

FAXED

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DESIGNERS & MANUFACTURERS OF NOISE & VIBRATION CONTROL PRODUCTS

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For : Maeda-Chun Wo J.V.
KCRC Contracts CC-201 & CC-211
(Viaducts)
P.O. Box 80277
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Attm : Mr. Mike CHOW

MAEDA-CHUN WO J.V.
(Viaducts) CC-211 Office

06 APR 2000

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ACOUSTIC MEASUREMENT REPORT OF KCRC Contracts CC-210 & CC-211 for Hydraulic Crane Rev. A

Prepared By : Mr. Patrick Kong (Project Engineer)

Approved By : Ir. K. K. Ip (Managing Director)

Registered Professional Engineer
B.Sc.(Eng.), C.Eng., MCIBSE, MIE Aust., MEKIE, FEKIOA, MIOA



Client : Maeda-Chun Wo J.V.
Project : KCRC Contracts CC-201 & CC-211 for KATO Hydraulic Crane
Title : Acoustic Measurement Report

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Client : Maeda-Chun Wo J.V.
 Project : KCRC Contracts CC-201 & CC-211 for KATO Hydraulic Crane
 Title : Acoustic Measurement Report

1.0 Introduction

- 1.1 NAP Acoustics (Far East) Ltd. was invited to conduct acoustic measurements to verify the effectiveness of the noise control treatment.
- 1.2 The noise control treatment consisted of NAP Silentflo roll-away acoustic barriers of 3.6m high surrounding the engine of the Hydraulic crane.

2.0 Date & Time

5 April 2000, 4:56 p.m. - 6:14 p.m.

3.0 Weather Conditions

Fine Weather

4.0 Test Conducted By

Mr. K.K. IU (Managing Director) - NAP Acoustics (Far East) Ltd.

5.0 Test Witnessed By

Mr. Mike CHOW - Maeda-Chun Wo J.V.

6.0 Instrumentation

The instrumentation used for the measurement was as follows:

- 6.1 Ono Sokki Precision Integrating Sound Level Meter model LA-5110 (serial no.: 73100927), with built-in filters LA-0563/0564, complying with IEC651 : 1979 (Type 1) and IEC 804 : 1985 (Type 1).
- 6.2 Bruel & Kjaer Sound Level Calibrator Type 4231 (serial no. 2024888), complying with IEC 942 : 1988 (Class 1).



7.0 Measurement Parameters

- 7.1 The noise source under investigation was characterized as steady and continuous.
- 7.2 Time weighting was set to the fast response and measurement period was set to 60 second.
- 7.3 Parameter of L_{Aeq} in 1/3 Octave Bands and L_{Aeq} in overall level was used.

8.0 Description of Plant and Operation Conditions

The Hydraulic Crane under investigation were KATO model NK-500E-III. Measurement were carried out with 3 tons loadings moving up and down to simulate the normal operation condition.

9.0 Measurement Locations

- 9.1 the measurement locations were 2m, 4m and 6m distance from the acoustic barrier with the microphone position at 1.2m to 1.5m above the ground.

10.0 Measurement Procedures

- 10.1 A calibration check was carried out on the Precision Integrating Sound Level Meter with the Sound Level Calibrator.
- 10.2 The hydraulic crane was set to operate at their typical duty for normal condition.
- 10.3 Measurements for engine noise were taken at the specified locations.
- 10.4 The engine were switched off.
- 10.5 Measurements for background noise were taken at the specified locations.
- 10.6 A calibration check was carried out as procedure 10.1 immediately after the measurements.



11.0 Measurement Results

11.1 Total Noise : Hydraulic crane operating with acoustic barrier

Distance	L _{Aeq} (dBA)
6 m	69.9*
4 m	67.5
2 m	69.3

11.2 Total Noise : Hydraulic crane operating without acoustic barrier

Distance	L _{Aeq} (dBA)
6 m	72.5
4 m	74.3
2 m	76.5

11.3 Background Noise : 59.8 dB(A)

12.0 Calculations

12.1 When the background noise level is at least 10 dB(A) lower than the total noise, no adjustment is required. Except the measurement at 2m and 4m with the acoustic barrier installed.

