

목구조 다가구주택 바닥충격음 차단구조

국내 목구조 다가구 및 다세대주택에 적용할 수 있도록 캐나다우드와 캐나다국립연구소(NRC-CNRC)에서 공동 연구 개발한 바닥충격음 차단구조를 소개합니다.

「주택건설기준 등에 관한 규정」 제 14 조의 2, 제 60 조의 2 및 제 60 조의 3 에 따른 공동주택 바닥충격음 차단구조인정 및 관리기준에 준하여 인정기관에 현장에서 시험을 실시하는 방법으로 바닥충격음 차단 성능시험을 신청하여 바닥충격음 차단 구조인정을 받을 수 있습니다.

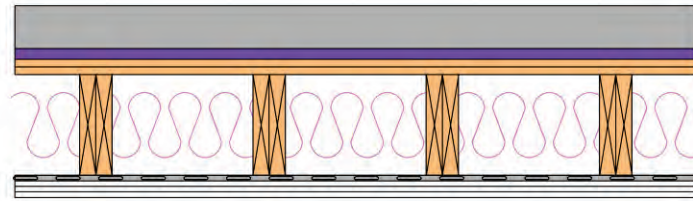
관련법규: 소음방지를 위한 층간 바닥충격음 차단 구조기준
(국토교통부고시 제 2015-319 호)

다가구주택 바닥충격음 차단 구조의 성능:

- **중량충격음** (무겁고 부드러운 충격에 의한 바닥충격음) **50 데시벨** 이하
- **경량충격음** (비교적 가볍고 딱딱한 충격에 의한 바닥충격음) **58 데시벨** 이하

본 자료의 저작권은 캐나다우드에 있으며, 자료의 무단복제 및 도용은 금지합니다.

NRC-K02



CON100_RES125_OSB18_OSB18_SCWJ235(406)_GFB152_RC13(610)_G13_G13_G13

Description	100 mm concrete topping, 25 mm interlayer on two layers of OSB subfloor, scabbed joists with resilient channels spaced 610 mm oc and three layers of gypsum board ceiling
Topping	<ul style="list-style-type: none"> • 100 mm Concrete topping • 25 mm GenieMat™ FF25 interlayer
Subfloor	<ul style="list-style-type: none"> • Two layers of 18 mm (23/32") T&G OSB sheathing. Joints staggered by 406 mm • Base layer OSB attached using #8 flat head screws 51 mm long spaced 150 mm along the edge and 300 mm in the field • Face layer OSB attached using #8 flat head screws 76 mm long spaced 150mm along the edge and 300 mm in the field • OSB boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the joists
Framing & Cavity Insulation	<ul style="list-style-type: none"> • Double 2x10 solid wood joists scabbed and spaced 406 mm oc and attached to headers using Simpson Strong-Ties type LUS28-2. Second joist scabbed to primary joist using three 65 mm screws at every 406 mm. • 152 mm glass fiber insulation
Ceiling	<ul style="list-style-type: none"> • Resilient channel type RC Deluxe 0.5 mm thick spaced 610 mm oc using 38 mm screws. • Three layers of 13 mm Korean Lafarge gypsum board • All layers attached using screws with at least 13 mm penetration. Drywall screws of length 32 mm, 41 mm and 50 mm were used for each layer respectively with spacing of 300 mm. • The gypsum boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the resilient channels

NRC-K02

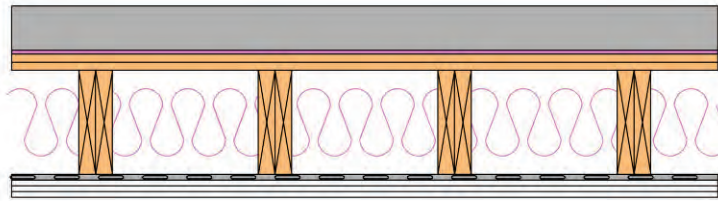
Single Number Ratings

Test	Test ID	Rating	Single Number Rating	Grade
Heavy Impact (Bang)	HVF-10-035	LiF _{MaxAW}	45	3
Heavy Impact (Ball)	HVF-10-036	LiF _{MaxAW}	36	1
Light Impact	IIF-10-029	LnW	40	1
Airborne	TLF-10-023	Rw+C	74	

