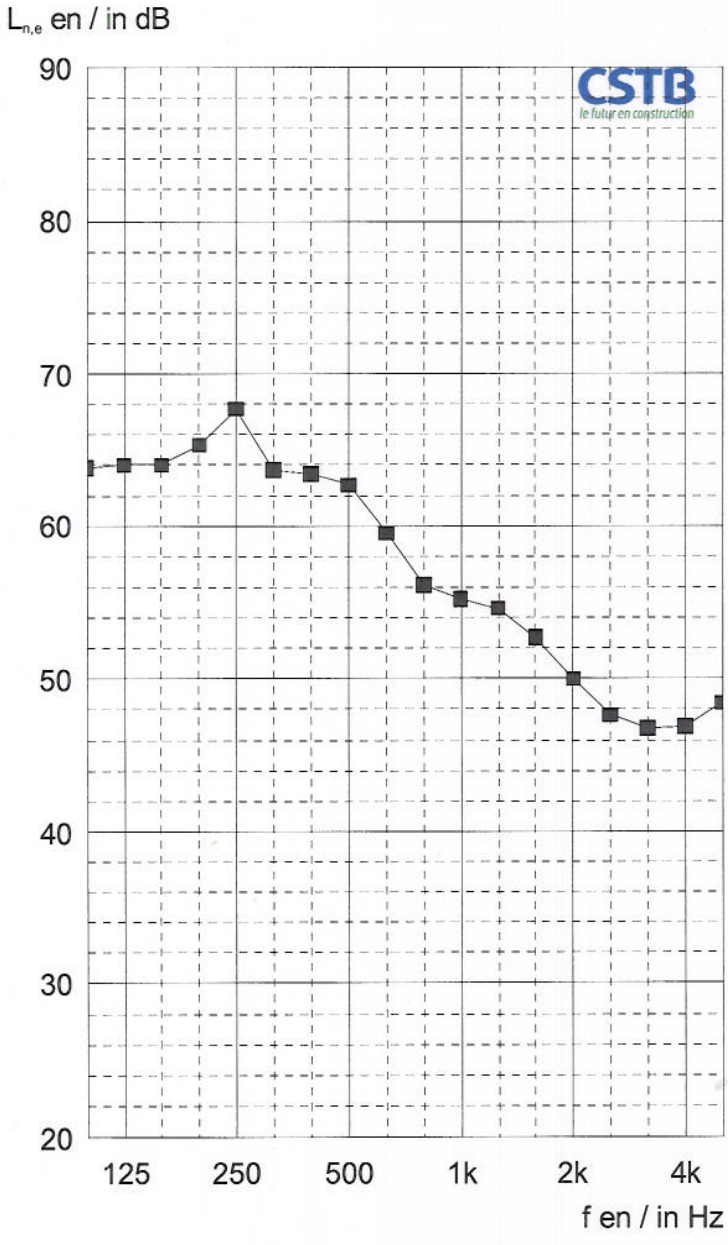
MAIN CHARACTÉRISTICS

Thickness in mm: 3.00
Mass per unit area in g/m²: 2198

MEASUREMENT CONDITIONS

Temperature of the concrete floor in °C: 22
Temperature in the emission room in °C: 24
Relative humidity in the emission room in %: 48

