

Acoustic Performance Assessment of a Product or System

Company Description

Ritek Building Solutions Pty Ltd – 3 Production Street,
Noosaville, QLD, 4566

Product

115mm, 135mm, 150mm, 165mm and 200mm Ritek XL Concrete
Wall Systems

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Assessment by: Peter Knowland

Prepared for: Mark Healey
Ritek NSW
633 Kurmond Road
Freemans Reach NSW 2756

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10/6/05	1	Draft	Mark Healey	02 4579 7745
29/6/05	1	Draft	Mark Healey	Fax
12/7/05	1	Final	Mark Healey	mark.healey@ozemail.com.au
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This firm is a member of the Association of Australian Acoustical Consultants.

The work reported herein has been carried out in accordance with the terms of membership. We stress that the advice given herein is for acoustic purposes only, and that the relevant authorities should be consulted with regard to compliance with regulations governing areas other than acoustics.

1 CLIENT

Ritek Building Solutions Pty Ltd, 3 Production Street, Noosaville, QLD, 4566.

2 PRODUCT FOR ASSESSMENT

115mm, 135mm, 150mm, 165mm and 200mm Ritek XL concrete wall systems as stand alone walls or combined with separate steel stud walls sheeted with plasterboard together with the use of insulation in the cavity. The combination of the above with an additional wall on furring channels to the other side of the Ritek concrete panel.

3 PRODUCT DESCRIPTION

The Ritek Concrete wall is a lost formwork system that utilizes plastic separators to hold 6mm fibre cement facing sheets. The composite studs are in various widths of 103mm, 123mm, 138mm, 153mm and 188mm and are placed at 150mm centres vertically, providing finished panel thickness 115mm, 135mm, 150mm, 165mm and 200mm. These are known as the XL-A wall types.

The panels are erected on a finished slab and filled with concrete. The recessed edges of the fibre cement sheet are then taped and set and the faces finished with paint.

4 CLIENT REQUEST

(1)

To assess the acoustic performance of the Ritek concrete wall together with various plasterboard configurations mounted on separate steel studs or steel furring channels together with the use of cavity insulation. These performances of the various configurations are assessed for compliance with the Section F Acoustic Provisions of the Building Code of Australia 2005.

Specifically, these are covered by

For the Commonwealth States of

New South Wales
Victoria
South Australia
Tasmania
Australian Capital Territory
Western Australia

Sound insulation rating of a wall in Class 2 or 3 building must –

- (i) have an $R_w + C_{tr}$ (airborne) not less than 50, if it separates sole-occupancy units; and
- (ii) have an R_w (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification; and
- (iii) comply with F5.3(b) if it separates:
 - (A) a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit; or
 - (B) a sole-occupancy unit from a plant room or lift shaft.

The BCA 2005 allows for on site verification.

This is covered by Section FV5.2. Compliance with FP5.2(a) and FP5.3 to avoid the transmission of airborne sound through walls is verified when it is measured in-situ that –

- (a) a wall separating sole-occupancy units has a weighted standardised level difference with spectrum adaptation term ($D_{nT,mw} + C_{tr}$) not less than 45 when determined under AS/NZS 1276.1 or ISO 717.1; or
- (b) a wall separating a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, or parts of a different classification, has a weighted standardised level difference ($D_{nT,w}$) not less than 45 when determined under AS/NZS 1276.1 or ISO 717.1.

BCA 2005 also allows for **A0.8 Alternative Solutions** together with **A0.9 Assessment Methods** providing these are determined in accordance with **A0.10 Relevant Performance Requirements**. This is covered in **A2.2 Evidence of Suitability** (a) (iii) (A) and (B).

This assessment is in accordance with the requirements of BCA 2005.

(2)

To assess the acoustic performance of the Ritek Concrete wall together with various plasterboard configurations mounted on separate steel studs or steel furring channels together with the use of cavity insulation. These performances of the various configurations are assessed for compliance with the Section F Acoustic Provisions of the Building Code of Australia 2005.

Specifically, these are covered by

For the States of

Queensland
Northern Territory

The acoustic requirements stay as per the previous Building Code of Australia. The requirement for sound insulation between sole occupancy units is only R_w 45.

