

# Infrastructure

## Product Brochure



Busck's operations are ISO9001 certified as well as being Certified Plants meeting the high standards set by Concrete NZ.

Busck manufacture quality assured precast concrete products for the infrastructure sector throughout New Zealand in controlled conditions to meet your desired look and specification. Contact Busck's technical people if you have any queries and we are always happy to work through options.



# Architects

## General

Busck Prestressed Concrete Ltd. has been manufacturing precast concrete as its core business for 75 years. In that time Busck has grown to the extent that we are now one of the largest precast concrete operations in New Zealand. Busck also influence the industry delivering high quality performance and standards. Busck has time & time again proved itself to deliver on technically challenging commercial and infrastructure projects.

To be in this business successfully for as long as we have takes innovation and flexibility to adapt to the market requirements. If your project is a little different to the precast elements we present here, contact our highly capable people and we will work through the feasibility and offer efficient solutions to see your unique project through to successful completion, on time.

## Fire Rating

Three elements define the fire rating of concrete units in accordance with section 4 of NZS3101:2006.

- 1) Insulation – thickness of concrete and other materials that separate occupancies in the building.
- 2) Integrity – the criteria of integrity are considered satisfied if the precast element meets the criteria of both insulation and structural adequacy for that period.
- 3) Structural adequacy – section geometry of the concrete element, distance from the surface to the centre of the reinforcement and/or strand called “axis distance” and continuity at the supports.

Specified in the form eg. 60/60/60 for a 60 minute fire rating. Seek advice from fire protection suppliers in regards to their tested products when detailing fire rated penetrations through precast elements.

Contact Busck for solutions to increase fire rating.

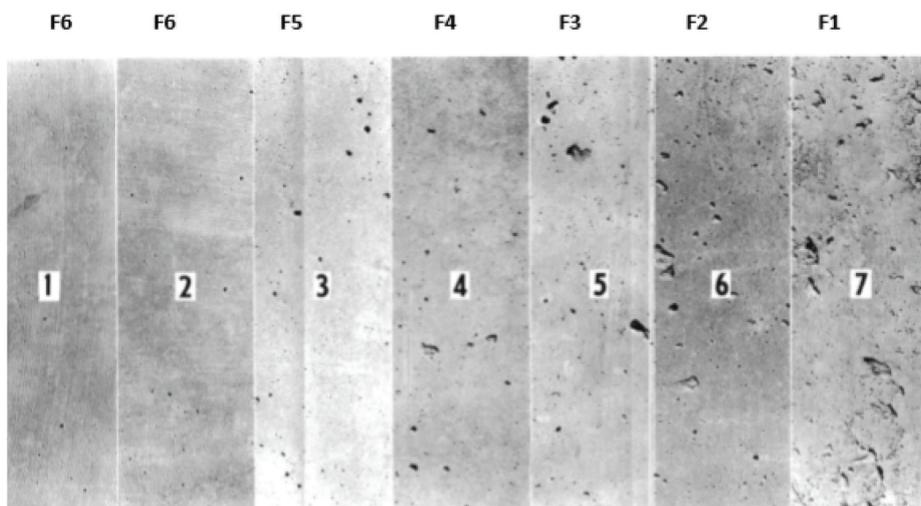


## Surface Finishes

NZS3114:1987 prescribes the descriptions and tolerances for formed finishes "F1" to "F6" and manual finishes "U1" to "U11" eg. "U3" for steel trowelled surface quality. Concrete surfaces are influenced by quality of vibration, trowelling and mould material used in production. Cost increases as the expectations of the quality of the surface improves.

Busck precast products generally achieves, at worst, "F4" finish off a steel mould. Contractors should allow for minor remedial work on-site to receive an exposed painted finish.

Architects have the option of specifying textured, exposed aggregate, rebated, lettering, polished (honed) finishes.



## Thermal Rating

Estimated thermal resistance ratings for materials associated with precast concrete elements are:

Thermal Rating	
Material	R rating/100mm thick (m <sup>2</sup> .°C/w)
Concrete	0.045
Timber	0.77
Expanded poly.(type2)	2.77
Gypsum plasterboard	0.62

## Durability

Busck's precast concrete products are typically manufactured with the strength and cover to reinforcement to achieve 100 year design life in exposure classifications A1, A2, B1 & B2 prescribed in section 3 of the New Zealand standard NZS3101:Part 1:2006. Longer design life and/or precast concrete elements in environmentally more extreme environments, such as coastal marine areas are achievable.

