Hollowcore

stahlton
ENGINEERED CONCRETE
A division of Fulton Hogan Ltd

Product brochure

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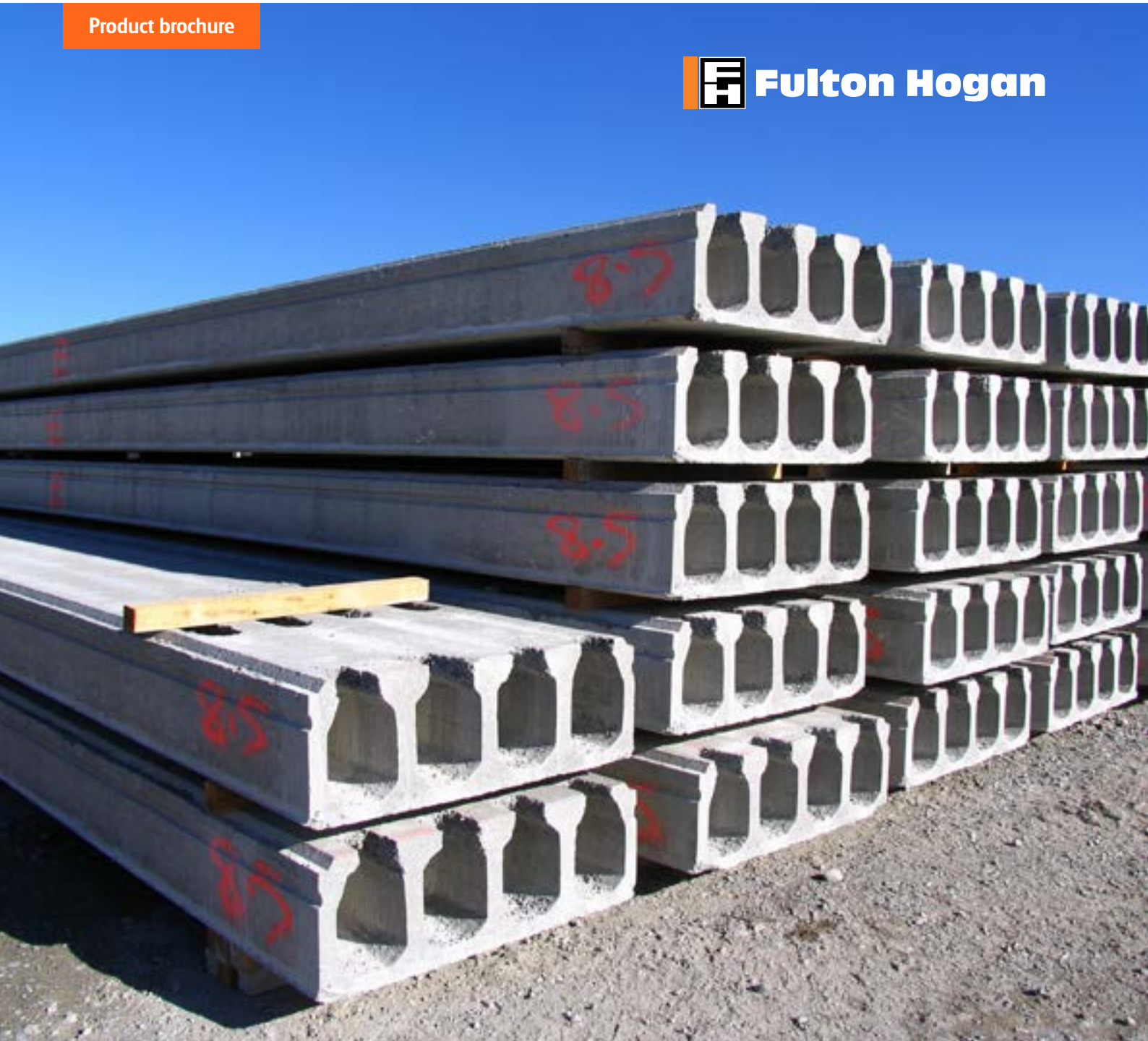

Hollowcore

Hollowcore is ideal for long unpropped spans which are subjected to uniformly distributed loads, and is used extensively in commercial buildings all around the world. Hollowcore is manufactured using high strength concrete which is processed through a unique machine that extrudes the Hollowcore profile onto a steel bed. This specialised manufacturing process allows the product to be cut to any length within its capacity, making Hollowcore economical, quick to produce and flexible to use.

