

10 April 2019

Steel & Tube ComFlor
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Attention: Steve Stickland

Dear Steve

COMFLOR ACOUSTIC PERFORMANCE

Further to your recent request, we have considered the Sound Transmission Class (STC) and the Impact Insulation Class (IIC) of the ComFlor suite of products that includes the 60, 80 and 210 profiles and the recently added SR profile. These ratings are used by the New Zealand Building Code for describing the acoustic performance of inter tenancy walls and floors of residential buildings and are used to protect occupants from undue noise from adjacent occupancies. The requirements of Section G6 of the Building Code are shown below:

The Sound Transmission Class (STC) of walls, floors and ceilings, shall be no less than 55.

The Impact Insulation Class (IIC) of floors shall be no less than 55.

For both STC and IIC ratings, the Building Code requires that field tests shall be within 5 points of the performance requirement.

The STC and IIC ratings have been considered separately below:

Sound Transmission Class

The sound transmission class of the various ComFlor profiles has been predicted using the INSUL computer prediction program and comparisons with onsite testing of other, similar floor types. The STC rating of a floor depends on:

- Topping thickness of the ComFlor profile;
 - The dimensions of the profile itself;
 - Type of ceiling, if any;
 - Depth of ceiling cavity;
 - Method of supporting the ceiling (such as a suspension system);
 - Presence of an absorptive material in the ceiling cavity; and
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- Number of penetrations in the ceiling.

As these factors are expected to vary between projects, analysis has been undertaken for a range of typical construction types for each profile and are reported below. The performance of other types of construction can be assessed as required. The options considered are:

- a) No ceiling, such as may be used above car parks and commercial units;
- b) A direct fix ceiling with a 50mm batten where the ceiling cavity is to be minimised;
- c) A ceiling fixed with a resilient clip, such as the STWC acoustic clip from Rondo; and
- d) A suspended ceiling on a Rondo wire grid with a 200mm ceiling cavity which is typical for apartment inter tenancy floors.

The results are based on a 10mm Standard Gib Board ceiling but similar thicknesses of Fyreline, Aqualine, Noiseline or Ultraline will all provide the same or slightly improved results. Increasing the thickness of the ceiling will result in a minor increase in STC rating. Other, comparable plaster board products will provide similar results.

Analysis has been based on a USC Donn ScrewFix steel frame suspension system with 2.5mm diameter wire hangers at 1200mm centres and strong backs at 1200mm centres. Alternative suspension systems are likely to provide similar results although should be checked prior to their use.

Predictions are provided with and without cavity absorption. For analysis, cavity absorption has been taken as the cavity depth, but not greater than 75mm R1.8 thermal fibreglass blanket. As an alternative, Polyester blanket of the same thickness could be used provided it has a minimum density of 14.7kg/m³ and 1900 rays/m.

One further factor that may affect the STC performance is any penetrations in the ceiling for items such as downlights or mechanical ventilation grills. The STC ratings quoted below are based on a maximum open area equivalent to 1 x 130mm diameter downlight per 8m² of ceiling. Should more open area be required, the acoustic performance of the floor may be less than reported below and could be checked if required.

It should be noted that noise flanking the floors through the building structure will affect field tests and as a result, it is unlikely that any floor, regardless of its construction, will test greater than STC 65.

COMFLOR 60

Table 1 below summarises the STC ratings for the range of ComFlor 60 options considered where *d* is the concrete depth to the bottom of the trough as shown on Figure 1 (or Figure 2 for the suspended grid option).

