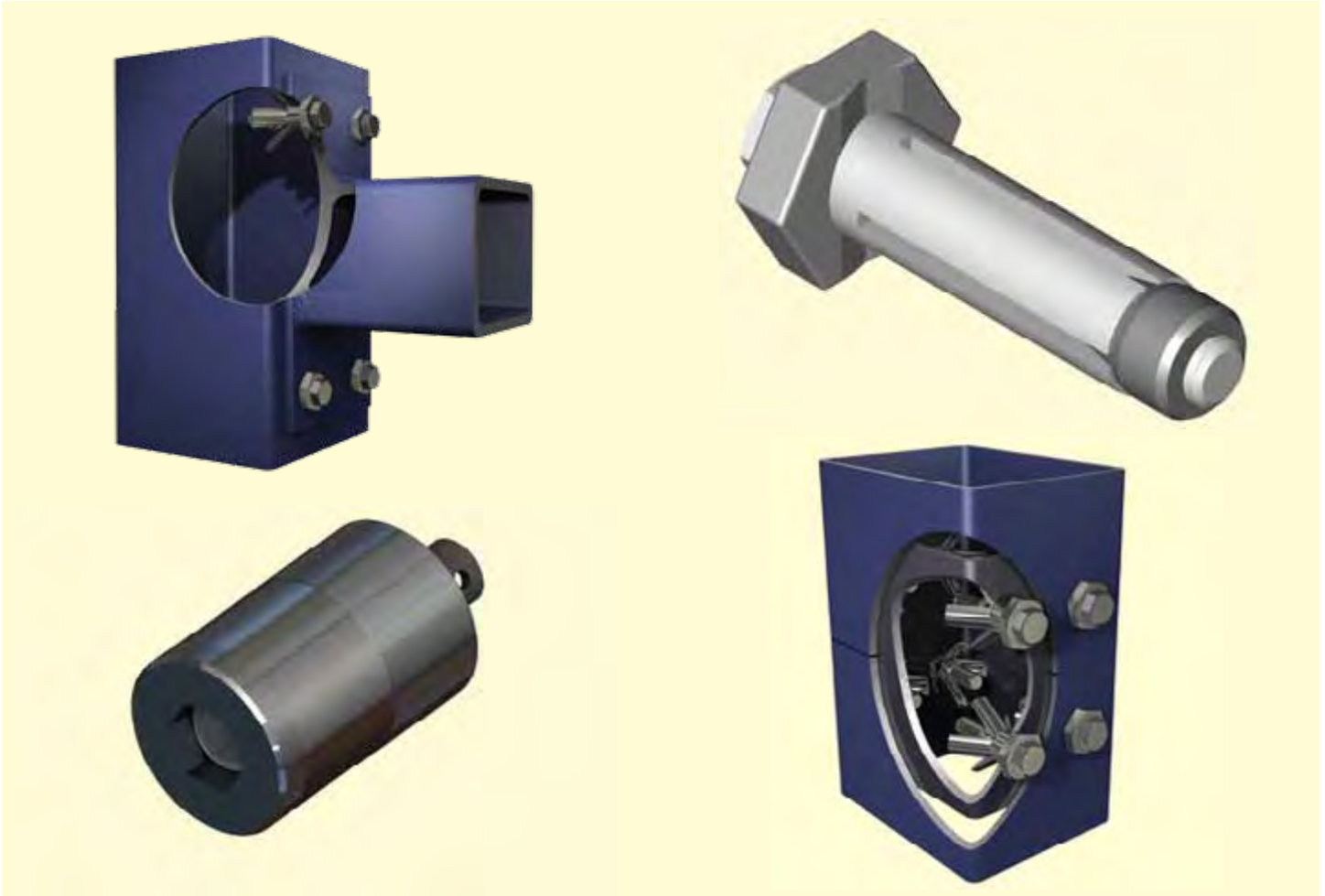


Box Bolt

ICC-ES Submitted Blind Bolt



- **NO** TAPPING OR THROUGH BOLTING
- **NO** ACCESS HOLES
- **NO** SITE WELDING
- **NO** INTERNAL NUTS

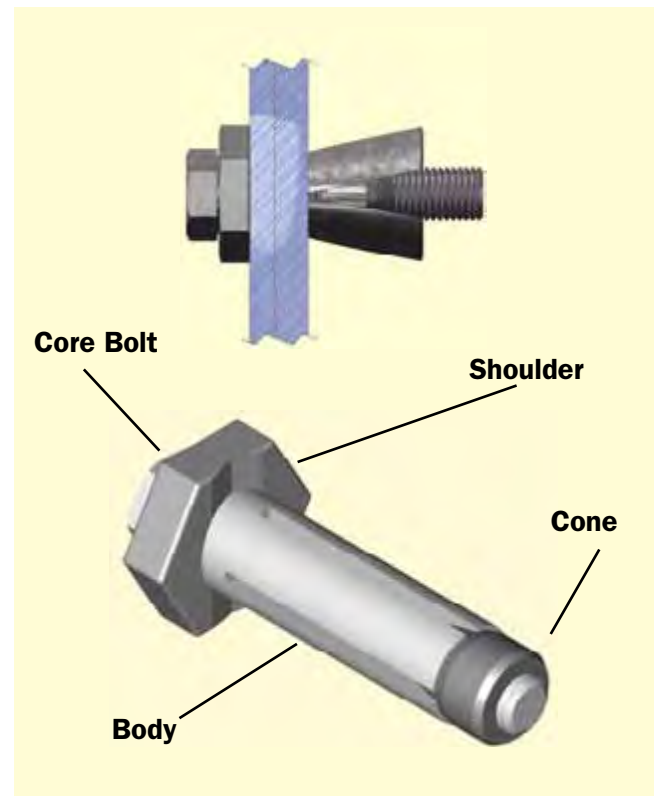
What is BoxBolt®?

BoxBolt is a fully tested blind fastener for connecting to tube steel or where access is restricted to one side only. **BoxBolt** is suitable for use with rectangular, square or even round tube sections. It eliminates the need for access to both sides of the connection and only requires a clearance hole to be drilled to suit its outside diameter. The holes can be drilled off site for either new projects where the position of the holes can be detailed or the holes can be drilled on site for retro fit applications.

There is no need for any skilled labor to install a **BoxBolt** as it can be done by using simple hand tools such as a wrench and torque wrench.

The **BoxBolt** offers a guaranteed load value provided the correct torque has been applied; this is stated in our technical tables and installation guidelines. The loads stated are based on physical testing of all conditions performed by a test facility with International Accreditation Service (IAS) certification.

Our unique **BoxSok** installation tool can be used to speed up installation when large numbers of **BoxBolts** are required.



Why use BoxBolt®?

Features	Advantages	Benefits
Access needed from one side only	Connection can be made blind into tube steel or where access to the backside is restricted	No through bolting, welding, strapping or tapping resulting in less fabrication time
Only basic tools required	No hire or purchase of specialist equipment	Reduction in installation cost
