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The ASTC Rating of Constructions with Precast Concrete Hollowcore Floors

Canadian Precast/Prestressed Concrete Institute Report A1-012467.1 28 March, 2018



Conseil national de recherches Canada



The ASTC Rating of Constructions with Precast Concrete Hollowcore Floors

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Report No:A1-012467.1Report Date:28 March 2018Contract No:A1-012467Agreement date:27 September 2017Program:Building Regulations for Market Access

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Executive Summary

This report includes ten examples of calculations of the ASTC ratings for constructions consisting of bare concrete masonry walls connected to bare 203 mm (8") precast concrete hollowcore floors. Examples using concrete hollowcore slabs of three different mass per unit areas are presented (269 kg/m², 301 kg/m² and 338 kg/m² without grout or 273 kg/m², 305 kg/m² and 344 kg/m², respectively with grout). The ASTC rating is also calculated for the addition of linings on the floor of 301 kg/m² concrete hollowcore slabs. The examples using the detailed method show that constructions of bare (no liners, unpainted) normal weight 190 mm thick hollow concrete block masonry walls connected to bare 203 mm (8") thick precast/prestressed concrete hollowcore slabs can achieve an ASTC rating of at least 47.

Based on the findings from this study, it is expected that constructions of hollow concrete block masonry walls with a mass per unit area of or greater to 238 kg/m² connected to precast concrete hollowcore floors with a mass per unit area equal to or greater than 273 kg/m² (with grout) will achieve ASTC ratings which are equal to or greater than 47.

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1. Motivation and Objective

The 2015 edition of the National Building Code of Canada (NBCC) includes significant changes to the acoustic requirements for residential constructions. Earlier editions of the NBCC described the acoustic requirements in terms of the Sound Transmission Class (STC) rating of the assemblies that separate dwellings in a building. In the 2015 edition, for constructions that separate dwelling units, the requirements based on a STC rating were replaced with new requirements based on the Apparent Sound Transmission Class (ASTC) rating. The NBCC requires that the ASTC rating is at least 47 for constructions between dwelling units. The requirements for constructions that separate dwelling units from elevator shafts or refuse chutes remained unchanged in the 2015 NBCC.

The ASTC rating includes contributions from other transmission paths between the rooms (referred to as flanking paths as shown in Figure 1) and is therefore a better metric of the sound transmission that occupants in buildings will experience in practice.



Figure 1: Comparison between STC and ASTC

The 2015 NBCC allows for three methods of demonstrating compliance with the acoustic requirements. The methods include post completion field testing, constructing buildings using the prescribed acceptable solutions found in Part 9 of the NBCC and the prediction of the ASTC rating using the prediction methods based on the standards, ISO 15712 [1] and ISO 10848 [2] and described in detail in the National Research Council Canada Research Report RR-331 *Guide to Calculating Airborne Sound Transmission in Buildings* [3]. This report focuses on the method of showing compliance by the prediction of the ASTC rating.

This report presents ten examples of the calculation of the ASTC rating for constructions with floors made of 203 mm (8") precast/prestressed concrete hollowcore slabs rigidly connected to concrete masonry walls. Examples using concrete hollowcore slabs of three different mass per unit areas (273 kg/m², 305 kg/m² and 343 kg/m²) are included. The ASTC rating is also calculated for the addition of linings on the floor of 305 kg/m² concrete hollowcore slabs.

2. ASTC Examples

2.1 Standard Scenarios for the Examples

For the purposes of this report, the ASTC ratings are calculated using the Standard Scenarios presented in the National Research Council Canada Research Report RR-331 for side-by-side and one-above-theother rooms. The Standard Scenario rooms are shown in Figure 2 and Figure 3.



Figure 2: Standard Scenario from the NRC Research Report RR-331 for "horizontal room pair" case where the rooms are side-by side with a separating wall assembly between the rooms.



Figure 3: Standard Scenario from the NRC Research Report RR-331 for "vertical room pair" case where one of the pair of rooms is above the other with a floor/ceiling assembly between the two rooms.

The pertinent dimensions and junction details of the Standard Scenario rooms are:

- For horizontal room pairs (rooms are side-by-side) the separating wall is 2.5 m high by 5 m wide, the flanking floors and ceilings are 4 m by 5 m and the flanking walls are 2.5 m by 4 m.
- For vertical room pairs (one room is above the other) the separating floor/ceiling is 4 m by 5 m and the flanking walls in both rooms are 2.5 m high.
- In general, it is assumed that the junctions at one side of the room (at the separating wall if rooms are side-by-side) are cross junctions, while one or both of the other two junctions are T-junctions. This enables the examples to illustrate the typical differences between the two common junction cases.
- For a horizontal room pair, the separating wall has T-junctions with the flanking walls at both the façade and corridor sides and cross junctions at the floor and ceiling.
- For a vertical room pair, the façade wall has a T-junction with the separating floor, but the opposing corridor wall has a cross junction, as do the other two walls.

Deviations from the dimensions shown in the Standard Scenarios can change the ASTC ratings.

2.2 ASTC Examples - 203 mm Precast Concrete Hollowcore Floors

The following examples use the detailed calculation methods to determine the ASTC rating of constructions of 190 mm thick hollow concrete block masonry units with a mass per unit area of 238 kg/m² connected to floors and ceilings of 203 mm (8 inch) thick concrete hollowcore slabs. The transmission loss values for the concrete block masonry wall are laboratory measured values from the NRC Report RR-334 [6]. The transmission loss values for the precast concrete hollowcore slabs are laboratory measured values from the NRC Client Reports A1-004972.1 and A1-012467.2. The transmission loss values are summarized in Appendix A.

Also presented are examples with toppings of a 25.4 mm (1") thick underlayment poured directly on the 203 mm thick concrete hollowcore floor with a mass per unit area of 305 kg/m² and a topping of the underlayment with 6 mm (1/4") carpet and an 8mm (5/16") underpad. The improvements due to linings are presented in Appendix B.

The examples and ASTC ratings are summarized in Table 1 for side-by-side rooms and in Table 2 for oneabove-the-other rooms.

	Separating		Floor T	opping	
Example	and Flanking Wall Assemblies	Floor / Ceiling	Underlayment	Carpet	ASTC Rating
1	190 mm concrete masonry wall - 238 kg/m ²	203 mm (8") concrete hollowcore slabs with grout - 344 kg/m ²	None	None	47
3	190 mm concrete masonry wall - 238 kg/m ²	203 mm (8") concrete hollowcore slabs with grout - 305 kg/m ²	None	None	47
5	190 mm concrete masonry wall - 238 kg/m ²	203 mm (8") concrete hollowcore slabs with grout - 305 kg/m ²	25.4 mm (1") underlayment poured directly on the concrete hollowcore slabs	None	47
7	190 mm concrete masonry wall - 238 kg/m ²	203 mm (8") concrete hollowcore slabs with grout - 305 kg/m ²	25.4 mm (1") underlayment poured directly on the concrete hollowcore slabs	6 mm (1/4") carpet with an 8 mm (5/16") underpad	47
9	190 mm concrete masonry wall - 238 kg/m ²	203 mm (8") concrete hollowcore slabs with grout - 273 kg/m ²	None	None	47

Table 1: Summary of the examples with rooms side-by-side. All of the constructions have separating and flanking walls of concrete masonry and concrete hollowcore floors and ceilings.



Table 2: Summary of the examples with rooms one-above-the-other. All of the constructions have flanking walls of concrete masonry and concrete hollowcore floors and ceilings.

Evampla	Separating	Flanking Wall	Floor To	opping	ASTC
Example	Floor / Ceiling	Assemblies	Underlayment	Carpet	Rating
2	203 mm (8") concrete hollowcore slabs with grout - 344 kg/m ²	190 mm concrete masonry wall - 238 kg/m ²	None	None	54
4	203 mm (8") concrete hollowcore slabs with grout - 305 kg/m ²	190 mm concrete masonry wall - 238 kg/m ²	None	None	51
6	203 mm (8") concrete hollowcore slabs with grout - 305 kg/m ²	190 mm concrete masonry wall - 238 kg/m ²	25.4 mm (1") underlayment poured directly on the concrete hollowcore slabs	None	52
8	203 mm (8") concrete hollowcore slabs with grout - 305 kg/m ²	190 mm concrete masonry wall - 238 kg/m ²	25.4 mm (1") underlayment poured directly on the concrete hollowcore slabs	6 mm (1/4") carpet with an 8 mm (5/16") underpad	52
10	203 mm (8") concrete hollowcore slabs with grout - 273 kg/m ²	190 mm concrete masonry wall - 238 kg/m ²	None	None	49

Note that the examples in this report use transmission loss data which can be found in the following reports:

- A1-012467.1 The Transmission Loss of 203 mm Thick Prestressed Precast Concrete Hollowcore Floors
- A1-004972.1 Measurements of Airborne Sound Transmission Loss (ASTM E90) and Impact Sound Transmission (ASTM E492) on One Bare Hollow Core Floor Assembly (203 mm)
- A1-004972.2 Measurements of Airborne Sound Transmission Loss (ASTM E90) and Impact Sound Transmission (ASTM E492) on One Bare Hollow Core Floor Assembly (305 mm)

Horizontal Room Pair - 203 mm Precast Concrete Hollowcore Floor 344 kg/m²



Example 1	ISO Symbol	Reference	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	ASTC
Junction 1 (Rigid cross junction, 190 mr	n block separa	ting wall / 203 mm precast hol	low core	floor 344	kg/m ²)				
Sound Transmission Loss F1 or f1	Races	Measured	38	46	52	60	65	72	56
Structural Reverberation Time Jab		Measured	0.458	0 2 2 9	0.200	0.169	0.100	0.061	50
Change by Lining on 51	¹ s,lab A P	Nelining	0.456	0.526	0.200	0.100	0.109	0.001	
	ΔR_{F1}	NOLINING	0	0	0	0	0	0	
Change by Lining on f1	$\Delta \kappa_{f1}$	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	I _{s,situ}	ISO 15/12-1, Eq. C.1-C.3	0.320	0.220	0.147	0.096	0.061	0.039	
TL in-situ for Element F1	R _{F1,situ}	ISO 15712-1 Eq. 19	39	47	54	62	67	74	58
TL in-situ for Element f1	R _{f1,situ}	ISO 15712-1 Eq. 19	39	47	54	62	67	74	58
Junction 1 - Coupling									
In-situ Velocity Level Difference for Ff	$D_{v,F1,f1,situ}$	ISO 15712-1 Eq. 21, 22	9.6	9.8	10.0	10.4	10.8	11.2	
In-situ Velocity Level Difference for Fd	$D_{v,F1,d,situ}$	ISO 15712-1 Eq. 21, 22	11.8	12.0	12.3	12.8	13.4	14.0	
In-situ Velocity Level Difference for Df	$D_{v,D,f1,situ}$	ISO 15712-1 Eq. 21, 22	11.8	12.0	12.3	12.8	13.4	14.0	
	.,_,,_,_,								
Elanking Transmission Loss - Dath Values									
Flanking Talishission Loss - Faul Values	ת	160 15712 1 5~ 25-	47		62	70	70	02	66
Flatiking IL for Paul FIL	Γ_{F1f1}	130 13712-1 Eq. 25a	47	55	02	70	70	03	00
Flanking IL for Path Fd1	K _{F1d}	ISO 15712-1 Eq. 25a	48	54	60	68	75	81	65
Flanking TL for Path Df1	R_{Df1}	ISO 15712-1 Eq. 25a	48	54	60	68	75	81	65
Flanking STC for Junction 1			43	50	56	64	71	77	60
Junction 2 (Rigid T-Junction, 190 mm bl	ock separating	<mark>, wall / 190 mm block facade w</mark>	/all)						
Transmission Loss Element F2	R _{F2.lah}	RR-334, NRC-Mean BLK190(NW)	35	38	44	50	58	62	49
Structural Reverberation Time Jab	Telah	ISO 15712-1 Eq. C5	0.299	0.191	0.119	0.072	0.042	0.024	-
Change by Lining on F?	ΔR_{E2}	No Lining	0	0	0	0	0	0	
Change by Lining on f2	ΔR_{co}	Notining	0	0	0	0	0	0	
Change by Lining Of 12	T T		0 220	0.1.40	0 000	0.001	0.027	0 022	
Structural Reverberation Time In-situ	^I s,situ	ISO 15/12-1, Eq. C.1-C.3	0.226	0.149	0.098	0.061	0.037	0.022	
TL in-situ for Element F2	R _{F2,situ}	ISO 15712-1 Eq. 19	36	39	45	51	59	62	50
TL in-situ for Element f2	R _{f2,situ}	ISO 15712-1 Eq. 19	36	39	45	51	59	62	50
Junction 2 - Coupling									
In-situ Velocity Level Difference for Ff	D _{v.F2.f2.situ}	ISO 15712-1 Eq. 21, 22	10.8	11.0	11.4	11.9	12.6	13.3	
In-situ Velocity Level Difference for Fd	$D_{v,F2,d,situ}$	ISO 15712-1 Eq. 21, 22	10.9	11.2	11.5	12.1	12.9	13.6	
In-situ Velocity Level Difference for Df	$D_{vD f2 situ}$	ISO 15712-1 Eq. 21. 22	10.9	11.2	11 5	12.1	12.9	13.6	
	0,0, <u>1</u> ,0,000	100 10/12 1 24: 21, 22	10.5		11.0		12.0	1010	
Elanking Transmission Loss Dath Values									
Flanking Transmission Loss - Paul Values	D	100 15712 1 5- 25-	40	F4		C.A.	70	70	62
Flanking IL for Path Ff2	R _{F2f2}	ISO 15712-1 Eq. 25a	48	51	57	64	/3	/6	62
Flanking TL for Path Fd2	R _{F2d}	ISO 15712-1 Eq. 25a	47	50	57	63	72	76	61
Flanking TL for Path Df2	R_{Df2}	ISO 15712-1 Eq. 25a	47	50	57	63	72	76	61
Flanking STC for Junction 2			43	46	52	59	68	71	57
Junction 3 (Rigid cross junction, 190 mr	n block separa	ting wall / 203 mm precast hol	low core	ceiling sla	ab 344 kg	/m²)			
All values are the same as for Junction 1									
Flanking TI for Path Ff3	REAFA	ISO 15712-1 Eq 25b	47	55	62	70	76	83	66
Elanking TI for Path Ed3	Rrad R	ISO 15712-1 Eq 255	/18	54	60	68	75	81	65
Elanking TL for Dath Df2	Rpsa	ISO 15712 1 Eq 250	40	54	60	60	75	01	65
Flanking IE for Facil DIS	RDJ3	130 13712-1 Eq 23b	40	54	50	00	75	01	60
Flanking STC for Junction 3			43	50	50	64	/1	//	60
Junction 4 (Rigid T-junction, 190 mm bl	ock separating	wall / 190 mm block corridor	wall)						
All of the input data is the same as for Junct	tion 2, but differ	ent junctions at the ceiling and flo	or result i	n differen	t loss facto	rs than Jun	ction 2.		
Structural Reverberation Time in-situ	T _{s,situ}	ISO 15712-1, Eq. C.1-C.3	0.244	0.163	0.105	0.065	0.039	0.023	
TL in-situ for Element F4	R _{F4,situ}	ISO 15712-1 Eq. 19	36	39	45	50	58	62	50
TL in-situ for Element f4	R _{f4,situ}	ISO 15712-1 Eq. 19	36	39	45	50	58	62	50
	, ,,	1 -	-				-		-
Junction 4 - Coupling									
In-situ Velocity Level Difference for Ef	Data	ISO 15712-1 Eq. 21. 22	10.4	10.7	11 1	11 7	12.2	12.2	
In situ Velocity Level Difference for 54	Dv,F4,f4,situ	ISO 15712-1 Eq. 21, 22	10.4	11.0	11.1	12.0	12.3	12.2	
In-situ verocity Lever Difference for Fd	Dv,F4,d,situ	150 15712-1 Eq. 21, 22	10.7	11.0	11.4	12.0	12.7	13.0	
In-situ Velocity Level Difference for Df	D _{v,D,f} 4,situ	ISO 15/12-1 Eq. 21, 22	10.7	11.0	11.4	12.0	12.7	13.6	
Flanking Transmssion Loss - Path Values									
Flanking TL for Path Ff4	R_{F4f4}	ISO 15712-1 Eq 25b	47	51	57	63	71	76	62
Flanking TL for Path Fd4	R _{F4d}	ISO 15712-1 Eq 25b	47	50	56	63	71	76	61
Flanking TL for Path Df4	R _{Df4}	ISO 15712-1 Ea 25b	47	50	56	63	71	76	61
Flanking STC for Junction 4	2,1		42	46	52	58	66	71	57
									5.
Total Flanking STC (combined transmission f	or all of the flee	king paths)	27		47	54	62	67	52
		king pauloj	57	41	4/	54	02	07	52
ASIC due to Direct plus Flanking Transr	mission	RR-335, Eq. 1.1	33	37	42	49	57	61	47