Stahlton's Hollowcore is 1200mm wide and comes in 150, 200, 300 and 400mm thick. Hollowcore can be used either as a solid floor or "spaced" to provide an even more economical flooring solution.

PRECAST NEW ZEALAND INC CERTIFIED PLANT

At Stahlton, we pride ourselves on providing our customers quality, safety driven, products and services. All Fulton Hogan businesses are ISO9001 certified and our Stahlton Auckland and Christchurch plants have been certified by Precast New Zealand Incorporated.

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General

Stahlton Engineered Concrete has two different profiles of Hollowcore made in different locations around New Zealand. The Auckland branch has Echo in sizes 150, 200, 300 & 400mm deep. The Christchurch branch has Elematic in sizes 200, 300 & 400mm deep. As the different sections have some differing properties, individual projects should be designed with location in mind to match the nearest Hollowcore profile from the closest manufacturing plant.

Acoustic rating

The following tables provide STC (Sound Transmission Class) ratings, measured in decibels, for the various Stahlton Hollowcore profiles solid and spaced with a minimum depth of 75mm of topping concrete. It should be noted that the following are predicted levels using a complex cross section. To verify some of the results, comparisons have been made with field tests and the prediction model calibrated using these field tests.

Echo

Depth (mm)	Solid	Spaced 1800
150	56	55
200	59	58
300	64	59
400	68	60

Elematic

Depth (mm)	Solid	Spaced 1800
200	58	52
300	63	52
400	67	52

Durability

Stahlton Hollowcore slabs meet exposure classifications A1, A2, B1 & B2 as per table 3.6 in NZS 3101:Part 1:2006 for a 50-year life.

Thermal rating

Estimated thermal resistance ratings, R(m^2 °c/w) for Stahlton Hollowcore:

Depth (mm)	Standard All profiles	Spaced 1800	
		Echo	Elematic
150	0.22	0.25	
200	0.27	0.26	0.23
300	0.37	0.26	0.23
400	0.42	0.26	0.23

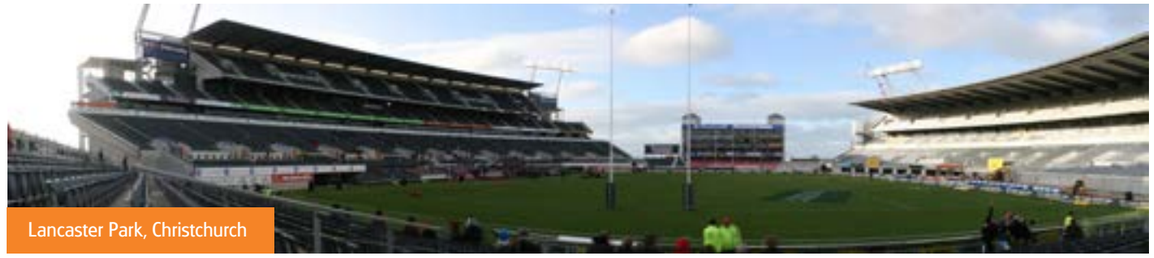
These values are a guide only, if further information is required please contact the Stahlton Engineered Concrete Technical Department.

Fire rating

150 Stahlton Hollowcore achieves a 60-minute Fire Resistance Rating (FRR), and 200-400 Stahlton Hollowcore floors with a minimum of 75mm of on-site topping have a 90-minute Fire Resistance Rating (FRR).

Increased FRR can be achieved in some circumstances; please contact Stahlton Technical Department if you wish to discuss further. Any penetrations through the Stahlton Hollowcore floors must also be fire rated.

Advice should be sought from the fire protection suppliers regarding suitability of their tested products with the Hollowcore floor systems.



Lancaster Park, Christchurch

Consulting Engineers

Loadings

Generally common loadings used on residential, office and apartment buildings are suitable for Stahlton Hollowcore and Spaced Hollowcore flooring systems. The Load Span tables assume that there is maximum strand, that the flooring is not temporarily propped, and that loads are uniformly distributed. Load factors of 1.2G and 1.5Q as per AS/NZS 1170.1 have been allowed for in the design analysis, as well as the self weight of the unit and 75mm depth of topping concrete. Simply compare your unfactored superimposed live load with the allowable shown on the table. Please note high dead loads may induce higher creep values than expected. Also loads as per cl 3.4.2(a) NZS 1170.1 2002 have not been allowed for. If this is the case, please contact the Stahlton Technical Team for further advice.