Installation by semi-skilled labor	Connections can be made quickly without special skills or equipment	Reduction in labor costs
Architectually pleasing	Provides an aesthetic connection	Flexibility in Architectural design
Tested at an IAS facility	Third party tested for use in tensile and shear applications	Confidence the connection will perform as stated
BoxSok Rapid installation tool	Unique tool used to speed up installation	Reduction in time and labor costs
No Hot Work (when shop drilled)	No permit required	Speeds up installation

Markets for BoxBolt®

General Building



The **BoxBolt** is used in any steel construction where access is restricted or when a connection to tube steel is required.

Civil



BoxBolt is used for making blind connections on bridges and other infrastructure. Two common applications are the replacement of rivets and the strengthening of sea walls.

Facades



Supporting brackets for cladding panels and glass facades are connected into the main tube steel structure using **BoxBolt** fastener.

Material Handling



Within the Material handling industry, our **BoxBolt** rigging clamp is used to make lifting points instead of having to weld lifting tabs.

Petrochemical



Due to the nature of this industry, the **BoxBolt** is a great solution for making blind connections when hot work needs to be kept to a minimum.

Telecommunications



The strengthening of telecommunication towers is achieved by using the **BoxBolt** to connect materials to the existing structure from the outside of the tower only.

Stadiums/Theatres



Typical applications within stadiums and theatres would be for connecting ballustrading, seating and display screens.