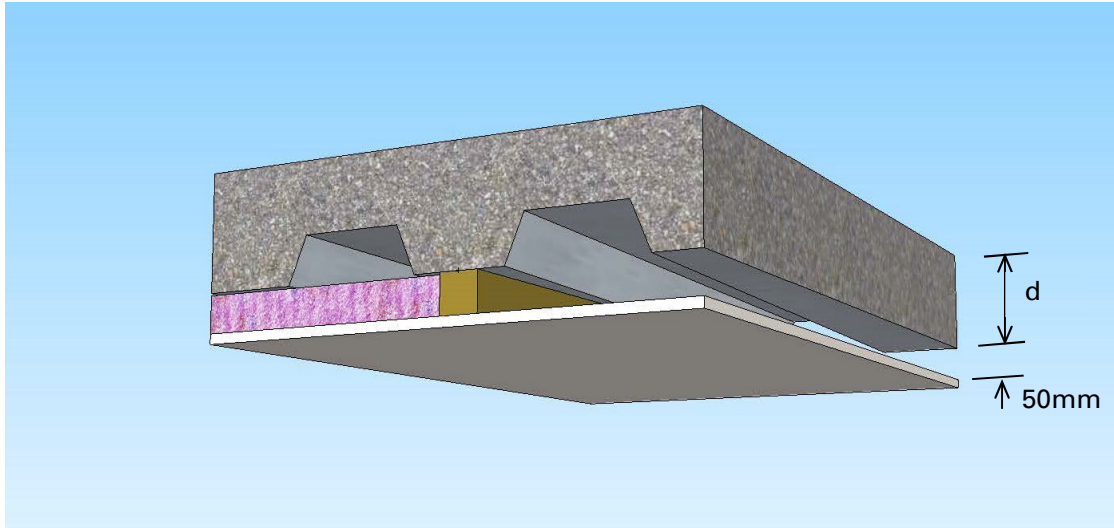


Figure 1. ComFlor 60 showing Battened Ceiling

Table 1. ComFlor 60 STC Ratings

ComFlor Depth (mm)	STC Rating of ComFlor 60						
	No Ceiling	10mm Gib Ceiling; Direct fix to tray with a 50mm batten		10mm Gib Ceiling; Resilient fix to tray, 50mm cavity		10mm Gib Ceiling; Resilient fix to tray, 200mm cavity	
		No Absorption	50mm Absorption	No Absorption	50mm Absorption	No Absorption	75mm Absorption
130	45	49	56	51	62	53	66
140	46	49	57	52	63	54	67
150	47	50	58	53	63	55	69
160	48	50	59	53	64	56	69
170	49	51	60	53	64	58	70
180	50	51	60	54	64	59	71
190	51	51	61	54	65	60	72
200	52	51	62	54	65	61	72
210	53	52	63	55	66	62	73
220	53	53	64	56	67	63	74
230	54	53	64	56	67	63	75
240	55	55	65	57	68	64	75
250	55	56	66	59	69	65	76

56

- Indicates performance of floor is STC 55 or greater and therefore meets the Building Code criterion for inter tenancy floors.

66

- Indicates that the predicted STC rating may not actually be achieved on site as flanking paths will provide a practical upper limit to a field test to approximately STC 65.

COMFLOR 80

Table 2 below summarises the STC ratings for the range of ComFlor 80 where d is the concrete depth to the bottom of the trough as shown on Figure 2 (or Figure 1 for the battened option).

