CARES Technical Approval Report TA15 5098

Issue 1

Electronic Copy www.carescertification.com

REINFORCEMENT SOLUTIONS
Sustainable • Dependable • Responsible

Reinforcement Solutions Ltd
T-Connect & T-Connect Lite

Assessment of the Reinforcement Solutions T-Connect & T-Connect Lite Cage Connector Product and Quality System for Production

CARES
TECHNICAL APPROVAL 5098
UKAS PRODUCT CERTIFICATION
0002
Validate with the CARES Cloud App

Product

Reinforcement Solutions
T-Connect &
T-Connect Lite System

Product approval held by:

Reinforcement Solutions Ltd (Site E)
Wyrley Brook Park
Walkmill Lane
Cannock
South Staffordshire WS11 0XA
Tel: 01902 382060

Electronic Copy www.carescertification.com

1 Product Summary

Reinforcement Solutions T-Connect has been designed and engineered to be a secure, safe, and efficient method of effecting a temporary connection of pile cages sections during site installation.

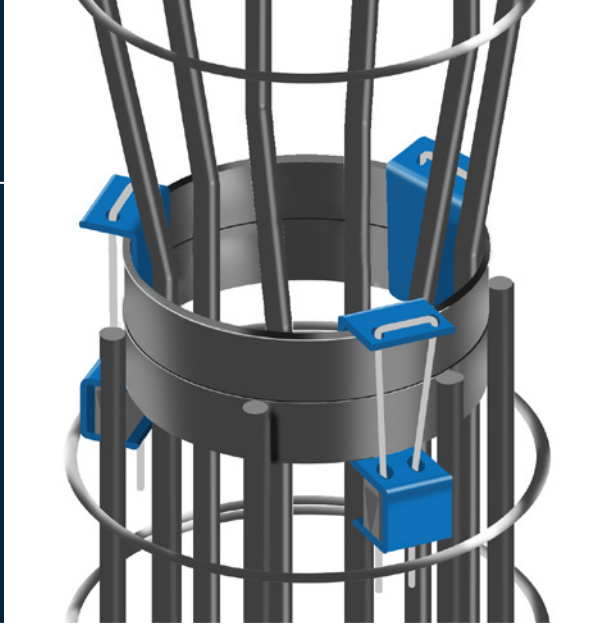
1.1 Scope of Application

Reinforcement Solutions T-Connect cage connectors using steel wire rope have been evaluated for use as follows:

a) Designs in accordance with Eurocode 2.

b) CARES Appendix TA15 for the temporary non-structural mechanical connection of reinforced cage sections in the vertical orientation whilst being lowered into the pile bore.

c) The product should be used with reinforced cages fabricated from CARES approved reinforcing steel of BS4449:2005 grades B500B or B500C incorporating welded lifting bands, fabricated in accordance with BS8666: 2020 and factory welded in accordance with CARES SRC Appendix 12.



1.2 Design Considerations

The T-Connect and T-Connect Lite cage connectors are non-structural products and therefore there are no specific reinforced concrete structural design considerations.

The T-Connect and T-Connect Lite devices are designed to be deployed in a configuration of 3, equally spaced around the circumference of the pile cage.

Each T-Connect array of 3 has a safe working load of 25kN with a safety factor of 4:1.

Each T-Connect Lite array of 3 has a safe working load of 10kN with a safety factor of 3:1.

Pile cage sections should be orientated such that longitudinal reinforcement is aligned and design lap lengths are maintained in order to ensure reinforcement continuity.

T-Connect and T-Connect Lite devices should be fitted strictly in accordance with the installation guidance as given in this report, also included in the product packing. Failure to adhere to this guidance may adversely affect the safe working load for each device.

1.3 Conclusion

It is the opinion of CARES that the Reinforcement Solutions T-Connect & T-Connect Lite cage connectors are satisfactory for use within the limits stated above and in 1.1 when applied and used in accordance with the producer's instructions and the requirements of this certificate.

