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A CRH COMPANY



Ancon[®]
**Keybox Reinforcement
Continuity Systems**
for the Construction Industry

May 2014



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Keybox

Continuity of Reinforcement at Construction Joints

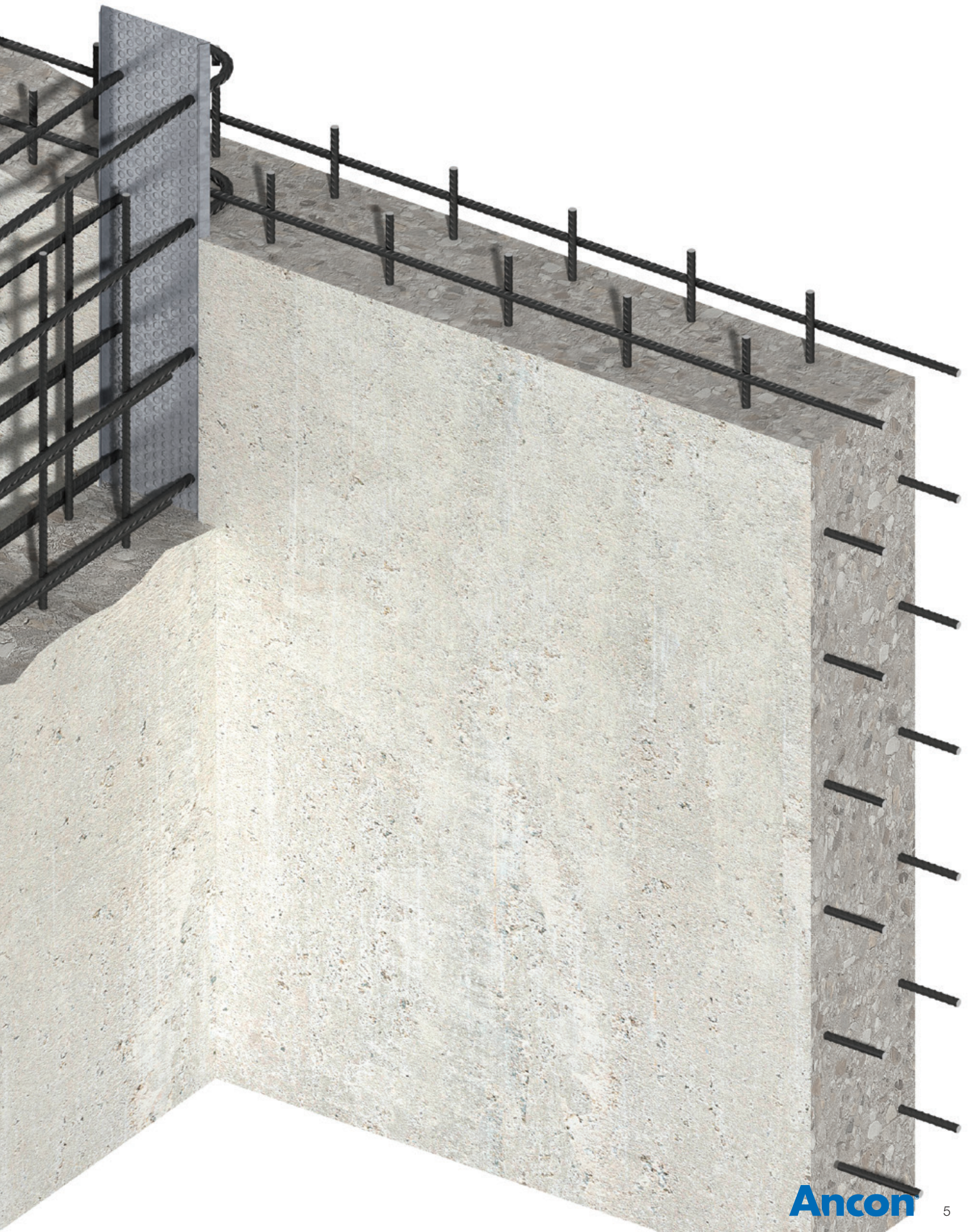
The use of reinforcement continuity systems is a widely accepted means of providing continuity of reinforcement across construction joints in concrete. The Keybox system comprises a galvanised steel casing which houses pre-bent bars. The unit is cast into the face of a concrete wall and the bars are straightened, ready for lapping when required.