12.2 Overall total noise level (4m) = 67.5 dB(A)
 Overall background noise level = 59.8 dB(A)

Corrected Noise Level (4m) = 66.7 dB(A)

12.3 Overall total noise level (2m) = 69.3 dB(A)
 Overall background noise level = 59.8 dB(A)

Corrected Noise Level (2m) = 68.9 dB(A)

12.4 Insertion Loss (IL) achieved by the acoustic barrier

Distance	L _{Aeq} before treatment	L _{Aeq} after treatment	IL
6m	72.5 dB(A)	69.9*dB(A)	2.6 dB(A)
4m	74.3 dB(A)	66.7 dB(A)	7.6 dB(A)
2m	76.5 dB(A)	68.9 dB(A)	7.6 dB(A)

Remarks : The total noise level measurement at 6m distances with acoustic barrier installed is believed to be influenced by other sources.



13.0 Analyses and Conclusions

- 13.1 The noise level under investigation is considered to have no tonal, impulsive or intermittent characteristics. No correction to the measured noise level is required.
- 13.2 According to the calculated results in section 12, by implementing the noise control treatments to the hydraulic crane, the noise emitted shall be reduced by about 5 dB(A).
- 13.3 Calibration checks before and after the measurements confirm that no drift, the measurements are considered to be valid.
- 13.4 No presence of any reflective or absorbent surfaces is found to be around the measurements locations to give a significant effect on the measured noise levels.

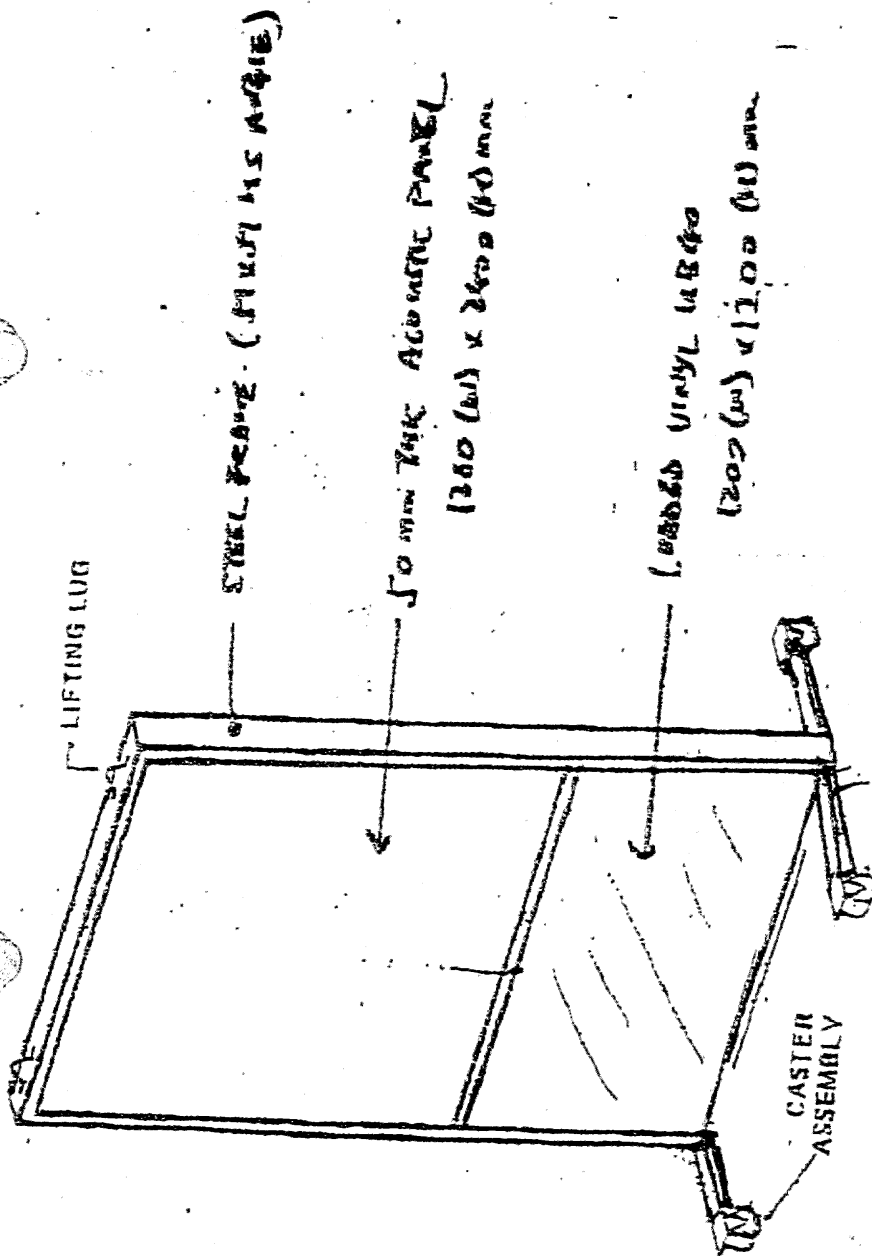
14.0 Appendices

- 14.1 Dimensional sketch of roll-away acoustic barrier
- 14.2 Data sheet of NAP Silentfo Acoustic Panels
- 14.3 Data sheet of INC Flexible Noise Barrier