L. Brankley
Chief Executive Officer
July 2025

Electronic Copy www.carescertification.com

CARES TECHNICAL APPROVAL 5098
UKAS PRODUCT CERTIFICATION 0002
Validate with the CARES Cloud App

2 Component Technical Specification

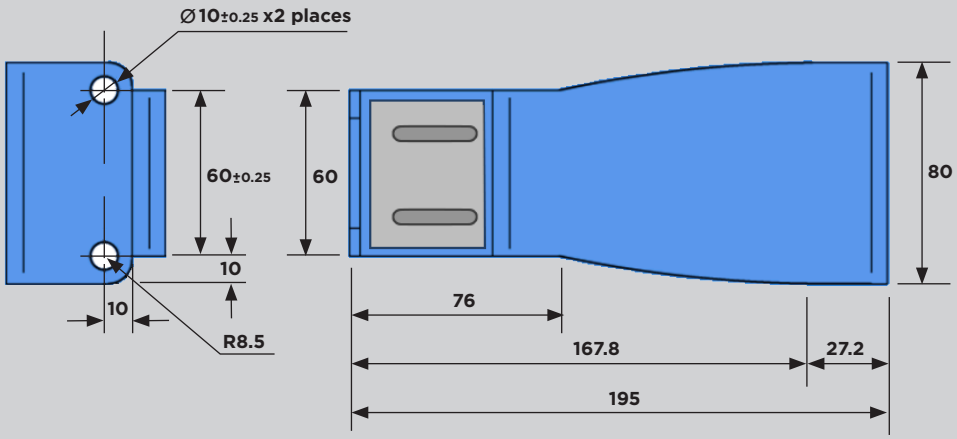
2.1 General

The T-Connect system has been designed and engineered to be a secure, safe, and efficient method of effecting a temporary connection of pile cages sections during site installation. The development of the T-Connect, has been as a result of an exclusive collaboration between the Reinforcement Solutions and Zip Clip Limited, the UK's leading provider of cable suspension systems and allied technologies.

The T-Connect and T-Connect Lite systems are designed for use as a temporary non-structural connection method for reinforcement cage sections in a vertical orientation over the pile bore.

2.2 T-Connect

The T-Connect system utilizes a specially designed trapping device incorporated into a pressed metal bracket to optimise the capacity of the wire rope loop and delivers a SWL suspended load capacity of 2.5 tonnes in an array of 3 devices. The appropriately tested and dimensioned steel wire rope is wrapped over the meeting steel splice bands of the cage sections and trapped off permanently in a patented locking device thus forming a wire rope suspension loop.