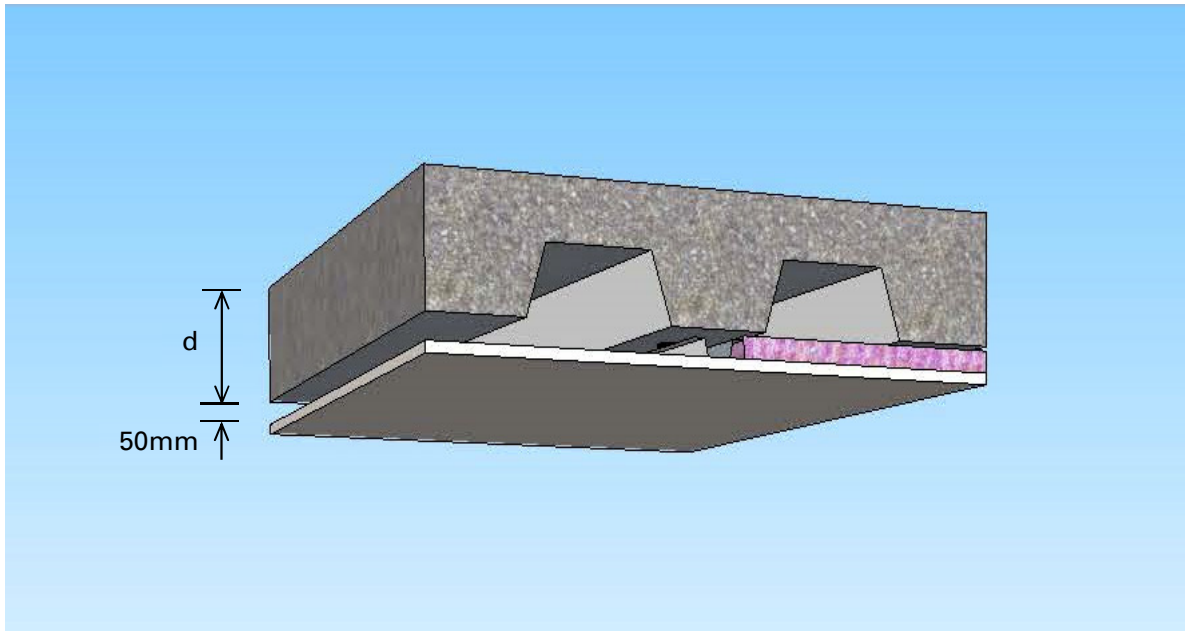


Figure 2. ComFlor 80 showing Ceiling on Resilient Clip

Table 2. ComFlor 80 STC Ratings

ComFlor Depth (mm)	STC Rating of ComFlor 80						
	No Ceiling	10mm Gib Ceiling; Direct fix to tray with a 50mm batten		10mm Gib Ceiling; Resilient fix to tray, 50mm cavity		10mm Gib Ceiling; Resilient fix to tray, 200mm cavity	
		No Absorption	50mm Absorption	No Absorption	50mm Absorption	No Absorption	75mm Absorption
150	47	48	57	51	62	54	67
160	48	49	58	52	62	55	68
170	49	49	59	52	63	56	69
180	50	50	60	52	63	58	70
190	51	50	61	53	64	59	71
200	51	51	62	54	64	60	72
210	52	52	63	55	65	61	73
220	53	52	63	55	66	62	74
230	54	53	64	56	67	63	74
240	54	55	65	58	68	64	75
250	55	55	65	58	69	64	76

56

- Indicates performance of floor is STC 55 or greater and therefore meets the Building Code criterion for inter tenancy floors.

66

- Indicates that the predicted STC rating may not actually be achieved on site as flanking paths will provide a practical upper limit to a field test to approximately STC 65.

COMFLOR 210

Table 3 below summarises the STC ratings for the range of ComFlor 210 where d is the concrete depth to the bottom of the trough as shown on Figure 3.

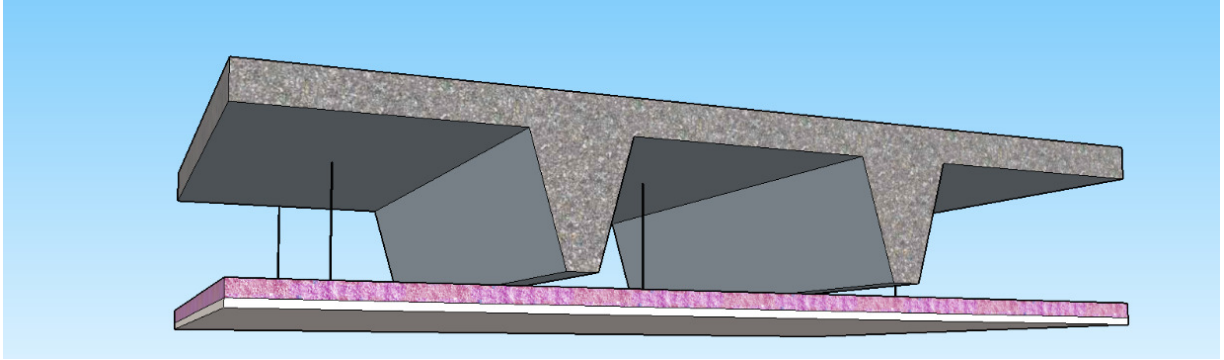


Figure 3. ComFlor 210 showing Suspended Ceiling

Table 3. ComFlor 210 STC Ratings

ComFlor Depth (mm)	STC Rating of ComFlor 210				
	No Ceiling	10mm Standard Gib Fixed directly to underside of ComFlor 210 tray with a 50mm batten.		10mm Standard Gib Suspended minimum 50mm below bottom of rib	
		No absorption	50mm Absorption	No Absorption	75mm Absorption
280	50	50	60	58	70
290	51	51	61	59	71
300	52	51	62	59	72
310	52	52	62	61	73
320	53	53	63	62	73
330	54	53	64	63	74
340	54	54	64	63	74
350	55	54	64	64	75
360	56	55	65	65	75

56

- Indicates performance of floor is STC 55 or greater and therefore meets the Building Code criterion for inter tenancy floors.

66

- Indicates that the predicted STC rating may not actually be achieved on site as flanking paths will provide a practical upper limit to a field test to approximately STC 65.

COMFLOR SR

Table 4 below summarises the STC ratings for the range of ComFlor SR where d is the concrete depth to the bottom of the trough as shown on Figure 4.