Hollowcore floors can sustain point loads and loads induced by some truck wheels. However, significant loadings should be checked by one of the Stahlton Engineers at the preliminary design stage. Generally for vehicles loadings refer to table 3.1 in AS/NZS 1170.1 as well as the NZBC Handbook Acceptable Solutions C/AS1 Part 8 'Fire Fighting' cl8.1.1a.

Loadings shown for 'medium trucks' and the recommended fire truck loadings are acceptable for Hollowcore floors but will depend on span, UDL and load factors of the unit. Additional detailing at the ends may be required to sustain high shear forces induced by wheel loadings or point loads located at the ends of the units.

Intended load factors and uniformly distributed loads should be clearly shown on the Consultant's drawings to avoid any confusion throughout the shop drawing and design process. Contact the Stahlton Technical Department if you have special loading cases for design advice.

End seating

Shear wall buildings

All Stahlton Hollowcore flooring requires a minimum of 75mm or span/180, whichever is greater, seating onto walls or beams. A construction tolerance of 15mm needs to be added to both of these figures if sitting on an unarmoured concrete beam as per cl 18.7.4 NZS 3101: Part 1:2006. Stahlton recommends the use of low-friction bearing strips for Hollowcore.

Further considerations for Hollowcore floors

In situations where either high diaphragm shear stresses are induced or relative displacements may be imposed between the Hollowcore units and the supporting structure then the deemed to comply details of cl.C18.6.7 NZS 3101: Part 2:2006, amendment 2 govern. Also refer to C18.6.7.2 for advice on the end unit of a bay of Hollowcore flooring. Refer to the key plan for further information.

Detailing of the end seating should be done at tender time so the contractor can allow and plan for the work.

Until further research is undertaken we recommend you use engineering judgement for the specific type and location of the building being designed when considering seating details.

A paper on *The performance of precast concrete floor systems during the 2010/2011 Canterbury Earthquakes* is available on the Stahlton website, courtesy of the New Zealand Concrete Society.

Hollowcore durability

Stahlton Hollowcore slabs meet exposure classifications A1, A2, B1 & B2 as per table 3.6 in NZS 3101:Part 1:2006 for a 50-year life.

Topping

The topping concrete strength should be specified as a minimum of 25MPa as per cl 5.2.1 NZS 3101:2006. The minimum topping depth for Stahlton Hollowcore at midspan is 65mm. Additional topping depth will usually be required feathered out to the ends of the units to allow for an even finished floor level. Floor reinforcement and saddle bars should be designed and shown on the Consulting Engineer's drawings. Steps in the topping can be formed using suitable density polystyrene, however the extra topping thickness needs to be accounted for as a gravity load and allowed for in the design.

Care should be taken when pouring topping not to mound up the concrete in one place as this can produce large point loads. The mounding of in situ concrete should not exceed the construction loadings the units are designed to sustain. Topping concrete should also not be poured directly onto the timber infill sections for spaced Hollowcore but rather raked into place.

In-house design

With our in-house design capability, led by our National Technical and Design Manager, we work with structural designers to provide an economical and bespoke design specifically for the needs of each structure.

New Stahlton "Fibre-core"

In recent years, through research and perceptions amongst designers, much has been learnt and developed by our designers to improve the shear performance of Stahlton Hollowcore products.

Stahlton now offers galvanised steel fibres cast in our Hollowcore units to prevent web shear cracking in highly pre-stressed units as well as provide 20% added shear capacity to the bare unit. To learn more, read the report by the University of Canterbury Quake Centre Testing.