# Consulting Engineers

## Design

Precast concrete elements incorporated into the design of any structure provide a durable, weather-tight, energy efficient shell and a stable, strong backbone to resist gravity loads as well as lateral forces induced by New Zealand’s active seismicity. Busck Prestressed Concrete Ltd manufacture these quality critical elements to comply with the buildings structural engineers and architects detailed design and specification.

We encourage designers to involve our expertise early in the design process to ensure the best, most cost effective solutions are detailed, for example, element size for safe, practical handling and transportation. Busck offer this design advice, as well as cost estimates on request, freely.

Our people use the latest AutoCad software as well as Rivet and Solid Works 3D capability to ensure everything connects as it should.

## Manufacture

One benefit of precasting is our ability to make quality products on a daily basis. To achieve this our precast products are manufactured using concrete that achieves a minimum stripping strength of 20MPa overnight by purchasing concrete that is a minimum 40MPa at 28 days cast on steel heated beds.

### MAXIMUM SPAN TABLE

Busck Hollowcore bridge unit depth, mm	Highway Normal (HN-HO-72) Loading Maximum span, m
450 Busck Hollowcore bridge deck	12.5
585 Busck Hollowcore bridge deck	16.0
650 Busck Hollowcorebridge deck	18.0
900 Busck Hollowcorebridge deck	25.0

The New Zealand Transport Agency (NZTA) has produced standard drawings for Precast Concrete Bridge Beams. These are available using this link: [www.nzta.govt.nz/assets/resources/research/reports/364/docs/364.pdf](http://www.nzta.govt.nz/assets/resources/research/reports/364/docs/364.pdf)



# Contractors

---

## Handling and Storage

Busck's precast products are usually cast with Reid swiftlift lifting anchors to our design to suit our lifting equipment. Specifically designed lifting clutches, chains and hooks are to be used to lift the units. These lifting points should be used without substitution. All lifting gear needs to be certified and regularly checked for any wear or damage because concrete elements can be abrasive.

Busck precast products, if stored on-site, needs to be dunnaged near the lifting points and dunnage blocks need to be aligned directly on top of each other so as to not induce large point loads on the units below. Care needs to be taken as to the bearing capacity of the ground the units are stored on. Racks for storing panels should be designed by a suitably qualified engineer.

We encourage contractors to contact Busck technical staff early in the design process to ensure precast concrete element sizes are kept safely practical to be handled and transported.

Every precast concrete unit is reproduced by our experienced draughting team on a shop drawing showing cast in inserts, weld-plates, brackets, reinforcement, roughened surfaces and formed rebates to be installed to match the designers details and our moulding orientation. A lifting design using the Concrete NZ Precast sector standard rigging codes is applied and shown on the shop drawing. It is important all shop drawings are rigorously checked, lifting process is understood and approved by the contractor to ensure their needs are met prior to manufacture.

Handling weights of Busck precast products will be noted on the shop drawings. We generally allow 2500kg per cubic metre of concrete volume plus some compensation for reinforcement content.

## Propping

Temporary propping of precast concrete elements is designed by the contractor's temporary works engineer to ensure stability under gravity as well as lateral forces from wind and earthquake during construction.

The Good Practise Guidelines for **"Safe Work with Precast Concrete"** published by Worksafe New Zealand is an essential resource for all contractors handling precast concrete elements. Refer to [www.worksafe.govt.nz/topic-and-industry/concrete/safe-work-with-precast-concrete/](http://www.worksafe.govt.nz/topic-and-industry/concrete/safe-work-with-precast-concrete/)



Busck Hollowcore bridge unit depth, mm	Unit weight, kg/m	
	635mm wide	1145mm wide
450 Busck Hollowcore bridge deck	545	970
585 Busck Hollowcore bridge deck	595	1056
650 Busck Hollowcorebridge deck	625	1100
900 Busck Hollowcorebridge deck	735	1275

## Drilling Penetrations and Installing Fixings

Busck strongly recommends, before any holes are drilled for services or fixings into precast concrete elements, that contractors seek approval of the designer.

Holes for fixings can be drilled using a hammer drill or "dyna-drill" ensuring you maintain minimum edge distances, spacings as well as avoiding the reinforcement to achieve the required embedment. If in doubt seek advice from the fixing manufacturer as to the suitability and the load carrying capacity of their products.

## Surface Finish

Contractors should allow to remediate air holes and minor defects before applying paint finishes to exposed surfaces. Refer to NZS3114:1987 that describes the allowable tolerances. Lifting anchor recesses will also need to be filled.

# Our Products

## Bridge Beams

We offer economic bridge deck elements to suit various spans, loading and site conditions. Our Double or Single Hollowcore units are manufactured to length in moulds which give a smooth finish and light broom top finish, providing grip for vehicles, topping concrete or an asphalt layer if required. Prestressed concrete bridges are well proved to stand the test of time in the harshest of environments.