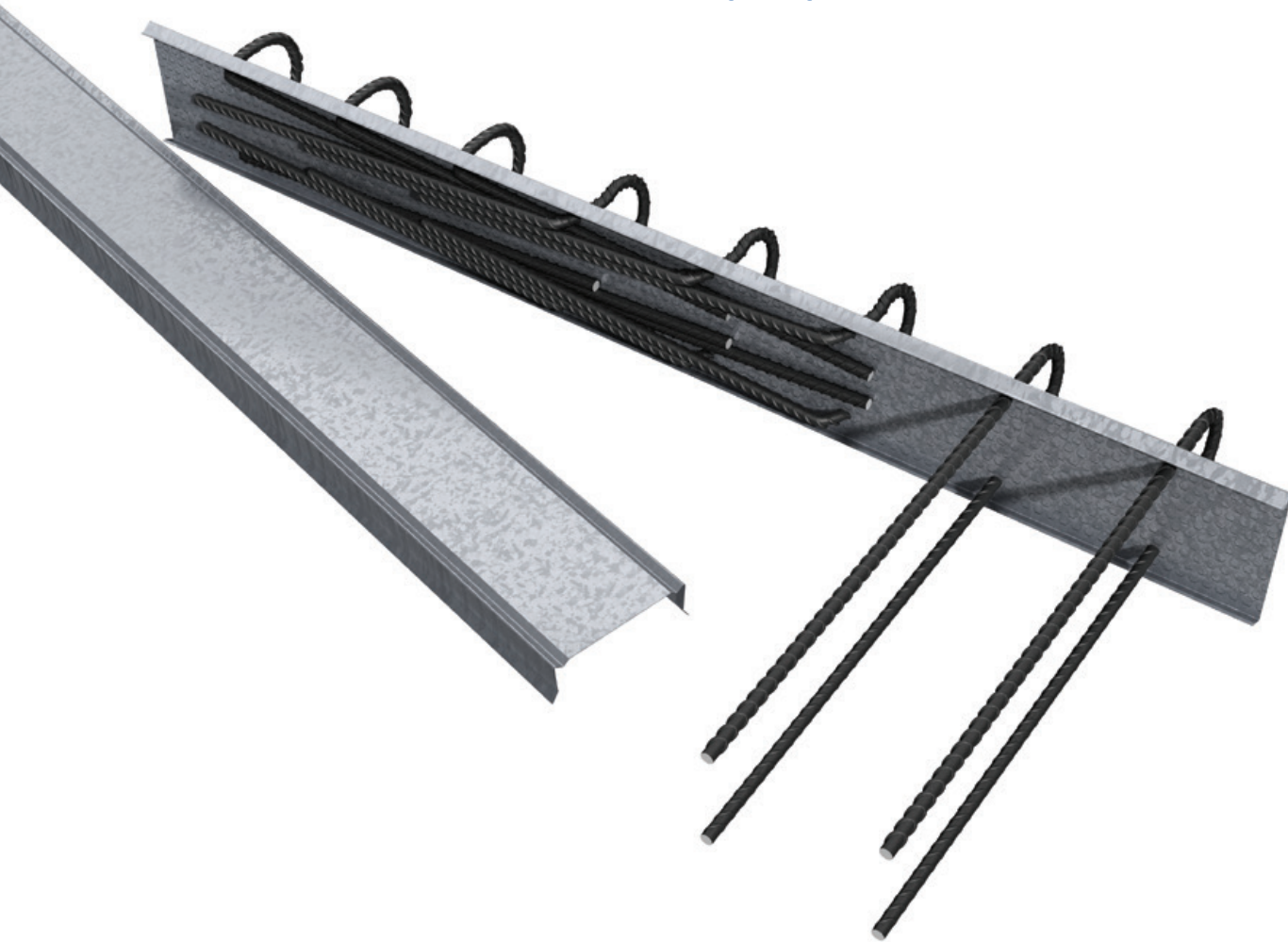
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Reinforcement Continuity Systems



Ancon Keybox Reinforcement Continuity Systems

The Keybox Reinforcement Continuity System is a quick and easy to install method of maintaining continuity of reinforcement at construction joints in concrete. It consists of a galvanised steel casing with a dimpled surface to provide an effective concrete bond. Pre-bent bars are housed within the casing and are enclosed by a protective cover. Each end of the unit is sealed with a polystyrene block in order to prevent the ingress of concrete.

The complete unit is nailed to the formwork. Alternatively it can be wired back to the main reinforcement cage. The concrete is then cast. After striking the formwork, the cover is removed and the bars are straightened, ready for lapping onto the main reinforcement, using a Keybox re-bending tool.

The steel casing remains embedded in the wall and is filled with concrete when the next section is poured, the dimpled surface providing an efficient key.

Use of the Keybox system offers many benefits over conventional joint construction, including the simplification of formwork design and removal of the need to drill shuttering. This contributes to the acceleration of the construction process. As the bars remain enclosed within the casing until required, they are protected and the risk of injury from projecting bars is minimised. Easy to use, the system requires no on site training in order to carry out installation.