Design weight including topping concrete

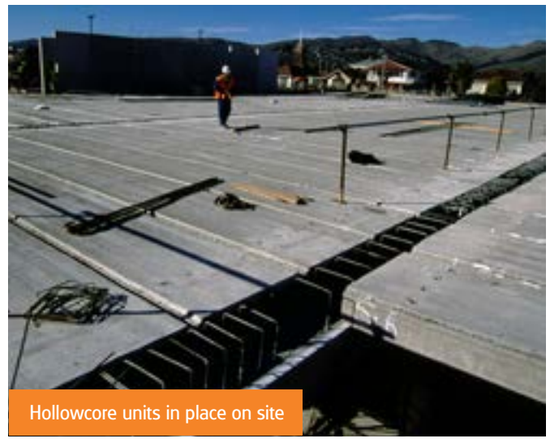
The following figures are based on the average cross-section for each product.

Topping depth of 75mm (1.9kPa) has been allowed

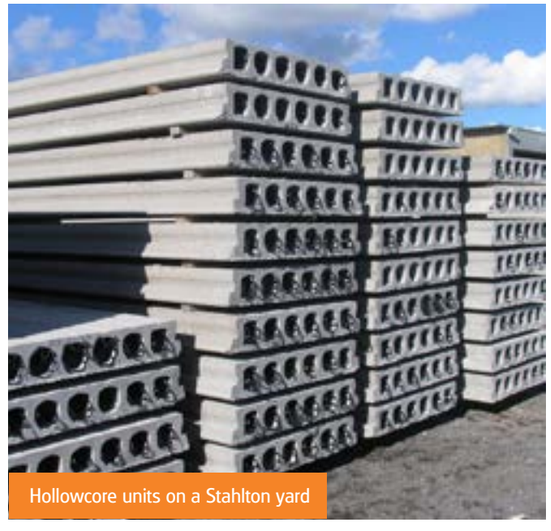
Depth (mm)	Echo (kPa)	Elematic (kPa)
150	4.25	
200	4.65	4.57
300	5.60	5.46
400	6.50	6.35

1800mm Spaced System

Depth (mm)	Echo (kPa)	Elematic (kPa)
150	3.86	
200	4.25	3.80
300	4.87	4.36
400	5.45	4.95



Hollowcore units in place on site



Hollowcore units on a Stahlton yard

Contractors

Temporary propping

Although temporary propping is not normally required for Stahlton Hollowcore, propping may be shown on the Stahlton Engineered Concrete shop drawing layout. If cores are broken out to enhance shear performance, temporary end propping may be required. If this occurs a suitably qualified Engineer will need to be consulted for the design of the propping system. The natural variations in precamber expected in prestressed members can also be minimised by the use of propping. Under standard uniformly distributed loadings temporary propping would be expected for spans exceeding 8.5m, 10m, 14.5m and 17.0m for 150mm 200mm, 300mm, and 400mm deep Stahlton Hollowcore units respectively. Eccentrically loaded beams will require temporary propping. This should be planned into the rigging sequence of the building floor plate to minimize the amount of propping required.

Camber

Stahlton Hollowcore units will arrive at site with some positive camber (hog). This is unavoidable due to the nature of prestressing. The amount of hog will depend on a number of factors, including amount of prestress, time since the units were manufactured and exposed to the elements and length of unit to name just a few variables. As a rule of thumb allow 2-3mm of hog for every 1m of span. Generally half of the hog of the Hollowcore unit will come down after the topping concrete is poured and any propping is removed. Half of the remaining hog will eventually come out over time due to creep and shrinkage. We now cast in top strand for better control of cambers.

Handling & storage

Stahlton Hollowcore is designed to be lifted at the ends. Wire mesh sling or specifically designed scissor clamps can be used to lift the units. Other lifting devices may damage the soffit of the Hollowcore unit. The strops should be placed approximately 300mm in from the ends of the unit. All lifting gear should be checked for any wear or damage regularly as concrete elements can be abrasive.

Stahlton Hollowcore units if stored on site need to be dunnaged near the lifting points (maximum of 300mm from end of unit). The dunnage blocks need to be aligned on top of each other so as not to induce large point loads on the units below. Care needs to be taken as to the suitability of the ground the units are stored on and should be checked by a suitably qualified engineer.

Handling weights for Stahlton Hollowcore

Depth (mm)	Echo (kg/m)	Elematic (kg/m)
150	290	
200	350	330
300	470	430
400	580	575

Penetrations & fixings

An Information Bulletin IB95 *Drilling, Cutting or Forming Holes in Suspended Concrete Floor Slabs*, published by CCANZ, is available on the Stahlton website.