Where the wall separates a bathroom, sanitary compartment, laundry or kitchen and a habitable room in adjoining unit except for a Class 9c aged care building, a wall separating a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit must –

- (i) have an R_w of not less than 50; and
- (ii) provide a satisfactory level of insulation against impact sound; and
- (iii) not incorporate a duct which reduces the R_w of the wall to less than 50.

Note:

In the case of the Ritek concrete wall with a steel stud frame separated by at least 15mm and the studs sheathed with plasterboard, this would be considered as a wall with impact insulation rating, providing the services pertaining to the Ritek side of the wall are not run within the steel stud framing. In the case of a Ritek panel wall with resilient mounts and furring channels supporting a plasterboard lining, this would only be considered to have impact insulation rating if there were no services run on the furring channel side of the wall. In addition the plasterboard sheeting is required to be moderately heavy so that there is sufficient acoustic inertia so that there will be adequate resilience in the resilient mounts. Field experience has shown that where services are run on the furring channel side trades tend to fix the service to the Ritek panel and then connect the service to the plasterboard sheeting resulting in acoustic bridging from the Ritek panel to the plasterboard lining. Also it should be noted that the resilient mounts may provide insufficient clearance to run services in the void without bridging between the Ritek panel and the rear of the furring panel.

5 INFORMATION ON WHICH THE ASSESSMENT IS BASED

The determination of the existing performance is based on the following:

Laboratory tests of Ritek 105F-A structural wall carried out by CSIRO Highett Acoustic Laboratories and covered by test report number TL343A, 1997.

CSIRO Highett, calibration test performance for 300 thick concrete slabs in floor transmission laboratory. Tests of 150 thick floor slabs in the same laboratory covered by TL374 of 1999.

Field testing of Ritek panel wall systems carried out by this office on a reasonably large project. Reference is also made to field testing carried out by other approved acoustic consulting firms.

Reference is also made to tests carried out at CSIRO North Ryde on behalf of the Australian Precast Concrete Association. The results of these tests were lower than predicted due to known limitations of the test facilities. It is possible to make appropriate corrections from these tests.

Reference is made to tests of CSR resilient mounts in combination with CSR Plasterboard products when attached to various configurations of masonry walls. The acoustic performance gained is appropriately added to the equivalent Ritek situation. The assessment therefore has to assume that CSR resilient mounts and CSR Plasterboard products are used in conjunction with the appropriate Ritek panel.

In making the assessment of the existing performance of the Ritek Structural wall reference is made to performance of precast concrete panels. For the Ritek panel of 150 and thicker the fibre cement facing sheets neither add nor detract from the acoustic performance. Whilst there are differences in the coincidence dip frequencies of the fibre cement face panel and the concrete infill, the concrete dominates and the acoustic performance is as if the wall is entirely of concrete. Reference is also made to extensive on site testing of the 150 Ritek panel.

6 ASSESSMENT

The systems are as follows:

For compliance with the Commonwealth States of

New South Wales
 Victoria
 South Australia
 Tasmania
 Australian Capital Territory
 Western Australia

Sound insulation rating of a wall in Class 2 or 3 building must –

- (i) have an $R_w + C_{tr}$ (airborne) not less than 50, if it separates sole-occupancy units

In terms of laboratory measurement this performance is provided by 200 XL-A. System 165 XL-A is marginally below with an $R_w + C_{tr}$ of 49 dB, however site verification clearly shows compliance.

Verification Methods

In BCA 2005 on site verification is allowed and the performance required is $D_{ntw} + C_{tr}$ of equal to or greater than 45 dB. Field measurements show that the 150 XL-A system has an average performance of D_{ntw} 50.5 dB. The field-measured $D_{ntw} + C_{tr}$ is typically 45 to 47 dB. This wall system, if correctly installed with quality workmanship, will comply with the on site verification requirements of BCA 2005.

System Ritek 165 XL-A provides a field performance in the range of 46 to 48 $D_{ntw} + C_{tr}$ and therefore easily complies with the site verification requirements of BCA 2005.

Sound insulation rating of a wall in Class 2 or 3 building must –

- (ii) have an R_w (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification;

Ritek System 150 XL-B, Ritek System 165 XL-B and Ritek System 200 XL-B all comply.

