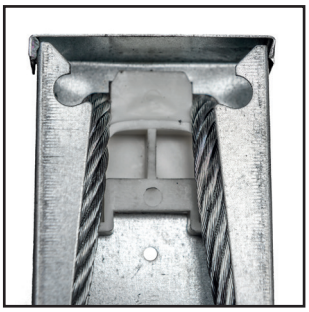
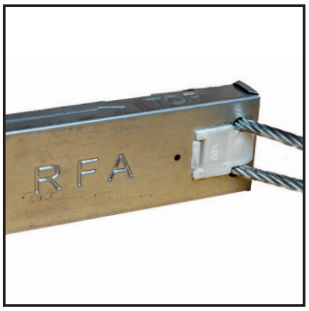
RFA-TECH





PRECAST CONNECTION
RFA LOOP BOXES

THE PROFESSIONAL CHOICE FOR YOUR PRECAST CONCRETE ANCHORS AND ACCESSORIES

Contents

What is the Loop Box

The RFA Loop Box is a simple and highly efficient product that is used to join precast elements together or precast to in-situ. They are mainly used in the connection of slabs, walls and columns.

The connecting loop is made of high strength galvanised wire rope, and is protected by the galvanised metal box, which is sealed by a tape covering.

The RFA Loop Box is easily installed in both precast factories and on site. When the units are ready to be connected, the sealing tape is removed and the wire loop is locked into position using the unique locking device (Patent Pending). This addition to the RFA Loop Box allows easy and accurate placement of the connecting rebar by ensuring the loops are held at 90° to the box axis.

The RFA Loop Box allows tension forces and horizontal & vertical shear forces to be transmitted at joint positions.

Benefits of the Loop Box

- Simple installation due to flexible loops and pre punched nail holes.
- Anchorage in thin walls.
- Weatherproof cover, easy to remove.
- Different colours to indicate the box sizes.
- Top arrow sign to allow correct installation.
- High load capacity.
- Use of individual RFA Loop Boxes allows flexibility in setting out.
- Small box volume reduces grout consumption.
- Slim box means ease of placement within standard concrete cover.

Product Information

Material

Box. . . . . .Galvanized Steel Sheet

Loop. . . . . .High Tensile Strength Wire Rope
. . . . . .Mpa ≥ 1770 Mpa

Ferrule S355J2

FIGURE 1

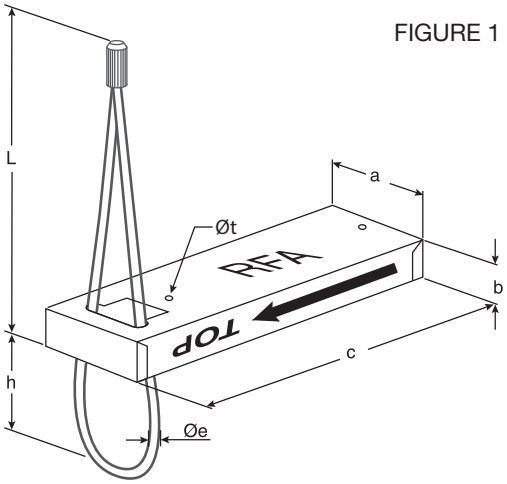


Table 1.

Loop Box	a	b	c	Øt	Øe	L	h	Clip Colour
RFA-LB080	50	20	160	3	6	212	80	Black
RFA-LB100	50	20	160	3	6	212	100	White
RFA-LB120	50	20	160	3	6	212	120	Blue
RFA-LB140	50	20	200	3	8	262	140	Orange

Note: All dimensions are in mm.

Application

The capacity of the connecting joint is defined by the grout joint strength and the number of the connecting loops per metre

The capacities are defined for static loads with the dimensions as detailed in Figure 2.

The wire rope loops are not designed to be used for dynamic loading or for lifting.

The RFA Loop Box capacities, do not take into account cracks or deformations at the joints.

