



## The Original Expansion Bolt for Structural Steel



 **Hollo-Bolt®**  
by **lindapter®**

## THE ORIGINAL EXPANSION BOLT FOR STRUCTURAL STEEL

Lindapter®, the steel connection specialists, invented the Hollo-Bolt® as a fast, cost effective connection for Hollow Structural Section (HSS). The 'blind connection' technique requires installation access to only one side of the steel for exceptional convenience. In comparison to alternative methods such as welding, a Hollo-Bolt connection can be quickly installed by simply inserting the fastener into pre-drilled holes and tightening with a torque wrench.

Since the Hollo-Bolt was first launched in 1995, the product range has been continuously developed to meet the diverse requirements of Structural Engineers and Architects, with enhancements including new head types, lengths, finishes and performance improvements.



## 10 REASONS TO USE HOLLO-BOLT

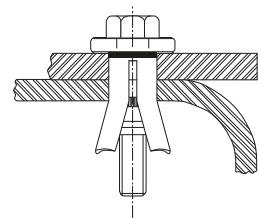
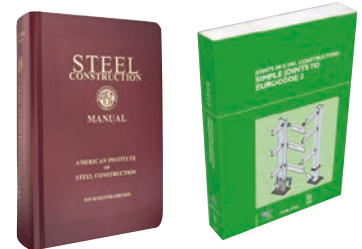
- 1 Fast, time saving installation
- 2 Lower labor costs
- 3 Easy to install from just one side
- 4 For structural tube and other hollow sections
- 5 No need to weld, no hot work permits
- 6 High resistance to shear and tension
- 7 Hollo-Bolt (HCF) for 3x Clamping Force
- 8 Various corrosion resistant options
- 9 Aesthetically pleasing connections
- 10 Independently approved product performance

## INTERNATIONAL RECOGNITION

The British Constructional Steelwork Association (BCSA) and Steel Construction Institute (SCI) include the Hollo-Bolt as a structural connection in the design guide 'Joints in Steel Construction: Simple Connections'.

The American Institute of Steel Construction (AISC) also recognizes the Hollo-Bolt as a HSS connection in the Steel Construction Manual.

Engineers and Architects around the world specify the Hollo-Bolt as a time and labor saving method of connecting structural steel frames or securing almost anything to HSS (see page 8-19 for project examples).



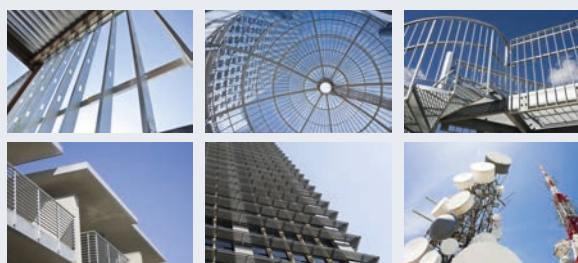
Drawing from the AISC Steel Construction Manual.  
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## TYPICAL APPLICATIONS

- Structural Frames
- Glazing and Roofs
- Staircases and Handrails
- Balconies and Canopies
- Façades and Cladding
- Towers and Masts



## APPROVALS

**ICC-ES** is North America's leading evaluation service and assures both building officials and the wider building industry that Lindapter's 'Original Expansion Bolt for Structural Steel' complies with the International Building Code®. Engineers can specify Hollo-Bolt structural steel connections in Seismic Design Categories (SDC) A through F. See page 23 for details or download the full Evaluation Report (ESR-3330) from [www.Hollo-Bolt.com](http://www.Hollo-Bolt.com)



**CE Marking** provides additional security for Engineers, Architects and Specifiers by demonstrating that product performance is tested and confirmed by a third party to meet a standard renowned on a European scale.



**DIBt** - Deutsches Institut für Bautechnik is a respected organisation that approves construction products for use in Structural and Civil Engineering industries in Germany.



**TÜV** are the certifying authority for safety, quality and environmental protection in Germany. Hollo-Bolts are produced under strict quality and environment management systems to ensure consistently high manufacturing standards across the range.