Power



The solar industry is a good market for **BoxBolt**. Used for joining the frames together and also for securing the panels to the frames.

Transportation



BoxBolt is used in the transportation industry for a variety of connections, a common application would be securing tube

Easy as 1-2-3 When Compared to Alternative Methods

When it comes to performing structural connections to HSS or blind connections, BoxBolt connections are the cleanest and simplest by far. When compared to alternative methods you will clearly see why the BoxBolt connection is the best solution.

BoxBolt®



1. Drill clearance holes
2. Insert BoxBolt fastener
3. Tighten BoxBolt to torque

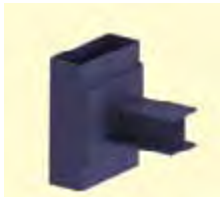
Drilling & Tapping



1. Drill pilot holes
2. Tap holes
3. Connect bolts
4. Tighten bolts to torque

*Tapping requires primary material to be thick enough

Welding



1. Apply for hot work permit
2. Prepare surfaces to weld
3. Position welding equipment
4. Perform weld
5. Leave to cool (under supervision)
6. Perform proof test on the weld

Strapping / Wrapping



1. Place plate and bolts around one side
2. Place plate on other side and align bolts
3. Connect nuts and washers
4. Tighten equally to avoid twisting

Through Bolting



1. Drill clearance holes one side
2. Drill clearance holes other side
3. Connect bolts through and align holes
4. Tighten bolts to torque

*Tightening to torque may crush tube

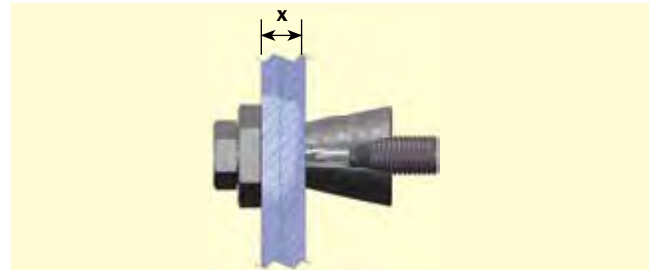
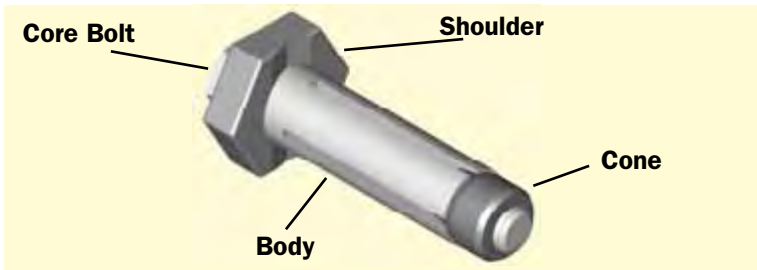
Access Holes



1. Drill clearance holes in tube and bracket
2. Cut access hole in side wall of tube
3. Insert bolts through the bracket
4. Connect nuts/washers through access hole

Features	Welding	Drilling & Tapping	Through Bolting	Strapping	Access Holes	BoxBolt Method
Access needed from one side only	✓	✓	✗	✗	✗	✓
No need for close tolerance holes	✓	✗	✗	✓	✓	✓
Installs with standard tools	✗	✗	✓	✓	✓	✓
Skilled labor not required	✗	✗	✓	✓	✓	✓
Architecturally pleasing	✗	✓	✗	✗	✗	✓
Submitted to ICC-ES for ICC-ER	✗	✗	✗	✗	✗	✓
Guaranteed load without site testing	✗	✓	✓	✓	✓	✓
No hot work permit required	✗	✓	✓	✓	✓	✓
BoxSok Rapid installation tool	✗	✗	✗	✗	✗	✓
Corrosion protection maintained	✗	✗	✗	✓	✗	✓

BoxBolt® Cavity Connections



The technical data below contains all the information necessary for selecting the correct **BoxBolt** blind fastener. The load carrying capacity of the assembly depends on the type of section used and its cross-section. The permissible load is limited by the permissible load of the weakest component in the assembly, namely the section itself in the case of thin wall sections, or the **BoxBolt** in the case of thick wall sections (or combination of the two). If there is any doubt, it is essential to consult LNA Solutions and/or have the application checked by a qualified Structural Engineer.