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Dimensional sketch of roll-away acoustic barrier

Acoustic enclosures with modular panel system

Introduction

As legislation and local standards are introduced to control noise the need for a modular acoustic panel system has grown. In response to this demand, NAP Silencio provides the unique Sound Snap system. Its practical design and wide range of applications are illustrated in this catalogue. Following many years of development the Sound Snap panel system is now widely used in hundreds of installations. This is because it is proven, developed, tested and economical, for all applications in noise and vibration control involving screens, enclosures, plenums, barriers or acoustic air handling units.

Superior Performance

When the theoretical performance of panel systems fails to live up to expectations because of poor sealing, misalignment or manufacturing variations, Sound Snap panels eliminate these problems and give maximum field performance as a result of the overlapping snap lock design, achieved *without fasteners or rivets*.

Designed to cover a range of performances, the panels are available in a variety of finishes and thicknesses. Standard panels are 50mm and 100mm thick. These provide reductions of up to 35 dB(A). Special panels are available on request.

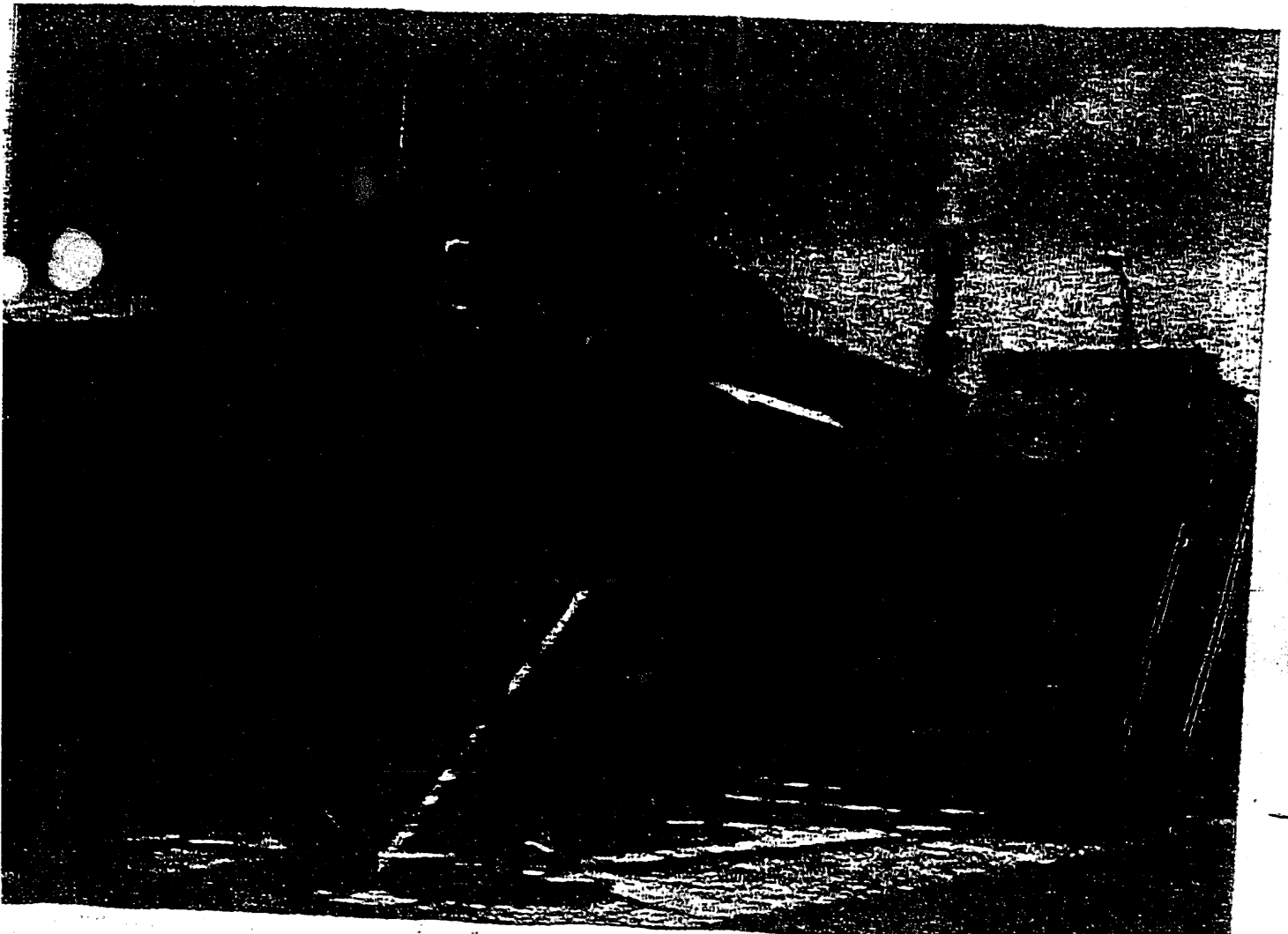
Standard Modular Panels

Sound Snap enclosures can be erected using standard sized panels to suit most requirements. The panels can be installed and disassembled as required, to suit production or machine changes and changes in plant layout. The use of modular panels makes installation fast and simple even for inexperienced teams.

The great advantages of using these panels with or without frames (depending on size or design requirements) are the flexibility, efficiency, standardization and cost saving gained, even though all the features of custom built equipment are retained. The panels are manufactured without damage to the galvanised sheet coating and present an attractive appearance with no rough metal edges, unsightly weld marks or ugly bolt fixings.