Stahlton Hollowcore units can have penetrations core drilled through the unit in specific locations. The area of concrete around the strand must be avoided altogether. If a strand is cut onsite, temporary prop either side of the penetration immediately, then contact Stahlton Engineered Concrete as a design check will need to be done to ascertain whether the unit is still structurally sound.

There are very few fixings specifically designed for use in Hollowcore floors. Anchors are specifically designed for Hollowcore are available. Please note powder actuated shot fired nails are not permitted to be used with Stahlton Hollowcore unless specially designed and tested by the fixing supplier. Advice should be sought from the fixing manufacturer as to the suitability and load-carrying capacity of their products in Hollowcore.

An alternative is to use fixings such as threaded rod that pass through the void area of the Stahlton Hollowcore. Again fixings cannot be situated so as to interfere with the prestressing strand. Units can be designed with additional prestressing tendons to allow for cutting of occasional tendons. However, this needs to be thought about at the start of the project and built into the design before the units are cast, bearing in mind that extra strand will induce more hog in the slab.

The infill sections of Stahlton Spaced Hollowcore are the ideal place to accommodate penetrations and services. Care should still be taken with placing of penetrations so as not to cause weakness in the floor diaphragm. Fixings can be made into the timber infill for light loads or into the topping concrete for heavier loads. These fixings should be checked by a suitably qualified engineer. Refer to drawings.

Product data sheet

Hollowcore flooring

Hollowcore is ideal for long unpropped spans which are subjected to uniformly distributed loads, and is used extensively in commercial buildings all around the world. Hollowcore is manufactured using high strength concrete which is processed through a unique machine that extrudes the Hollowcore profile onto a steel bed. This specialised manufacturing process allows the product to be cut to any length within its capacity, making Hollowcore economical, quick to produce and flexible to use.

Stahlton's Hollowcore is 1200mm wide and comes in 150, 200, 300 and 400mm thick. Hollowcore can be used either as a solid floor or 'spaced' (refer Hollowcore Spaced Product Data Sheet) to provide an even more economical flooring solution.

Hollowcore load/span tables

Tables are indicative only.

Unfactored maximum superimposed live load (Q_b) in kilopascals (kPa), (assuming no superimposed dead load ie. SDL = 0kPa). Unpropped and free of filled cores, beyond Figs C18 NZS3101:Part 2:2006, for added shear capacity to the left of the solid line.

75mm of 25MPa topping concrete

Hollowcore depth	Self wt (kPa)	Simply supported span (m)														
		5.5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
150 Echo	4.25	11.0	9.6	7.2	5.4											
200 Echo	4.65			11.0	8.0	6.0	4.6									
200 Elematic	4.60			10.7	7.8	5.8	4.5									
300 Echo	5.60						10.3	8.1	7.1	6.2	5.0					
300 Elematic	5.50						8.5	7.2	5.5	4.7	3.6					
400 Echo	6.50									8.9	7.7	6.5	5.7	4.6	3.6	
400 Elematic	6.40									8.1	7.2	6.4	5.5	4.9	3.8	

90mm of 25MPa topping concrete

Hollowcore depth	Self wt (kPa)	Simply supported span (m)														
		5.5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
150 Echo	4.6		11.2	8.0	5.5	5.7										
200 Echo	5.1			12.0	8.6	6.8	4.4	4.2								
200 Elematic	4.9			11.6	8.5	6.1	4.5	4.5	3.2							
300 Echo	6.1						10.8	8.5	7.4	6.5	5.1	5.4	4.2			
300 Elematic	5.8						8.8	7.5	5.7	4.9	3.7	5.0	4.3			
400 Echo	7.0									9.2	8.0	6.6	5.7	4.6	4.1	3.1
400 Elematic	6.8									8.4	7.4	6.6	5.5	5.0	5.2	3.0

Product data sheet

Unfactored maximum superimposed live load (Qb) in kilopascals (kPa), (assuming no superimposed dead load ie. SDL = 0kPa). Possibly propped, filled cores for added shear capacity to the left of the solid.