RESULTS



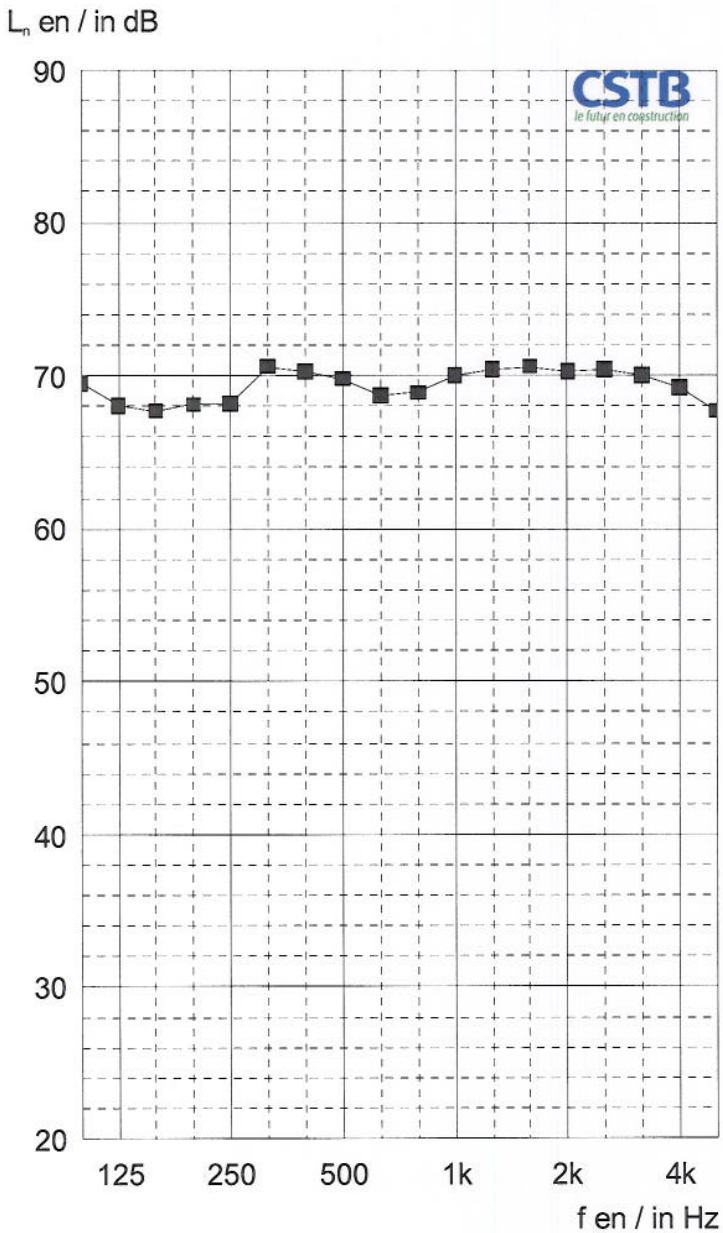
f	$L_{n,e}$
100	63,8
125	64,0
160	64,0
200	65,3
250	67,7
315	63,7
400	63,4
500	62,7
630	59,5
800	56,1
1000	55,2
1250	54,6
1600	52,7
2000	50,0
2500	47,6
3150	46,7
4000	46,9
5000	48,4
Hz	dB

(*) : valeur corrigée/corrected value. (+) : limite de poste/station limit.

$L_{n,e,w}$ = 61 dB

APPENDIX 1
NORMALIZED IMPACT SOUND LEVEL L_n OF THE BASE FLOOR

Date 28/08/09
Station DELTA



f	L_n
100	69,5
125	68,0
160	67,7
200	68,1
250	68,2
315	70,6
400	70,3
500	69,8
630	68,7
800	68,9
1000	70,0
1250	70,4
1600	70,6
2000	70,3
2500	70,4
3150	70,0
4000	69,2
5000	67,7
Hz	dB

(*) : valeur corrigée/corrected value. (+) : limite de poste/station limit.

$L_{n,w}$ = 76 dB

APPENDIX 2
METHOD OF EVALUATION AND EXPRESSION OF THE RESULTS

IMPROVEMENT OF THE IMPACT SOUND INSULATION ΔL

Determination of the improvement of the impact sound insulation by the floor coverings on a heavy standardized concrete floor with a standardized tapping machine.
The measurements must be run into a test laboratory.