Integrated System

The standard panel width is 750mm and the panels are available in lengths up to a maximum of 3.6m. Panels 900mm and 1200mm wide are also available. Integrated with the panels are complementary components; corner panels, glazed panels, doors, windows, access hatches, ventilation silencers, inlet and outlet feed chutes, cable and pipe penetrations and locating channels.



Laboratory Rated Test Results

The noise level reduction achieved at installation depends not only on the transmission loss of the components, but on the size of the enclosure, the internal absorption and other physical effects. With a constant transmission loss, any enclosure with greater internal absorption will achieve a lower external noise level. For this reason, the noise level reduction (NR) or the insertion loss (IL) are the most suitable as practical performance criteria for acoustic enclosures.

Noise Reduction is the difference in sound pressure level (L_p) from inside to outside the enclosure at a given measurement point. Insertion loss is the L_p difference measured with and without the enclosure at the same location and under the same operating conditions. The insertion loss of an enclosure is always less than the transmission loss. With equal insertion losses, a different noise reduction will be obtained according to the frequency spectrum of the source.

NAP Silentflo uses transmission loss (TL) as it is the Laboratory result which can be used to provide either the NR or IL for a particular situation.

Specification

NAP SILENTFLO SOUND SNAP PANELS

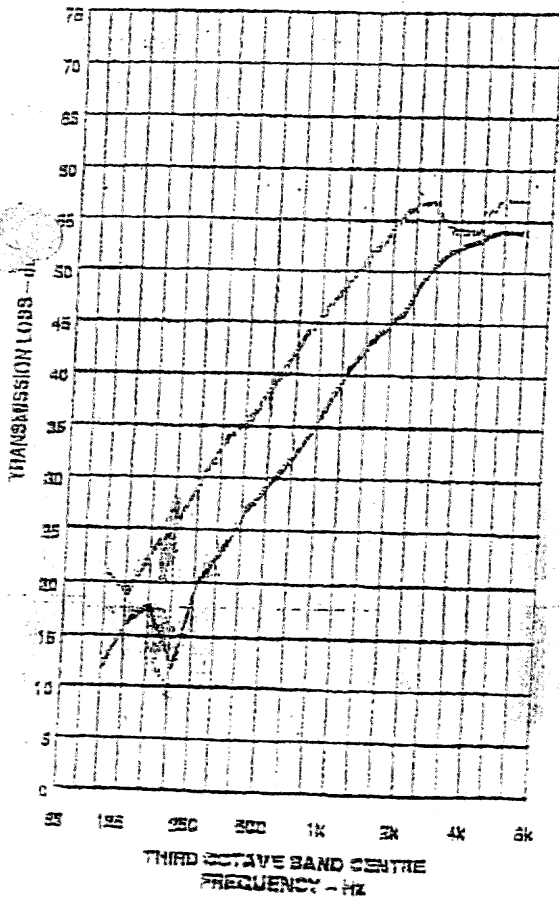
- 1.1 50mm panels shall have an external steel sheet 1.0mm thick 100mm panels shall have an external steel sheet

1.6mm thick. All internal perforated sheet shall be 0.8mm thick galvanised steel with 2.4mm diameter holes on 6.35 staggered centres giving an open area of 11%.