Vertical Room Pair - 203 mm Precast Concrete Hollowcore Floor 344 kg/m²





Example 2	ISO Symbol	Reference	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	ASTC
Junction 1 (Rigid Cross junction, 203 m	m precast holl	ow core floor 344 kg/m ² / 190 i	mm block	wall)					
Flanking Path Ff 1									
Sound Transmission Loss F1 or f1	RELIAN	RR-334, NRC-Mean BLK190(NW)	35	38	44	50	58	62	49
Structural Reverberation Time Jab	Telah	ISO 15712-1 Eq. C 5	0 299	0 191	0 119	0 072	0.042	0.024	.5
Change by Lining on Source Side	ΔR_{F1}	No Lining	0	0	0	0	0	0	
Change by Lining on Beceive Side	ΔR_{ϵ_1}	No Lining	0	0	0	0	0	0	
Structural Reverboration Time in city	T		0.267	0.176	0 112	0.060	0.041	0.024	
This situ for Floment F1	R n	150 15/12-1, Eq. C.1-C.3	0.267	0.170	0.113	0.069	0.041	0.024	40
	P	ISO 15712-1 Eq. 19	35	38	44	50	50	62	49
IL IN-SITU FOR Element F1	Nf 1,situ	ISO 15/12-1 Eq. 19	35	38	44	50	58	62	49
Junction 1 - Coupling									
In-situ Velocity Level Difference for Ff	$D_{v,F1,f1,situ}$	ISO 15712-1 Eq. 21, 22	13.9	14.2	14.6	15.2	16.0	16.8	
In-situ Velocity Level Difference for Fd	D _{v,F1,d,situ}	ISO 15712-1 Eq. 21, 22	11.8	12.0	12.3	12.8	13.4	14.0	
In-situ Velocity Level Difference for Df	D _{v,D,f1,situ}	ISO 15712-1 Eq. 21, 22	11.8	12.0	12.3	12.8	13.4	14.0	
Flanking Transmssion Loss - Path Values									
Flanking TL for Path Ff1	R_{F1f1}	ISO 15712-1 Eq. 25a	51	54	61	67	76	81	65
Flanking TL for Path Fd1	R _{F1d}	ISO 15712-1 Eq. 25a	50	56	62	70	77	83	67
Flanking TL for Path Df1	R _{Df1}	ISO 15712-1 Eq. 25a	50	56	62	70	77	83	67
	2)1	·							
Flanking STC for Junction 1			46	50	57	64	72	77	62
		1		50	5,		,2		
Junction 2 (Pigid T junction, 202 mm n	rocact hollow	$core floor 244 kg/m^2 / 100 mm$	block fac	ado wall)					
Elanking Dath Ef. 2		COLE 11001 244 Kg/111 / 130 MM	DIUCK IdÇ	ade wail)					
Flanking Path Ff_2			25	20		50	50	62	10
Characteristic Loss Element F2	R _{F2,lab}	KK-334, NKC-IVIEan BLK190(NW)	35	38	44	50	58	62	49
Structural Reverberation Time Tab	T _{s,lab}	ISO 15/12-1, Eq. C.5	0.299	0.191	0.119	0.072	0.042	0.024	
Change by Lining on Source Side	ΔR_{F2}	No Lining	0	0	0	0	0	0	
Change by Lining on Receive Side	ΔR_{f2}	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	T _{s,situ}	ISO 15712-1, Eq. C.1-C.3	0.226	0.149	0.098	0.061	0.037	0.022	
TL in-situ for Element F2	R _{F2,situ}	ISO 15712-1 Eq. 19	36	39	45	51	59	62	50
TL in-situ for Element f2	R _{f2,situ}	ISO 15712-1 Eq. 19	36	39	45	51	59	62	50
Junction 2 - Coupling									
In-situ Velocity Level Difference for Ff	$D_{nF2} f_{2situ}$	ISO 15712-1 Eq. 21, 22	11.1	11.4	11.7	12.3	13.0	13.7	
In-situ Velocity Level Difference for Fd	$D_{v,F2,d,situ}$	ISO 15712-1 Eq. 21, 22	9.6	9.8	10.1	10.5	11.1	11.7	
In-situ Velocity Level Difference for Df	$D_{vD} f_{2} situ$	ISO 15712-1 Eq. 21, 22	9.6	9.8	10.1	10.5	11.1	11.7	
	0,0,1 2,500								
Flanking Transmssion Loss - Path Values									
Elanking TI for Path Ef?	REAG	ISO 15712-1 Eq. 25a	50	53	60	66	75	79	65
Elanking TL for Path Ed2	READ	ISO 15712-1 Eq. 25a	/0	55	61	69	76	81	66
Elanking TL for Path Df2	RDf2	ISO 15712-1 Eq. 25a	40	55	61	69	76	81	66
	DJ2	150 15712 1 Eq. 250	45	35	01	05	70	01	00
Flanking STC for lunction 2			44	40	50	62	71	75	60
Flanking STC for Junction 2	1	1	44	49	50	03	/1	/5	60
Junction 3 (Rigid Cross Junction, 203 m	m precast non	ow core floor 344 kg/m ² / 190 l	<u>тт ріоск</u>	wall)					
All values are the same as for Junction 1									
Flanking STC for Junction 3	·	7	46	50	57	64	72	77	62
Junction 4 (Rigid Cross junction, 203 m	m precast holl	ow core floor 344 kg/m² / 190	mm block	corridor	wall)				
All of the input data is the same as for Junc	tion 2, but diffe	rent junctions at the ceiling and flo	oor result i	n differen	t loss facto	rs than Jur	iction 2.		
Structural Reverberation Time in-situ	T _{s,situ}	ISO 15712-1, Eq. C.1-C.3	0.244	0.163	0.105	0.065	0.039	0.023	
TL in-situ for Element F4	R _{F4,situ}	ISO 15712-1 Eq. 19	36	39	45	50	58	62	50
TL in-situ for Element f4	R _{f4,situ}	ISO 15712-1 Eq. 19	36	39	45	50	58	62	50
Junction 4 - Coupling									
In-situ Velocity Level Difference for Ff	Dy FA fA situ	ISO 15712-1 Eq. 21, 22	14.2	14.5	14.9	15.5	16.2	17.0	
In-situ Velocity Level Difference for Ed	D _{12 FA d situ}	ISO 15712-1 Eg. 21. 22	12.4	12.6	13.0	13.4	14.0	14.6	
In-situ Velocity Level Difference for Df	$D_{n D f A situ$	ISO 15712-1 Fg 21 22	12.4	12.6	13.0	13.4	14.0	14.6	
	v,v,j 4,su u	100 107 12 1 Ly. 21, 22		12.0	10.0	13.4	11.0	1 10	
Elanking Transmission Loss - Path Values									
Elanking TI for Dath Ef4	<i>R</i>	ISO 15712 1 Ex 25h	E.2	57	62	60	77	07	60
Flanking IL IVI Fatti F14	n _{F4f4}	130 13712-1 Eq 230	55	57	05	71	77	02	00
Flanking TL for Path P64	K F4d	150 157 12-1 Eq 250	52	5/	04	/1	/8	64	60
Flanking IL for Path D14	R _{Df4}	150 15/12-1 Eq 250	52	5/	64	/1	78	84	68
Flanking STC for Junction 4	1	1	4/	52	59	65	/3	/8	63
Total Flanking CTC (combined to	for all after the	nking noths)	40	44	54	50		74	50
Total Flanking STC (combined transmission	for all of the fla	nking paths)	40	44	51	58	66	/1	56
ASIC due to Direct plus Flanking Trans	mission	RR-335, Eq. 1.1	37	43	49	57	64	69	54