➢ ***Method of evaluation : NF EN ISO 140-8 (1997)***

Measurement by 1/3 of octave, from 100 to 5000 Hz:
- Of the impact sound level L_i into the reception room
- Of the background noise level
- Of the reverberation time of the reception room T

Calculation of the standardized impact sound level L_n in dB for any 1/3 of octave:

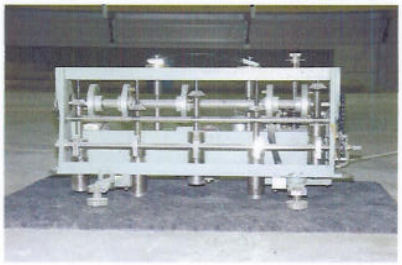
$L_n = L_i + 10 \log (A_0/A)$

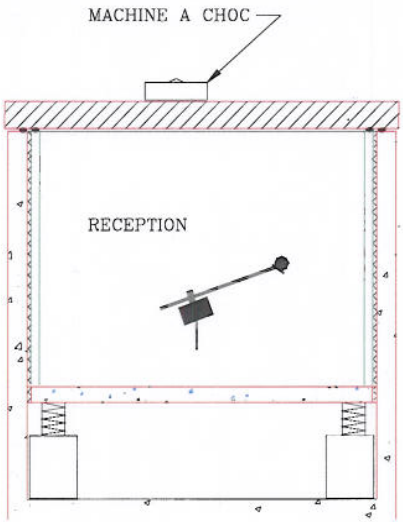
L_i : impact sound level measured into the reception room and eventually corrected by the background sound level

A_0 : Reference area equal to 10 m² in laboratory

A : Equivalent absorption area in the reception room in m²

A = (0,16 x V)/T with V the volume of the reception room in m^3 and T the reverberation time of this room in s





Calculation of the improvement of the impact sound insulation ΔL in dB for any 1/3 of octave:

$\Delta L = L_{n0} - L_n$

L_{n0} : Standardized impact sound level of the standardized heavy concrete floor without any floor covering,

L_n : Standardized impact sound level of the standardized heavy concrete floor with the floor covering.

➢ ***Expression of the results:***

Calculation of the of the standardized impact sound level of the reference floor covered by the floor covering submitted to the test in 1/3 of octave from 100 to 3150 Hz:

$L_{n,r} = L_{n,r,o} - \Delta L$

- $L_{n,r,o}$: Impact sound level of the reference floor,
- ΔL : Improvement of the impact sound level

Calculation of the ΔL_w:

$\Delta L_w = L_{n,r,o} - L_{n,r,w} = 78\ dB - L_{n,r,w}$.

For the calculation of the $L_{n,r,w}$, consideration of the $L_{n,r}$ by 1/3 of octave from 100 to 3150 Hz with a $1/10^{th}$ of dB precision.

Vertical movement of a reference curve by jump of 1 dB until the sum of the unfavourable distances is the biggest while remaining lower or equal to 32,0 dB.

$L_{n,r,w}$ is the value given then by the curve of reference to 500 Hz.

APPENDIX 3
METHOD OF EVALUATION AND EXPRESSION OF THE RESULTS

CORRECTED IMPACT SOUND PRESSION LEVEL $L_{n,e}$

Determination of the impact sound level into a room by the floor coverings put into this room. The measurement must be realized in a laboratory and the tapping machine is standardized.

➢ ***Method of evaluation : NF S 31-074 (2002)***

Measurement by 1/3 octave, from 100 to 5000 Hz:
- of the impact sound level Li in the reception room
- of the background noise
- of the reverberation time of the reception room T

Calculation of the standardized impact sound level L_n in dB for any 1/3 octave:

$$L_n = L_i + 10 \log (A_0/A)$$

Li : Impact sound level measured into the reception room and obviously corrected by the background noise

A0 : Reference area equal to 10 m² in laboratory

A : Equivalent absorption area in the emission room in m²,
A = (0,16 x V)/T with V the volume of the reception room in m^3 and T the reverberation time of the same room in s