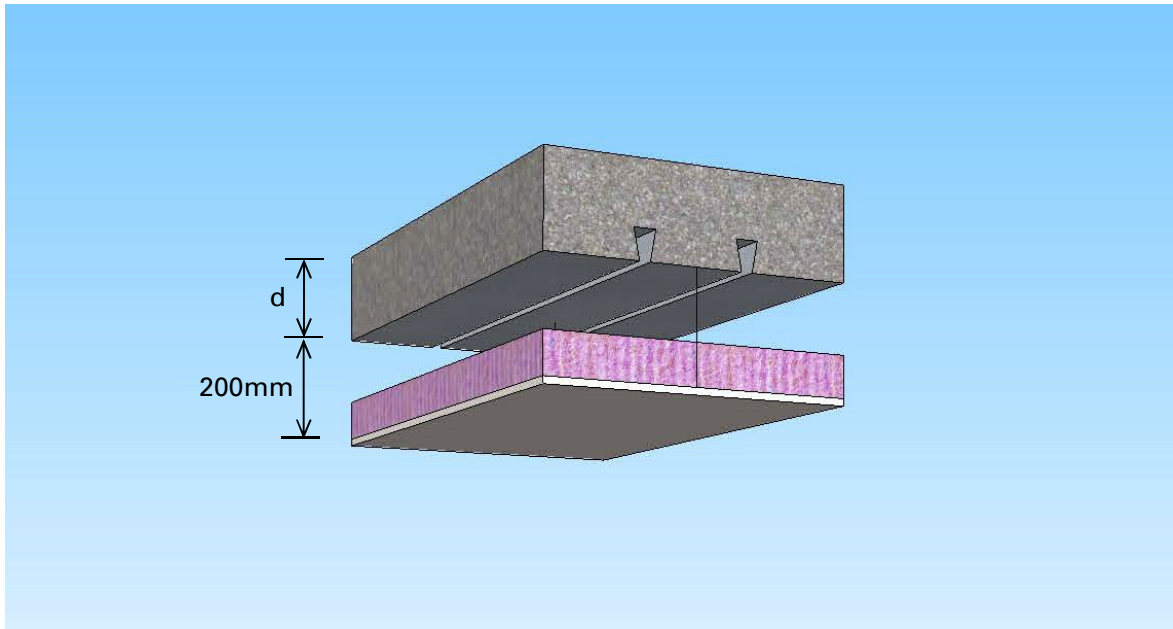


Figure 4. ComFlor SR showing Suspended Ceiling

Table 4. ComFlor SR STC Ratings

ComFlor Depth (mm)	STC Rating of ComFlor SR						
	No Ceiling	10mm Gib Ceiling; Direct Fix to tray with a 50mm batten		10mm Gib Ceiling; Resilient Fix to tray, 50mm cavity		10mm Gib Ceiling; Resilient Fix to tray, 200mm cavity	
		No Absorption	50mm Absorption	No Absorption	50mm Absorption	No Absorption	75mm Absorption
110	48	48	53	51	58	53	63
120	49	49	54	51	61	54	63
130	50	50	56	53	63	57	67
140	51	51	57	53	64	58	67
150	52	51	58	54	64	59	69
160	53	52	58	54	65	60	70
170	55	52	59	54	65	61	70
180	56	52	60	55	65	63	72
190	56	52	61	55	66	63	72
200	57	53	62	55	66	64	73

56

- Indicates performance of floor is STC 55 or greater and therefore meets the Building Code criterion for inter tenancy floors.

66

- Indicates that the predicted STC rating may not actually be achieved on site as flanking paths will provide a practical upper limit to a field test to approximately STC 65.

Impact Insulation Class

The same factors that control the STC rating of a floor also contribute to the IIC rating. However, for impact noise, the floor surface (including the presence of an acoustic underlay) is also a significant factor in the floor's performance. Given the number of acoustic underlays available, and the varying performance of each, it is impracticable to produce a table giving IIC ratings for a range of floor constructions. However, with a suitable acoustic underlay and absorption in the ceiling cavity, any of the floors that satisfy the STC requirement will also be capable of satisfying the IIC requirement. It should be noted that the IIC rating depends largely on the acoustic underlay selected and, as with any type of floor, a substandard underlay or poor installation will result in the floor achieving substandard results.

Should you have any questions regarding the above please do not hesitate to contact me.

Yours sincerely

Hegley Acoustic Consultants



Rhys Hegley