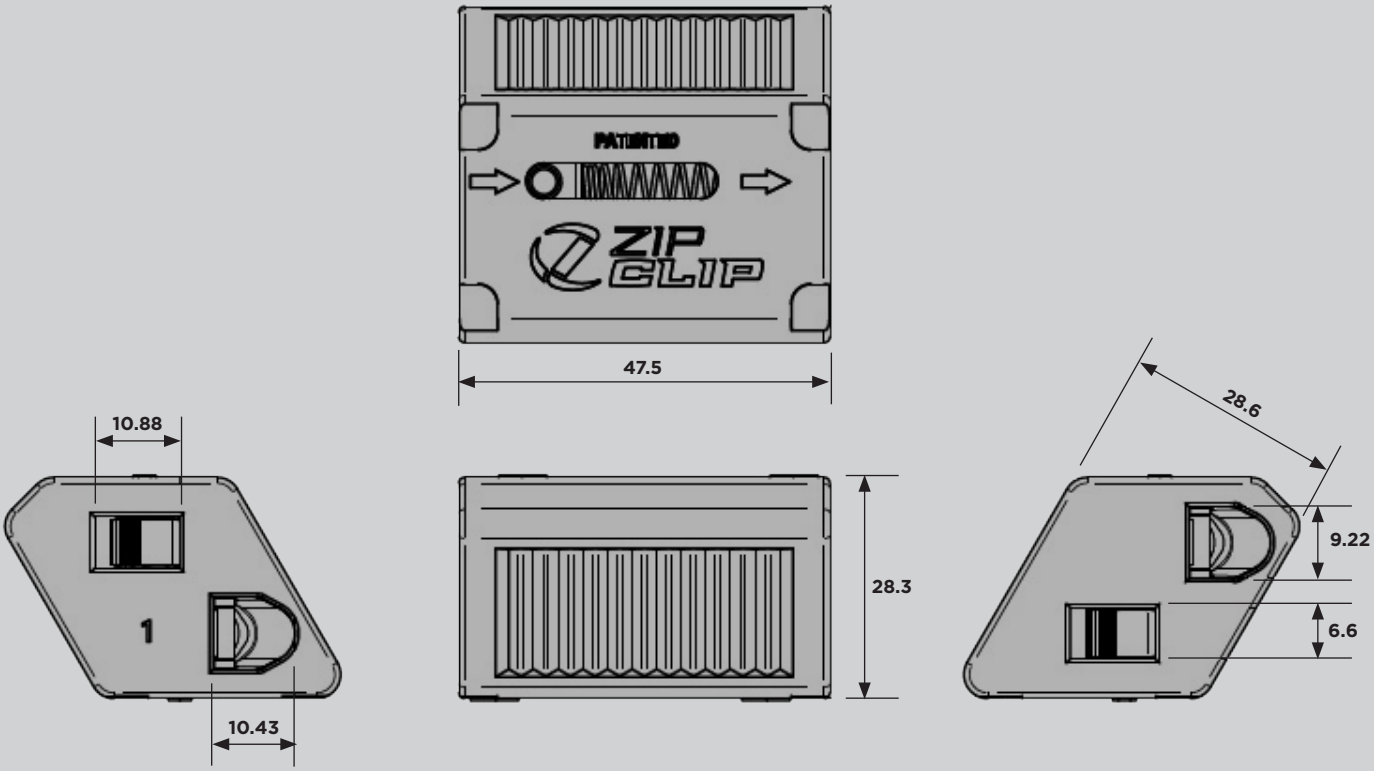
T-Connect (all dimensions in mm)

Electronic Copy www.carescertification.com

Electronic Copy www.carescertification.com

2.3 T-Connect Lite

T-Connect Light, generally applicable to the suspension of loads up to 1.0 tonne in an array of 3 devices is the simplest variant comprising a single (1/4in diameter) wire rope formed into a loop using a Zip Clip (see below) patented locking device. Similar to the T-Connect system, the tested and dimensioned steel wire rope is wrapped over the meeting steel splice bands of the cage sections and trapped off permanently in the patented locking device thus forming a wire rope suspension loop.



T-Connect Lite comprising Zip Clip (all dimensions in mm)

3 Product Performance and Characteristics

Tensile tests were carried out on arrays of 3 devices in a rig to simulate working conditions to demonstrate compliance with the performance requirements defined in CARES Appendix TA15:

CARES Appendix TA15 strength requirements

- The T-Connect cage connectors thus arrayed are tested to a proof loading of 100kN to verify the recommended SWL of 25kN (2.5 tonnes) at a Factor of Safety (FOS) of 4:1
- The T-Connect Lite similarly arrayed are tested to a proof loading of 30kN to verify the recommended SWL of 10kN (1 Tonne) at a FOS of 3:1
- Testing has been carried out in an approved laboratory to a methodology approved by both CARES and UKAS.

Figure 1 - Testing rig for T-Connect

Figure 2 - Testing rig for T-Connect Lite

Electronic Copy www.carescertification.com

4 Design and Cage Construction

The T-Connect system requires that the pile cages sections are designed with “male” and “female” ends configured and constructed to allow the male end of a section to telescope into a corresponding female end providing either a side by side or under/over overlapping of the bars by a determined lap length to provide the designed continuity of the reinforcement in the permanent condition. The connection is affected by the installation of appropriately sized mild steel bands welded to the main bars of the cages – on the inside of the female cage and on the outside of the male cage bars. These bands (referred to as “splice bands”) are so located as to determine, when they are brought together, the effective lap of the main bars. The length of the lap is determined by reference to the project specification and the relevant codes of practice.