Calculation of the corrected impact sound level $L_{n,e}$ in dB for any 1/3 octave :

$$L_{n,e} = 10 \log \left(10^{(L_{HR}/10)} - 10^{(L_{BR}/10)} + 10^{((LBR+Ln,r,0 - LD)/10)} \right)$$

L_{H0} : Measured standardized impact sound level of the concrete floor on the top

L_{B0} : Measured standardized impact sound level of the concrete floor down

L_{HR} : Measured standardized impact sound level with the floor covering, on the top

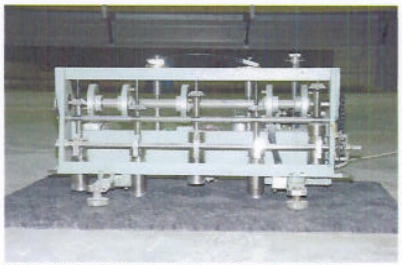
L_{BR} : Measured standardized impact sound level with the floor covering, down

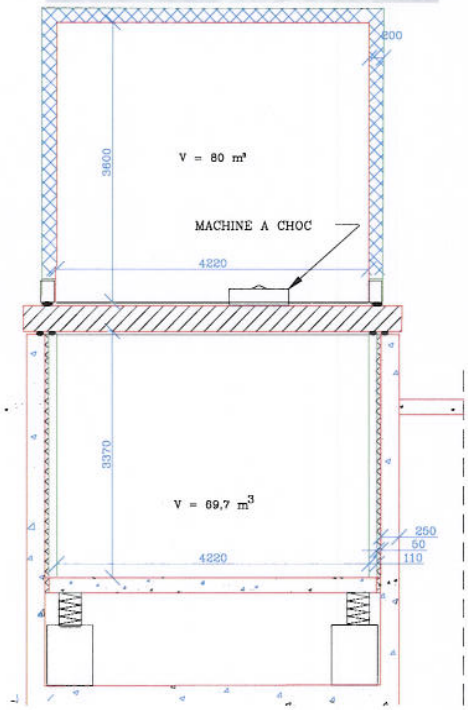
L_R : standardized impact sound level due to the relative movement of the floor covering , on the top

L_{DR} : standardized impact sound level due to the relative movement of the concrete floor, on the top and down

L_D : standardized impact sound level of the concrete floor, on the top and down

$L_{n,r,0}$: standardized impact sound level of the reference concrete floor





➢ ***Expression of results : Calculation of the overall weighted index $L_{n,e,w}$ according to NF EN ISO 717-2 (1997)***

On the values of $L_{n,e}$ for any 1/3 octave between 100 and 3150 Hz with a 1/10 dB precision.
Vertical moving of the reference curve by 1 db step until the sum of the unfavourable differences is the biggest while remaining lower than 32 dB.

$L_{n,e,w}$ is than the value given by the reference curve at 500 Hz.

APPENDIX 4– APPARATUS | STATION DELTA

Emission room : DELTA 3

NAME	BRAND	TYPE	N° CSTB
Microphone network	Bruël & Kjær Bruël & Kjær	Microphone 4166 Preamplifier 2669	CSTB 01 0210
Rotating arm	Bruël & Kjær	3923	CSTB 97 0166
Amplifier	LAB GRUPPEN	LAB1000	CSTB 97 0197
Speaker	CSTB-PHL AUDIO	Cube	CSTB 97 0185
Speaker	CSTB-PHL AUDIO	Cube	CSTB 97 0186
Taping machine	Bruël & Kjær	3204	CSTB 98 0182