The Keybox system is potentially suitable for use in any construction joint in concrete, but the most commonly found applications include:

- Floor slabs
- Walls
- Stairwells
- Corbels
- Diaphragm walls
- Jumpforms
- Brick support ledges

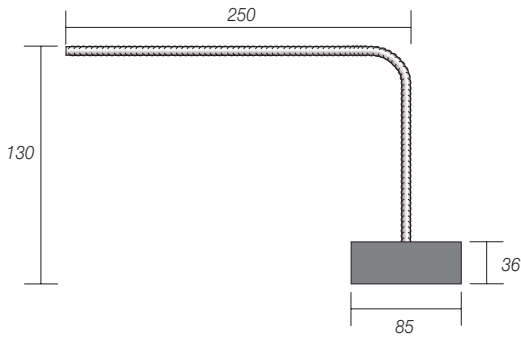
Quality

Keybox Reinforcement Continuity Systems are manufactured using ACRS approved bar which meets the requirements of AS/NZS 4671: 2001. The grade of reinforcing bar used is Grade 500N, minimum yield 500MPa, minimum uniform elongation Agt 5%. The bars are bent in accordance with AS/NZS 4671: 2001.

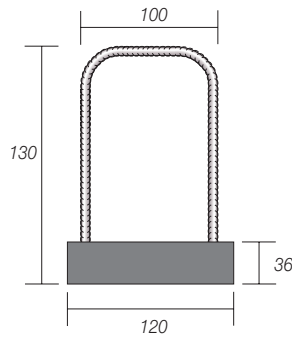


Standard Range Configurations

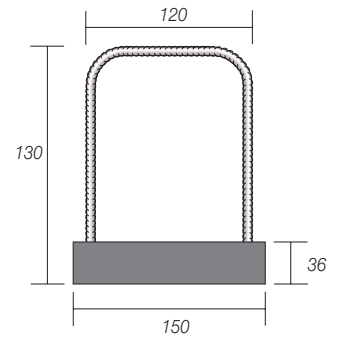
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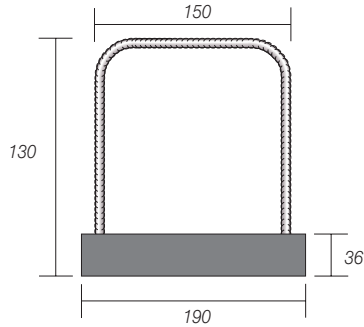
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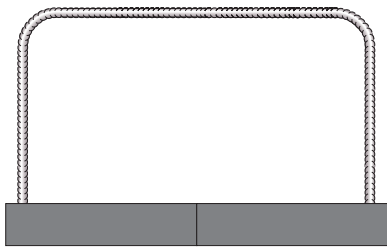
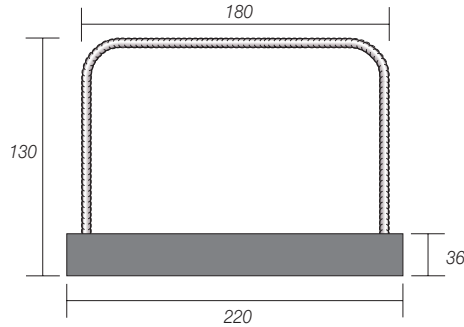
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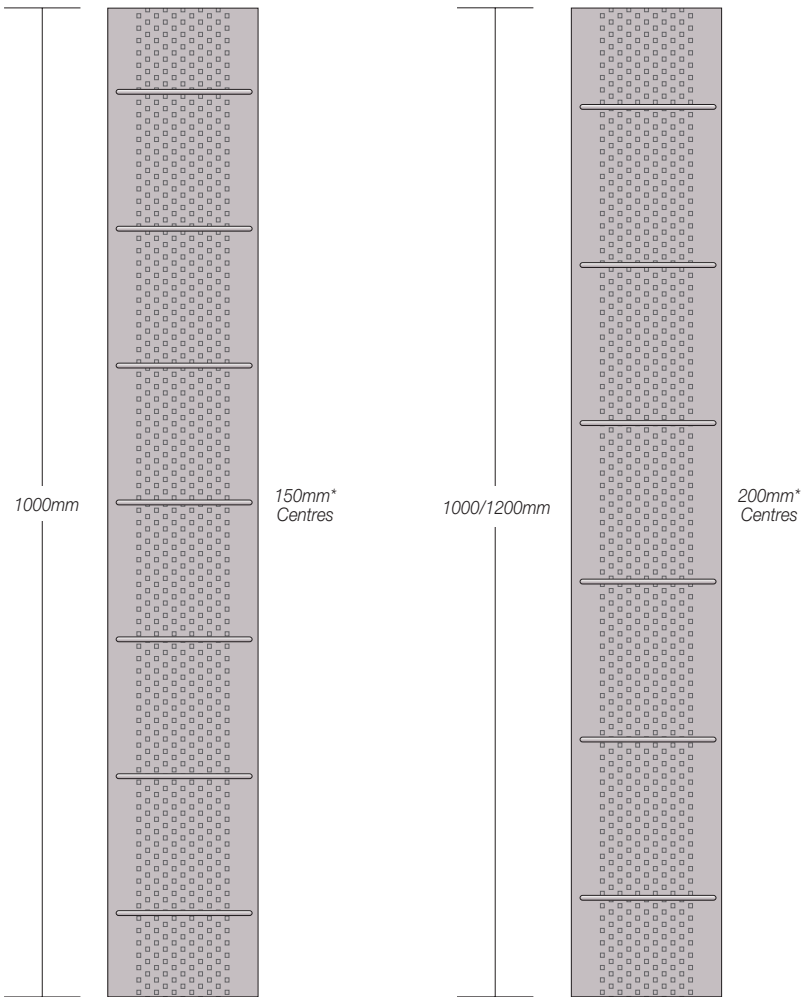