The selection of the splice band size and the specification for welding these bands to the main bars of the cage should be determined by calculation considering site methodology of installation as well as the cage dead weight. It should be noted that production of the pile cages should be at an approved CARES fabricator who is approved for welding in accordance with CARES Steel Scheme SRC12.

It is recommended that lifting from the splice bands should be avoided to avoid distortion of the cage cross sections and resultant difficulty in connection.

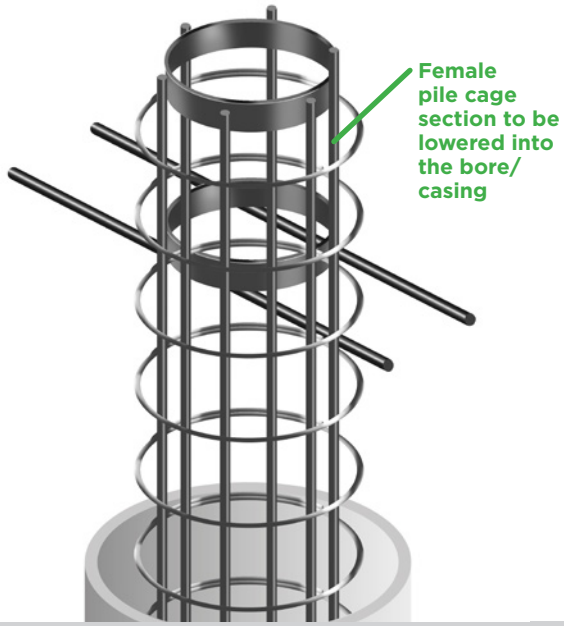
The provision of specific lifting points/ bands should be considered separately within the design. The design process calls for close collaboration between the designer and the customer to ensure all aspects of proposed installation methodology are known and considered in the design.

There must be a minimum clear spacing between bars of 100mm.

The bands need to be designed by appropriately qualified persons to transfer the loads – for guidance and advice please contact the technical team at Reinforcement Solutions Ltd.

4.1 Installation

1



Pile Cages

Pile cages are composed of “Female” and “Male” sections.

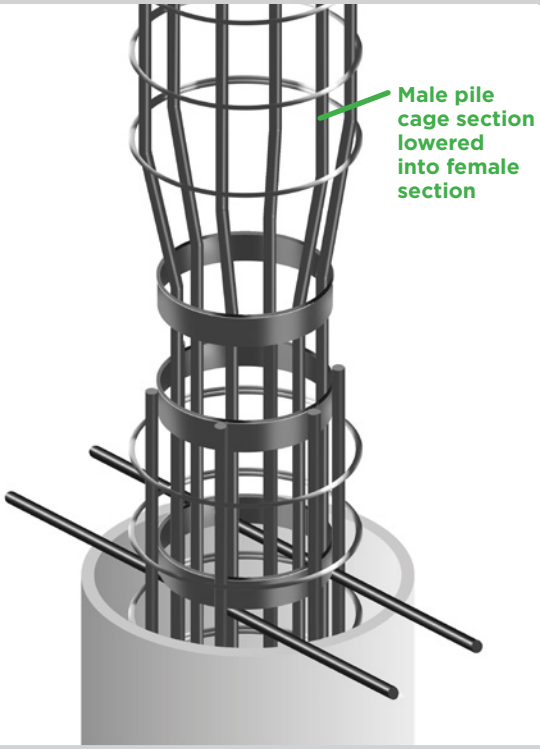
Typically, the layout is configured with the “Female” section as the lower part and the initial installation component. (in certain situations, this orientation may be reversed for operational or design considerations). To confirm the order of installation and the orientation of the cages, please refer to the approved layout drawings for accurate guidance.