Element Details

Element	Unit Density	Mass (kg)	Thickness (mm)
100 mm Concrete Slab	246.2 kg/m ²	4800	100
GENIEMAT™ FF25 Interlayer	9.6 kg/m ²	184	25
Subfloor - 2x 18 mm OSB	20.4 kg/m ²	398	38
2x10 Joists Headers	4.4 kg/m	68	
2x10 Scabbed Joists	7.32 kg/m	338	235
2x10 Double Joist Hangers	0.2 kg/ea	4.4	
152mm Glass Fibre Insulation	0.55 kg/ea	22	152*
Dietrich Resilient Channels	0.2 kg/m	9	13
Ceiling – 3 x 13mm Gypsum	33.2 kg/m ²	584	39
		6407.4	450

NRC-K04



CON100_RESL9_OSB18_OSB18_SCWJ235(406)_GFB152_RC13(610)_G13_G13_G13

Description	100 mm concrete topping, 9 mm interlayer on two layers of OSB subfloor, scabbed joists with resilient channels spaced 610 mm oc and three layers of gypsum board ceiling
Topping	<ul style="list-style-type: none"> • 100 mm Concrete topping
Covering	<ul style="list-style-type: none"> • 9 mm Owens Corning QuietZone™ interlayer
Subfloor	<ul style="list-style-type: none"> • Two layers of 18 mm (23/32") T&G OSB sheathing. Joints staggered by 406 mm • Base layer OSB attached using #8 flat head screws 51 mm long spaced 150 mm along the edge and 300 mm in the field • Face layer OSB attached using #8 flat head screws 76 mm long spaced 150mm along the edge and 300 mm in the field • OSB boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the joists
Framing & Cavity Insulation	<ul style="list-style-type: none"> • Double 2x10 solid wood joists scabbed and spaced 406 mm oc and attached to headers using Simpson Strong-Ties type LUS28-2. Second joist scabbed to primary joist using three 65 mm screws at every 406 mm. • 152 mm glass fiber insulation
Ceiling	<ul style="list-style-type: none"> • Resilient channel type RC Deluxe 0.5 mm thick spaced 610 mm oc using 38 mm screws. • Three layers of 13 mm Korean Lafarge gypsum board • All layers attached using screws with at least 13 mm penetration. Drywall screws of length 32 mm, 41 mm and 50 mm were used for each layer respectively with spacing of 300 mm. • The gypsum boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the resilient channels

NRC-K04

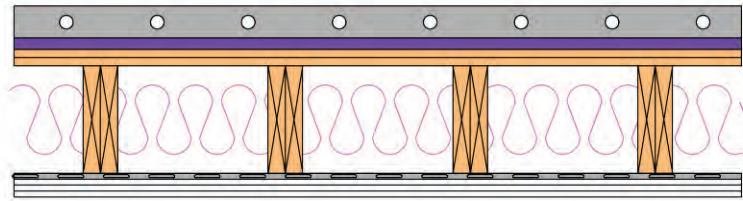
Single Number Ratings

Test	Test ID	Rating	Single Number Rating	Grade
Heavy Impact (Bang)	HVF-10-042	LiF _{MaxAW}	45	3
Heavy Impact (Ball)	HVF-10-044	LiF _{MaxAW}	37	1
Light Impact	IIF-10-033	LnW	41	1
Airborne	TLF-10-027	Rw+C	72	

Element Details

Element	Unit Density	Mass (kg)	Thickness (mm)
100 mm Concrete Slab	246.2 kg/m ²	4800	100
OwensCorning 9 mm interlayer	0.3 kg/m ²	6	9
Subfloor - 2x 18 mm OSB	20.4 kg/m ²	398	38
2x10 Joists Headers	4.4 kg/m	68	
2x10 Scabbed Joists	7.32 kg/m	338	235
2x10 Double Joist Hangers	0.2 kg/ea	4.4	
152mm Glass Fibre Insulation	0.55 kg/ea	22	152*
Dietrich Resilient Channels	0.2 kg/m	9	13
Ceiling – 3 x 13mm Gypsum	33.2 kg/m ²	584	39
		6229.4	434