Horizontal Room Pair - 203 mm Precast Concrete Hollowcore Floor 305 kg/m²



Example 3	ISO Symbol	Reference	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	ASTC
Junction 1 (Rigid cross junction, 190 mr	n block separa	ting wall / 203 mm precast hol	low core	floor 305	kg/m ²)				
Sound Transmission Loss E1 or f1	Races	Measured A1-012467 2	36	43	51	57	63	71	54
Structural Reverberation Time Jab		Mossured	0.282	0 102	0 1 20	0.095	0.055	0.024	54
Change by Lining on 51	Γs,lab ΛΡ	Nelining	0.265	0.192	0.129	0.065	0.055	0.034	
	ΔR_{F1}	NOLINING	0	0	0	0	0	0	
Change by Lining on f1	ΔK_{f1}	NO LINING	0	0	0	0	0	0	
Structural Reverberation Time in-situ	I _{s,situ}	ISO 15/12-1, Eq. C.1-C.3	0.383	0.267	0.1/6	0.116	0.073	0.046	
TL in-situ for Element F1	R _{F1,situ}	ISO 15712-1 Eq. 19	35	41	50	55	62	70	53
TL in-situ for Element f1	R _{f1,situ}	ISO 15712-1 Eq. 19	35	41	50	55	62	70	53
Junction 1 - Coupling									
In-situ Velocity Level Difference for Ff	$D_{v,F1,f1,situ}$	ISO 15712-1 Eq. 21, 22	9.7	9.7	10.0	10.4	10.8	11.4	
In-situ Velocity Level Difference for Fd	D _{v,F1,d,situ}	ISO 15712-1 Eq. 21, 22	11.5	11.7	12.0	12.5	13.1	13.8	
In-situ Velocity Level Difference for Df	D _{v,D,f1,situ}	ISO 15712-1 Eq. 21, 22	11.5	11.7	12.0	12.5	13.1	13.8	
Flanking Transmssion Loss - Path Values									
Flanking TI for Path Ff1	R ra ca	ISO 15712-1 Eq. 25a	43	49	58	63	71	79	61
Flanking TL for Path Ed1	D D	ISO 15712-1 Eq. 252	45	51	50	64	71	70	62
Flanking TL for Path Dft	n _{F1d}	150 15712-1 Eq. 25a	40	51	50	04	72	79	02
Flanking IL for Path Df1	K _{Df1}	ISO 15/12-1 Eq. 25a	46	51	58	64	12	79	62
Flanking STC for Junction 1			40	46	53	59	67	74	57
Junction 2 (Rigid T-Junction, 190 mm bl	ock separating	g wall / 190 mm block facade w	/all)						
Transmission Loss Element F2	$R_{F2,lab}$	RR-334, NRC-Mean BLK190(NW)	35	38	44	50	58	62	49
Structural Reverberation Time lab	T _{s.lah}	ISO 15712-1 Eq. C5	0.299	0.191	0.119	0.072	0.042	0.024	
Change by Lining on F2	ΔR_{F2}	No Lining	0	0	0	0	0	0	
Change by Lining on f?	ΔR_{f2}	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	72 T	ISO 15712-1 Eq. C 1-C 3	0 202	0.135	0.088	0.056	0.034	0.020	
This situ for Element E2	R	150 15712 1, Eq. C.1 C.5	27	20	0.000	0.050 E1	E0	62	FO
TL in situ for Element f2	P	150 15712-1 Eq. 19	37	20	45	51	59	63	50
TL IN-SITU FOR Element 12	Rf2,situ	ISO 15712-1 Eq. 19	3/	39	45	51	59	63	50
Junction 2 - Coupling									
In-situ Velocity Level Difference for Ff	D _{v,F2,f2,situ}	ISO 15712-1 Eq. 21, 22	11.2	11.5	11.8	12.3	12.9	13.7	
In-situ Velocity Level Difference for Fd	D _{v,F2,d,situ}	ISO 15712-1 Eq. 21, 22	11.4	11.6	12.0	12.5	13.2	14.0	
In-situ Velocity Level Difference for Df	D _{v,D,f2,situ}	ISO 15712-1 Eq. 21, 22	11.4	11.6	12.0	12.5	13.2	14.0	
Flanking Transmssion Loss - Path Values									
Flanking TI for Path Ff2	Reaso	ISO 15712-1 Eq. 25a	49	51	58	64	73	78	63
Elanking TL for Path Ed2	P	ISO 15712-1 Eq. 250	19	51	57	64	73	70	62
Flanking TL for Path Df2	R _{F2d}	ISO 15712-1 Eq. 25a	40	51	57	64	72	77	62
Flanking IL for Path DI2	n _{Df2}	ISO 15712-1 Eq. 25a	48	51	57	04	12	11	62
Flanking STC for Junction 2			44	46	53	59	68	73	58
Junction 3 (Rigid cross junction, 190 mr	n block separa	ting wall / 203 mm precast hol	low core	ceiling sla	ab 305 kg	/m²)			
All values are the same as for Junction 1									
Flanking TL for Path Ff3	R_{F3f3}	ISO 15712-1 Eq 25b	43	49	58	63	71	79	61
Flanking TL for Path Fd3	R _{F3d}	ISO 15712-1 Eq 25b	46	51	58	64	72	79	62
Flanking TL for Path Df3	R_{Df3}	ISO 15712-1 Eq 25b	46	51	58	64	72	79	62
Flanking STC for Junction 3		·	44	45	53	59	67	74	57
	1								
Junction 4 (Rigid T-junction, 190 mm bl	ock senarating	wall / 190 mm block corridor	wall)						
All of the input data is the same as for lunct	ion 2 but differ	ant junctions at the ceiling and flo	or result i	n difforont	t loss facto	rs than lun	ction 2		
An of the input data is the same as for surce	ion 2, out uniter	encjunctions at the centing and he	orresulti				2.		
Structural Boyorbaration Time in situ	T .	150 15712 1 5~ 0 1 0 2	0 222	0.147	0.000	0.050	0.027	0.021	
Structural Reverberation Time In-situ	I s,situ	ISU 15/12-1, Eq. C.1-C.3	0.223	0.14/	0.096	0.059	0.037	0.021	
ILIN-SITUTOR Element F4	R _{F4,situ}	ISU 15/12-1 Eq. 19	36	39	45	51	59	63	50
TL in-situ for Element f4	R _{f4,situ}	ISO 15712-1 Eq. 19	36	39	45	51	59	63	50
Junction 4 - Coupling									
In-situ Velocity Level Difference for Ff	$D_{v,F4,f4,situ}$	ISO 15712-1 Eq. 21, 22	10.8	11.1	11.5	12.0	12.6	13.5	
In-situ Velocity Level Difference for Fd	D _{v,F4,d,situ}	ISO 15712-1 Eq. 21, 22	11.2	11.5	11.8	12.4	13.0	13.9	
In-situ Velocity Level Difference for Df	$D_{v,D,f4.situ}$	ISO 15712-1 Eq. 21. 22	11.2	11.5	11.8	12.4	13.0	13.9	
	., ,, .,								
Flanking Transmission Loss - Path Values									
Elanking TI for Dath Ef4	React	ISO 15712 1 5~ 25h	10	E1	E7	C1	70	77	62
Flanking TL for Dath 5-14	D	ISO 15712-1 EQ 250	4ð	51	57	04	73	// 77	62
Flanking IL for Path F04	r F4d	ISU 15/12-1 Eq 250	48	51	5/	64	/2		62
Flanking TL for Path Df4	K _{Df4}	ISO 15712-1 Eq 25b	48	51	57	64	72	77	62
Flanking STC for Junction 4			43	46	52	59	68	72	57
Total Flanking STC (combined transmssion f	or all of the flan	king paths)	35	40	47	53	61	67	51
ASTC due to Direct plus Flanking Transr	nission	RR-335, Eq. 1.1	33	36	43	49	57	61	47

Vertical Room Pair - 203 mm Precast Concrete Hollowcore Floor 305 kg/m²





Example 4	ISO Symbol	Reference	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	ASTC
Junction 1 (Rigid Cross junction, 203 m	m precast hol	ow core floor 305 kg/m ² / 190 j	nm block	wall)					
Elanking Path Ef 1									
Sound Transmission Loss E1 or f1	<i>R</i>	PP-224 NPC-Moon RIK190(NIW)	25	29	11	50	59	62	10
	T T	KK-554, INKC-IVIEAII BEK190(INW)	0.200		44	0.072	0.042	02	49
	I s,lab	150 15/12-1, Eq. C.5	0.299	0.191	0.119	0.072	0.042	0.024	
Change by Lining on Source Side	ΔR_{F1}	No Lining	0	0	0	0	0	0	
Change by Lining on Receive Side	ΔR_{f1}	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	T _{s,situ}	ISO 15712-1, Eq. C.1-C.3	0.238	0.157	0.102	0.063	0.038	0.022	
TL in-situ for Element F1	$R_{F1,situ}$	ISO 15712-1 Eq. 19	36	39	45	51	58	62	50
TL in-situ for Element f1	$R_{f1,situ}$	ISO 15712-1 Eq. 19	36	39	45	51	58	62	50
Junction 1 - Coupling									
In-situ Velocity Level Difference for Ef	$D_{n E1} f_{1 city}$	ISO 15712-1 Eq. 21. 22	13.4	13.7	14.0	14 7	15.3	16.2	
In-situ Velocity Level Difference for Ed	$D_{v,F1,J1,Sttu}$	ISO 15712 1 Eq. 21, 22	11.5	11.7	12.0	12.5	12.1	12.2	
In-situ Velocity Level Difference for Pf	$D_{v,F_{1,a,sltu}}$	150 15712-1 Eq. 21, 22	11.5	11.7	12.0	12.5	13.1	12.0	
In-situ velocity Level Difference for Di	2 v,D,J 1,Situ	ISO 13712-1 Eq. 21, 22	11.5	11.7	12.0	12.5	15.1	13.8	
Flanking Transmssion Loss - Path Values									
Flanking TL for Path Ff1	R_{F1f1}	ISO 15712-1 Eq. 25a	51	55	61	68	75	80	66
Flanking TL for Path Fd1	R _{F1d}	ISO 15712-1 Eq. 25a	49	54	61	68	75	81	65
Flanking TL for Path Df1	R_{Df1}	ISO 15712-1 Eq. 25a	49	54	61	68	75	81	65
	1								
Flanking STC for Junction 1			45	50	56	63	70	76	61
	1								
Junction 2 (Bigid T junction, 202 mm a		race floor 205 kg/m2 / 100 mm	hlack fac						
Junction 2 (Rigid 1-Junction, 203 mm p	recast nonow	core floor 305 kg/m ⁻ / 190 mm	рюск тас	ade wall)					
Flanking Path Ft_2									
Transmission Loss Element F2	R _{F2,lab}	RR-334, NRC-Mean BLK190(NW)	35	38	44	50	58	62	49
Structural Reverberation Time lab	T _{s,lab}	ISO 15712-1, Eq. C.5	0.299	0.191	0.119	0.072	0.042	0.024	
Change by Lining on Source Side	ΔR_{F2}	No Lining	0	0	0	0	0	0	
Change by Lining on Receive Side	ΔR_{f2}	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	Tssitu	ISO 15712-1. Eq. C.1-C.3	0.202	0.135	0.088	0.056	0.034	0.020	
TL in-situ for Element E2	R ro situ	ISO 15712-1 Eq. 19	37	39	45	51	59	63	50
TL in-situ for Element f2	R _{F2} ,situ	ISO 15712-1 Eq. 19	37	30	45	51	59	63	50
	NJ 2,SIEU	130 13712 1 Eq. 13	57	35	43	51	35	05	50
lumetica 2. Compliant									
Junction 2 - Coupling	-								
In-situ Velocity Level Difference for Ff	D _{v,F2,f2,situ}	ISO 15712-1 Eq. 21, 22	10.8	11.0	11.4	11.8	12.4	13.2	
In-situ Velocity Level Difference for Fd	D _{v,F2,d,situ}	ISO 15712-1 Eq. 21, 22	9.4	9.5	9.9	10.2	10.8	11.4	
In-situ Velocity Level Difference for Df	$D_{v,D,f2,situ}$	ISO 15712-1 Eq. 21, 22	9.4	9.5	9.9	10.2	10.8	11.4	
Flanking Transmssion Loss - Path Values									
Flanking TI for Path Ff2	REAFA	ISO 15712-1 Eq. 25a	51	53	59	66	75	79	64
Elanking TI for Path Ed2	READ	ISO 15712-1 Eq. 25a	/18	53	59	66	74	80	64
Elanking TL for Dath Df2	Rpm	ISO 15712 1 Eq. 25a	40	55	50	66	74	00	64
	RDJ2	130 13712-1 Eq. 23a	40		39	00	/4	00	04
Flanking STC for Junction 2	-		44	48	55	61	69	75	59
Junction 3 (Rigid Cross junction, 203 m	m precast holl	ow core floor 305 kg/m² / 190 i	nm block	wall)					
All values are the same as for Junction 1									
Flanking STC for Junction 3			45	50	56	63	70	76	61
Junction 4 (Rigid Cross junction, 203 m	m precast hol	ow core floor 305 kg/m ² / 190 j	nm block	corridor	wall)				
All of the input data is the same as for lunc	tion 2 but diffe	rent junctions at the calling and flo	or result i	n difforent	loss facto	rs than lun	ction 2		
An of the input data is the same as for junc	tion 2, but unre		Joi result i						
Structural Powerbaration Time in site	T		0.222	0.147	0.000	0.050	0.027	0.024	
structural Reverberation Time In-situ	I s,situ	150 15/12-1, Eq. C.1-C.3	0.223	0.14/	0.096	0.059	0.037	0.021	
IL in-situ for Element F4	K _{F4,situ}	ISO 15712-1 Eq. 19	36	39	45	51	59	63	50
TL in-situ for Element f4	R _{f4,situ}	ISO 15712-1 Eq. 19	36	39	45	51	59	63	50
Junction 4 - Coupling									
In-situ Velocity Level Difference for Ff	D _{vF4.f4.situ}	ISO 15712-1 Eq. 21, 22	13.7	14.0	14.3	14.9	15.5	16.4	
In-situ Velocity Level Difference for Ed	D _{12 FA A sity}	ISO 15712-1 Fg. 21, 22	12.2	12.4	12.7	13.1	13.7	14.4	
In-situ Velocity Level Difference for Df	$D_{nD} f_{A} cita$	ISO 15712-1 Fg 21 22	12.2	12.4	12.7	12.1	13.7	14.4	
	v,v,j 4,511 u			12.7	/	15.1	13.7	27.7	
Flanking Transmession Lass Dath Malus									
Flanking Transmission Loss - Path Values	D								
Fianking IL for Path Ft4	K _{F4f4}	ISU 15/12-1 Eq 25b	53	56	62	69	/8	82	6/
Flanking TL for Path Fd4	R _{F4d}	ISO 15712-1 Eq 25b	50	56	62	69	77	83	66
Flanking TL for Path Df4	R_{Df4}	ISO 15712-1 Eq 25b	50	56	62	69	77	83	66
Flanking STC for Junction 4			46	51	57	64	72	78	62
Total Flanking STC (combined transmssion	for all of the fla	nking paths)	39	43	50	57	64	70	54
_ ,									
ASTC due to Direct plus Flanking Trans	mission	RR-335 Fg 1 1	35	41	47	54	61	67	51