FIGURE 2

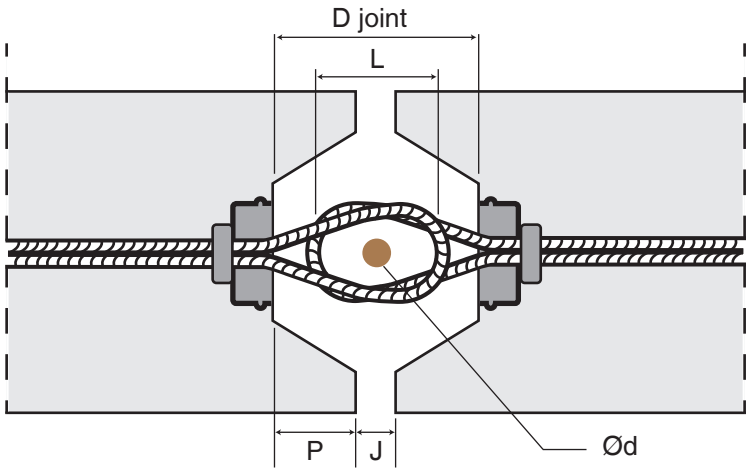


Table 2.

Box Type	Joint Length Range			
	D	L	P	Ød
RFA-LB080	90-110	60	40	12mm
RFA-LB100	110-130	80	50	12mm
RFA-LB120	130-150	100	60	12mm
RFA-LB140	150-170	120	80	16mm

The above values are based on an average construction width J of 10mm-20mm

Load and Test Data

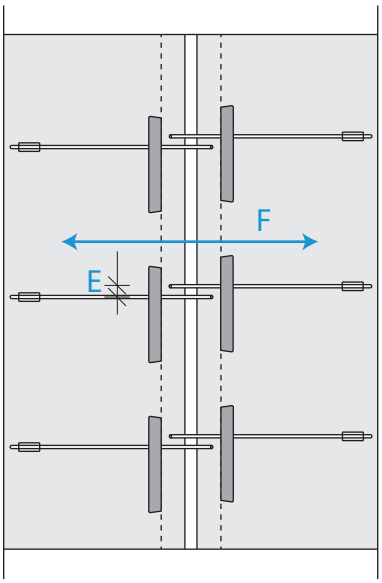
Following extensive independent *testing from a UKAS approved test facility, RFA-TECH Ltd can confirm the following load data:

Table 3. Load Capacities for 80/100 & 120 RFA Loop Box

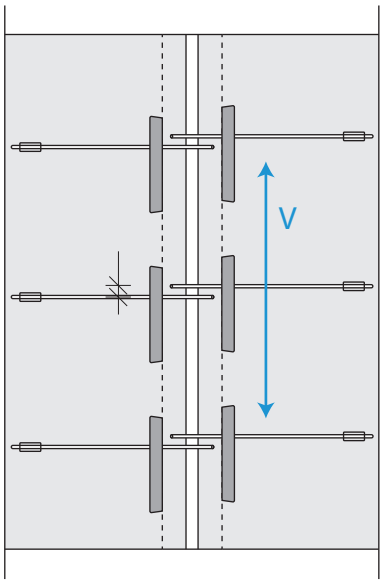
Loop Centre to Centre	Failure Load kN/m - Concrete Grade C40/50		Failure Load per Loop Tension F
	Vertical Shear V	Horizontal Shear N	
300*	135.6	113.5	39.0
500*	116.7	82.9	39.0

For different setting out dimension or information on the testing please contact RFA-TECH Ltd