- 1.2 50mm or 100mm thick inert sound absorbing acoustic infill shall be incombustible, mildew resistant and comply with AS1530/1976 with combustion characteristics of 0 for ignitability, spread of flame, heat evolved and smoke developed.
- 1.3 All internal panel stiffeners shall be a minimum of 0.8mm thick galvanised steel. Vertical stiffeners shall be spaced so that the unsupported panel width does not exceed 480mm. Spot welds shall not exceed 100mm on centres and all marks shall be coated with cold galvanising paint.
- 1.4 For the 50mm panel the acoustic infill shall have a minimum density of 60 kg/m³. The density of the acoustic infill for a 100mm thick panel shall be 80kg/m³. Infill shall be compressed 5% to minimise fibre breakdown. No voids are allowed.
- 1.5 Capping channels, joiners and flashing strips shall be made of 1.6mm thick galvanised steel, formed to prevent a direct path for sound or air leakage. All sections shall be roll formed and cut to length to minimise breaks and joints. All voids shall be filled with acoustic infill on installation.
- 1.6 The manufacturer shall at the time of tendering supply certified test data from an independent N.A.T.A. registered laboratory, with a reverberation chamber in excess of 200m³.
 - a. The minimum allowable transmission loss, including all components, shall be:

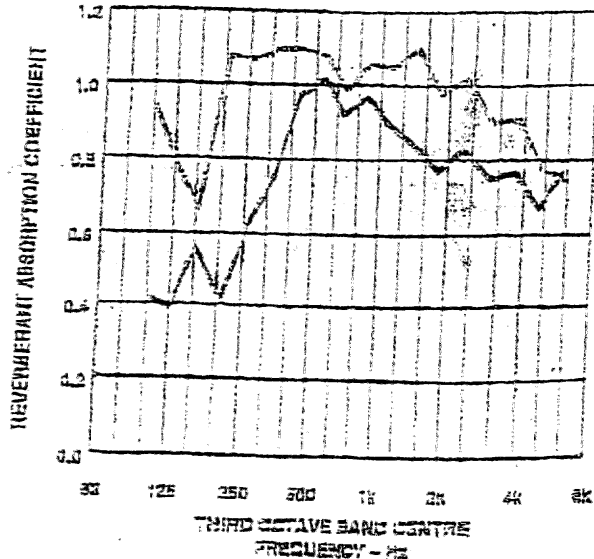
Transmission Loss, dB vs Frequency, Hz							
Panel	125	250	500	1k	2k	4k	5TC
50mm	16	20	30	41	50	54	50
100mm	21	29	39	50	56	56	41
 - b. A composite panel with an area of at least 10m² shall have the following minimum absorption coefficients:

TRANSMISSION LOSS of SOUNDSNAP PANEL SYSTEM



— TRANSMISSION LOSS of 50mm PANEL
 — TRANSMISSION LOSS of 100mm PANEL

REVERBERANT ABSORPTION COEFFICIENT OF SOUNDSNAP PANEL SYSTEM



Data sheet: Barrier

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DECI-BAR® UB Unsupported Flexible Noise Barrier

DECI-BAR UB is a flexible unsupported sound barrier material. It is an economical general purpose sound barrier.

DECI-BAR UB is manufactured from EVA extruded sheet. All offcuts are 100% recyclable. No wastage is incurred during manufacture. Clean offcuts are accepted back from customers for recycling - making DECI-BAR UB the most environmentally friendly noise barrier.

DECI-BAR UB has extremely low flammability and smoke emission without the need for reflective aluminium facings. It is suitable for use in buildings and boats under Marine Survey.

Unlike stiff materials, low stiffness highly damped materials such as DECI-BAR UB provide the full sound reduction predicted by the mass law.

In addition, DECI-BAR UB can impart limited damping when bonded into a sandwich structure. It will help to maximise the sound transmission loss at critical and coincidence frequencies, thus minimising the effect of panel resonance. This effect increases with temperature.

DECI-BAR UB is free of plasticisers. This makes it possible to use conventional contact adhesives or self adhesive tapes.

The complete range of DECI-BAR UB covers standard weights from 3-8kg/m².