Horizontal Room Pair - 203 mm Concrete Hollowcore Floor 305 kg/m² - Underlayment Topping



Example 5	ISO Symbol	Reference	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	ASTC
Junction 1 (Rigid cross junction, 190 mr	n block separa	ting wall / 203 mm precast hol	low core	floor 305	kg/m ²)				
Sound Transmission Loss F1 or f1	RELLAN	Measured A1-012467.2	36	43	51	57	63	71	54
Structural Reverberation Time lab	Talah	Measured	0 283	0 192	0 129	0.085	0.055	0.034	-
Change by Lining on F1	ΛR_{E4}	25.4 mm Linderlayment	2005	0.152	1	1	1	3	
Change by Lining on f1		25.4 mm Underlayment	2	0	1	4	4	2	
Change by Lining On 11			2	0.251	0.100	4	4	0.042	
Structural Reverberation Time In-situ	I s,situ	ISO 15/12-1, Eq. C.1-C.3	0.359	0.251	0.169	0.110	0.069	0.042	50
TLIN-situ for Element F1	R _{F1,situ}	ISO 15/12-1 Eq. 19	35	41	50	50	62	70	53
TL in-situ for Element f1	R _{f1,situ}	ISO 15712-1 Eq. 19	35	41	50	56	62	70	53
Junction 1 - Coupling									
In-situ Velocity Level Difference for Ff	D _{v,F1,f1,situ}	ISO 15712-1 Eq. 21, 22	10.0	10.0	10.2	10.6	11.1	11.7	
In-situ Velocity Level Difference for Fd	D _{v,F1,d,situ}	ISO 15712-1 Eq. 21, 22	11.6	11.8	12.1	12.6	13.2	13.9	
In-situ Velocity Level Difference for Df	D _{v,D,f1,situ}	ISO 15712-1 Eq. 21, 22	11.6	11.8	12.1	12.6	13.2	13.9	
Flanking Transmssion Loss - Path Values									
Flanking TL for Path Ff1	R_{F1f1}	ISO 15712-1 Eg. 25a	47	50	60	72	79	85	63
Flanking TL for Path Fd1	REA	ISO 15712-1 Eq. 25a	48	51	59	68	76	82	63
Flanking TI for Path Df1	Rpa	ISO 15712-1 Eq. 25a	48	51	59	68	76	82	63
	RDJ1	150 15/12 1 Eq. 250	-10	51	33	00	70	02	05
Flanking CTC for Junction 1			42	40		C A	72	70	F.0
Flanking STC for Junction 1			43	46	55	64	12	/8	58
Junction 2 (Rigid 1-Junction, 190 mm bl	ock separating	wall / 190 mm block facade w	all)						
Transmission Loss Element F2	R _{F2,lab}	RR-334, NRC-Mean BLK190(NW)	35	38	44	50	58	62	49
Structural Reverberation Time lab	T _{s,lab}	ISO 15712-1 Eq. C5	0.299	0.191	0.119	0.072	0.042	0.024	
Change by Lining on F2	ΔR_{F2}	No Lining	0	0	0	0	0	0	
Change by Lining on f2	ΔR_{f2}	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	T _{s,situ}	ISO 15712-1, Eq. C.1-C.3	0.210	0.140	0.092	0.058	0.035	0.021	
TL in-situ for Element F2	R _{F2,situ}	ISO 15712-1 Eq. 19	37	39	45	51	59	63	50
TL in-situ for Element f2	R _{f2} situ	ISO 15712-1 Eq. 19	37	39	45	51	59	63	50
	j 2preu								
Junction 2 - Counting									
In-situ Velocity Lovel Difference for Ef	D	ISO 15712-1 Eq. 21. 22	11 1	11.2	11 7	12.1	12.9	12 5	
In situ Velocity Level Difference for Ed	$D_{v,F2,f2,situ}$	150 15712-1 Eq. 21, 22	11.1	11.5	11.7	12.1	12.0	12.0	
In-situ velocity Level Difference for Fd	D _{v,F2,d,situ}	ISO 15712-1 Eq. 21, 22	11.2	11.5	11.9	12.4	13.0	13.8	
In-situ Velocity Level Difference for Df	D _{v,D,f2,situ}	ISO 15712-1 Eq. 21, 22	11.2	11.5	11.9	12.4	13.0	13.8	
Flanking Transmssion Loss - Path Values									
Flanking TL for Path Ff2	R_{F2f2}	ISO 15712-1 Eq. 25a	49	51	58	64	73	77	62
Flanking TL for Path Fd2	R _{F2d}	ISO 15712-1 Eq. 25a	48	51	57	64	72	77	62
Flanking TL for Path Df2	R_{Df2}	ISO 15712-1 Eq. 25a	48	51	57	64	72	77	62
Flanking STC for Junction 2			44	46	53	59	68	72	57
Junction 3 (Rigid cross junction, 190 mr	n block separa	ting wall / 203 mm precast hol	low core	ceiling sla	ab 305 kg	/m²)			
All values are the same as for lunction 1 exc	rent the tonning								
Elanking TI for Path Ef3	Rrace	ISO 15712-1 Eq 25b	/13	19	58	65	71	80	61
Flanking TL for Dath Ed2	P	ISO 15712 1 Eq 250	45		50 E0	65	71	70	62
Flanking TL for Dath Df2	P = =	150 15712-1 Eq 250	40	51	50	05	72	79	62
	KDf3	ISO 13712-1 Eq 250	40	51	50	65	12	79	62
Flanking STC for Junction 3	1		44	45	53	60	6/	/5	57
Junction 4 (Rigid T-junction, 190 mm bl	ock separating	wall / 190 mm block corridor	wall)						
All of the input data is the same as for Junct	tion 2, but differ	ent junctions at the ceiling and flo	or result i	n different	t loss facto	rs than Jur	iction 2.		
Structural Reverberation Time in-situ	T _{s,situ}	ISO 15712-1, Eq. C.1-C.3	0.232	0.154	0.100	0.061	0.038	0.022	
TL in-situ for Element F4	R _{F4,situ}	ISO 15712-1 Eq. 19	36	39	45	51	58	62	50
TL in-situ for Element f4	R _{f4,situ}	ISO 15712-1 Eq. 19	36	39	45	51	58	62	50
Junction 4 - Coupling									
In-situ Velocity Level Difference for Ef	Du FA FA citu	ISO 15712-1 Eq. 21. 22	10.6	10.9	11 3	11 9	12 5	13 3	
In-situ Velocity Level Difference for Ed	D ₂₂ FA d situ	ISO 15712-1 Eq. 21. 22	11.0	11.3	11.7	12.3	12.9	13.7	
In-situ Velocity Level Difference for Df	Du D fa site	ISO 15712-1 Eq. 21, 22	11.0	11.3	11 7	12.5	12.0	13.7	
	v,D,J 4,SIU	150 15/12 ⁻ 1 Ly. 21, 22	11.0	11.3	11./	12.3	12.9	13.7	
Flanking Transmission Lass Dath Mat									
Flanking Transmission Loss - Path Values	D								
Flanking TL for Path Ff4	rt _{F4f4}	ISO 15/12-1 Eq 25b	48	51	57	64	/1	/6	62
Flanking TL for Path Fd4	R _{F4d}	ISO 15712-1 Eq 25b	47	51	57	64	72	76	62
Flanking TL for Path Df4	R_{Df4}	ISO 15712-1 Eq 25b	47	51	57	64	72	76	62
Flanking STC for Junction 4			43	46	52	59	67	71	57
Total Flanking STC (combined transmssion f	or all of the flan	king paths)	36	40	47	54	62	67	51
ASTC due to Direct plus Flanking Transr	nission	RR-335, Eq. 1.1	33	36	43	49	57	61	47

Vertical Room Pair - 203 mm Precast Hollowcore Floor 305 kg/m² - Underlayment Topping



REPORT A1-012467.1



Example 6	ISO Symbol	Reference	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	ASTC
Junction 1 (Rigid Cross junction, 203 mi	m precast holl	ow core floor 305 kg/m ² / 190 j	nm block	wall)					
Flanking Path Ff 1									
Sound Transmission Loss F1 or f1	Races	RR-334 NRC-Mean BLK190(NW)	35	38	11	50	58	62	19
Sound mansmission Loss 110111	T T		0.200	0 101	0 1 1 0	0.072	0.042	0.024	43
	I s,lab	130 13/12-1, Eq. C.3	0.299	0.191	0.119	0.072	0.042	0.024	
Change by Lining on Source Side		No Lining	0	0	0	0	0	0	
Change by Lining on Receive Side	ΔR_{f1}	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	T _{s,situ}	ISO 15712-1, Eq. C.1-C.3	0.248	0.163	0.105	0.065	0.039	0.023	
TL in-situ for Element F1	R _{F1,situ}	ISO 15712-1 Eq. 19	36	39	45	50	58	62	50
TL in-situ for Element f1	R _{f1,situ}	ISO 15712-1 Eq. 19	36	39	45	50	58	62	50
Junction 1 - Coupling									
In-situ Velocity Level Difference for Ff	D _{v,F1,f1,situ}	ISO 15712-1 Eq. 21, 22	13.2	13.5	13.9	14.5	15.2	16.0	
In-situ Velocity Level Difference for Fd	D _{v.F1.d.situ}	ISO 15712-1 Eq. 21, 22	11.6	11.8	12.1	12.6	13.2	13.9	
In-situ Velocity Level Difference for Df	$D_{v,D,f,1,situ}$	ISO 15712-1 Eq. 21. 22	11.6	11.8	12 1	12.6	13.2	13.9	
Elanking Transmission Loss - Bath Values									
Flanking Hanshission Loss - Facil Values	D	100 15712 1 5- 25-	54		64	67	75	00	~~
Flanking IL for Path Ff1	n _{F1f1}	ISO 15712-1 Eq. 25a	51	55	61	67	75	80	66
Flanking IL for Path Fd1	R _{F1d}	ISO 15/12-1 Eq. 25a	49	55	61	68	/5	81	65
Flanking TL for Path Df1	R_{Df1}	ISO 15712-1 Eq. 25a	49	55	61	68	75	81	65
Flanking STC for Junction 1			45	50	56	63	70	76	61
Junction 2 (Rigid T-junction, 203 mm p	recast hollow	core floor 305 kg/m ² / 190 mm	block faç	ade wall)					
Flanking Path Ff 2									
Transmission Loss Element F2	REDLah	RR-334. NRC-Mean BLK190(NW)	35	38	44	50	58	62	49
Structural Reverberation Time lab	Talah	ISO 15712-1. Eq. C.5	0.299	0.191	0.119	0.072	0.042	0.024	-
Change by Lining on Source Side	ΔR_{ro}	Nolining	0	0	0	0	0	0	
Change by Lining on Boceive Side	Δ.R. _{F.2}	No Lining	0	0	0	0	0	0	
Change by Linnig on Receive Side			0 210	0.140	0.002	0.059	0.025	0.021	
	^I s,situ	150 15712-1, Eq. C.1-C.3	0.210	0.140	0.092	0.058	0.035	0.021	50
IL In-situ for Element F2	R _{F2,situ}	ISO 15/12-1 Eq. 19	3/	39	45	51	59	63	50
IL in-situ for Element f2	R _{f2,situ}	ISO 15/12-1 Eq. 19	37	39	45	51	59	63	50
Junction 2 - Coupling									
In-situ Velocity Level Difference for Ff	D _{v,F2,f2,situ}	ISO 15712-1 Eq. 21, 22	10.6	10.9	11.2	11.7	12.3	13.1	
In-situ Velocity Level Difference for Fd	D _{v,F2,d,situ}	ISO 15712-1 Eq. 21, 22	9.4	9.6	9.9	10.3	10.9	11.5	
In-situ Velocity Level Difference for Df	D _{v,D,f2,situ}	ISO 15712-1 Eq. 21, 22	9.4	9.6	9.9	10.3	10.9	11.5	
Flanking Transmssion Loss - Path Values									
Flanking TL for Path Ff2	R_{F2f2}	ISO 15712-1 Eq. 25a	51	53	59	66	74	79	64
Flanking TI for Path Ed2	REAd	ISO 15712-1 Eq. 25a	48	53	59	67	74	80	64
Elanking TI for Path Df2	Rpf2	ISO 15712-1 Eq. 25a	/18	53	59	67	7/	80	64
	DJ2	150 15712 1 Eq. 250	-+0	33	55	07	/4	00	04
Flanking STC for Junction 2			44	40		61	60	75	50
Flanking STC for Junction 2		1	44	48	22	61	09	/5	59
Junction 3 (Rigid Cross junction, 203 mi	m precast holi	ow core floor 305 kg/m² / 190 i	nm block	wall)					
All values are the same as for Junction 1									
Flanking STC for Junction 3			45	50	56	63	70	76	61
Junction 4 (Rigid Cross junction, 203 m	m precast holl	ow core floor 305 kg/m² / 190 ı	nm block	corridor	wall)				
All of the input data is the same as for Junc	tion 2, but diffe	rent junctions at the ceiling and flo	oor result i	n different	t loss facto	rs than Jun	ction 2.		
Structural Reverberation Time in-situ	T _{s.situ}	ISO 15712-1, Eq. C.1-C.3	0.232	0.154	0.100	0.061	0.038	0.022	
TL in-situ for Element F4	REACITY	ISO 15712-1 Eq. 19	36	39	45	51	58	62	50
TL in-situ for Element f4	RfAsitu	ISO 15712-1 Fg. 19	36	39	45	51	58	62	50
	JASteu								
Junction 4 - Coupling									
Junction 4 - Coupling	D	ISO 15712 1 5~ 21 22	12 5	12.0	14.1	14.0	15.2	16.2	
In-situ velocity Level Difference for Ff	D _{v,F4,f4,situ}	150 15/12-1 Eq. 21, 22	13.5	13.8	14.1	14.8	15.3	10.2	
In-situ Velocity Level Difference for Fd	D _{v,F4,d,situ}	ISO 15/12-1 Eq. 21, 22	12.2	12.4	12.7	13.2	13.7	14.4	
In-situ Velocity Level Difference for Df	D _{v,D,f} 4,situ	ISO 15712-1 Eq. 21, 22	12.2	12.4	12.7	13.2	13.7	14.4	
Flanking Transmssion Loss - Path Values									
Flanking TL for Path Ff4	R_{F4f4}	ISO 15712-1 Eq 25b	53	56	62	69	76	81	67
Flanking TL for Path Fd4	R_{F4d}	ISO 15712-1 Eq 25b	50	56	62	69	76	82	66
Flanking TL for Path Df4	R_{Df4}	ISO 15712-1 Eq 25b	50	56	62	69	76	82	66
Flanking STC for Junction 4		•	46	51	57	64	71	77	62
Total Flanking STC (combined transmission)	for all of the fla	nking paths)	39	43	50	57	64	70	54
		0,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,							
ASTC due to Direct plus Flanking Trans	mission	RR-335 Fg 1 1	26	/1	/10	56	62	69	52
Talls		555, Eq. 1.1	50	74	-10	55		00	