## Lego Blocks

Ideal for storage bins, barriers and retaining walls.



## Sleepers

Since 2005 Busck has successfully supplied railway sleepers to strengthen New Zealand and Tasmania's rail network through innovative design.

## Marine

Busck have supplied precast concrete elements to resist New Zealand's harshest marine environments.

We have the resources to directly load barges from within our Whangerei facility.





## Kassel Kerb®

Busck are the sole licensed manufacturer of the Kassel Kerb® range in New Zealand and Australia.

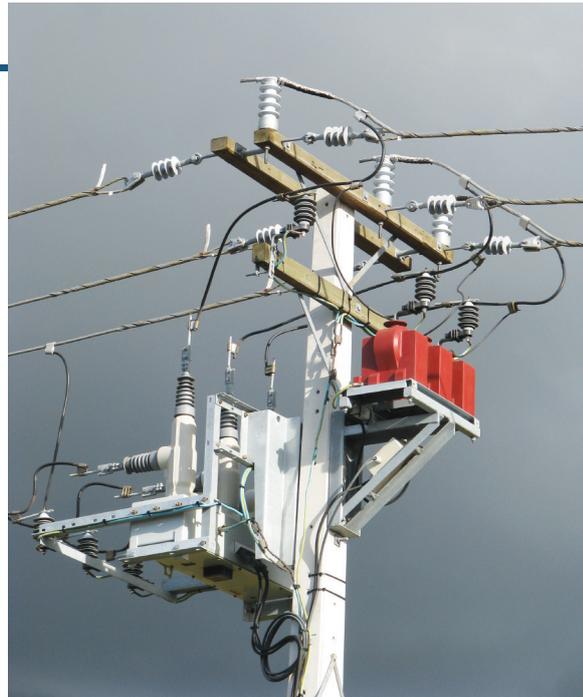
The design philosophy behind all Kassel Kerb® product is to improve the Public Transport experience - making bus and tram travel safer and easier for passengers.

Primarily the Type 1.16 kerb unit is in use in Auckland for Bus stops and stations. Please contact Busck regarding project specific curves, transitions and any other Kassel Kerb® profile you may require.

Kassel Kerb® parent company website:  
[www.profilbeton.com/index.php](http://www.profilbeton.com/index.php)

## Electricity

Busck is New Zealand's leading Concrete power pole supplier. We supply poles and associated products to most electricity lines companies in New Zealand and have also supplied poles to Australia and the Pacific Islands. We pride ourselves on producing a high quality, high strength prestressed concrete products.



## Culverts, Retaining walls, Reservoirs, Barriers and more

Busck manufacture precast concrete culverts, retaining walls and barriers to meet the specific requirements of your project.



# Specifications

## Drawing call-up

To specify the Busck bridge beam system on your drawings, we suggest you use the following designation:

Busck depth bridge beam

For example if the project is to be made from 650mm deep Busck Double Hollowcore, then the specification would read:

Busck 650 Double Hollowcore bridge beam

## Written specification clauses

Busck bridge beam products in general comply with the following standards:

- (i) NZS 3101:2006 'Concrete Structures Standard Part 1 & 2' Amendment 3.
- (ii) NZS 3109:1997 'Concrete Construction'
- (iii) AS/NZS 4671:2001 'Steel Reinforcing Materials'
- (iv) BS 5896:1980 'Specification for High Tensile Steel Wire and Standard for the Prestressing of Concrete'
- (v) NZTA Bridge Manual 3rd Edition (SP/M/022)

## Manufacture

- (i) Materials, execution of stressing prestress strand and workmanship of the Busck bridge beam units shall conform with Busck Prestressed Concrete ISO 9001 Quality Assurance Operating Procedures.
- (ii) Busck Hollowcore bridge beam units shall be nominally 635mm or 1145mm wide and made in the nominal depths not limited to 460mm, 585mm, 650mm and 900mm.