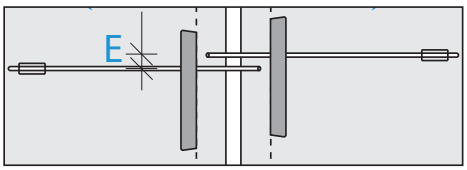
FIGURE 3

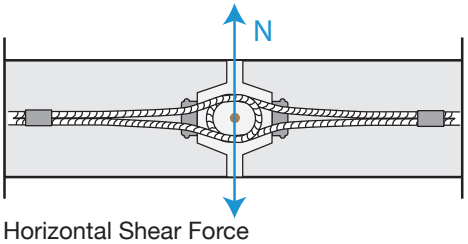


Tension Force



Vertical Shear Force





Horizontal Shear Force

Combined Forces

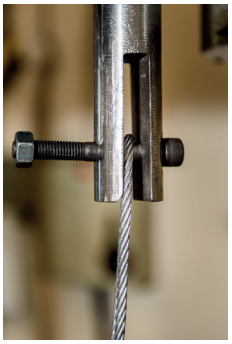
For circumstances where there is a combination of forces on the wire loop joints, the following format must apply:

$$\frac{V_{Applied}}{V_{Rd}} + \frac{F_{Applied}}{F_{Rd}} + \frac{N_{Applied}}{N_{Rd}} \leq 1$$

- The capacities in table 3 are all given as static failure loads.
- The RFA Loop Boxes cannot be used for lifting.
- Possible structure deformations or concrete fractures are not taken into account in the capacities. If the connecting loops are to be used in fire resistant load bearing walls, the concrete cover thickness must be effective enough, so that the wire loop will not reach its critical temperature.

Wire Rope Test

In addition RFA-TECH conduct regular tension tests on the wire rope used within the RFA Loop Box which achieves an average failure of 39kN when pulled on a 12mm bar.



Inspection and Testing

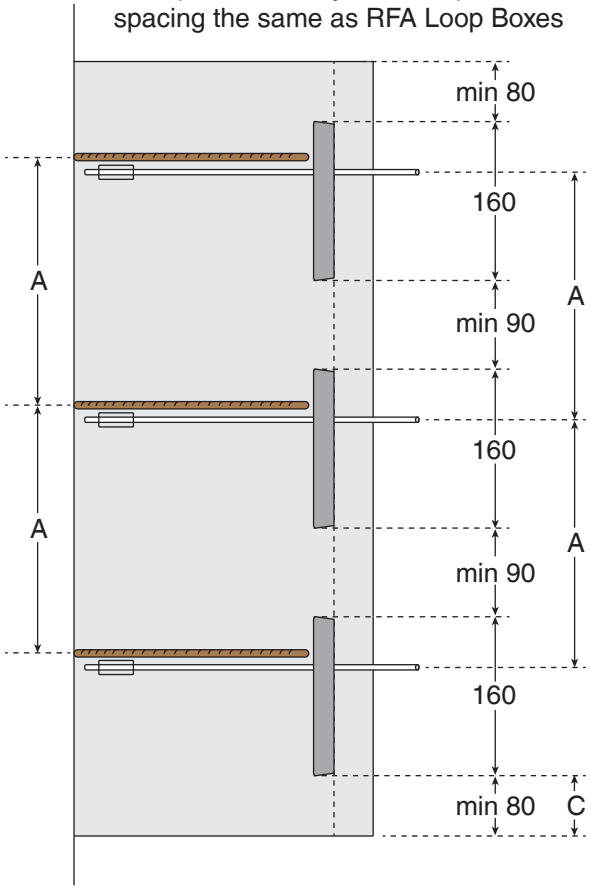
- RFA Loop boxes are clearly identified by the RFA stamp
- The plastic clip identifies the size of RFA Loop Box by colour and physical marking
- Tension testing on the wire rope is carried out in house at RFA-TECH, at a minimum ratio of 1/500
- Inspection testing of the loop is carried out on 1/250

Joint and element reinforcement

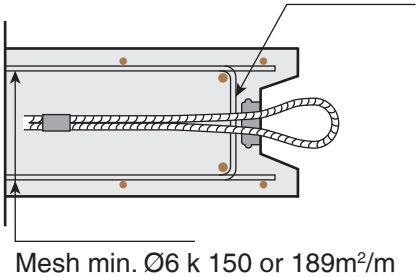
The element has to be reinforced according to the reinforcement of the construction/structural design. The diameters of the vertical rebar (Figure 2), which go through both of the facing connecting loops, should be min 12mm for 80/100/120 Loop Boxes and 16mm for the 140mm Loop Box.