Horizontal Room Pair - 203 mm Precast Hollowcore Floor 305 kg/m² - Underlayment & Carpet





Example 7	ISO Symbol	Reference	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	ASTC
Junction 1 (Rigid cross junction, 190 mr	n block separa	ting wall / 203 mm precast hol	low core	floor 305	kg/m ²)				
Sound Transmission Loss F1 or f1	RELLAN	Measured A1-012467.2	36	43	51	57	63	71	54
Structural Reverberation Time lab	Telah	Measured	0 283	0 192	0 129	0.085	0.055	0.034	-
Change by Lining on F1	ΛR_{E4}	Underlayment & Carnet	1	0.152	1	5	10	0.054 g	
Change by Lining on f1		Underlayment & Carpet	1	0	1	5	10	0	
Change by Lining On 11			1	0.251	0.100	0 110	0.000	0 042	
Structural Reverberation Time In-Situ	I s,situ	ISO 15/12-1, Eq. C.1-C.3	0.359	0.251	0.169	0.110	0.069	0.042	50
IL In-situ for Element F1	R _{F1,situ}	ISO 15712-1 Eq. 19	35	41	50	56	62	70	53
TL in-situ for Element f1	R _{f1,situ}	ISO 15712-1 Eq. 19	35	41	50	56	62	70	53
Junction 1 - Coupling									
In-situ Velocity Level Difference for Ff	D _{v,F1,f1,situ}	ISO 15712-1 Eq. 21, 22	10.0	10.0	10.2	10.6	11.1	11.7	
In-situ Velocity Level Difference for Fd	$D_{v,F1,d,situ}$	ISO 15712-1 Eq. 21, 22	11.6	11.8	12.1	12.6	13.2	13.9	
In-situ Velocity Level Difference for Df	D _{v,D,f1,situ}	ISO 15712-1 Eq. 21, 22	11.6	11.8	12.1	12.6	13.2	13.9	
Flanking Transmssion Loss - Path Values									
Flanking TL for Path Ff1	R_{F1f1}	ISO 15712-1 Eg. 25a	45	49	61	75	91	96	62
Flanking TL for Path Fd1	REA	ISO 15712-1 Eq. 25a	47	50	60	70	82	87	63
Flanking TI for Path Df1	Rpa	ISO 15712-1 Eq. 25a	47	50	60	70	82	87	63
	RDJ1	150 15/12 1 24. 250	-+7	50	00	70	02	07	05
Flanking CTC for Junction 1			42	45	FC	66	70	04	F.0
Flanking STC for Junction 1			42	45	50	00	79	84	58
			- 11)						
Junction 2 (Rigid 1-Junction, 190 mm bi	OCK Separating	g wall / 190 mm block facade w	/all)						
Iransmission Loss Element F2	K _{F2,lab}	RR-334, NRC-Mean BLK190(NW)	35	38	44	50	58	62	49
Structural Reverberation Time lab	T _{s,lab}	ISO 15712-1 Eq. C5	0.299	0.191	0.119	0.072	0.042	0.024	
Change by Lining on F2	ΔR_{F2}	No Lining	0	0	0	0	0	0	
Change by Lining on f2	ΔR_{f2}	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	T _{s,situ}	ISO 15712-1, Eq. C.1-C.3	0.210	0.140	0.092	0.058	0.035	0.021	
TL in-situ for Element F2	R _{F2,situ}	ISO 15712-1 Eq. 19	37	39	45	51	59	63	50
TL in-situ for Element f2	R _{f2,situ}	ISO 15712-1 Eq. 19	37	39	45	51	59	63	50
Junction 2 - Coupling									
In-situ Velocity Level Difference for Ff	Du F2 62 situ	ISO 15712-1 Fg 21 22	11 1	11 3	11 7	12 1	12.8	13 5	
In-situ Velocity Level Difference for Ed	Durpadaitu	ISO 15712-1 Eq. 21, 22	11.1	11.5	11.7	12.1	12.0	12.9	
In situ Velocity Level Difference for Df	$D_{v,F,2,a,situ}$	ISO 15712-1 Eq. 21, 22	11.2	11.5	11.9	12.4	12.0	13.0	
In-situ velocity Level Difference for Di	2 v,D,J 2,Situ	130 13712-1 Eq. 21, 22	11.2	11.5	11.9	12.4	15.0	15.0	
Flanking Transmission Loss - Path Values									
Flanking TL for Path Ff2	R_{F2f2}	ISO 15712-1 Eq. 25a	49	51	58	64	73	77	62
Flanking TL for Path Fd2	R _{F2d}	ISO 15712-1 Eq. 25a	48	51	57	64	72	77	62
Flanking TL for Path Df2	R_{Df2}	ISO 15712-1 Eq. 25a	48	51	57	64	72	77	62
Flanking STC for Junction 2			44	46	53	59	68	72	57
Junction 3 (Rigid cross junction, 190 mr	n block separa	ting wall / 203 mm precast hol	low core	ceiling sla	ab 305 kg	/m²)			
All values are the same as for Junction 1		-							
Flanking TL for Path Ff3	R_{F3f3}	ISO 15712-1 Eq 25b	43	49	58	65	71	80	61
Flanking TI for Path Ed3	REA	ISO 15712-1 Eq 25b	46	51	58	65	72	79	62
Flanking TI for Path Df3	R _{Df3}	ISO 15712-1 Eq 25b	46	51	58	65	72	79	62
Elanking STC for Junction 3	5)5	100 10/12 124 200	14	45	53	60	67	75	57
				45	35	00	0/	/3	57
Junction 4 (Pigid T junction, 190 mm b)	ock constating	wall (190 mm block corridor							
Junction 4 (Rigid 1-Junction, 190 mm bi	UCK Separating	wall / 190 mm block corridor	wall)	n different	loss fosto	rs than lun	ation 2		
An of the input data is the same as for junct	lon 2, but unier	enclunctions at the centrig and ho	orresult	numeren	L IOSS TACLO	is than Jun			
Characterized Discussion of the Third State	T		0.222	0.45 -	0.400	0.001	0.000	0.022	
Structural Reverberation Time in-situ	I _{s,situ}	ISU 15/12-1, Eq. C.1-C.3	0.232	0.154	0.100	0.061	0.038	0.022	
IL In-situ for Element F4	R _{F4,situ}	ISO 15712-1 Eq. 19	36	39	45	51	58	62	50
TL in-situ for Element f4	R _{f4,situ}	ISO 15712-1 Eq. 19	36	39	45	51	58	62	50
Junction 4 - Coupling									
In-situ Velocity Level Difference for Ff	$D_{v,F4,f4,situ}$	ISO 15712-1 Eq. 21, 22	10.6	10.9	11.3	11.9	12.5	13.3	
In-situ Velocity Level Difference for Fd	D _{v,F4,d,situ}	ISO 15712-1 Eq. 21, 22	11.0	11.3	11.7	12.3	12.9	13.7	
In-situ Velocity Level Difference for Df	$D_{v,D,f4.situ}$	ISO 15712-1 Eq. 21. 22	11.0	11.3	11.7	12.3	12.9	13.7	
,	, ,, ,	-,,	-		· ·		-		
Flanking Transmission Loss - Path Values									
Elanking TI for Path Ef4	REAGA	ISO 15712-1 Eq 25b	19	51	57	64	71	76	62
Elanking TL for Dath Edd	D	ISO 15712-1 EQ 250	40	51 E1	57	C/	71	70	62
Flanking TL for Dath Df4	D F4d	150 15712-1 EQ 250	4/	51	57	04	72	70	02
Flanking IL for Path Df4	NDf4	ISU 15712-1 Eq 250	4/	51	5/	64	/2	/6	62
Flanking STC for Junction 4			43	46	52	59	67	/1	57
Total Flanking STC (combined transmssion f	or all of the flan	iking paths)	36	40	47	54	62	68	51
ASTC due to Direct plus Flanking Transr	nission	RR-335, Eq. 1.1	33	36	43	49	57	61	47

Vertical Room Pair - 203 mm Precast Hollowcore Floor 305 kg/m² - Underlayment & Carpet