75mm of 25MPa topping concrete

Hollowcore depth	maxΦMn (kNm)	Simply supported span (m)														
		5.5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
150 Echo	171	18.0	14.7	10.0	6.9	4.8										
200 Echo	198			14.4	10.2	7.3	5.3	3.7								
200 Elematic	195			14.5	10.4	7.5	5.5	4.0	2.9							
300 Echo	473						13.9	10.8	8.4	8.4	6.4	5.0	3.9			
300 Elematic	483						14.2	11.2	8.9	7.5	6.3	4.9	3.7			
400 Echo	657									12.3	9.9	8.0	6.4	5.1	4.0	3.1
400 Elematic	716									9.8	7.8	7.1	6.9	5.8	4.9	3.9

Units too long to handle

Notes regarding Load/Span tables

1. Consideration needs to be given to long term creep effects due to higher superimposed dead loads. Contact Stahlton's technical people for guidance.
2. The Load Span tables assume loads are uniformly distributed. Consideration is required for shear actions enduced from point loads. Again, conctact Stahlton's technical people for advice.
3. Theoretical cambers have been limited to span/400. Consider higher cambers for situations close to the tabulated load limits.
4. Moment capacity quoted is per 1.2m U.N.O. width with maximum strand.
5. Echo equipment is usually located in Auckland, Elematic equipment is located Christchurch.
6. Refer to Stahlton's website, www.stahlton.co.nz for typical detailing examples that you can download.

Spaced 1.8m Hollowcore load/span table (Indicative only)

Unfactored maximum superimposed live load (Qb) in kilopascals (kPa), (assuming no superimposed dead load ie. SDL = 0kPa).
Unpropped and free of filled cores, beyond Figs C18 NZS3101:Part 2:2006, for added shear capacity to the left of the solid line.

75mm of 25MPa topping concrete

Hollowcore depth	Self wt (kPa)	Simply supported span (m)														
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
150 Echo	3.9	10.2	8.2	4.6	4.5											
200 Echo	4.3		11.4	7.6	5.1	4.5										
200 Elematic	3.8			6.8	5.0	3.3	3.7									
300 Echo	4.9					7.0	5.5	4.0	2.7	2.4	3.0					
300 Elematic	4.4						6.8	5.2	4.3	3.9	3.2	3.3				
400 Echo	5.5									4.7	4.0	3.0	3.4			
400 Elematic	5.0									6.3	5.4	5.8	3.8	3.5		

Camber - Spaced Stahlton Hollowcore units will arrive on site with a significant positive camber or "hog". Near a limit of span/400 if your loads are close to the limits published in the above load/span table, compensation for deflections will be required by the contractor while casting the topping concrete. Please contact Stahlton for advice.

Hollowcore section properties

Section properties are based on a 1200mm wide section of floor with a 75mm concrete topping. Composite section assumes a modular ratio of 0.67.

Hollowcore depth (mm)	Unit wt (kg/m)	Overall depth (mm)	Bare unit				Composite unit				
			A	Y_b	I	Z_b	A'	Y_b'	I'	Z_b'	Z_t'
			$x10^3mm^2$	mm	$x10^9mm^4$	$x10^6mm^3$	$x10^3mm^2$	mm	$x10^9mm^4$	$x10^6mm^3$	$x10^6mm^3$
150 Echo	288	215	113	74	0.296	4.01	173	116	0.87	7.5	8.8
200 Echo	347	265	136	96	0.651	6.79	196	146	1.63	11.2	13.7
200 Elematic	319	265	133	96	0.654	6.81	193	148	1.53	10.3	13.1
300 Echo	472	365	185	144	1.979	13.72	246	197	3.78	19.2	22.5
300 Elematic	432	365	180	151	2.081	13.80	240	203	3.74	18.4	23.1
400 Echo	575	465	226	194	4.320	22.23	286	251	7.33	29.2	34.3
400 Elematic	560	465	233	207	4.755	23.01	293	261	7.47	28.7	36.6

Echo equipment is usually located in Auckland where concrete density is measured to be 25.0kN/m3. Elematic equipment is usually located in Christchurch where the concrete density measured is 23.6kN/m3.

Important information

End Seating

Stahlton Hollowcore flooring requires a minimum, and the greater of, 80mm or L/180 seating onto unarmoured concrete beam or wall. A construction tolerance of up to 15mm needs to be compensated for as per cl.18.74 NZS3101:Part 1:2006. Stahlton and the code requires the use of low-friction bearing strips.