NRC-K06



CON70_RESL25_OSB18_OSB18_SCWJ235(406)_GFB152_RC13(610)_G13_G13_G13

Description	70 mm Ondol concrete topping, 25 mm interlayer on two layers of OSB subfloor, scabbed joists with resilient channels spaced 610 mm oc and three layers of gypsum board ceiling)
Topping	<ul style="list-style-type: none"> • 70 mm Ondol concrete topping • 25 mm GenieMat™ FF25 interlayer
Subfloor	<ul style="list-style-type: none"> • Two layers of 18 mm (23/32") T&G OSB sheathing. Joints staggered by 406 mm • Base layer OSB attached using #8 flat head screws 51 mm long spaced 150 mm along the edge and 300 mm in the field • Face layer OSB attached using #8 flat head screws 76 mm long spaced 150mm along the edge and 300 mm in the field • OSB boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the joists
Framing & Cavity Insulation	<ul style="list-style-type: none"> • Double 2x10 solid wood joists scabbed and spaced 406 mm oc and attached to headers using Simpson Strong-Ties type LUS28-2. Second joist scabbed to primary joist using three 65 mm screws at every 406 mm. • 152 mm glass fiber insulation
Ceiling	<ul style="list-style-type: none"> • Resilient channel type RC Deluxe 0.5 mm thick spaced 610 mm oc using 38 mm screws. • Three layers of 13 mm Korean Lafarge gypsum board • All layers attached using screws with at least 13 mm penetration. Drywall screws of length 32 mm, 41 mm and 50 mm were used for each layer respectively with spacing of 300 mm. • The gypsum boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the resilient channels

NRC-K06

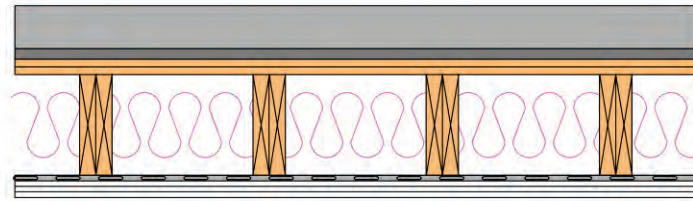
Single Number Ratings

Test	Test ID	Rating	Single Number Rating	Grade
Heavy Impact (Bang)	HVF-10-054	LiF _{MaxAW}	46	3
Heavy Impact (Ball)	HVF-10-052	LiF _{MaxAW}	38	1
Light Impact	IIF-10-039	LnW	40	1
Airborne	TLF-10-033	Rw+C	75	

Element Details

Element	Unit Density	Mass (kg)	Thickness (mm)
70 mm Ondol Concrete slab	154 kg/m ²	3003	70
GENIEMAT™ FF25 Interlayer	9.6 kg/m ²	184	25
Subfloor - 2x 18 mm OSB	20.4 kg/m ²	398	38
2x10 Joists Headers	4.4 kg/m	68	
2x10 Scabbed Joists	7.32 kg/m	338	235
2x10 Double Joist Hangers	0.2 kg/ea	4.4	
152mm Glass Fibre Insulation	0.55 kg/ea	22	152*
Dietrich Resilient Channels	0.2 kg/m	9	13
Ceiling – 3 x 13mm Gypsum	33.2 kg/m ²	584	39
		4610.4	420

NRC-K12



CON100_RESL20_OSB18_OSB18_SCWJ235(406)_GFB152_RC13(610)_G13_G13_G13

Description	<p>100 mm concrete topping, Sori-en Classic interlayer (20 mm) on two layers of OSB subfloor, scabbed joists with resilient channels spaced 610 mm oc and three layers of gypsum board ceiling</p>
Topping	<ul style="list-style-type: none"> • 100 mm Concrete topping • 20 mm Sori-en Classic interlayer
Subfloor	<ul style="list-style-type: none"> • Two layers of 18 mm (23/32") T&G OSB sheathing. Joints staggered by 406 mm • Base layer OSB attached using #8 flat head screws 51 mm long spaced 150 mm along the edge and 300 mm in the field • Face layer OSB attached using #8 flat head screws 76 mm long spaced 150mm along the edge and 300 mm in the field • OSB boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the joists
Framing & Cavity Insulation	<ul style="list-style-type: none"> • Double 2x10 solid wood joists scabbed and spaced 406 mm oc and attached to headers using Simpson Strong-Ties type LUS28-2. Second joist scabbed to primary joist using three 65 mm screws at every 406 mm. • 152 mm glass fiber insulation
Ceiling	<ul style="list-style-type: none"> • Resilient channel type RC Deluxe 0.5 mm thick spaced 610 mm oc using 38 mm screws. • Three layers of 13 mm Korean Lafarge gypsum board • All layers attached using screws with at least 13 mm penetration. Drywall screws of length 32 mm, 41 mm and 50 mm were used for each layer respectively with spacing of 300 mm. • The gypsum boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the resilient channels