The table displays the values for static tensile and static shear loads that were achieved by physical testing at an IAS certified facility. The resistance factor for the Load Resistance Factor Design (LRFD) method and the factor of safety for the Allowable Stress Design (ASD) method have been determined by section 3.7 and 3.9 respectively of AC437.

BoxBolt® Technical Data

Part Number & Description			Dimensional Information							Technical		Loading			
BoxBolt (Part Code)	Core Bolt dia	Description	Setscrew Length	Clamping Range (dim x)		Across Flats of Collar	Shoulder Thickness	Dim A	Dim B	Dim C Drill dia	Torque (ft lb)	LRFD Method		ASD Method	
				Min	Max							Tensile (lbs)	Shear (lbs)	Tensile (lbs)	Shear (lbs)
BQ1GE012C	1/2"	1/2" BoxBolt Size 1	2-3/16"	3/8"	15/16"	1"	5/16"	2	1	13/16"	60	5600	8900	3500	5500
BQ2GE012C	1/2"	1/2" BoxBolt Size 2	3-1/8"	11/16"	1-7/8"	1"	5/16"	2	1	13/16"	60	5600	8900	3500	5500
BQ3GE012C	1/2"	1/2" BoxBolt Size 3	4"	1-1/2"	2-11/16"	1"	5/16"	2	1	13/16"	60	5600	8900	3500	5500
BQ1GE016C	5/8"	5/8" BoxBolt Size 1	3"	3/8"	1-3/8"	1-7/16"	3/8"	2-3/16	1-1/16	1-1/16"	140	9200	16100	5700	10100
BQ2GE016C	5/8"	5/8" BoxBolt Size 2	4"	1"	2-5/16"	1-7/16"	3/8"	2-3/16	1-1/16	1-1/16"	140	9200	16100	5700	10100
BQ3GE016C	5/8"	5/8" BoxBolt Size 3	4-3/4"	2"	3-1/16"	1-7/16"	3/8"	2-3/16	1-1/16	1-1/16"	140	9200	16100	5700	10100
BQ1GE020C	3/4"	3/4" BoxBolt Size 1	4"	1/2"	1-13/16"	1-13/16"	7/16"	2-3/4	1-3/8	1-3/8"	220	17000	26300	10800	16400
BQ2GE020C	3/4"	3/4" BoxBolt Size 2	4-3/4"	1-3/16"	3"	1-13/16"	7/16"	2-3/4	1-3/8	1-3/8"	220	17000	26300	10800	16400
BQ3GE020C	3/4"	3/4" BoxBolt Size 3	6"	2-9/16"	4"	1-13/16"	7/16"	2-3/4	1-3/8	1-3/8"	220	17000	26300	10800	16400

Shear loading - The shear loads are based on physical testing using the minimum thickness of steel that we anticipate each diameter of **BoxBolt** to be used with. These thicknesses are 1/2" **BoxBolt** diameter = 1/4", 5/8 **BoxBolt** diameter = 5/16" and 3/4" **BoxBolt** diameter = 3/8".

Should it be required to use **BoxBolt** in materials that are thinner, then the structural capacity of the connected steel will need to be checked by a licensed structural engineer to ensure it can withstand the loads.

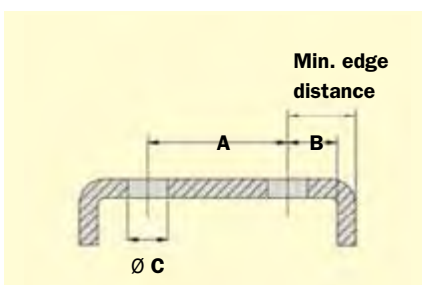
Note 1: Only use the drill sizes stated as Dim C Drill Dia

Note 2: Always ensure the correct torque is applied to the core bolt using a calibrated torque wrench

Note 3: Always check that the total fixing range is within the ranges stated for dimension X

Note 4: **BoxBolt** will operate within a wide temperature range of between -30°C to + 60°C, please consult the supplier if you intend to use it outside of this range for advice.