FIGURE 4

Stirrup Ø8 for every RFA Loop Box wire, spacing the same as RFA Loop Boxes



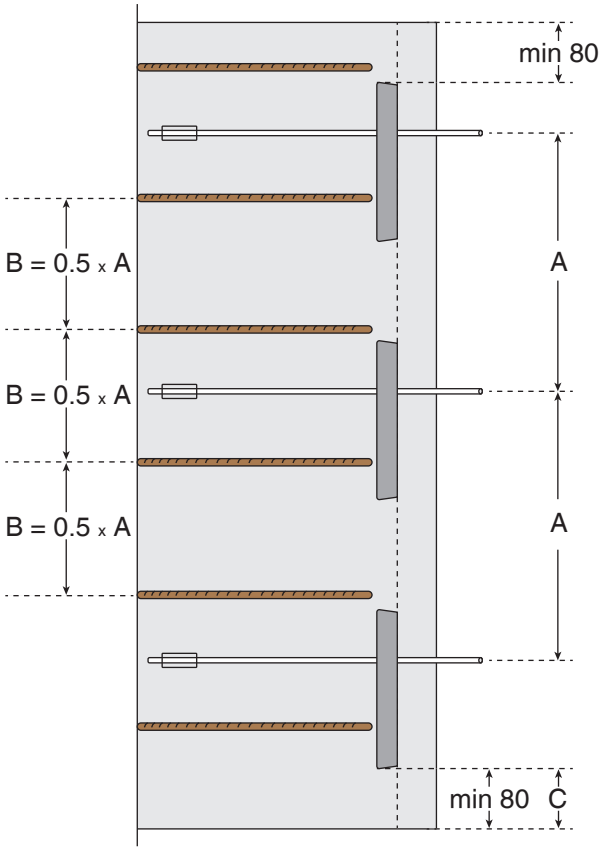
Stirrups Ø8, c/c as RFA Loop Box



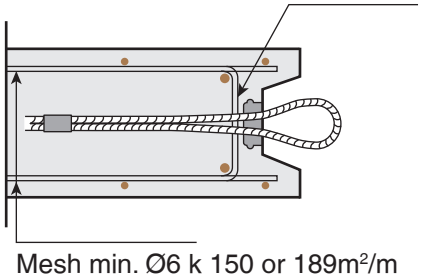
Mesh min. Ø6 k 150 or 189m²/m

FIGURE 5

Stirrup Ø6, spacing 1/2 of RFA Loop Box spacing



Stirrups Ø6, c/c 0.5 x spacing of RFA Loop Box



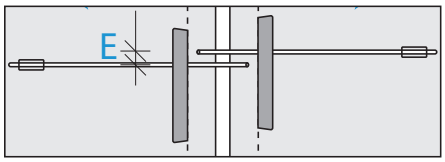
Mesh min. Ø6 k 150 or 189m²/m

Installation

- The RFA Loop Box should be fixed securely to the mould using any suitable fixing method that will give a positive hold. The loop box should be installed with the tail within the reinforcement, however it is not necessary to tie the box to the reinforcement.
- RFA Loop Boxes should be placed symmetrically throughout the joint, to ensure equal loading per box
- Ensure careful compaction of concrete around the RFA Loop Boxes
- On removal of the tape, the loop is then folded out and secured using the Patent Pending locking device within the box. Once in position the vertical rebar is installed through all the loops, ensuring the alignment of the wire is correct as the elements are being installed.
- After the careful inspection, the joint can be filled with a suitable high quality grout, installed in line with the manufacturers recommendations
- The grouting compound of the joint should have at least the same concrete strength as in the concrete of the connecting precast or in-situ units
- The Joint should be filled as soon as possible after installation of the concrete elements
- When using RFA Loop Boxes the steel should be ribbed, 12mm (16mm for 140mm Loop Box) and to BS500
- Min Minimum Edge Distance and Spacing Refer Table 4
- RFA Loop Boxes should be stored in dry conditions

Table 4.