Sound insulation rating of a wall in Class 2 or 3 building must –

- (iii) comply with F5.3(b) if it separates:

- (A) a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit; or
- (B) a sole-occupancy unit from a plant room or lift shaft.

F5.3 Determination of impact sound insulation ratings

(b) A wall in a building required to have an impact sound insulation rating must -

- (i) for a Class 2 or 3 building be of discontinuous construction; and
- (ii) for a Class 9c aged care building must –
 - (A) for other than masonry, be two or more separate leaves without rigid mechanical connection except at the periphery; or
 - (B) be identical with a prototype that is no less resistant to the transmission of impact sound when tested in accordance with Specification F5.5 than a wall listed in Table 2 of Specification F5.2.

(c) For the purposes of this Part, discontinuous construction means a wall having a minimum 15mm cavity between 2 separate leaves.

Ritek System 115 XL-C, Ritek System 150 XL-C, Ritek System 165 XL-C and Ritek System 200 XL-C all comply.

For States of

Queensland
Northern Territory

Requiring a sound insulation of not less than R_w 45

All Ritek systems listed in this assessment comply.

Having a sound insulation

- (i) of not less than R_w 50; and
- (ii) provide a satisfactory level of insulation against impact sound; and
- (iii) not incorporate a duct which reduces the R_w of the wall to less than 50.

Ritek System 115 XL-B, Ritek System 135mm XL-B, Ritek System 150 XL-B, Ritek System 165 XL-B and Ritek System 200 XL-B all comply.

Whilst all states other than Queensland and Northern Territory require discontinuous structure there is argument that the state of Queensland will accept resilient mounts as a form of impact isolation. If there is doubt as to the acceptance then the XL-C separate stud and plasterboard wall construction should be employed.

Ritek System 115 XL-C, Ritek System 150 XL-C, Ritek System 165 XL-C and Ritek System 200 XL-C all comply.

7 TABLE OF COMPLIANCE (ACT, NSW, SA, Victoria and Tasmania)

For walls that require $R_w + C_{tr} \geq 50$ dB or $D_{ntw} + C_{tr} \geq 45$ dB:

Wall Type	Wall Width (mm)	Rw Rating	Rw + Ctr	Dntw + Ctr	BCA 2005 Compliant
150 XL-A	150	53	48	45-47	Yes
165 XL-A	165	54	49	46-48	Yes
200 XL-A	200	56	51	46-50	Yes

115 XL-B	168	56	48	45-47	Yes
135XL-B	188	58	50	46-48	Yes
150 XL-B	203	59	51	47-49	Yes
165 XL-B	218	60	52	47-50	Yes
200 XF-B	253	62	54	48-52	Yes

Assessment values shown in **bold** indicate compliance with that section of BCA2005.

XL-B walls consist of XL-A plus 13mm plasterboard screw fixed to resiliently mounted 28mm furring channels on one side with cavity filled with filled with Autex ASB2 or Tontine TSB2 polyester insulation batts.

For walls that require $R_w + C_{tr} \geq 50$ dB + Impact Isolation or $D_{ntw} + C_{tr} \geq 45$ dB + Impact Isolation:

Wall Type	Wall Width (mm)	Rw Rating	Rw + Ctr	Dntw + Ctr	BCA 2005 Compliant
115 XL-C	207	60	52	46-50	Yes
135 XL-C	227	62	54	48-52	Yes
150 XL-C	242	64	56	50-54	Yes
165 XL-C	257	64	56	50-54	Yes
200 XL-C	292	66	58	50-55	Yes

Assessment values shown in **bold** indicate compliance with that section of BCA2005.

XL-C walls consist of XL-A separated by 15mm then a 64mm 0.8 bmt steel stud. The studs are sheeted one side with 13mm plasterboard. The cavity is filled with Autex ASB4 or Tontine TSB4 polyester insulation.

For walls that require $R_w + C_{tr} \geq 40$ dB:

Wall Type	Wall Width (mm)	Rw Rating	Rw + Ctr	BCA 2005 Compliant
115 XL-A	115	47	42	Yes
135XL-A	135	51	46	Yes
150 XL-A	150	53	48	Yes
165 XL-A	162	54	49	Yes
200 XL-A	200	56	51	Yes

115 XL-B	168	56	48	Yes
135XL-B	188	58	50	Yes
150 XL-B	203	59	51	Yes
165 XL-B	215	60	52	Yes
200 XF-B	253	62	54	Yes

Assessment values shown in **bold** indicate compliance with that section of BCA2005.