Reception room : DELTA 1

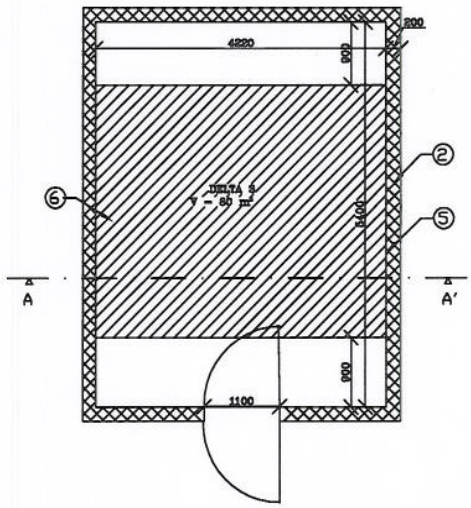
NAME	BRAND	TYPE	N° CSTB
Microphone network	Bruël & Kjær Bruël & Kjær	Microphone 4166 Preamplifier 2669	CSTB 01 0211
Rotating arm	Bruël & Kjær	3923	CSTB 90 0088
Amplifier	CARVER	PM600	CSTB 91 0117
Speaker	CSTB-ELECTRO VOICE	Pyramid	CSTB 97 0204

Control room

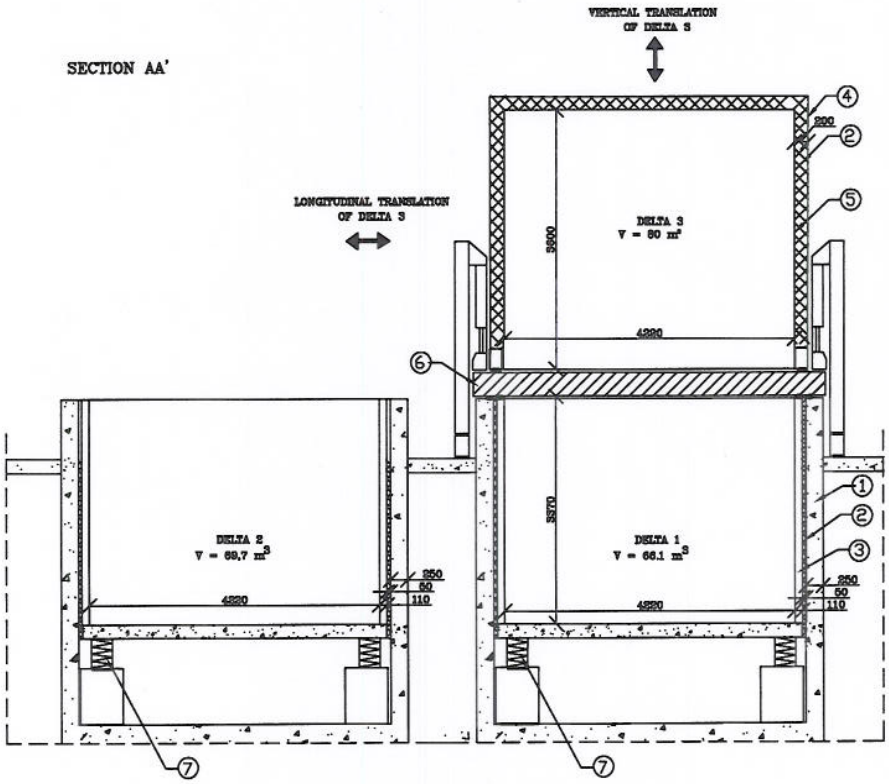
NAME	BRAND	TYPE	N° CSTB
Real time analyser	Bruël & Kjær	2144	CSTB 96 0176
Micro-computer	DELL	OPTIPLEX GX 270	
Calibrator	Bruël & Kjær	4231	CSTB 95 0145

APPENDIX 5 – DRAWING OF THE TESTS STATION | DELTA STATION

SCHEME



SECTION AA'



dimensions in mm

REP	DESIGNATION
7	Box mounted on spring
6	Aperture test area S=15 m²
5	Steel plate 6mm
4	Steel plate 2mm
3	Filled concrete e=100 mm
2	Mineral wool
1	Concrete e=200 mm

scale: 1/100

DELTA STATION

ACOUSTICS

END OF REPORT