KB 220 U



Unit will be supplied as a double box, joined together, when stirrup width exceeds 220mm

This brochure contains an enquiry/order form on page 12. An order form can also be downloaded from www.ancon.com.au



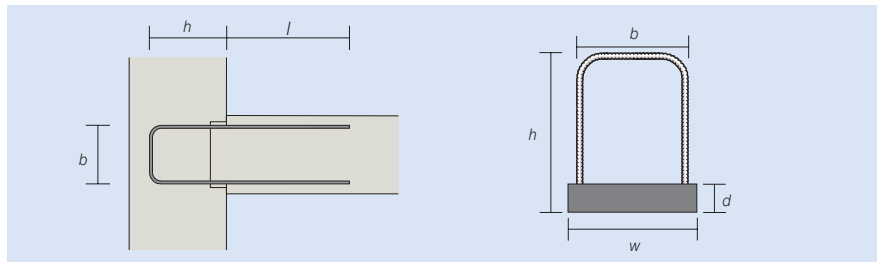
*Other centres are available

Reinforcement Continuity Systems

Standard Range Specifications

The following table gives details of the Keybox standard range. Many customers require purpose made units to suit their particular application. In order to meet this requirement we will manufacture according to your specific bar arrangement. The most common shapes are shown on page 14. For further details please contact us.

U Type Box Dimensions

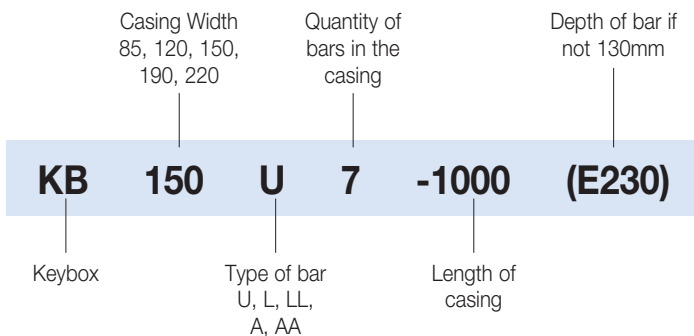


Code	Slab Size mm	Box Width mm (w)	Box Length mm	Rebar Dia mm	Centres mm	Bar Shape	Wall Thickness mm	Bar Embedment mm (h)	Bar Width/Cog Length mm (b)	Leg Length mm (l)	Bars/Box
KB85L7 - 1000	90 - 140	85	1000	12	150	L	>=180	130	250	450	7
KB85L8 - 1200	90 - 140	85	1200	12	150	L	>=180	130	250	450	8
KB85L5 - 1000	90 - 140	85	1000	12	200	L	>=180	130	250	450	5
KB85L6 - 1200	90 - 140	85	1200	12	200	L	>=180	130	250	450	6
KB120U7 - 1000	140 - 160	120	1000	12	150	U	>=180	130	100	450	7
KB120U8 - 1200	140 - 160	120	1200	12	150	U	>=180	130	100	450	8
KB120U5 - 1000	140 - 160	120	1000	12	200	U	>=180	130	100	450	5
KB120U6 - 1200	140 - 160	120	1200	12	200	U	>=180	130	100	450	6
KB150U7 - 1000	160 - 190	150	1000	12	150	U	>=180	130	120	450	7
KB150U8 - 1200	160 - 190	150	1200	12	150	U	>=180	130	120	450	8
KB150U5 - 1000	160 - 190	150	1000	12	200	U	>=180	130	120	450	5
KB150U6 - 1200	160 - 190	150	1200	12	200	U	>=180	130	120	450	6
KB190U7 - 1000	190 - 220	190	1000	12	150	U	>=180	130	150	450	7
KB190U8 - 1200	190 - 220	190	1200	12	150	U	>=180	130	150	450	8
KB190U5 - 1000	190 - 220	190	1000	12	200	U	>=180	130	150	450	5
KB190U6 - 1200	190 - 220	190	1200	12	200	U	>=180	130	150	450	6
KB220U7 - 1000	220 - 300	220	1000	12	150	U	>=180	130	180	450	7
KB220U8 - 1200	220 - 300	220	1200	12	150	U	>=180	130	180	450	8
KB220U5 - 1000	220 - 300	220	1000	12	200	U	>=180	130	180	450	5
KB220U6 - 1200	220 - 300	220	1200	12	200	U	>=180	130	180	450	6

Notes: Dimensions shown in the above table are nominal. Heights and lengths may vary by one bar diameter. Maximum box length is determined by practicality and weight. Suggested slab sizes are based on a minimum top and bottom cover of 20mm.