Important: Do not lift from the splice bands as this may cause distortion and lead to bands not marrying in the coupling process.

Electronic Copy www.carescertification.com

Electronic Copy www.carescertification.com

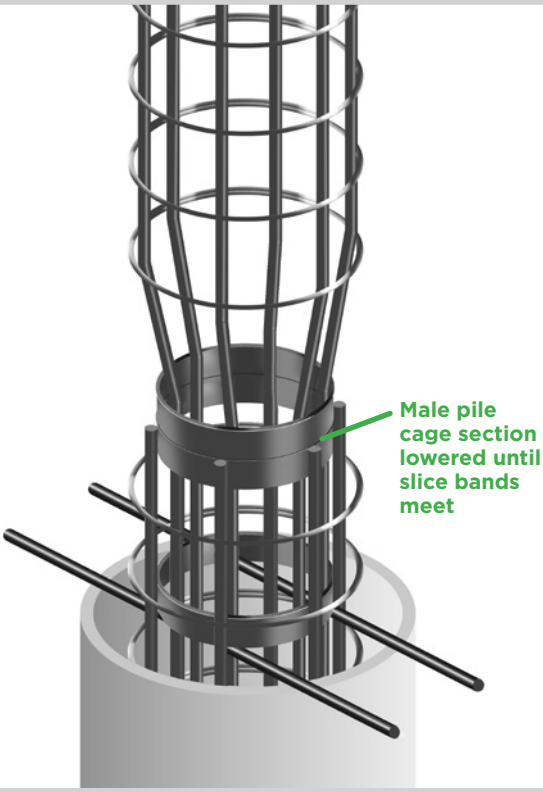
2



Insert the lower (female) cage into the bore/casing and securing it with a trapping bar/beam spanning across the bore or liner and located under a designated trapping band.

Once the lower (female) cage is sufficiently supported by the trapping bar/beam, the crane can be disconnected and used to lift and lower the upper (male) cage over the bore and into the lower cage.

3

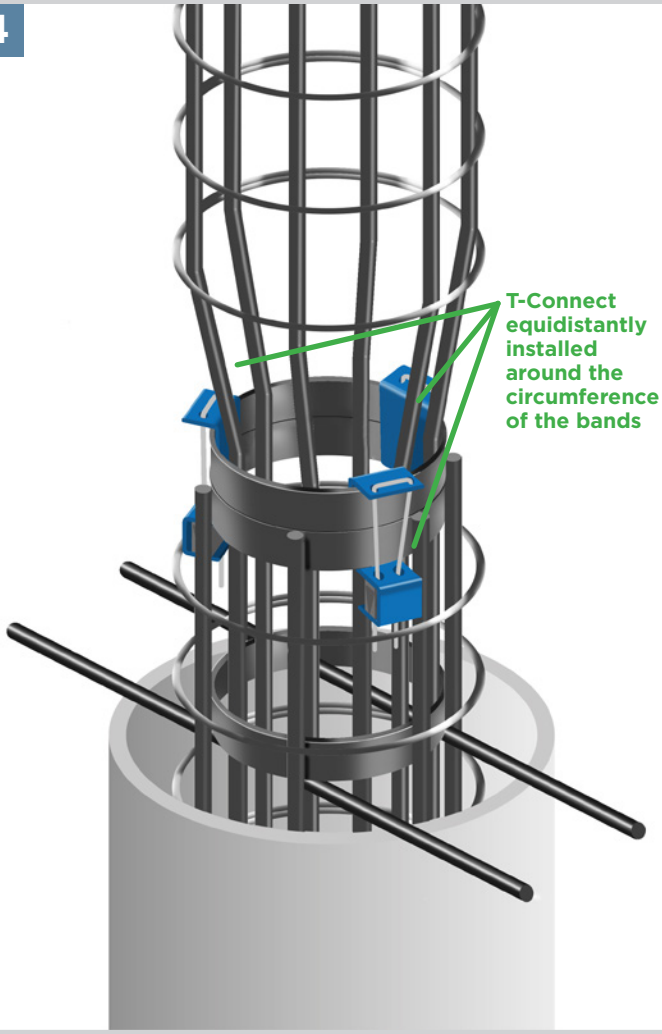


The upper (male) cage should be lowered gradually and carefully over and into the top of the lower cage until both splice bands are meeting.