**Disclaimer** - Lindapter International supplies components in good faith, on the assumption that customers fully understand the loadings, safety factors and physical parameters of the products involved. Customers or users who are unaware or unsure of any details should refer to Lindapter International before use. Responsibility for loss, damage or other consequences of misuse cannot be accepted. Lindapter makes every effort to ensure that technical specifications and other product descriptions are correct. 'Specification' shall mean the specification (relating to the use of the materials) set out in the quotation given by the Seller to the Buyer. Responsibility for errors or omissions cannot be accepted. All dimensions stated are subject to production tolerances - if in doubt please check with Lindapter.

**Applications** - All the applications featured in the brochure are based on real projects. For more information and further examples visit: [www.hollo-bolt.com](http://www.hollo-bolt.com)

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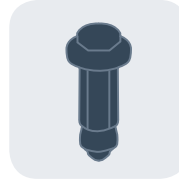
## ALTERNATIVE CONNECTION METHODS

### WELDING

- ❌ Hot work permit required
- ❌ Skilled labor needed
- ❌ Requires power/consumables



V

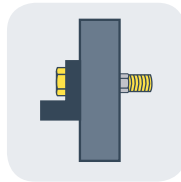


### HOLLO-BOLT

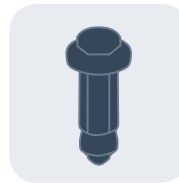
- ✓ A safe and permanent connection that is quick to install using hand tools.

### THROUGH-BOLTING

- ❌ Inappropriate for larger HSS
- ❌ Strength of connection not guaranteed
- ❌ Risk of HSS deformation



V

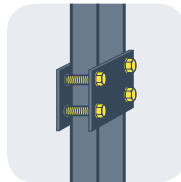


### HOLLO-BOLT

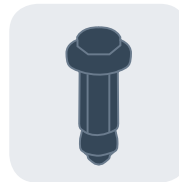
- ✓ A reliable high strength fixing, supported by independently approved Safe Working Loads.

### BRACKETS & STRAPPING

- ❌ Unsightly finish
- ❌ Time consuming installation
- ❌ Low capacity in friction



V



### HOLLO-BOLT

- ✓ Architectural options include the Hollo-Bolt Flush Fit for a very discreet connection.

### CUTTING ACCESS HOLES

- ❌ Expensive & time consuming
- ❌ Unsuitable for structural connections
- ❌ Defeats any architectural benefit of HSS



V



### HOLLO-BOLT

- ✓ A neat, labor saving HSS connection, suitable for structural applications.

## SIMPLE HOLLO-BOLT INSTALLATION

Project Example: Salt River Fields Stadium, Arizona, USA

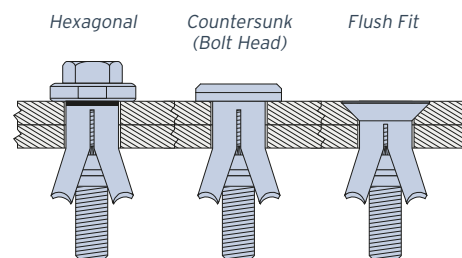
1. Deliver pre-drilled steel to site.
2. Align the pre-drilled fixture and insert the Hollo-Bolt.
3. Using a torque wrench, tighten the Hollo-Bolt to recommended torque.





## HEAD VARIANTS

The Hollo-Bolt is available in three head types to complement diverse architectural designs. Lindapter also has the capability to produce customized Hollo-Bolts; a service passionately referred to as 'Engineered Solutions'.

**HEXAGONAL**

**Visible protrusion:** Regular

**Description:** The Hollo-Bolt collar and head of the Grade 8.8 bolt (Grd.5 / A325 equivalent) are evident above the surface of the steel section. This head variant is the usual choice for the majority of HSS connections, or where architects favor an 'industrial' look.

**COUNTERSUNK (BOLT HEAD)**

**Visible protrusion:** Minimal

**Description:** This discreet midway option has a smaller protrusion for the perfect balance of appearance and convenience, and features a Grade 10.9 (A490 equivalent) countersunk bolt with a special collar designed to accommodate the entire bolt head. Drilling countersunk holes in the steel section is not required.