NRC-K12

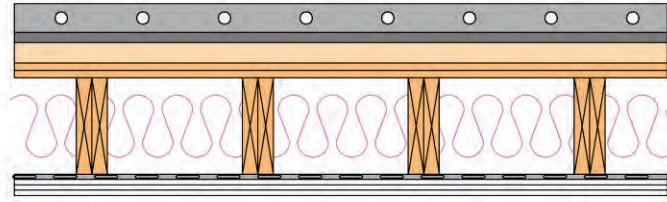
Single Number Ratings

Test	Test ID	Rating	Single Number Rating	Grade
Heavy Impact (Bang)	HVF-11-012	LiF _{MaxAW}	46	3
Heavy Impact (Ball)	HVF-11-013	LiF _{MaxAW}	37	1
Light Impact	IIF-11-014	LnW	42	1
Airborne	TLF-11-018	Rw+C	73	

Element Details

Element	Unit Density	Mass (kg)	Thickness (mm)
100 mm Concrete Slab	246.2 kg/m ²	4800	100
Sori-en Classic interlayer (20 mm)	0.84 kg/m ²	16.4	20
Subfloor - 2x 18 mm OSB	20.4 kg/m ²	398	38
2x10 Joists Headers	4.4 kg/m	68	
2x10 Scabbed Joists	7.32 kg/m	338	235
2x10 Double Joist Hangers	0.2 kg/ea	4.4	
152mm Glass Fibre Insulation	0.55 kg/ea	22	152*
Dietrich Resilient Channels	0.2 kg/m	9	13
Ceiling – 3 x 13mm Gypsum	33.2 kg/m ²	584	39
		6239.8	445

NRC-K14



CON70_RESL20_OTH50_OSB18_OSB18_SCWJ235(406)_GFB152_RC13(610)_G13_G13_G13

Description	70 mm Ondol concrete topping, Sori-en Classic interlayer (20 mm), 50 mm sand on two layers of OSB subfloor, scabbed joists with resilient channels spaced 610 mm oc and three layers of gypsum board ceiling
Topping	<ul style="list-style-type: none"> • 70 mm Ondol concrete topping • 20 mm Sori-en Classic interlayer • 50 mm sand
Subfloor	<ul style="list-style-type: none"> • Two layers of 18 mm (23/32") T&G OSB sheathing. Joints staggered by 406 mm • Base layer OSB attached using #8 flat head screws 51 mm long spaced 150 mm along the edge and 300 mm in the field • Face layer OSB attached using #8 flat head screws 76 mm long spaced 150mm along the edge and 300 mm in the field • OSB boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the joists
Framing & Cavity Insulation	<ul style="list-style-type: none"> • Double 2x10 solid wood joists scabbed and spaced 406 mm oc and attached to headers using Simpson Strong-Ties type LUS28-2. Second joist scabbed to primary joist using three 65 mm screws at every 406 mm. • 152 mm glass fiber insulation
Ceiling	<ul style="list-style-type: none"> • Resilient channel type RC Deluxe 0.5 mm thick spaced 610 mm oc using 38 mm screws. • Three layers of 13 mm Korean Lafarge gypsum board • All layers attached using screws with at least 13 mm penetration. Drywall screws of length 32 mm, 41 mm and 50 mm were used for each layer respectively with spacing of 300 mm. • The gypsum boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the resilient channels