Hole Dimensions & Positioning



Materials

Mild Steel
to BS EN ISO 10083
Grade 1.151

Finish

Geomet 321 XL

BoxBolt Size	Dim A	Dim B	Dia C
1/2	2	1	13/16
5/8	2 - 3/16	1 - 1/16	1-1/16
3/4	2 - 3/4	1 - 3/8	1-3/8

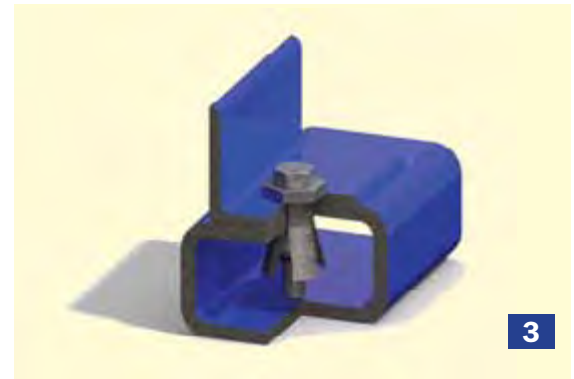
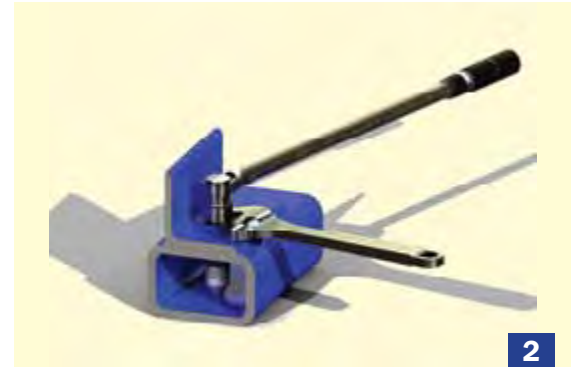
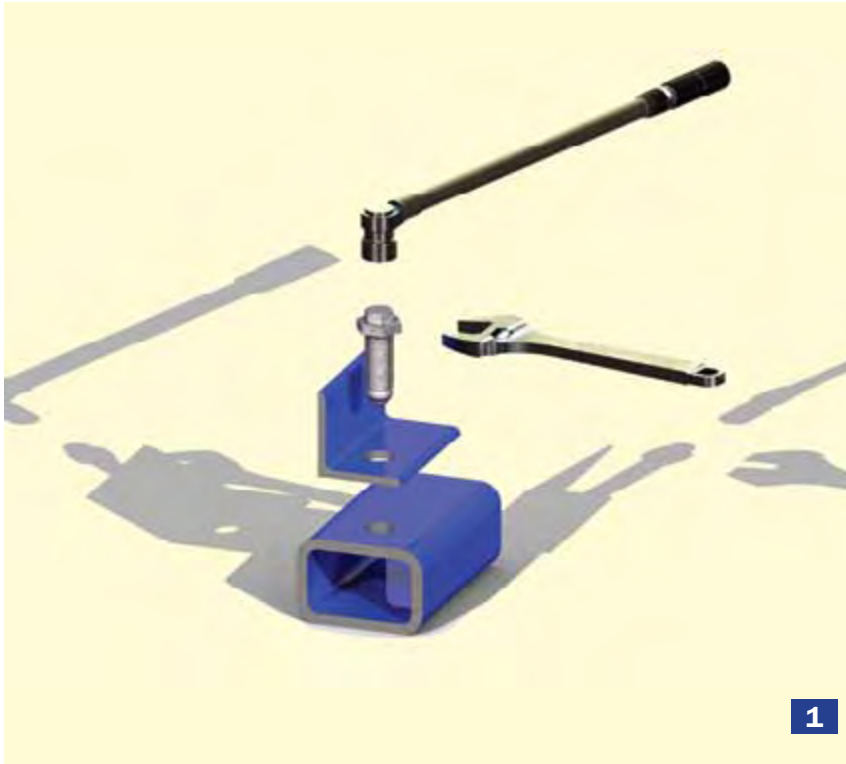
A = Minimum distance between **BoxBolt** holes