Example 8	ISO Symbol	Reference	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	ASTC
Junction 1 (Rigid Cross junction, 203 mi	m precast holl	ow core floor 305 kg/m ² / 190 j	nm block	wall)					
Elapting Dath Ef									
Sound Transmission Loss F1 or f1	R _n , , ,	RR-334 NRC-Mean BLK190(NW)	35	38	11	50	58	62	19
Sound mansmission Loss 110111	T T		0.200	0 101	0 1 1 0	0.072	0.042	0.024	43
	I s,lab	130 13/12-1, Eq. C.3	0.299	0.191	0.119	0.072	0.042	0.024	
Change by Lining on Source Side		No Lining	0	0	0	0	0	0	
Change by Lining on Receive Side	ΔR_{f1}	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	T _{s,situ}	ISO 15712-1, Eq. C.1-C.3	0.248	0.163	0.105	0.065	0.039	0.023	
TL in-situ for Element F1	R _{F1,situ}	ISO 15712-1 Eq. 19	36	39	45	50	58	62	50
TL in-situ for Element f1	R _{f1,situ}	ISO 15712-1 Eq. 19	36	39	45	50	58	62	50
Junction 1 - Coupling									
In-situ Velocity Level Difference for Ff	$D_{v,F1,f1,situ}$	ISO 15712-1 Eq. 21, 22	13.2	13.5	13.9	14.5	15.2	16.0	
In-situ Velocity Level Difference for Ed	$D_{v,F1,d,situ}$	ISO 15712-1 Eq. 21, 22	11.6	11.8	12.1	12.6	13.2	13.9	
In-situ Velocity Level Difference for Df	$D_{nDf1situ}$	ISO 15712-1 Eq. 21.22	11.6	11.8	12.1	12.6	13.2	13.9	
In site verbeity lever binerence for bi	0,0, <u>0</u> , <u>0</u> ,000	130 13712 1 Eq. 21, 22	11.0	11.0	12.1	12.0	15.2	15.5	
Elanking Transmission Loss Dath Values									
Flanking Transmission Loss - Path Values	מ	100 15712 1 5 25	= 4		64	67		00	
Flanking TL for Path Ff1	R _{F1f1}	ISO 15/12-1 Eq. 25a	51	55	61	6/	/5	80	66
Flanking TL for Path Fd1	R _{F1d}	ISO 15712-1 Eq. 25a	49	55	61	68	75	81	65
Flanking TL for Path Df1	R_{Df1}	ISO 15712-1 Eq. 25a	49	55	61	68	75	81	65
Flanking STC for Junction 1			45	50	56	63	70	76	61
Junction 2 (Rigid T-junction, 203 mm p	recast hollow	core floor 305 kg/m² / 190 mm	block fac	ade wall)					
Flanking Path Ff 2									
Transmission Loss Flement F2	Bros .	RR-334, NRC-Mean RIK190(NW)	35	38	44	50	58	62	49
Structural Poverberation Time Jab	T	ISO 15712-1 Eq. C 5	0 200	0 101	0 1 1 0	0.072	0.042	0.024	45
Change by Lining on Course Side	I s,lab	130 137 12-1, Eq. C.3	0.299	0.191	0.115	0.072	0.042	0.024	
Change by Lining on Source Side		No Lining	0	0	0	0	0	0	
Change by Lining on Receive Side	ΔR_{f2}	NoLining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	T _{s,situ}	ISO 15712-1, Eq. C.1-C.3	0.210	0.140	0.092	0.058	0.035	0.021	
TL in-situ for Element F2	R _{F2,situ}	ISO 15712-1 Eq. 19	37	39	45	51	59	63	50
TL in-situ for Element f2	R _{f2,situ}	ISO 15712-1 Eq. 19	37	39	45	51	59	63	50
Junction 2 - Coupling									
In-situ Velocity Level Difference for Ff	$D_{v,F2,f2,situ}$	ISO 15712-1 Eq. 21, 22	10.6	10.9	11.2	11.7	12.3	13.1	
In-situ Velocity Level Difference for Fd	$D_{y,F2,d,situ}$	ISO 15712-1 Eq. 21, 22	9.4	9.6	9.9	10.3	10.9	11.5	
In-situ Velocity Level Difference for Df	$D_{n,D,f,2,situ}$	ISO 15712-1 Eq. 21, 22	9.4	9.6	9,9	10.3	10.9	11.5	
	0,0, <u>0</u> , <u>0</u> ,000	,						-	
Elanking Transmission Loss - Path Values									
Flanking Ti for Dath 52	<i>R</i>	160 15712 1 50 250	F1	52	50		74	70	C 4
	n _{F2f2}	150 15712-1 Eq. 25a	51	53	59	00	74	79	04
Flanking IL for Path Fd2	n _{F2d}	ISO 15/12-1 Eq. 25a	48	53	59	67	74	80	64
Flanking TL for Path Df2	R _{Df2}	ISO 15/12-1 Eq. 25a	48	53	59	67	/4	80	64
Flanking STC for Junction 2			44	48	55	61	69	75	59
Junction 3 (Rigid Cross junction, 203 mi	m precast holl	<mark>ow core floor 305 kg/m² / 190 ı</mark>	nm block	wall)					
All values are the same as for Junction 1									
Flanking STC for Junction 3			45	50	56	63	70	76	61
Junction 4 (Rigid Cross junction, 203 m	n precast holl	ow core floor 305 kg/m ² / 190 j	nm block	corridor	wall)				
All of the input data is the same as for lunc	tion 2 but diffe	rent junctions at the ceiling and flo	or result i	n different	t loss facto	rs than lun	ction 2		
An of the input data is the same as for sure			Joi resulti				2.		
Structural Reveneration Time in situ	Τ		0 222	0.154	0 100	0.061	0 020	0.022	
This situates Floment 54	s,situ	150 157 12-1, EQ. C.1-C.3	0.252	20	0.100	0.001	0.050	0.022	F.0
The stution of the state of the	K _{F4,situ}	ISU 15/12-1 Eq. 19	30	39	45	51	58	62	50
IL IN-SITU FOR Element 14	K _{f4,situ}	ISU 15/12-1 Eq. 19	36	39	45	51	58	62	50
Junction 4 - Coupling									
In-situ Velocity Level Difference for Ff	D _{v,F4,f4,situ}	ISO 15712-1 Eq. 21, 22	13.5	13.8	14.1	14.8	15.3	16.2	
In-situ Velocity Level Difference for Fd	$D_{v,F4,d,situ}$	ISO 15712-1 Eq. 21, 22	12.2	12.4	12.7	13.2	13.7	14.4	
In-situ Velocity Level Difference for Df	D _{v,D,f4,situ}	ISO 15712-1 Eq. 21, 22	12.2	12.4	12.7	13.2	13.7	14.4	
Flanking Transmssion Loss - Path Values									
Flanking TL for Path Ff4	REAGA	ISO 15712-1 Fa 25h	53	56	62	69	76	81	67
Flanking TI for Path Ed4	R	ISO 15712-1 Eq 256	50	56	62	60	76	87	66
Elanking TL for Dath Df4	R	ISO 15712-1 Eq 250	50	50	62	60	70	02 02	66
Flanking IL für Path D14	n _{Df4}	130 13/12-1 EQ 250	50	50	02	69	70	ō2	00
Flanking STC for Junction 4	1	1	46	51	5/	64	/1	//	62
Total Flanking CTC (or white difference	for all of the fi	nking nothe)	20	12	50	67	64	70	Γ4
Combined transmission	or all of the fla	nking paths)	39	43	50	5/	64	/0	54
ASIC due to Direct plus Flanking Trans	mission	KK-335, Eq. 1.1	35	41	48	56	64	69	52

Horizontal Room Pair - 203 mm Precast Concrete Hollowcore Floor 273 kg/m²



Example 9	ISO Symbol	Reference	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	ASTC
Junction 1 (Rigid cross junction, 190 mr	n block separa	ting wall / 203 mm precast hol	low core	floor 273	kg/m ²)				
Sound Transmission Loss F1 or f1	Races	Measured A1-012467 2	36	43	51	57	63	71	54
Structural Reverberation Time Jab		Measured	0 170	0.090	0.060	0.050	0.060	0.040	54
Change by Lining on 51	¹ s,lab A D	Nelining	0.170	0.080	0.000	0.050	0.000	0.040	
	ΔR_{F1}	NOLINING	0	0	0	0	0	0	
Change by Lining on f1	ΔK_{f1}	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	I _{s,situ}	ISO 15/12-1, Eq. C.1-C.3	0.367	0.259	0.169	0.110	0.069	0.042	
TL in-situ for Element F1	R _{F1,situ}	ISO 15712-1 Eq. 19	33	37	47	53	62	71	49
TL in-situ for Element f1	R _{f1,situ}	ISO 15712-1 Eq. 19	33	37	47	53	62	71	49
Junction 1 - Coupling									
In-situ Velocity Level Difference for Ff	$D_{v,F1,f1,situ}$	ISO 15712-1 Eq. 21, 22	10.6	10.7	11.0	11.4	11.9	12.5	
In-situ Velocity Level Difference for Fd	D _{v,F1,d,situ}	ISO 15712-1 Eq. 21, 22	11.6	11.7	12.1	12.5	13.2	13.9	
In-situ Velocity Level Difference for Df	D _{v,D,f1,situ}	ISO 15712-1 Eq. 21, 22	11.6	11.7	12.1	12.5	13.2	13.9	
, ·									
Flanking Transmssion Loss - Path Values									
Flanking TI for Path Ff1	Brass	ISO 15712-1 Eq. 25a	42	46	56	62	72	81	58
Flanking TL for Path Ed1	P RF1f1	ISO 15712-1 Eq. 25a	42	40	57	62	72	80	61
Flanking TL for Path Dfd	n _{F1d}	150 15712-1 Eq. 25a	45	49	57	05	72	00	01
Flanking IL for Path Df1	K _{Df1}	ISO 15712-1 Eq. 25a	45	49	57	63	12	80	61
Flanking STC for Junction 1			39	43	52	58	67	76	55
Junction 2 (Rigid T-Junction, 190 mm bl	ock separating	g wall / 190 mm block facade w	rall)						
Transmission Loss Element F2	R _{F2,lab}	RR-334, NRC-Mean BLK190(NW)	35	38	44	50	58	62	49
Structural Reverberation Time lab	$T_{s,lab}$	ISO 15712-1 Eq. C5	0.299	0.191	0.119	0.072	0.042	0.024	
Change by Lining on F2	ΔR_{F2}	No Lining	0	0	0	0	0	0	
Change by Lining on f2	ΔR_{f2}	No Lining	0	0	0	0	0	0	
Structural Reverberation Time in-situ	Tesitu	ISO 15712-1 Eq. C 1-C 3	0 202	0 135	0.088	0.056	0.034	0.020	
TL in-situ for Element E2	R ra situ	ISO 15712-1 Fg 19	37	30	45	51	59	63	50
This situ for Element f2	R _{F2} ,situ	ISO 15712 1 Eq. 10	27	20	45	51	55	62	50
	NJ 2,situ	130 13712-1 Eq. 19	57		45	51		05	50
Junction 2 - Coupling									
In-situ Velocity Level Difference for Ff	D _{v,F2,f2,situ}	ISO 15712-1 Eq. 21, 22	11.2	11.5	11.8	12.3	12.9	13.7	
In-situ Velocity Level Difference for Fd	D _{v,F2,d,situ}	ISO 15712-1 Eq. 21, 22	11.3	11.6	12.0	12.4	13.2	14.0	
In-situ Velocity Level Difference for Df	D _{v,D,f2,situ}	ISO 15712-1 Eq. 21, 22	11.3	11.6	12.0	12.4	13.2	14.0	
Flanking Transmssion Loss - Path Values									
Flanking TL for Path Ff2	REAFA	ISO 15712-1 Eq. 25a	49	51	58	64	73	78	63
Flanking TI for Path Ed2	R rad	ISO 15712-1 Eq. 25a	48	51	57	64	72	77	62
Elanking TL for Path Df2	R _{F2a}	ISO 15712-1 Eq. 250	10	51	57	64	72	77	62
	RDJ2	130 13712-1 Lq. 23a	40	51	57	04	12		02
				10	50	50	60	70	50
Flanking STC for Junction 2			44	46	53	59	68	/3	58
Junction 3 (Rigid cross junction, 190 mr	n block separa	ting wall / 203 mm precast hol	low core	ceiling sla	ab 273 kg	/m²)			
All values are the same as for Junction 1									
Flanking TL for Path Ff3	R_{F3f3}	ISO 15712-1 Eq 25b	42	46	56	62	72	81	58
Flanking TL for Path Fd3	R _{F3d}	ISO 15712-1 Eq 25b	45	49	57	63	72	80	61
Flanking TL for Path Df3	R_{Df3}	ISO 15712-1 Eq 25b	45	49	57	63	72	80	61
Flanking STC for Junction 3			44	43	52	58	67	76	55
Junction 4 (Rigid T-junction, 190 mm bl	ock separating	wall / 190 mm block corridor	wall)						
All of the input data is the same as for lunct	ion 2 but differ	ent junctions at the ceiling and flo	or result i	n different	t loss facto	rs than lun	ction 2		
			ion result i						
Structural Poverberation Time in situ	T .	150 15712 1 50 0 1 0 2	0.226	0.140	0.000	0.061	0.027	0.022	
This situ for Flow and 54	s,situ	150 15712-1, Eq. C.1-C.3	0.226	0.149	0.098	0.061	0.037	0.022	-0
The stution Element F4	R _{F4,situ}	ISU 15/12-1 Eq. 19	30	39	45	51	59	62	50
IL in-situ for Element f4	K _{f4,situ}	ISO 15712-1 Eq. 19	36	39	45	51	59	62	50
Junction 4 - Coupling									
In-situ Velocity Level Difference for Ff	$D_{v,F4,f4,situ}$	ISO 15712-1 Eq. 21, 22	10.8	11.0	11.4	11.9	12.6	13.3	
In-situ Velocity Level Difference for Fd	D _{v,F4,d,situ}	ISO 15712-1 Eq. 21, 22	11.1	11.4	11.8	12.3	13.0	13.8	
In-situ Velocity Level Difference for Df	$D_{v,D,f4,situ}$	ISO 15712-1 Eq. 21, 22	11.1	11.4	11.8	12.3	13.0	13.8	
					-				
Flanking Transmission Loss - Path Values									
Flanking TI for Path Ff4	REAFA	ISO 15712-1 Fo 25h	/19	51	57	64	72	76	67
Elanking TL for Dath Edd	D	ISO 15712-1 LY 250	40	51 E1	57	C/	75	70	62
rianking it for Path Fd4	R _{F4d}	150 15/12-1 Eq 250	48	51	5/	64	12	//	62
Flanking IL for Path Df4	κ _{Df4}	ISU 15/12-1 Eq 25b	48	51	5/	64	/2	//	62
Flanking STC for Junction 4			43	46	52	59	68	72	57
Total Flanking STC (combined transmssion f	or all of the flar	king paths)	35	38	46	52	61	68	50
ASTC due to Direct plus Flanking Transr	nission	RR-335, Eq. 1.1	32	36	42	48	57	61	47