This process to this point is the same irrespective of whether T-Connect or T-Connect lite devices are to be used to effect the connection.

Electronic Copy www.carescertification.com

4



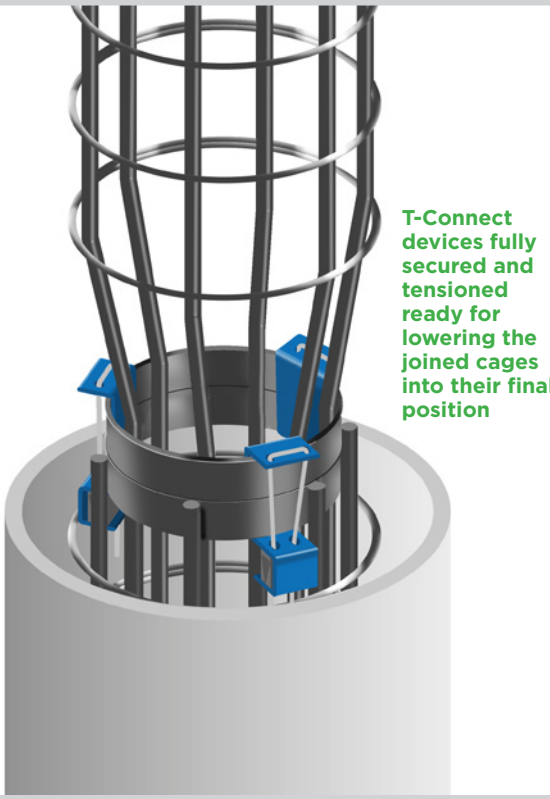
Fitting The T-Connect Devices

T-Connect devices must be spaced equally apart (+/- 10 degrees). Initially, it is advisable to locate and mark the ideal positions of the T-Connect devices on the circumference of the bands given that they should be as close as is practicable to being equidistant around the circumference of the cage.
For confirmation of device locations please refer to the design drawings.

The top of the bracket should be positioned on the cage with the holes facing outward, and the bottom is rotated into place. Installers should refrain from placing their hands inside the cage at any time. Once the bracket is correctly rotated, the wire rope can be threaded through the locking device, ensuring the wire rope length is kept as even as possible in both the left and right-hand holes.

Care should be taken to ensure that the brackets are secured and that all rope ends are tensioned as evenly and as much as can be practically achieved by hand. Care must be taken to not place the hands inside the cage during assembly and tightening of the system.

5



After installing all the T-Connect devices, the crane can lift the joined cages, taking care not to snatch the lift.

The trapping bar can then be removed.

Once the trapping bar is removed, the cage installation can continue by either adding another section in the same manner or lowering the assembled cage to the correct levels.

Electronic Copy www.carescertification.com

6

Array of 3 T-Connect devices installed equidistantly around the circumference of the bands

In instances where specific locations are not specified, adhere to the following guidelines:

Ensure an even distribution of the specified number of the three T-Connect Devices around the circumference of the cage splice.