NRC-K14

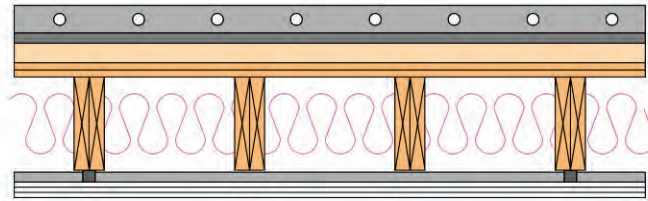
Single Number Ratings

Test	Test ID	Rating	Single Number Rating	Grade
Heavy Impact (Bang)	HVF-11-020	LiF _{MaxAW}	47	3
Heavy Impact (Ball)	HVF-11-019	LiF _{MaxAW}	39	1
Light Impact	IIF-11-020	LnW	40	1
Airborne	TLF-11-030	Rw+C	76	

Element Details

Element	Unit Density	Mass (kg)	Thickness (mm)
70 mm Ondol Concrete slab	154 kg/m ²	3003	70
Sori-en Classic interlayer (20 mm)	0.84 kg/m ²	16.4	20
50 mm sand	80 kg/m ²	1560	50
Subfloor - 2x 18 mm OSB	20.4 kg/m ²	398	38
2x10 Joists Headers	4.4 kg/m	68	
2x10 Scabbed Joists	7.32 kg/m	338	235
2x10 Double Joist Hangers	0.2 kg/ea	4.4	
152mm Glass Fibre Insulation	0.55 kg/ea	22	152*
Dietrich Resilient Channels	0.2 kg/m	9	13
Ceiling – 3 x 13mm Gypsum	33.2 kg/m ²	584	39
		6002.8	465

NRC-K20



CON70_RESL20_OTH50_OSB18_OSB18_SCWJ235(406)_GFB152_OTH22(1220)_FUR22(610)_G13_G13_G13

Description	70 mm Ondol concrete topping, Sori-en Classic interlayer (20 mm), 50 mm sand on two layers of OSB subfloor, scabbed joists with furring channels spaced 610 mm oc using Kinetics WAVE Hangers™ spaced 1220 mm oc and three layers of gypsum board ceiling
Topping	<ul style="list-style-type: none"> • 70 mm Ondol concrete topping • 20 mm Sori-en Classic interlayer • 50 mm sand
Subfloor	<ul style="list-style-type: none"> • Two layers of 18 mm (23/32") T&G OSB sheathing. Joints staggered by 406 mm • Base layer OSB attached using #8 flat head screws 51 mm long spaced 150 mm along the edge and 300 mm in the field • Face layer OSB attached using #8 flat head screws 76 mm long spaced 150mm along the edge and 300 mm in the field • OSB boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the joists
Framing & Cavity Insulation	<ul style="list-style-type: none"> • Double 2x10 solid wood joists scabbed and spaced 406 mm oc and attached to headers using Simpson Strong-Ties type LUS28-2. Second joist scabbed to primary joist using three 65 mm screws at every 406 mm. • 152 mm glass fiber insulation
Ceiling	<ul style="list-style-type: none"> • Four (4) Kinetics WAVE Hanger 22 installed in each corner. Thirty-one (31) Kinetics WAVE Hanger 44 installed with spacing of 1220 mm (every third joist) along the furring channels. Furring channels spaced 610 mm oc. Total of 35 hangers for the ceiling assembly. • 22 mm deep steel furring channels spaced 610 mm • Three layers of 13 mm Korean Lafarge gypsum board • All layers attached using screws with at least 13 mm penetration. Drywall screws of length 32 mm, 41 mm and 50 mm were used for each layer respectively with spacing of 300 mm. • The gypsum boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the resilient channels

NRC-K20

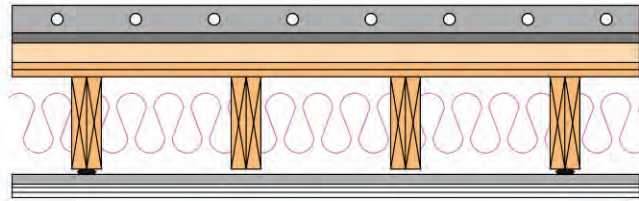
Single Number Ratings

Test	Test ID	Rating	Single Number Rating	Grade
Heavy Impact (Bang)	HVF-11-035	LiF _{MaxAW}	42	2
Heavy Impact (Ball)	HVF-11-034	LiF _{MaxAW}	37	1
Light Impact	IIF-11-029	LnW	40	1
Airborne	TLF-11-036	Rw+C	77	