FEATURES

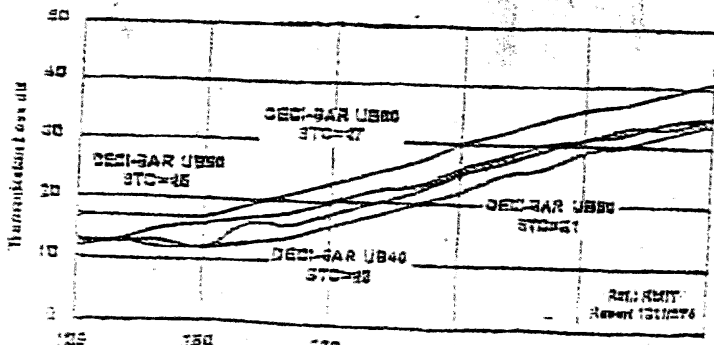
- NATA certified testing.
- Flexible & flexible
- AS 1530.3 smoke index of 3
- Inherently flame retardant
- Can be glued using conventional adhesives
- Easily cut, fabricated and installed
- Can be moulded to shape
- Contains no lead, non toxic
- Available with decorative finishes (to order)
- May be glued, stapled or nailed into position

BENEFITS

- Proven Performance Data
- Economical
- Low installed cost
- Easy to handle
- Maximum performance for weight
- Can be used in all Public buildings
- Can be used in boats under Marine Survey

APPLICATIONS

- Pipe or duct lagging
- Noise barrier in ceiling spaces
- Dry wall partitions
- Acoustic doors
- Small machinery enclosures
- Wrapping fan casings



Quality
Endorsed
Company

ISO 9001:2015
Suzhou, China



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APPENDIX 14.3

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STANDARD PRODUCT CODES

STANDARD PRODUCT	WEIGHT	NOMINAL THICKNESS	ROLL SIZE	
			STD	OPTIONAL
DECI-BAR UB30	3kg/m ²	1.2	140cm x 5m	100cm x 5m
DECI-BAR UB40	4kg/m ²	1.5	140cm x 5m	100cm x 5m
DECI-BAR UB50	5kg/m ²	2.0	140cm x 5m	100cm x 5m
DECI-BAR UB80	8kg/m ²	3.3	140cm x 5m	100cm x 5m

* Rolls not yet available

SOUND TRANSMISSION LOSS (Tested to AS1191-1985)

FREQUENCY	RANDOM INCIDENCE TRANSMISSION LOSS			
	DECI-BAR UB30	DECI-BAR UB40	DECI-BAR UB50	DECI-BAR UB80
100	10	13	14	13
125	12	13	12	17
160	13	13	13	17
200	12	13	15	17
250	12	12	16	17
315	13	16	17	19
400	14	16	18	21
500	18	18	20	23
630	18	20	22	25
800	20	22	23	27
1000	22	25	26	30
1250	26	27	28	32
1600	28	29	30	34
2000	29	31	31	36
2500	30	32	33	37
3150	32	34	33	39
4000	34	35	35	41
5000	36	37	36	43
STC	21	23	26	27

* Independent N.A.T.A. certified test in laboratories at RMIT University. Care must be taken when comparing test data from different laboratories. Tests from other laboratories may result in STC's up to 2-3dB higher for the same material.

FLAMMABILITY PROPERTIES

MATERIAL	UL94	MVSS-302	SAE1389	AS 1830.3.1989			
				Ignitability	Spread of Flame	Heat Evolved	Smoke Devolop.
DECI-BAR UB30	NT	Self Exting.	Self Exting.	12	0	1	3

MECHANICAL PROPERTIES

MATERIAL	SPECIFIC GRAVITY	TEAR RESISTANCE	TENSILE STRENGTH	ELONGATION	HARDNESS
DECI-BAR UB	2.45	7kN/m	1.1MPa	30%	N.T

MISCELLANEOUS PROPERTIES

MATERIAL	COLOUR	SERVICE TEMPERATURE RANGE
DECI-BAR UB	GREY	-20 to 90C

CHEMICAL RESISTANCE

MATERIAL	ACETONE	MEX	PETROL	DIESEL	10% HCL SOLUTION	10% NaOH SOLUTION
DECI-BAR UB	Very Good	Very Good	Swells	Good	Very Good	Very Good

NOTES: Specifications are subject to change without notice. The data listed in this data sheet are typical or average values based on tests conducted by independent laboratories or by the manufacturer. They are indicative only of the results obtained in such tests and should not be considered as guaranteed maximum or minimum. Material must be used under cover unless it is