Vertical Room Pair - 203 mm Precast Concrete Hollowcore Floor 273 kg/m²





Junction 1. (Rigid Coss junction, 203 mm precest hollow core floor 273 kg/m² / 130 mm block wall) Sign 1. Sig	Example 10	ISO Symbol	Reference	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	ASTC
Fights graph of 1 Fights	Junction 1 (Rigid Cross junction, 203 mi	n precast holl	ow core floor 273 kg/m² / 190 ı	nm block	wall)					
Son of Transmission Loss F1 or 11. R ₁₁₀₀ (FB-34, NIC-MARB BL/320(VIV) 35 38 44 50 738 (C 4 90) Son of Transmission The lab Trans (FL 40) (Flanking Path Ff 1									
Sinctural Reventersion Time isb Taxa TOD ST712, Eq. C.S. 0.299 0.319 0.072 0.024 0.034 Change by Lings on Reader Sile M_{P_1} No Lining 0	Sound Transmission Loss F1 or f1	RELIAN	RR-334, NRC-Mean BLK190(NW)	35	38	44	50	58	62	49
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Structural Reverberation Time Jab	Telah	ISO 15712-1 Fg. C 5	0 299	0 191	0 119	0.072	0.042	0.024	
Compare by Uning on Receive Side M_{PT}^{1} No burning 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Change by Lining on Source Side	ΔR_{F1}	No Lining	0	0	0	0	0	0	
	Change by Lining on Beceive Side	ΔR_{ϵ_1}	No Lining	0	0	0	0	0	0	
	Structural Boyorboration Time in situ	T ₋ -in		0 241	0.160	0 102	0.065	0.029	0.022	
$ \begin{array}{c} the relation of content in the state for General transmission of General transmission of the state for General transmission of the state for General transmission of G$	This situ for Floment F1	R no in	ISO 15/12-1, Eq. C.1-C.3	0.241	0.160	0.102	0.065	0.038	0.022	50
$ \begin{array}{ $		P	150 15712-1 Eq. 19	30	39	45	50	50	62	50
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	ILIN-situ for Element fi	Nf 1,situ	ISO 15712-1 Eq. 19	30	39	45	50	58	62	50
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $										
In situ Velocity Level Difference for P $P_{ort,Attare}$ (Bo 1571-2: 16, 21, 22 11.6 11.7 12.1 12.5 11.2 11.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.	Junction 1 - Coupling	D								
In-situ Velotiy tevel Difference for I $P_{ury Latrix}$ (50 15712-1 fg. 21, 22 11.6 11.7 12.1 12.5 13.2 13.9 Flanking Transmission Loss - Path Values $R_{ry(1)}$ (50 15712-1 fg. 21, 22 11.6 11.7 12.1 12.5 13.2 13.9 Flanking Thor Path F1 $R_{ry(1)}$ (50 15712-1 fg. 21, 22 11.6 11.7 12.1 12.5 13.2 13.9 Flanking Thor Path F1 $R_{ry(1)}$ (50 15712-1 fg. 25, 48 53 00 67 75 82 64 Flanking Thor Path F1 $R_{ry(1)}$ (50 15712-1 fg. 25, 48 53 00 67 75 82 64 Flanking Thor Path F1 $R_{ry(1)}$ (50 15712-1 fg. 25, 48 53 00 67 75 82 64 Flanking Thor Path F1 $R_{ry(1)}$ (50 15712-1 fg. 25, 48 53 00 67 75 82 64 Flanking Thor Path F1 $R_{ry(1)}$ (50 15712-1 fg. 25, 48 53 00 67 75 82 64 Flanking St for Junction 1 $R_{ry(1)}$ (50 15712-1 fg. 25, 48 53 00 67 75 82 64 Flanking St for Junction 1 $R_{ry(1)}$ (70 mm block feade wall) Unction 2 (Rigid T-junction, 20 mm precess hollow core floor 273 kg/m ² / 190 mm block feade wall) Unction 2 (Rigid T-junction, 20 mm precess hollow core floor 273 kg/m ² / 190 mm block feade wall) Unction Revenderation Time Iab T_{ratau} (50 15712-1 fg. 15 02 022 0.131 0.038 0.058 0.034 0.030 Thurs and Revenderation Time Iab T_{ratau} (50 15712-1 fg. 15 0.022 0.131 0.038 0.058 0.034 0.030 Thus the off lement 72 $R_{ry(2)}$ (50 15712-1 fg. 21, 22 94 95 93 10.3 10.9 11.6 Flanking Thor Path F1 $R_{ry(2)}$ (50 15712-1 fg. 21, 22 94 95 93 10.3 10.9 11.6 Flanking Toroarension Loss - Path Values $R_{ry(2)}$ (50 15712-1 fg. 25, 50 52 99 10.3 10.9 11.6 Flanking Toroarension Loss - Path Values $R_{ry(2)}$ (50 15712-1 fg. 25, 50 52 99 10.3 10.9 11.6 Flanking Toroarension Loss - Path Values $R_{ry(2)}$ (50 15712-1 fg. 25, 50 52 99 10.3 10.9 11.6 Flanking Toroarension Loss - Path Values $R_{ry(2)}$ (50 15712-1 fg. 25, 27 7 6 Flanking Toroarension Loss - Path Values $R_{ry(2)}$ (50 15712-1 fg. 25, 27 9 50 S1 10- 11-11 10 11.7 7 12.5 Flanking Toroarension Loss - Path Values $R_{ry(2)}$ (50 15712-1 fg. 25, 27 9 50 Flanking Toroarension Loss - Path Values $R_{ry(2)}$ (50 15712-1 fg. 21, 22	In-situ Velocity Level Difference for Ff	$D_{v,F1,f1,situ}$	ISO 15712-1 Eq. 21, 22	12.5	12.7	13.2	13.7	14.5	15.3	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	In-situ Velocity Level Difference for Fd	$D_{v,F1,d,situ}$	ISO 15712-1 Eq. 21, 22	11.6	11.7	12.1	12.5	13.2	13.9	
Flanking Transmission Loss - Path Values R Bit Signal Sig	In-situ Velocity Level Difference for Df	D _{v,D,f1,situ}	ISO 15712-1 Eq. 21, 22	11.6	11.7	12.1	12.5	13.2	13.9	
Flanking Trommstion Loss - Path Values Image of the path of th										
Flanking II for Path F11 R _{F1/1} ISO 15712-1Eq. 25a 51 54 60 66 75 79 65 Flanking II for Path P1 R ₁₀ ISO 15712-1Eq. 25a 48 53 60 67 75 82 64 Flanking ST for Junction 1 R <thr< th=""> R R <</thr<>	Flanking Transmssion Loss - Path Values									
Flanking TL for Path F41 R_{PAL} ISO 157/2-140, 25.8 48 53 60 67 75 82 64 Flanking TL for Path F41 R _{DTA} ISO 157/2-140, 25.8 48 53 60 67 75 82 64 Flanking ST for Junction 1 R 44 48 55 62 70 76 59 Junction 2 (Rigid T-junction, 203 mm precast hollow core floor 273 kg/m² / 190 mm block fiscade wall 0.191 0.072 0.042 0.024 Flanking TL orevands Districtural Reverberation Time lab T_sam 1SO 15712-1, Eq. C.5 0.259 0.191 0.072 0.042 0.024 Change by Uning on Source Side M _{DT} No Uning 0	Flanking TL for Path Ff1	R _{F1f1}	ISO 15712-1 Eq. 25a	51	54	60	66	75	79	65
Flanking TL for Path OT1 R BOTA ISO 157/2-1 Eq. 25a 48 53 60 67 75 82 64 Flanking STC for Junction 1 K 44 48 55 62 70 76 99 Junction 2 (Rigid T-junction, 203 mm precast hollow core floor 273 kg/m² / 190 mm block fraced well) - <	Flanking TL for Path Fd1	R_{F1d}	ISO 15712-1 Eq. 25a	48	53	60	67	75	82	64
Flanking ST: for Junction 2, 103 mm precess hollow core floor 273 kg/m² / 190 mm block fscade well C Pion Flanking ST: for Junction 2, 208 mm precess hollow core floor 273 kg/m² / 190 mm block fscade well C C C Flanking Path F12 Rr_2Late RR-334, NRC-Mean BU-190 (NW) 35 38 44 50 55 62 49 Structural Reverberation Time lab T_ALBE ISO 15712 1, Eq. C. S 0.299 0.191 0.19 0.002 0.042 0.024 Change by Uning on Source Side DAfry No Uning 0	Flanking TL for Path Df1	R_{Df1}	ISO 15712-1 Eq. 25a	48	53	60	67	75	82	64
Finking STC for Junction 1 44 48 55 62 70 76 99 Junction 2, (Bipld T-junction, 203 mm precess hollow core floor 273 kg/m² / 190 mm block façade wall) Image 1 I										
Junction 2 (Rigid T-junction, 203 mm precast hollow core floor 273 kg/m² / 190 mm block façade wall) Valuation of the second s	Flanking STC for Junction 1			44	48	55	62	70	76	59
Junction 2. (Rigid T-junction, 203 mm precest hollow core floor 273 kg/m² / 190 mm block façade wall) Image (Control of Control of Contr		1								
Planking Path FI 2 RF2.keb RR-334, NRC-Mean BLK190(NW) 35 34 50 58 62 49 Change by Lining on Source Side ΔR_{F2} No Lining 0	Junction 2 (Rigid T-junction, 203 mm p	ecast hollow	core floor 273 kg/m ² / 190 mm	block fac	ade wall)					
Transmission Loss Element F2 $R_{F,2kab}$ $R_{F,2kab}$ $R_{F,32k}$ NRC-Mean BLK190(NW) 35 38 44 50 58 62 49 Structural Reverberation Time lab T_{side} ISO 15712-1 Eq. (2.5) 0.299 0.191 0.012 0.024 0.024 Change by Lining on Receive Side $AR_{f,2}$ No Lining 0	Flanking Path Ef 2									
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Transmission Loss Element E2	D	PP-224 NPC-Moon RIK190(NIW)	25	29	11	50	59	62	10
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Structural Reveneration Time Joh	T F2,lab	ISO 15712-1 E~ C E	0.200	0 101	0.110	0.072	0.042	0.024	43
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Change by Lining on Course Side	I _{s,lab}	130 13712-1, Eq. C.3	0.299	0.191	0.119	0.072	0.042	0.024	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Change by Lining on Source Side	$\Delta \kappa_{F2}$	No Lining	0	0	0	0	0	0	
Structural keverberation line in-situ $I_{s,situ}$ iso 15/12-1, Eq. 21-23 0.202 0.135 0.088 0.086 0.094 0.000 TL in-situ for Element 12 $R_{f2,situ}$ iso 15/12-1, Eq. 19 37 39 45 51 59 63 50 TL in-situ for Element 12 $R_{f2,situ}$ iso 15/12-1, Eq. 19 37 39 45 51 59 63 50 In-situ velocity level olifference for Ff $D_{p,F2,d,situ}$ iso 15/12-1, Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 In-situ velocity level olifference for f $D_{p,F2,d,situ}$ iso 15/12-1, Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 In-situ velocity level olifference for $D_{p,F2,d,situ}$ iso 15/12-1, Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 In-situ velocity level olifference for $D_{p,F2,d,situ}$ iso 15/12-1, Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 In-situ velocity level olifference for D $D_{p,F2,d,situ}$ iso 15/12-1, Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 In-situ velocity level olifference for D $D_{p,F2,d,situ}$ iso 15/12-1, Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 In-situ velocity level olifference for D $D_{p,F2,d,situ}$ iso 15/12-1, Eq. 21, 24 9.4 9.5 9.9 10.3 10.9 11.6 In-situ velocity level olifference for D $D_{p,F2,d,situ}$ iso 15/12-1, Eq. 25 9.6 5 7.4 80 62 Flanking T.f. for Path Ff2 R_{F2d} iso 15/12-1, Eq. 25 47 51 58 65 7.4 80 62 Flanking T.f. for Path Ff2 R_{F2d} iso 15/12-1, Eq. 25 47 51 58 65 7.4 80 62 Flanking S.C.for Junction 2 43 46 53 60 69 75 58 In-situ velocity level olifference for D R_{F2d} iso 15/12-1, Eq. 25 47 51 58 65 7.4 80 62 Flanking S.C.for Junction 1 Flanking S.C.for Junction 2 44 48 55 62 70 76 59 In-situ velocity level olifference for Ff $D_{p,F,d,situ}$ iso 15712-1, Eq. 10 36 39 45 51 59 62 50 Th in-situ velocity level olifference for Ff $D_{p,F,d,situ}$ iso 15712-1, Eq. 12 2 12.8 13.0 13.4 13.9 14.6 15.3 In-situ velocity level olifference for Ff $D_{p,F,d,situ}$ iso 15712-1, Eq. 21, 22 12.2 12.3 12.7 13.1 13.7 14.4 In-situ velocity level olifference for	Change by Lining on Receive Side	$\Delta \kappa_{f2}$	NoLining	0	0	0	0	0	0	
IL in-situ for Element 12 R_{F2xitu} ISO IS/12-1 Eq. 19 37 39 45 51 59 63 50 Lin-situ for Element 12 R_{f2xitu} ISO IS/12-1 Eq. 19 37 39 45 51 59 63 50 Lin-situ Velocity Level Difference for Fd $D_{y2,f2,txitu}$ ISO IS712-1 Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 In-situ Velocity Level Difference for Pd $D_{y2,f2,xitu}$ ISO IS712-1 Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 Flanking Transmsion Loss - Path Values ISO IS712-1 Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 Flanking To Path Fd2 $R_{F2,2}$ ISO IS712-1 Eq. 25a 50 52 59 65 74 80 62 Flanking To Path Fd2 $R_{F2,2}$ ISO IS712-1 Eq. 25a 47 51 58 65 74 80 62 Flanking To Path Fd2 $R_{F2,2}$ ISO IS712-1 Eq. 25a 47 51 58 65 74 80 62 Flanking To Fath Fd2 $R_{$	Structural Reverberation Time in-situ	I _{s,situ}	ISO 15/12-1, Eq. C.1-C.3	0.202	0.135	0.088	0.056	0.034	0.020	
TL in-situ Vor Diement 12 R_{f2situ} ISO 15712-1 Eq. 19 37 39 45 51 59 63 50 Junction 2 - Coupling ISO 15712-1 Eq. 21, 22 100 10.3 10.7 11.1 11.7 12.5 In-situ Velocity Level Difference for Ff $D_{y,2A,situ}$ ISO 15712-1 Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 In-situ Velocity Level Difference for FD $D_{y,2A,situ}$ ISO 15712-1 Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 Flanking, To Path F2 R_{F2d} ISO 15712-1 Eq. 25.8 50 52 59 65 74 79 64 Flanking, To Path F2 R_{F2d} ISO 15712-1 Eq. 25.8 47 51 58 65 74 80 62 Flanking STC for Junction 2 R_072 ISO 15712-1 Eq. 25.8 47 51 58 65 74 80 62 Flanking STC for Junction 2 R_072 ISO 15712-1 Eq. 25.8 47 51 58 65 74 80 62 Flanking STC for Junction 1 Flanking STC f	IL In-situ for Element F2	R _{F2,situ}	ISO 15/12-1 Eq. 19	37	39	45	51	59	63	50
Junction 2 - Coupling Iso Type 1	TL in-situ for Element f2	R _{f2,situ}	ISO 15712-1 Eq. 19	37	39	45	51	59	63	50
Junction 2 - Coupling Image: Coupling										
In-situ Velocity Level Difference for Fd $D_{p,F,T,S,titu}$ ISO 1572:1:Eq. 21, 22 9.4 9.5 9.9 10.3 10.7 11.1 11.7 12.5 In-situ Velocity Level Difference for Fd $D_{p,P,Z,stitu}$ ISO 1572:1:Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 Flanking Transmssion Loss - Path Values $R_{F2/2}$ ISO 1571:2:1:Eq. 25a 50 52 59 65 74 79 64 Flanking T. for Path Fd2 $R_{F2/2}$ ISO 1571:2:1:Eq. 25a 47 51 58 65 74 80 62 Flanking T. for Path Fd2 $R_{D/2}$ ISO 1571:2:1:Eq. 25a 47 51 58 65 74 80 62 Flanking STC for Junction 2 43 46 53 60 69 75 58 Junction 3 (Rigid Cross junction, 203 mm precast hollow core floor 273 kg/m² / 190 mm block wall) Junction 3 Junction 4 44 48 55 62 70 76 59 Junction 4 (Rigid Cross junction, 2. Junction 3 44 48 55 62 50 74 80	Junction 2 - Coupling									
In-situ Velocity Level Difference for FD $D_{p,P,A,dstttt}$ ISO 15712-1 Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 In-situ Velocity Level Difference for Df $D_{v,D/2,dstttu}$ ISO 15712-1 Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 Flanking TL for Path Fd2 $R_{F2/2}$ ISO 15712-1 Eq. 25a 50 52 59 65 74 80 62 Flanking TL for Path Fd2 $R_{F2/2}$ ISO 15712-1 Eq. 25a 47 51 58 65 74 80 62 Flanking TL for Path Fd2 $R_{P2/2}$ ISO 15712-1 Eq. 25a 47 51 58 65 74 80 62 Flanking ST for Junction 2 43 46 53 60 69 75 58 Junction 3 (Rigid Cross junction, 203 mm precast hollow core floor 273 kg/m² / 190 mm block wall) All of the input data is the same as for Junction 2, but different junctions at the celling and floor result in different loss factors than Junction 2.	In-situ Velocity Level Difference for Ff	D _{v,F2,f2,situ}	ISO 15712-1 Eq. 21, 22	10.0	10.3	10.7	11.1	11.7	12.5	
In-situ Velocity Level Difference for Df $D_{vD,f2,stru}$ ISO 15712-1 Eq. 21, 22 9.4 9.5 9.9 10.3 10.9 11.6 Flanking Transmssion Loss - Path Values ISO 15712-1 Eq. 25a 50 52 59 65 74 79 64 Flanking TL for Path Ff2 $R_{F2/2}$ ISO 15712-1 Eq. 25a 47 51 58 65 74 80 62 Flanking TL for Path Ff2 $R_{D/2}$ ISO 15712-1 Eq. 25a 47 51 58 65 74 80 62 Flanking TL for Path Ff2 $R_{D/2}$ ISO 15712-1 Eq. 25a 47 51 58 65 74 80 62 Flanking STC for Junction 2 43 46 53 60 69 75 58 Junction 3 (Rigid Cross junction, 203 mm precast hollow core floor 273 kg/m² / 190 mm block corridor wall) -	In-situ Velocity Level Difference for Fd	D _{v,F2,d,situ}	ISO 15712-1 Eq. 21, 22	9.4	9.5	9.9	10.3	10.9	11.6	
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Flanking Transmssion Loss - Path Values R_{F4f4} ISO 15712-1 Eq 25b 52 55 61 68 77 80 66 Flanking TL for Path Ff4 R_{F4f4} ISO 15712-1 Eq 25b 52 55 61 68 77 83 65 Flanking TL for Path Fd4 R_{F4d} ISO 15712-1 Eq 25b 49 54 61 68 77 83 65 Flanking TL for Path Df4 R_{Df4} ISO 15712-1 Eq 25b 49 54 61 68 77 83 65 Flanking STC for Junction 4 R_{Df4} ISO 15712-1 Eq 25b 49 56 63 72 77 60 Total Flanking STC (combined transmssion for all of the flanking paths) 38 42 49 56 64 70 53 ASTC due to Direct plus Flanking Transmission RR-335. Eq. 1.1 33 38 45 53 61 68 49	In-situ Velocity Level Difference for Df	D _{v,D,f} 4,situ	ISO 15712-1 Eq. 21, 22	12.2	12.3	12.7	13.1	13.7	14.4	
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Flanking TL for Path Df4 R R ISO 15712-1 Eq 25b 49 54 61 68 77 83 65 Flanking STC for Junction 4 45 49 56 63 72 77 60 Total Flanking STC (combined transmission for all of the flanking paths) 38 42 49 56 64 70 53 ASTC due to Direct plus Flanking Transmission RR-335. Eq. 1.1 33 38 45 53 61 68 49	Flanking TL for Path Fd4	R_{F4d}	ISO 15712-1 Eq 25b	49	54	61	68	77	83	65
Flanking STC for Junction 4 45 49 56 63 72 77 60 Total Flanking STC (combined transmission for all of the flanking paths) 38 42 49 56 64 70 53 ASTC due to Direct plus Flanking Transmission RR-335. Eq. 1.1 33 38 45 53 61 68 49	Flanking TL for Path Df4	R _{Df4}	ISO 15712-1 Eq 25b	49	54	61	68	77	83	65
Total Flanking STC (combined transmission for all of the flanking paths) 38 42 49 56 64 70 53 ASTC due to Direct plus Flanking Transmission RR-335. Eq. 1.1 33 38 45 53 61 68 49	Flanking STC for Junction 4			45	49	56	63	72	77	60
Total Flanking STC (combined transmission for all of the flanking paths) 38 42 49 56 64 70 53 ASTC due to Direct plus Flanking Transmission RR-335. Eq. 1.1 33 38 45 53 61 68 49										
ASTC due to Direct plus Flanking Transmission RR-335. Eq. 1.1 33 38 45 53 61 68 49	Total Flanking STC (combined transmssion f	or all of the fla	nking paths)	38	42	49	56	64	70	53
	ASTC due to Direct plus Flanking Trans	nission	RR-335 Fg 1 1	22	28	45	52	61	68	49