8 TABLE OF COMPLIANCE (Queensland and Northern Territory)

For walls that require $R_w \geq 45$ dB:

Wall Type	Wall Width (mm)	Rw Rating	BCA 2005 Compliant
115XL-A	115	47	Yes
135XL-A	135	51	Yes
150 XL-A	150	53	Yes
165 XL-A	162	54	Yes
200 XL-A	200	56	Yes

115 XL-B	168	56	Yes
135XL-B	188	58	Yes
150 XL-B	203	59	Yes
165 XL-B	215	60	Yes
200 XF-B	253	62	Yes

Assessment values shown in **bold** indicate compliance with that section of BCA2005.

XL-B walls consist of XL-A plus 13mm plasterboard screw fixed to resiliently mounted 28mm furring channels on one side with cavity filled with filled with Autex ASB2 or Tontine TSB2 polyester insulation batts.

For walls that require $R_w \geq 50$ dB + Impact Isolation:

Wall Type	Wall Width (mm)	Rw Rating	BCA 2005 Compliant
115 XL-B	168	56	Yes
135XL-B	188	58	Yes
150 XL-B	203	59	Yes
165 XL-B	215	60	Yes
200 XF-B	253	62	Yes

Whilst all states other than Queensland and Northern Territory require discontinuous structure there is argument that the state of Queensland will accept resilient mounts as a form of impact isolation. If there is doubt as to the acceptance then the XL-C separate stud and plasterboard wall construction should be employed.

Wall Type	Wall Width (mm)	Rw Rating	BCA 2005 Compliant
115 XL-C	197	60	Yes
135 XL-C	227	62	Yes
150 XL-C	242	64	Yes
165 XL-C	264	64	Yes
200 XL-C	392	66	Yes

Assessment values shown in **bold** indicate compliance with that section of BCA2005.

XL-C walls consist of XL-A separated by 15mm then a 64mm 0.8 bmt steel stud. The studs are sheeted one side with 13mm plasterboard. The cavity is filled with Autex ASB4 or Tontine TSB4 polyester insulation.

9 CONDITIONS

- The Assessment(s) above refer to the expected laboratory performance of the product or system(s), with each product or system only as described.
- The product or system must be constructed and installed according to the material manufacturer's instructions for acoustic-rated construction and be installed with good workmanship.
- No allowance is made for sound flanking that may occur in a field installation. With appropriate design, good workmanship and attention to detail, and ideal site conditions, Field Dn,tw performance can be broadly comparable to laboratory performance.
- This Assessment is only valid for a period of 5 Years from the date of issue.
- Any changes to the construction of the material(s) used in the product or the system(s) can invalidate this assessment. If changes are made then they should be checked for compliance.
- The Assessment is on the acoustic performance only, and that relevant authorities should be consulted in regards to the aspects of structural, fire, durability and all other areas of the products' or systems' performance.
- The insulated assessments are based on the use of polyester insulation of either Tontine wall or Autex manufacture. The use of other polyester products may result in lower field performance being achieved.
- The use of plasterboard lining to the face of the Ritek Wall Panel can result in degradation of acoustic performance. This will particularly occur with the use of 10mm plasterboard. If plasterboard lining is to be used it should be at least 13mm thick. It is essential that there are no air gaps between the plasterboard and the face of the concrete panel as can be created by large dobs of wallboard adhesive. It is recommended that the wallboard adhesive be a combed screed application so that the plasterboard lining can be firmly pressed against the Ritek Panel.
- It is possible from an acoustic view point to cast electrical conduits or 50mm PVC vent pipes within the concrete without there being a significant degradation in the sound insulation of the wall system. There must be, however, not less than 150mm horizontal separation between any cast electrical conduits or 50mm vent pipes. Similarly, there cannot be back to back electrical outlets in the wall, the outlet boxes must be separated by not less than 200mm of concrete horizontally and each outlet box must be fed by separate conduits.

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SUITE 16 401 PACIFIC HIGHWAY ARTARMON 2064 Tel 612 9460 6824 Fax 612 9460 6823
admin@pka.com.au