Keybox Identification

The description of a Keybox is generally of the form:



Casing widths can vary by joining smaller casings to form larger sizes (150 + 190 = 340mm). The thinner the casing width the more difficult it is to fit more bars e.g. 10 bars will not fit in a 120mm casing.

Bar Type

- U** U-bars to fit within the specified casing to give two rows to lap onto
- L** L-bars placed approximately 15mm from top edge of casing (unless noted otherwise)
- LL** L-bars to fit within the specified casing to give two rows to lap onto
- A** Straight bars placed approximately 15mm from top edge of casing (unless noted otherwise) - typically used for penetrations
- AA** Straight bars to fit within casing to give two rows to lap onto - typically used for penetrations

Standard casing lengths are 1000mm and 1200mm, specials can be made if necessary.

Bar embedment (E) is 130mm as standard from front of casing, larger or smaller depths can be made if necessary.

Other Reinforcement Continuity Systems

Coupler Boxes

Where the connecting bar is larger than 12mm, continuity of reinforcement can be provided by the installation of an Ancon Coupler Box. These boxes combine standard Keybox casings with the BT mechanical splicing system.

The BT mechanical splice is a full strength connection and is one of the smallest coupler systems in the Ancon range. More information can be found in the Ancon Reinforcing Bar Couplers brochure.

When connecting beams or thick slabs to core walls, couplers are attached to the dimpled casing and cast into the wall with an approved embedment length of bar. This is typically an L-bar, designed to be tied onto the vertical wall steel but any shape or size of bar can be used as long as the bending detail conforms to AS/NZS 4671: 2001.

When the steel cover is stripped, the threaded continuation bars are screwed into the couplers leaving a lap length of bar for future connection. These boxes can be made in short lengths to simplify onsite handling.

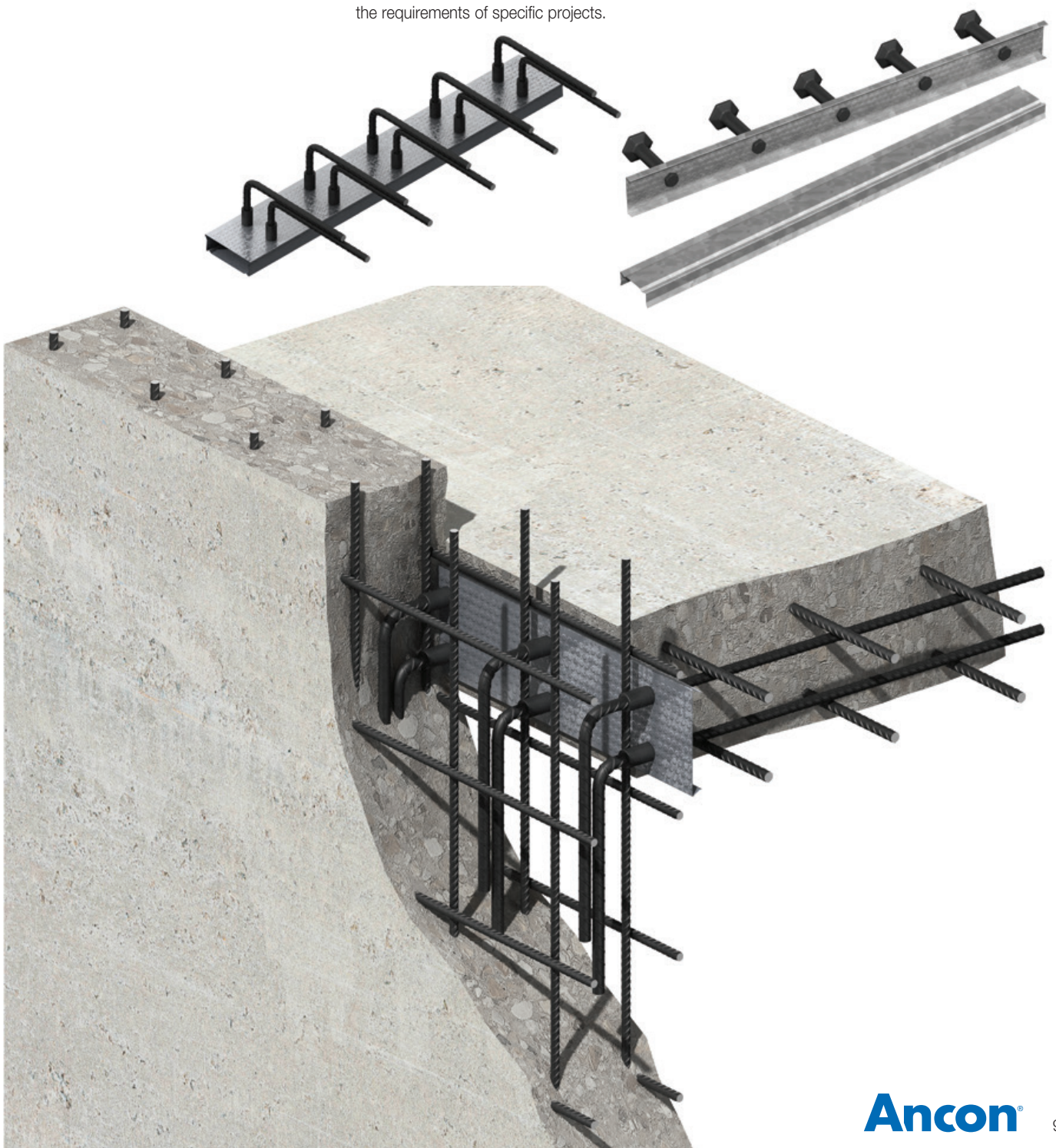
Ancon Coupler Boxes are manufactured to suit the requirements of specific projects.