Element Details

Element	Unit Density	Mass (kg)	Thickness (mm)
70 mm Ondol Concrete slab	154 kg/m ²	3003	70
Sori-en Classic interlayer (20 mm)	0.84 kg/m ²	16.4	20
50 mm sand	80 kg/m ²	1560	50
Subfloor - 2x 18 mm OSB	20.4 kg/m ²	398	38
2x10 Joists Headers	4.4 kg/m	68	
2x10 Scabbed Joists	7.32 kg/m	338	235
2x10 Double Joist Hangers	0.2 kg/ea	4.4	
152mm Glass Fibre Insulation	0.55 kg/ea	22	152*
Kinetics WAVE Hangers™ 1220 mm	0.09 kg/ea	3.1	22
Furring channels	0.37 kg/m	12	22*
Ceiling – 3 x 13mm Gypsum	33.2 kg/m ²	584	39
		6008.9	474

NRC-K21



CON70_RESL20_OTH50_OSB18_OSB18_SCWJ235(406)_GFB152_OTH22(1220)_FUR22(610)_G13_G13_G13

Description	70 mm Ondol concrete topping, Sori-en Classic interlayer (20 mm), 50 mm sand on two layers of OSB subfloor, scabbed joists with furring channels spaced 610 mm oc using Pliteq GenieClip™ spaced 1220mm oc and three layers of gypsum board ceiling
Topping	<ul style="list-style-type: none"> • 70 mm Ondol concrete topping • 20 mm Sori-en Classic interlayer • 50 mm sand
Subfloor	<ul style="list-style-type: none"> • Two layers of 18 mm (23/32") T&G OSB sheathing. Joints staggered by 406 mm • Base layer OSB attached using #8 flat head screws 51 mm long spaced 150 mm along the edge and 300 mm in the field • Face layer OSB attached using #8 flat head screws 76 mm long spaced 150mm along the edge and 300 mm in the field • OSB boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the joists
Framing & Cavity Insulation	<ul style="list-style-type: none"> • Double 2x10 solid wood joists scabbed and spaced 406 mm oc and attached to headers using Simpson Strong-Ties type LUS28-2. Second joist scabbed to primary joist using three 65 mm screws at every 406 mm. • 152 mm glass fiber insulation
Ceiling	<ul style="list-style-type: none"> • Pliteq GenieClip™ installed with spacing of 1220 mm (every third joist) along the furring channels. Furring channels spaced 610 mm oc. Total of 35 GenieClip for the ceiling assembly. • 22 mm deep steel furring channels spaced 610 mm • Three layers of 13 mm Korean Lafarge gypsum board • All layers attached using screws with at least 13 mm penetration. Drywall screws of length 32 mm, 41 mm and 50 mm were used for each layer respectively with spacing of 300 mm. • The gypsum boards were 2438 mm x 1219 mm (4' x 8') with the long axis installed perpendicular to the resilient channels

NRC-K21

Single Number Ratings

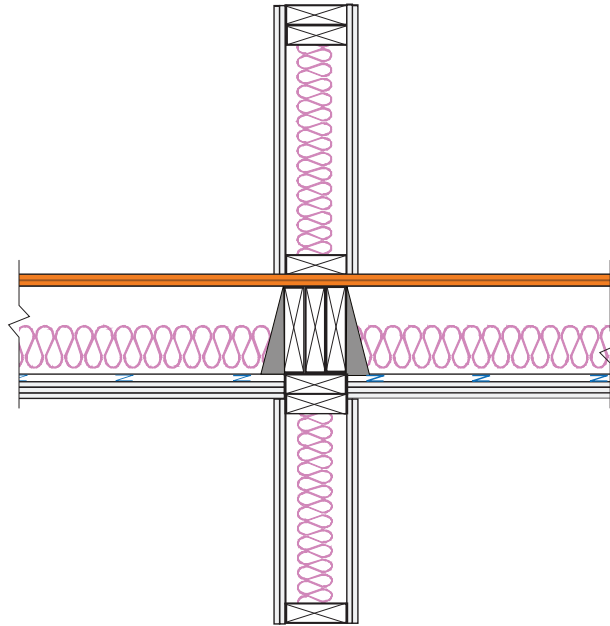
Test	Test ID	Rating	Single Number Rating	Grade
Heavy Impact (Bang)	HVF-11-036	LiF _{MaxAW}	45	3
Heavy Impact (Ball)	HVF-11-037	LiF _{MaxAW}	38	1
Light Impact	IIF-11-030	LnW	37	1
Airborne	TLF-11-037	Rw+C	76	