Box Type	Centre to Centre between loops (A) Min	Space between opposite loops (E) Max	Edge Distance (C) Min	Bar Dia Ød
RFA-LB080	250	20	80	12
RFA-LB100				
RFA-LB120				
RFA-LB140	350	25	200	16



Note: All dimensions are in mm.

MADE IN SHEFFIELD

CONSTRUCT CONCRETE STRUCTURES GROUP

CARES TECHNICAL APPROVAL UKAS PRODUCT CERTIFICATION 5007

CARES TECHNICAL APPROVAL UKAS PRODUCT CERTIFICATION 5028

CARES 1113 UKAS

mpa British Precast

Additional Reinforcement

A ribbed steel bar must be used with the RFA Loop Box, this steel bar has to pass through the middle of all the loops as per figure 6.

Table 5

RFA-CODE	STEEL SIZE Ød
RFA-LB080	12mm
RFA-LB100	12mm
RFA-LB120	12mm
RFA-LB140	16mm

Rebar grade should be min BS500

In order to transfer forces in the joint the tail of the RFA Loop box must lap sufficiently with the reinforcement in the concrete unit, in conjunction with the engineers structural design.

If the loop box it to be used in a corner situation, addition reinforcement should be inserted as per figure 7.

Figure 6

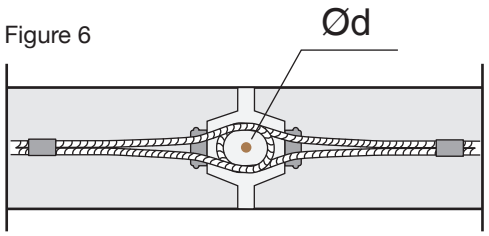
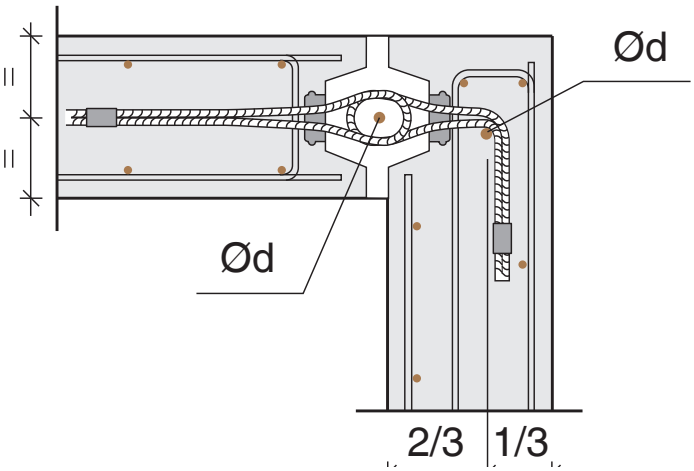


Figure 7



Grout Information

The grout used in the independent testing was Parex CS Grout and installed as per the manufacturers recommendations

Technical and performance details

CS Grout is a Portland cement based product giving high strength, good flow and non-shrink properties. Placed grout gives structural support and good vibration resistance. CS Grout is chloride free and can be safely used in contact with steel.

The specialised mix design enables placement at low water content leading to good freeze-thaw stability, low water absorption plus resistance to oil, sea water and mild alkali attack.

Table 6

Compressive Strength		
Water addition 4.5 litres per 25kg of CS Grout		
	Minimum	Typical
1 Day	25N/mm²	35N/mm²
3 Days	40N/mm²	56N/mm²
7 Days	56N/mm²	65N/mm²
28 Days	65N/mm²	70N/mm²
90 Days	70N/mm²	75N/mm²

Table 7

Mechanical Properties	
Flexural Strength	10N/mm² @ 28 days
Density	25N/mm²
Coefficient of Thermal Expansion	2100 kg/mm²
Compressive Modulus	30kN/mm²
Initial Set	260 minutes
Final Set	290 minutes

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