KSN Anchors

If reinforcing bar congestion in the wall is a problem when installing the coupler box, an alternative anchor system is available.

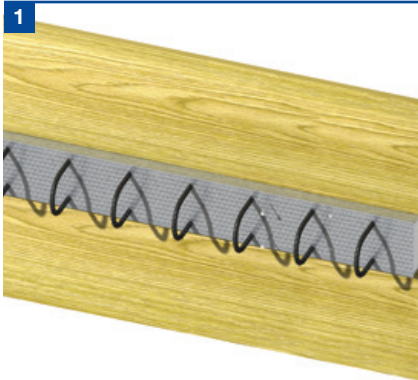
The KSN anchor system works in exactly the same way as a coupler box but instead of L-bars cast into the wall this box uses headed anchors conforming to the requirements of AS 3600: 2009. A threaded continuation bar is used in the same way as above.

This product has undergone extensive testing and tabulated performance data can be found in the Ancon KSN Anchor brochure.



Reinforcement Continuity Systems

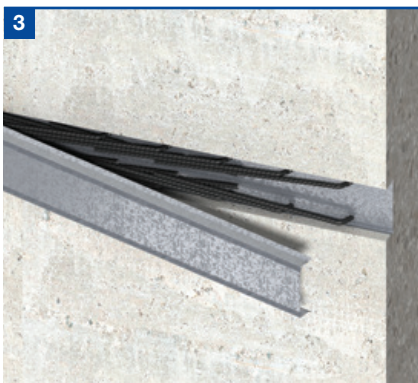
Installation



Nail the Keybox through the casing to the formwork or alternatively securely tie the projecting anchorage reinforcing bars back to the main reinforcement. In both cases the Keybox box should be securely fixed to avoid displacement during concreting. The casing should be tight against the formwork. Pour concrete.



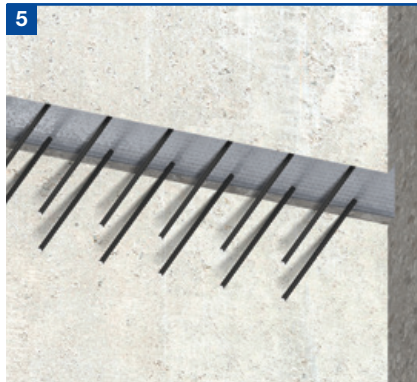
Strike the formwork to reveal the steel cover.



Remove the steel cover to expose the pre-bent bars.



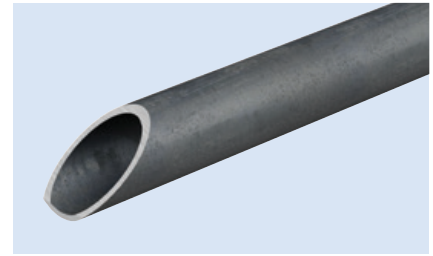
Straighten the bars using a Keybox re-bending tool. The bars should be straightened only once. To avoid damage to adjacent concrete, it is prudent to allow a concrete curing period of seven days. See 'Bar Straightening' for more information.



Once the bars are straightened and aligned they are ready for lapping.

Bar Straightening

The bars must be straightened using the appropriate sized Ancon Keybox re-bending tool. This is a steel tube designed to fit over the bar, the internal diameter being slightly larger than the maximum dimension of the ribs on the bar. One end of the tube has a section cut away; this provides support to the outside of the bend during straightening of the bar and limits the point contact of the tube on the bar.