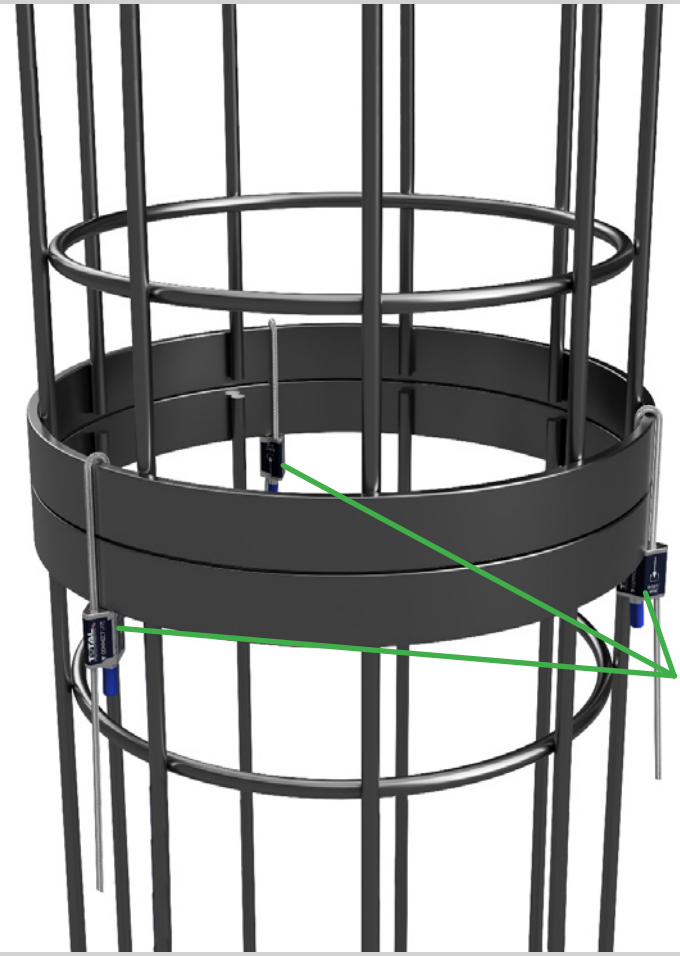
Place the T-Connect devices as closely as possible to the main longitudinal reinforcement. This reduces the likelihood of distortion of the Splice Band.

Note: The T-Connect system is designed to utilize 3 devices properly arrayed in all circumstances.

It should not be assumed that adding additional devices would provide additional load capacity.

For further technical advice, please consult the Reinforcement Solutions; Technical Team.

Electronic Copy www.carescertification.com



Array of 3 T-Connect Lite devices installed under the lower band splice

Fitting the T-Connect Lite devices

Albeit that this is a simpler device, the same principles as outlined for T-Connect should be followed for effecting a connection using the T-Connect Lite with the additional consideration that the locking device should be so located as to be under the lower band of the splice.

Failure to ensure that the locking device is not installed correctly under the lower band splice could adversely affect its safe working load. All wires should be tight to prevent movement.

Care must also be taken to not place the hands inside the cage during assembly and tightening of the system.

For further technical advice, please consult the Reinforcement Solutions; Technical Team.

5 Safety Considerations

Where pile cage sections are to be jointed on site, these cage sections should be suitably 'trapped-off' above ground whilst the T-Connect pile cage connectors are fitted (This detail to be determined by the contractors preferred methodology). 'Hand-time' around the cage whilst trapped-off (whilst multiple device connections are made) should be absolutely minimized. Correct placement of the T-Connect/ T-Connect Lite will not compromise concrete cover.

6 Product Testing and Evaluation

The proposed safe working load for T-Connect has been determined through a comprehensive testing process conducted to a standard test method at a UKAS (United Kingdom Accreditation Service) approved laboratory.

Specifically, T-Connect was tested in sets of three, with T-Connect placed at 120-degree intervals. This configuration subjects the system to a thorough examination of the product's strength and stability under load. The tensile test subjects the T-Connect System through force until reaching the designated proof load which allows for a factor of safety of 4:1 for the T-Connect system and a factor of safety of 3:1 for the T-Connect lite system, as detailed in clause 3 of this report. These systems are subject to ongoing testing to ensure the minimum properties are met as required by the TA15 certification scheme. This method assesses the product's capacity to withstand the tensile forces. The decision to perform these tests within the confines of a UKAS approved laboratory adds assurance to the results.