B = Minimum Edge distance to inside of steel

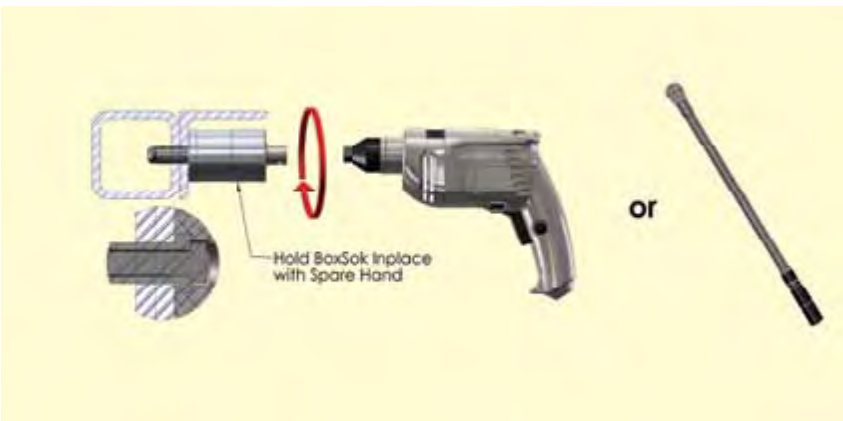
Ø C = Drill size to be used for **BoxBolt** sleeve

Installation Methods

Standard wrench and torque wrench.



BoxSok™ Rapid Assembly Tool



The **BoxSok™ Installation Tool** is a unique rapid assembly tool for the **BoxBolt**. This specially designed socket holds the hexagon shoulder on the body to stop it rotating while allowing the inner socket to tighten up the core bolt. The core bolt draws the cone up inside the slotted body of the sleeve and expands the individual fins inside the connection. **BoxSok™** eliminates the need for two tools to install the **BoxBolt**; this considerably speeds up the installation process and also reduces the risk of trapping hands between two tools.

Size	Overall length	Body length	Body dia	Drive size
1/2	4-1/2	3-7/16	1-5/8	3/8
5/8	4-1/2	3-7/16	1-15/16	1/2
3/4	4-9/16	3-1/2	2-5/16	1/2

Typical BoxBolt® Applications

1



Two hollow sections at 90 degrees using an end plate

2



Hollow section below an I-Beam at 90 degrees using a combination of BoxBolt and BeamClamp fixings

3



Hollow section sleeve connection creating an aesthetic joint from the outside

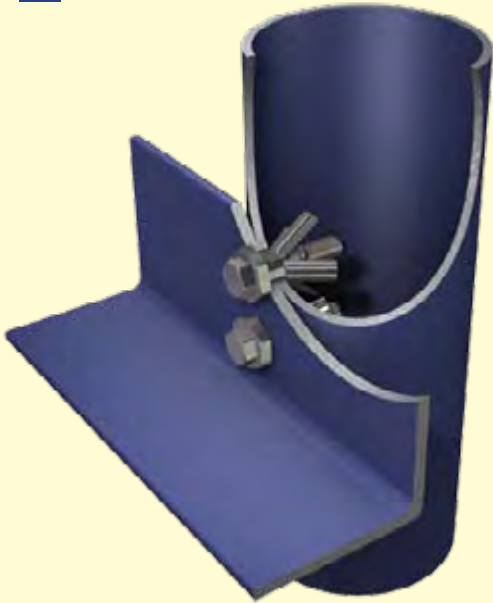
4



Two hollow sections at 90 degrees using angle brackets

Typical BoxBolt® Applications

5



Angle to vertical hollow section post

6



Rigging point to outside of hollow section

7



Side fixing of handrail base to hollow section

8



Glazing bracket to hollow section

Frequently Asked Questions

Can BoxBolt® be removed easily?

Yes. Hold the collar and un-screw the bolt. The collar can now be separated from the sleeve and the outer ply can be removed. The sleeve can be pried out if required or simply knocked through to the inside of the connection.

What hole size do I need for the BoxBolt®?

A clearance hole for the outside sleeve of the **BoxBolt** is required. A common mistake is to drill a clearance hole for the core bolt only but the hole must be larger to allow for the sleeve. The correct hole sizes are given as diameter C on page 6 of this brochure.