Use of the tool allows the re-bending process to be carried out in a smooth continuous action (avoiding jerky action), the tube being moved along the bar and around the bend as it is straightened.

To enable the re-bending tool to be fitted onto the bar, the bar should be pulled the minimum distance from the Keybox steel casing. The re-bending tool should then be slid along the bar to the start of the bend radius.

The bar straightening process should be smooth and progressive with the tube allowed to move along the bend towards the metal casing as it is straightened. The tool should contact the Keybox steel casing at the completion of the straightening process.

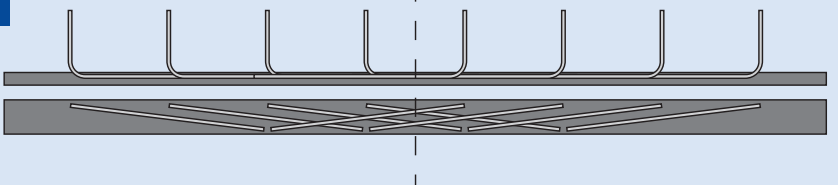
The tube is then removed and the straightened bar checked for alignment and cover with the adjoining reinforcement.

Keybox reinforcing bars should not be straightened when the temperature of the steel is below 5°C. Where straightening is necessary below 5°C, indirect warming of the steel to a temperature not exceeding 100°C is permitted.

Scaffold tubes or similar must not be used to straighten bar. Inappropriate tools will result in excessive kinks in the region of the bar bend and result in undesirable work hardening which may damage the bar and affect the strength. Bending the bar in excess of the recommendations will also result in work hardening of the rebar and should therefore be avoided.

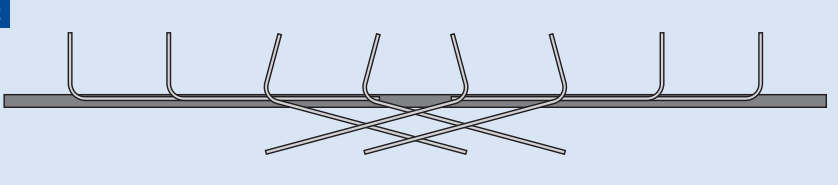
On-Site Cutting

1



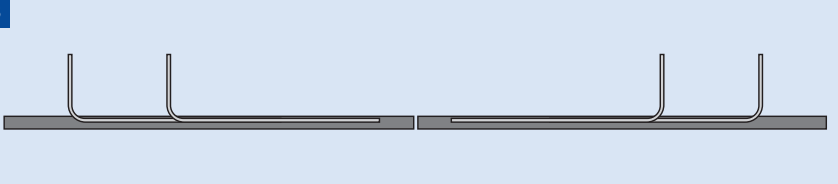
Identify the location of the intended cut.

2



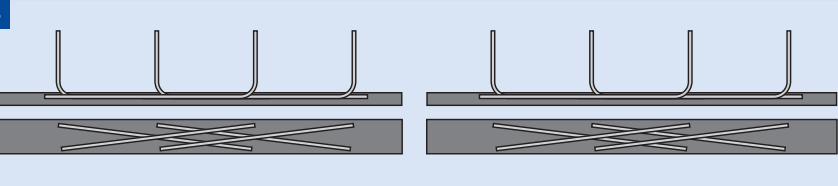
Slide the protective cover from the box and remove the bars which pass over the cut location.