7 Quality Assurance

Reinforcement Solutions T-Connect pile cage connectors are produced under an EN ISO 9001 quality management system certified by CARES. The quality management system scheme monitors the production of the connectors and connector components to ensure that materials and geometry remain within the limits of this technical approval.

Electronic Copy www.carescertification.com

8 Building Regulations

8.1 The Building Regulations (England and Wales)

Structure, Approved Document A

Reinforcement Solutions T-Connect pile cage connectors, when used in EC2 based designs using the data contained within this technical approval, satisfy the relevant requirements of The Building Regulations (England and Wales), Approved Document A.

Materials and Workmanship, Approved Document

This technical approval gives assurance that the Reinforcement Solutions T-Connect pile cage connectors comply with the material requirements of EC2.

8.2 The Building Regulations (Northern Ireland)

Materials and Workmanship

This technical approval gives assurance that Reinforcement Solutions T-Connect pile cage connectors comply with the material requirements of EC2 by virtue of regulation *23, Deemed to satisfy provisions regarding the fitness of materials and workmanship.*

8.3 The Building Standards (Scotland)

Fitness of Materials

This technical approval gives assurance that Reinforcement Solutions T-Connect pile cage connectors comply with the material requirements of EC2 by virtue of *Clause 0.8*.

Structure

Reinforcement Solutions T-Connect pile cage connectors, when used in EC2 based designs using the data contained within this technical approval, satisfy the requirements of *The Building Standards (Scotland) clause 1*.

Electronic Copy www.carescertification.com

CARES TECHNICAL APPROVAL 5098 UKAS PRODUCT CERTIFICATION 0002 Validate with the CARES Cloud App

9 References

- BS 4449: 2005: Steel for the reinforcement of concrete - weldable reinforcing steel - Bar, coil and decoiled product - Specification.
- BS8110: Part 1: 1997: Structural Use of Concrete, Code of Practice for Design and Construction.
- BS EN 1992-1-1:2004 Eurocode 2 Design of concrete structures - General rules for buildings.
- BS EN ISO 9001: 2015: Quality management systems - Requirements.
- CARES Appendix TA15: Quality and Operations Schedule for the Technical Approval of Pile Cage Connection Systems.
- BS8666: 2020 - Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete. Specification

Electronic Copy www.carescertification.com

10 Conditions

1. The quality of the materials and method of manufacture have been examined by CARES and found to be satisfactory. This technical approval will remain valid providing that:

   a. The product design and specification are unchanged.
   b. The materials, method of manufacture and location are unchanged.
   c. The manufacturer complies with CARES regulations for technical approvals.
   d. The manufacturer holds a valid CARES Certificate of Product Assessment.
   e. The product is installed and used as described in this report.

2. CARES make no representation as to the presence or absence of patent rights subsisting in the product and/or the legal right of Reinforcement Solutions Ltd to market the product.

3. Any references to standards, codes or legislation are those which are in force at the date of this certificate.

4. Any recommendations relating to the safe use of this product are the minimum standards required when the product is used. These requirements do not purport to satisfy the requirements of the Health and Safety at Work act 1974 or any other relevant safety legislation.

5. CARES does not accept any responsibility for any loss or injury arising as a direct or indirect result of the use of this product.

6. This Technical Approval Report should be read in conjunction with CARES Certificate of Product Assessment No 5098. Confirmation that this technical approval is current can be obtained from CARES.

Electronic Copy www.carescertification.com

CARES TECHNICAL APPROVAL 5098
UKAS PRODUCT CERTIFICATION 0002
Validate with the CARES Cloud App

Electronic Copy www.carescertification.com

CARES
Pembroke House
21 Pembroke Road
Sevenoaks
Kent TN13 1XR

Phone: +44(0)1732 450000
E-mail: general@carescertification.com
www.carescertification.com

Independent Product Assessments for the Construction Industry

Copyright CARES ©

22.7.25