What do I need to know before designing a BoxBolt® connection?

You will need to know the diameter of the **BoxBolt** that you wish to use by referring to our technical tables and reviewing the loading capacities. Once you have determined the diameter of **BoxBolt** you will then need the total thickness of steel you are connecting to. You can then use the technical tables by looking at dimension X to decide which is the most appropriate length for your application (1, 2 or 3).

Why are there three different lengths?

The **BoxBolt** is available in three lengths per diameter. The length is determined by comparing the total thickness of your steel to be connected to dimension X in the technical table. The sizes overlap between 1 and 2 and also between 2 and 3 so it might be that you can use two lengths for your application. The most economical length will always be the shortest but you may wish to commonize on one length for convenience.

Why can I not use the “snug tight” tightening method with BoxBolt®?

The **BoxBolt** uses an expansion mechanism which is only placed in tension enough when the correct tightening torque is applied. As this is a blind connection, it is essential to tighten the **BoxBolt** to this torque to ensure full engagement. This is true for both tensile and shear conditions.

Can BoxBolt® be used with slotted holes?

The **BoxBolt** is often used with slotted brackets to provide adjustment on site. The hole in the primary material where the **BoxBolt** expands in must always be a circular hole drilled to our recommendations, however, the external hole that fits to the underside of the collar can be slotted as long as the width of the slot is not wider than the hole diameter. If the load is in the direction of the slot, then you will need to refer to our technical department for advice.

How does the BoxBolt® create clamping force between the steel plys?

The **BoxBolt** features a clever interlocking mechanism between the collar and the sleeve to stop rotation while tightening. This allows for a small amount of separation once the expansion sleeve locates on the inside of the connection. This separation allows the sleeve and collar to act separately like a nut and bolt. The pre-load in the bolt is transferred to the area where the expanding sleeve makes contact with the inside of the blind hole.

Can the BoxBolt® be used in all shapes of structural tube?

The engagement of the expansion mechanism of the BoxBolt allows it to be used on rectangular, square or round tube sections. The sleeve expands on the inside of the hole evenly. A standard nut and bolt cannot be used on a round tube since a flat surface is required.

Why is Geomet finish used for the BoxBolt®?

Geomet finish provides a combination of an aesthetically pleasing finish with excellent corrosion resistance. The coating is very smooth which is perfect for fasteners since it has a very low co-efficient of friction. A minimum amount of clamping force is lost through friction between the bolt and threaded cone due to its low co-efficient of friction.

Can special versions of BoxBolt® be manufactured?

Yes. We can produce **BoxBolt** to suit most blind steel connections. This may include modifying the head for an aesthetic reason or creating a spacer to make it longer. We will even consider different diameters and finishes if there is the volume to justify it.

Can the BoxBolt® be used in concrete?

BoxBolt was designed and tested as an expansion anchor for steel. It can not be used as a replacement to concrete anchors. It can however be used in sections that are to be filled with concrete after the **BoxBolt** has been installed. For **BoxBolt** to install correctly it requires the back edge of the connection to be free, allowing it to expand.

What spacing do I need for positioning BoxBolt®?

A minimum spacing is required between two bolts to make sure they do not clash when they are expanded. This dimension is given as dimension A in our technical tables on page 6. When using a **BoxBolt** close to corners of tube steel it is important to check the clearance to the inside, dimension B plus the thickness of the tube steel will give the minimum dimension to the center of the hole.

How do I check for interference if connecting from both sides?

Our technical table provides a dimension for the thickness of the shoulder and the length of the bolt used in each **BoxBolt** which then allows a calculation to be made to check that no interference occurs.

Testing and Approvals



The **BoxBolt** type C is the first blind bolt to be submitted for an Evaluation Report to ICC-ES. We developed the Acceptance Criteria (AC437) in conjunction with ICC-ES to allow us to have a standard to follow.



The testing and analysis have been performed in accordance to AC437 Acceptance criteria. This ensures the application of blind connections are covered and that our product is safe to use for all blind connections. The data in our technical tables was developed from physical testing. Please visit www.icc-es.org/criteria/pdf_files/AC437.pdf to see a full copy of AC437.



The testing we instigated was performed at an IAS accredited test facility and the report is available for review.