2.3 Footnotes for the Examples

1. For the 190 mm thick concrete block walls in these examples, the value of 238 kg/m² is the measured mass per unit area for the tested wall specimen including mortar. Normal weight (NW) concrete block masonry units conform to CSA A165.1 and have a concrete mass density of not less than 2000 kg/m³. 190 mm NW concrete block units are not less than 53% solid, and 140 mm NW concrete block units are not less than 53% solid, and 140 mm NW concrete block units are not less than 73% solid, each giving a minimum wall mass per area over 238 kg/m².

2. The continuous hollow voids of the concrete hollowcore slabs can be oriented either parallel or perpendicular to the concrete block wall. The mass per unit areas given in the examples are for the floors with grout. The mass per unit areas of the concrete hollow core floors with and without grout are shown in Table 3

Mass per unit area of the bare concrete hollowcore Slab (kg/m ²)	Mass per unit area of the grouted hollowcore floor (kg/m ²)
269	273
301	305
338	344

Table 3: Mass per unit area of the hollowcore floors with and without grout.

3. Summary and Conclusions

The standard scenarios of RR-331 have been used to calculate the ASTC ratings of constructions of floors made of 203 mm (8") precast/prestressed concrete hollowcore slabs rigidly connected to concrete masonry walls. Examples using concrete hollowcore slabs of three different mass per unit areas (273 kg/m², 305 kg/m² and 343 kg/m²) were included. In each case, the constructions achieved an ASTC rating greater than 47 for the side-by-side and one-above-the-other scenarios.

Hollow concrete block masonry walls with a mass per unit area greater than 238 kg/m² are expected to have transmission loss values that are equal to or greater than the values reported for the hollow concrete block masonry walls evaluated for this study. Likewise, precast concrete hollowcore floors with a mass per unit area greater than 273 kg/m² are expected to have transmission loss values that are equal to or greater than the values reported for the precast concrete hollowcore floors evaluated in this study. Therefore, based on the findings from this study, it is expected that constructions of hollow concrete block masonry walls with a mass per unit area of or greater to 238 kg/m² connected to precast concrete hollowcore floors with a mass per unit area equal to or greater than 273 kg/m² will achieve ASTC ratings which are equal to or greater than 47.

References

- [1] ISO 15712-1:2005 -- Building acoustics -- Estimation of acoustic performance of buildings from the performance of elements -- Part 1: Airborne sound insulation between rooms. Geneva, Switzerland: International Standards Organization; 2005.
- [2] ISO 10848-1:2006 -- Acoustics -- Laboratory measurement of the flanking transmission of airborne and impact sound between adjoining rooms -- Part 1: Frame document. Geneva, Switzerland: International Standards Organization; 2006.
- [3] Hoeller C, Quirt, D., Mahn J, NRC Research Report *RR-331: Guide to Calculating Airborne Sound Transmission in Buildings*: 3rd Edition. Ottawa, Canada: National Research Council Canada; 2017.

Appendix A - Transmission Loss Data

The transmission loss of the floors of concrete hollowcore slabs are shown in 1/3 octave bands in Table 4. The data is from test report A1-012467.2. The single number ratings are shown in Table 5.

	Transmission Loss (dB)						
1/3 Octave	203 mm (8")	203 mm (8")					
Band	concrete hollowcore	concrete hollowcore					
Center	slabs with grout -	slabs with grout -					
Frequency	273 kg/m ²	305 kg/m ²					
(Hz)	TLF-18-008	TLF-17-081					
100	40	37					
125	40	36					
160	40	38					
200	41	41					
250	43	43					
315	46	45					
400	50	49					
500	51	51					
630	53	53					
800	55	55					
1000	57	57					
1250	59	60					
1600	60	62					
2000	60	63					
2500	62	65					
3150	66	67					
4000	69	71					
5000	68	72					

Table 4: Transmission loss of the 203 mm thick concrete hollowcore floors.

 Table 5: Sound transmission class (STC) and impact insulation class (IIC) ratings of the floors made of concrete hollowcore slabs.

Floor	STC	IIC
203 mm (8") concrete		
hollowcore slabs with grout -	55	23
273 kg/m²		
203 mm (8") concrete		
hollowcore slabs with grout -	54	23
305 kg/m ²		

Appendix B - Change in Transmission Loss Due to Linings

The change in the transmission loss due to the addition of toppings to the 305 kg/m² floor are shown in Table 6.

	Change in Transmission Loss on 203 mm thick 205 kg/m ² concrete bollowscere floors (dP)								
		25.4 mm (1")							
1/3	25.4 mm (1")	underlayment poured							
Octave	underlayment poured	directly on the							
Band	directly on the	concrete hollowcore							
Center	concrete hollowcore	slabs and 6mm (1/4")							
Frequency	slabs	carpet with a 8 mm							
(Hz)		(5/16") underpad							
	TLF-18-001	TLF-18-002							
100	1	-1							
125	2	1							
160	-1	-2							
200	1	1							
250	0	0							
315	1	0							
400	0	0							
500	1	1							
630	2	2							
800	3	3							
1000	4	5							
1250	4	7							
1600	4	8							
2000	4	10							
2500	4	12							
3150	3	13							
4000	3	8							
5000	1	5							

Table 6: Change in the transmission loss due to the installation of linings on the 203 mm 305kg/m² concrete hollowcore floor.