Temporary propping

Stahlton Hollowcore flooring does not normally require propping unless; increased capacity is required, more than two cores are required to be filled at the ends or there is a desire to minimise the natural variation in cambers. Propping is to be designed by a suitably qualified Engineer. Under typical office type loadings spans exceeding 8.5m, 10m, 14.5m and 17m for 150, 200, 300, 400mm deep units respectively propping would be expected. Refer to the Sale Operating procedure for propping of timber in-fills.

Camber

Stahlton Hollowcore units will arrive on site with a positive camber or 'hog'. This is unavoidable due to prestressing. Hogging will vary and be influenced by the amount of prestress required to resist the induced loads, length and age of the units exposed to the elements.

Handling & storage

Stahlton Hollowcore is designed to lifted and dunnaged within 300mm from the ends. Wire mesh slings or specifically designed scissor clamps can be used to lift the units. Ensure lifting gear is regularly checked. Units stored on site need to be dunnaged also within 300mm of the ends, with blocks in line with the block below, on solid and even ground.

Penetrations

Stahlton Hollowcore units can have penetrations drilled through the unit in specified locations that avoid the webs and strand. If a strand is cut on site, place a prop either side and contact Stahlton's Technical Department for a design review. Also see our standard drawings for acceptable details for attaching fixings to the soffit of the units.

Tolerances

Construction tolerances need to be considered, refer to NZS 3109:1987 Table 5.1.

Specifications

Draw call-up

To specify the Stahlton Hollowcore system on your drawings we suggest you use the following designation:

Stahlton (insert depth) Hollowcore with ___mm topping.

For example if the project is to be erected in Christchurch, made from 200mm-deep Stahlton Hollowcore with a 90mm-deep topping, then the specification would read:

Stahlton 200 Hollowcore with 90mm topping.

If 1.8m module Spaced Stahlton Hollowcore made in Auckland with 75mm topping is desired then:

Stahlton 200 Spaced 1.8m Hollowcore with 75mm topping.

Written specification clauses

Stahlton Hollowcore products in general comply with the following standards:

NZS 3101:2006	Concrete Structures Standard Part 1 & 2
NZS 3109:1997	Concrete Construction
AS/NZS 4671:2001	Steel Reinforcing Materials
BS 5896:1980	Specification for High Tensile Steel Wire and Standard for the Prestressing of Concrete.

Design

1. The design of Stahlton Hollowcore shall be in accordance with the requirements and recommendations of NZS 3101:2006 'Concrete Structures Standard Part 1 & 2' and/or any recognised international Standard or part thereof, for example BS 8110:1007 'The Structural Use of Concrete'.
2. The prestress strand pattern in the Stahlton Hollowcore shall be designed to sustain the loadings shown on the Consulting Engineer's drawings and allowance will be made for self weight of the unit and topping concrete.
3. The Stahlton Hollowcore shall be designed for exposure classification A1/A2/B1/B2 as per table 3.6 in NZS 3101:2006.
4. The Stahlton Hollowcore unit shall have a FRR (Fire Resisting Rating) of 90/90/90. Penetrations through the flooring system shall be reinstated to the required FRR by an approved fire protection system.
5. Stahlton Hollowcore shall be designed to have a maximum crack width of 0.3mm under full live load conditions.
6. The acoustic STC (Sound Transmission Class) and IIC rating of the floor system shall meet or exceed 55dB as tested at a registered institution or a field test of 50dB measured in 'on-site' conditions. These ratings apply to the finished floor system, including any carpeting and suspended ceiling systems.
7. The Stahlton Hollowcore units shall have a minimum of 75mm end seating of L/180, whichever is greater, as per clause 18.7.4 in NZS 3101:2006 plus tolerance of 15mm if seated on an unarmoured concrete beam.

Materials

1. Concrete shall be specifically mixed depending on environmental conditions and should have a 28 day cylinder strength of 45MPa as a minimum.
2. All concrete shall show signs of thorough compaction otherwise be rejected if repair cannot be undertaken to bring the unit back to the original specification.
3. An air entraining agent complying with BS EN 934-2-2001 may be included in the concrete mix to improve workability.
4. The strand reinforcement used in Stahlton Hollowcore shall be 12.7mm or 12.9mm diameter complying with the requirements of AS/NZS 4671:2001.
5. Prestressing strand shall be clean and free from deleterious substances. Superficial rust is acceptable, however strand with corrosion that has caused surface pitting shall be rejected for the main longitudinal reinforcement of the unit.