## Materials

- (i) Concrete shall be specifically mixed depending on environmental conditions and should have a 28 day cylinder strength of 50MPa as a minimum.
- (ii) Specified Concrete Compressive Strengths
  - Precast beams at transfer - Pretensioning.....30MPa
  - Precast at 28 days.....50MPa
  - In-situ concrete between units at 28 days.....30MPa
- (iii) All concrete shall show signs of thorough compaction otherwise rejected if repair cannot be undertaken to bring the unit back to the original specification.
- (iv) An air entraining agent complying with BS EN 934-2-2001 may be included in the concrete mix to improve workability.
- (v) Reinforcement and Prestressing
  - (a) Prestressing strand shall be clean and free from deleterious substances. Superficial rust is acceptable, however reinforcement and strand with corrosion that has caused surface pitting shall be rejected.
  - (b) All reinforcement shall be Grade 500E to AS/NZS4671.
  - (c) All prestressing strand shall be 12.7mm, 12.9mm or 15.2mm diameter low relaxation stress relieved super grade 7 wire strand complying with AS/NZS4672 or BS5896.
  - (d) Minimum breaking load of strand 184KN for 12.7mm and 12.9mm, and 250KN for 15.2mm.
  - (e) Force in strands immediately prior to transfer shall be accounted for in the jacking force required to achieve this value. Typically relaxation prior to transfer is in the order of 1% where curing at elevated temperatures is employed, high relaxation rates may result and due allowance for this shall be made by the precaster in determining the jacking force required to achieve the minimum force specified.
  - (f) Ends of strand shall be cut flush and protected with a minimum of 5mm epoxy mortar.
  - (g) Upward deflection of girders due to prestress is given a beam hog table. These are estimates only. Estimates are made for hog at transfer and minimum 60 days with due allowance for increase in hog due to creep of concrete under sustained load.
  - (h) Components prefixed RB are reidbar items. Reidbar or approved alternative shall be Grade 500E to AS/NZ4671. Grey cast iron components are not allowable.

## Design

- (i) The design of Busck bridge beams 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 8110:2007 'The Structural Use of Concrete'.
- (ii) The prestress strand pattern in the Busck bridge beams 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.
- (iii) The Busck bridge beams shall be designed for exposure classification A1/A2/B1/B2 as per table 3.7 in NZS 3101:2006 for 100 year design life.
- (iv) The Busck bridge beam 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.
- (v) Busck bridge beams shall be designed to have a maximum crack width of 0.2mm under full live load conditions.
- (vi) The Busck bridge beam units shall have a minimum end seating detailed by the engineer plus tolerance. Refer NZS3109 table 5.1 or this document.

### Concrete cover (minimum)

Cover to all prestressing components	40mm
Cover to all reinforcement exposed surface	40mm
Cover to reinforcement to shear keys	24mm
Cover adjacent to cored holes/voids	30mm
Cover to bridge deck and all cast in-situ concrete	50mm
Cover to barrier fixing steel (within barrier)	50mm

### Design Loading

To be specified, for example HN-HO-72 (Including SLS live load factor of 1.35 x Impact Factor) in accordance with the NZTA Bridge Manual.

### Handling

Extremes of vertical lifting points or ground support shown hatched. Central support position as shown is preferred (beam in upright position at all times).

### Surface Finishes

Top surface of flange	Type B construction joint
In direct contact with insitu diaphragm	Type B construction joint
Hidden formed surface	F1
All other formed surface	F4

## Tolerances

Dimensions at time of erection:

Actual overall length and squareness

- (i) The beam end surfaces shall lie within the 15mm "Tolerance boxes"
- (ii) Plane surface, deviation from a 1.5m straight edge  $\pm 6\text{mm}$
- (iii) Beam hogging variation (see specification)  $\pm 15\text{mm}$
- (iv) Cross section dimensions up to 0.5m  $\pm 5\text{mm}$
- (v) Cross section dimensions 0.5m to 2m  $\pm 10\text{mm}$
- (vi) Horizontal bow of longitudinal axis  $\pm 20\text{mm}$
- (vii) Longitudinal steel arrangement  $\pm 10\text{mm}$
- (viii) Location of an item in relation to any other item within its group or to the midpoint of the beam ends  $\pm 10\text{mm}$
- (ix) Pretensioning prestressing strands in any direction  $\pm 5\text{mm}$



### **Whangarei**

8 Fraser Street  
Whangarei 0110  
phone: 09 438 3059

### **Palmerston North**

116 Kaimanawa Street  
Kelvin Grove 4414  
phone: 027 600 5560

### **Ashburton**

7 Malcolm Mcdowell Road  
Ashburton 7772  
phone: 03 928 8013

### **Marsden Point**

554 Marsden Point Road  
Ruakaka 0171  
phone: 021 0240 1232

### **Christchurch**

257 Annex Road  
Middleton 8024  
phone: 027 287 5005

### **Invercargill**

4 Lake Street  
Cliffon  
phone: 027 246 8172

### **Hamilton**

20 Herschel Street  
Ngaruawahia 3720  
phone: 027 558 9172

*January 2020*

**DISCLAIMER:** Information contained in this brochure is subject to change, consult Busck Prestressed Concrete for further information.

email: [info@busck.co.nz](mailto:info@busck.co.nz)  
BUSCK website: [www.busck.co.nz](http://www.busck.co.nz)