3



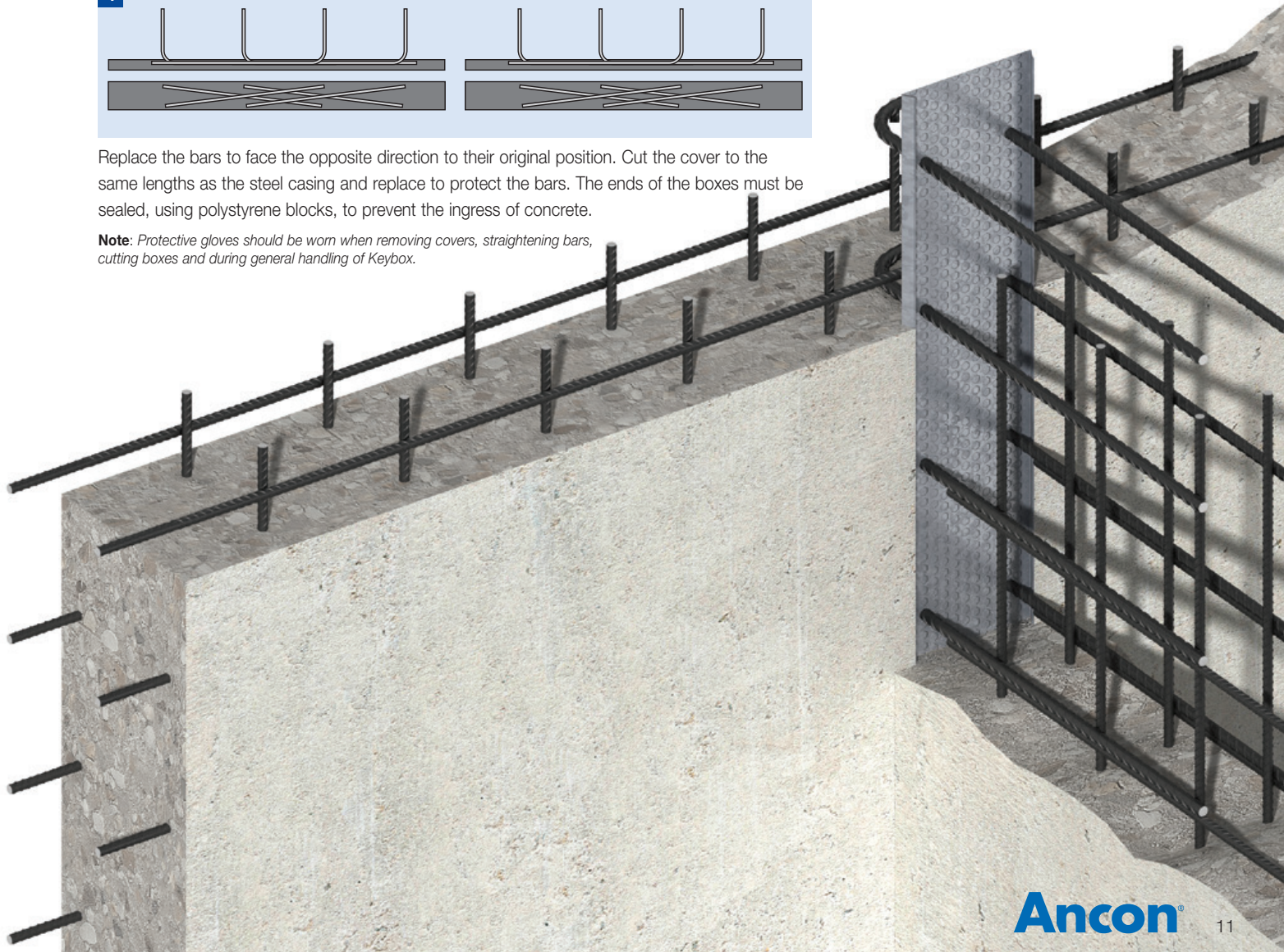
Cut through the steel casing using a disc cutter.

4



Replace the bars to face the opposite direction to their original position. Cut the cover to the same lengths as the steel casing and replace to protect the bars. The ends of the boxes must be sealed, using polystyrene blocks, to prevent the ingress of concrete.

Note: Protective gloves should be worn when removing covers, straightening bars, cutting boxes and during general handling of Keybox.



Applications



Beaumonde Apartments, Sydney, NSW



Condor Apartments, Docklands, VIC



ESP Apartments, Zetland, NSW



Eureka Tower, Melbourne, VIC

Other Ancon Products

BT Parallel Threaded Couplers

BT parallel threaded couplers provide a cost effective coupler system best suited to large scale, high coupler volume projects. The bar ends are enlarged by cold forging and a parallel thread is cut on to the ends to suit the threaded coupler. Installation requires the use of a pipe or chain wrench.

MBT Mechanically Bolted Couplers

MBT couplers offer a convenient means of joining bars without the need for bar end preparation to suit BT couplers. The bars are supported within the coupler on two serrated saddles and are locked in place by a series of special lockshear bolts. Bar rotation is not required.

Shear Load Connectors

Ancon DSD and ESD Shear Load Connectors are used to transfer shear across expansion and contraction joints in concrete. They are more effective at transferring load and allowing movement to take place than standard dowels, and can be used to eliminate double columns at structural movement joints in buildings. A 'Lockable' dowel is also available for temporary movement joints in post-tensioned concrete frames.

Punching Shear Reinforcement

Ancon Shearfix is used within a slab to provide additional reinforcement from punching shear around columns. The system consists of double-headed steel studs welded to flat rails and is designed to suit the load conditions and slab depth at each column using our free calculation software.

Channel and Bolt Fixings

Leviat offers a wide range of channels and bolts in order to fix stainless steel masonry support, restraints and windposts to structural frames. Cast-in channels and expansion bolts are used for fixing to the edges of concrete floors and beams. A range of stainless steel set screws and self-drill self-tap screws are designed to fix to steel frames.

Special Fabrications

Leviat is an ASSDA accredited specialist fabricator and has a wealth of experience in working with a variety of material grades. High integrity steel components are supplied to a wide range of industries including Civil Engineering, Building, Infrastructure, Water Treatment, Nuclear and Mining.



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