Element Details

Element	Unit Density	Mass (kg)	Thickness (mm)
70 mm Ondol Concrete slab	154 kg/m ²	3003	70
Sori-en Classic interlayer (20 mm)	0.84 kg/m ²	16.4	20
50 mm sand	80 kg/m ²	1560	50
Subfloor - 2x 18 mm OSB	20.4 kg/m ²	398	38
2x10 Joists Headers	4.4 kg/m	68	
2x10 Scabbed Joists	7.32 kg/m	338	235
2x10 Double Joist Hangers	0.2 kg/ea	4.4	
152mm Glass Fibre Insulation	0.55 kg/ea	22	152*
Pliteq GenieClip™ 1220 mm	0.048 kg/ea	1.7	22
Furring channels	0.37 kg/m	12	22
Ceiling – 3 x 13mm Gypsum	33.2 kg/m ²	584	39
		6007.5	496

NRC-FJLB

Load Bearing Junction

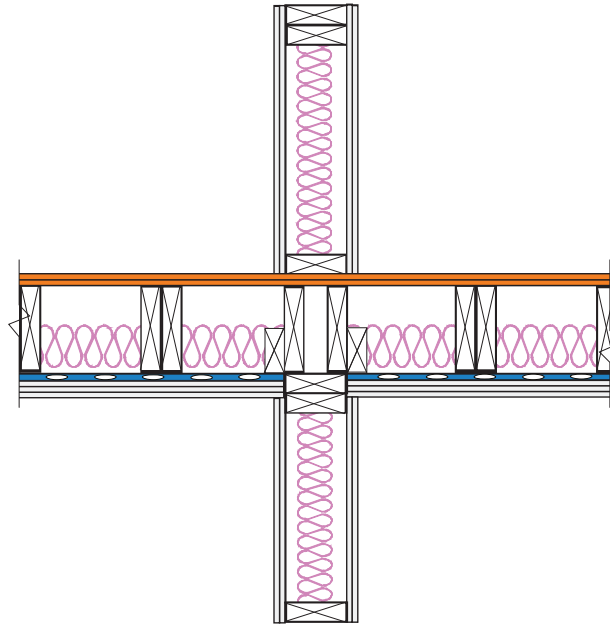


Wall/floor Junction Details

- Three 2x10 (38 x 135 mm) solid wood joists are combined, installed on top of the load-bearing partition wall, and nailed to the wall header. The joist header is continuous through the junction.
- The scabbed 2x10 (38 x 135 mm) floor joists are connected with Simpson Strong-Ties type LUS28-2 joist hangers to the joist header on both sides
- Both upper and lower load bearing walls have two 2x6 headers and one 2x6 (38x140 mm) footer that are continuous across the wall junction. The upper footers are resting on top of the joist header.
- Both layers of OSB subfloor are continuous across the junction
- The gypsum board of the ceiling is not continuous across the junction.
- The gap between wall cladding and the ceiling is filled with seal gasket and caulked

NRC-FJNLB

Non-Load Bearing Junction



Wall/floor Junction Details

- Two 2x10 (38x135 mm) solid wood joists spaced 2" (50 mm) are installed on top of the non-load bearing partition wall headers and butt up against the joist header of the load-bearing wall.
- 2x4 (38x89 mm) nailing plates are attached to the edge joists in the floor cavity to support the resilient channels of the ceiling of the lower rooms.
- Both upper and lower load bearing walls have two 2x6 headers and one 2x6 (38x140 mm) footer that are discontinuous across the wall junction. The upper footers are resting on top of the two solid wood joists.
- The gypsum board of the ceiling is not continuous across the junction.
- The gap between wall cladding and the ceiling is filled with seal gasket and caulked.