Manufacture

1. Materials, execution of stressing prestress strand and workmanship of the Stahlton Hollowcore units shall conform with Stahlton Engineered Concrete ISO 9001 Quality Assurance Operating Procedures.
2. Stahlton Hollowcore units shall be nominally 1200mm wide and made in the following profile and nominal depth; Echo (Auckland) 150mm, 200mm, 300mm & 400mm, Elematic (Christchurch) 200mm, 300mm & 400mm.
3. The top surface of the Stahlton Hollowcore unit shall have a nominal roughness of 2mm or more as stipulated in NZS3101:2006 clause 18.5.4.1(c).
4. The tolerance for length of the Stahlton Hollowcore units shall be in accordance with NZS 3109 Table 5.1 (usually +/- 15mm).

Handling, protection & placing units

1. The Hollowcore units shall to be designed to sustain all lifting stresses.
2. The Hollowcore shall be lifted only at the lifting position as nominated by the manufacturer.
3. Hollowcore units shall be handled using scissor clamps or metal woven strops. Strops must not exceed 30 degrees to the vertical and must be checked regularly for wear and tear.
4. Dunnage used for storing the Hollowcore units needs to be of suitable quality and placed on 'good' ground at the correct points in from the end of the units.
5. Where units are stacked one above the other, bearing dunnage shall be positioned in vertical lines.
6. The Hollowcore shall be handled and placed according to references contained in the Occupational Safety & Health approved code of practice entitled 'Safe Handling, Transportation and Erection of Precast Concrete'
7. The units shall not be damaged in any way including chips and cracks during the erection and placing phase. Any damage should be brought to the attention of the supervising Engineer immediately.

Temporary propping

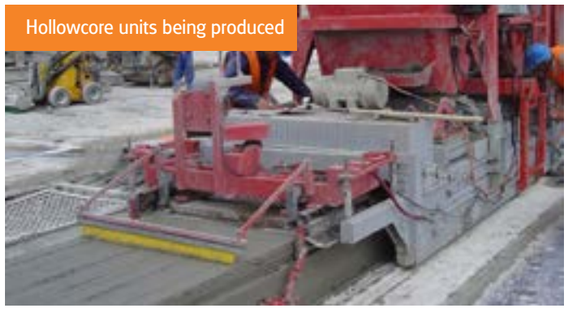
1. Design of temporary propping, back propping, bracing systems and ground conditions to support prop loads shall be carried out by a suitably qualified Engineer.
2. Propping shall not be removed until the topping concrete has reached at least 60% of the 28 day strength.
3. It is the Contractor's responsibility to ensure the propping system used on site meets the criteria as detailed in the aforementioned design and any additional requirements shown on the Stahlton Engineered Concrete drawings.
4. All proposed systems with supporting calculations shall be submitted to the Specifying Engineer prior to erection on site for approval.

Topping concrete

1. The top surface of the Hollowcore units shall be clean and free of all dust, oil or any deleterious substances which may adversely affect the wet topping bond to the Hollowcore units.
2. Pre-wet precast concrete surfaces prior to placing the topping concrete.
3. Free water shall be broomed away before the topping is applied.
4. Topping reinforcement shall be laid and supported to the Specifying Engineer's requirements and shall be supported to prevent displacement during concreting.
5. Topping concrete shall have a maximum aggregate size of _____ (normally 13mm) and a 28 day strength of _____ (minimum of 25MPa) and be well compacted with mechanical vibrators.
6. Topping concrete shall be poured to a true surface so that the specified thickness of _____ (minimum of 75mm) is achieved at the centre of the span. The key-ways between each Hollowcore unit must also be filled with well-compacted topping concrete.
7. In-situ concrete shall be cured by the application of an approved curing membrane or by being kept continuously wet for not less than seven days.

Fixings & penetrations

1. Fixing to the Hollowcore units shall be in accordance with the approved details only and shall not impair or reduce the strength of the unit in any way.
2. Documentation of tested fixings proposed for the project shall be submitted to the Specifying Engineer prior to installation.
3. Penetrations, setdowns or chases to the Hollowcore unit or topping concrete shall be in accordance with the details agreed by the Specifying Engineer and the Hollowcore manufacturer prior to any work being undertaken on site.



Hollowcore units being produced

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