**FLUSH FIT**

**Visible protrusion:** Zero

**Description:** The innovative Flush Fit Hollo-Bolt is entirely concealed within a drilled countersunk hole once installed, leaving no protrusion above the surface of the steel section - the perfect solution for architects!

**ENGINEERED SOLUTIONS**

**Visible protrusion:** Customized

**Description:** For rare connection requirements that an off-the-shelf Hollo-Bolt cannot fulfil, Lindapter's Research & Development Facility has the capability to design and manufacture custom connection solutions. Just one example of a custom Hollo-Bolt is the tamperproof Button Security Head variant, developed for use in prisons.

**CORROSION RESISTANCE**

The Hollo-Bolt is available in a series of protective coatings and materials to provide a customizable yet off-the-shelf connection solution. See right for availability:

*\* Sheraplex is an advanced coating designed for intricately shaped and precision machined components. The two-stage treatment process first involves Sheradizing (Zinc coating), then secondly applying an organic barrier layer. The resulting surface has a smooth matt grey finish that provides high corrosion resistance.*

	Hex Head	Countersunk	Flush Fit
Bright Zinc Plated & JS500	✓	✓	✓
Hot Dip Galvanized	✓		
Sheraplex*	✓	✓	✓
Stainless Steel (Grade 316)	✓	✓	✓
M8 (5/16"), M10 (3/8"), M12 (1/2")	✓	✓	✓
<b>HCF</b> M16 (5/8")	✓	✓	
M20 (3/4")	✓		

- Sizes M16 (5/8") and M20 (3/4"), known as the Hollo-Bolt (HCF), feature a unique **High Clamping Force** mechanism to produce three times more clamping force than the same sized product without the mechanism. The significance of clamping force and the superior performance of Lindapter's Hollo-Bolt (HCF) is illustrated on page 6.

## HOLLO-BOLT & HOLLO-BOLT (HCF)

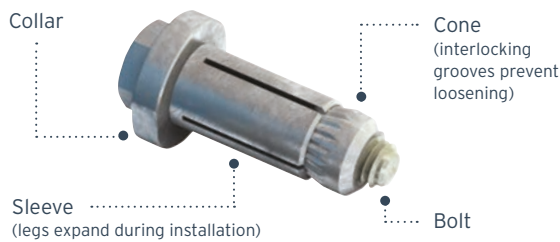
The Hollo-Bolt is available in two versions: the original 3-part design for general hollow section connections and the larger sized 5-part **High Clamping Force** (HCF) version, for higher strength structural connections.

### 3-PART HOLLO-BOLT

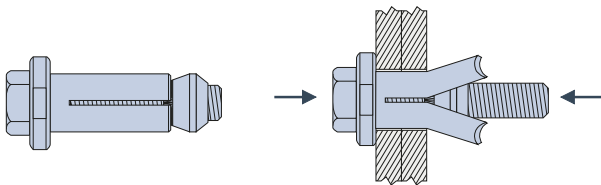
**M8**  
5/16"

**M10**  
3/8"

**M12**  
1/2"



→ ← = Clamping Force



A typical connection is made by inserting the Hollo-Bolt into the pre-drilled holes of the fixture and hollow section. As the bolt head is tightened, the cone is pulled up the bolt thread, causing the legs of the sleeve to expand until the cone locks the sleeve against the inner wall of the hollow section.

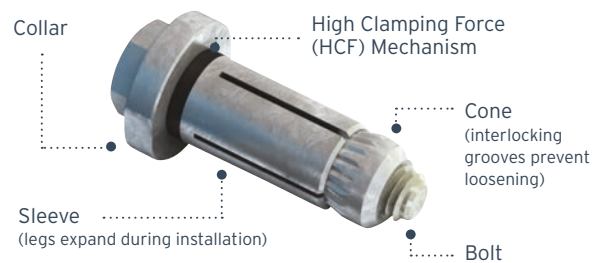
At full tightening torque, a clamping action is set up between the fixture and the steel section to form a secure connection. Once installed, only the head and collar are visible.

### 5-PART HOLLO-BOLT (HCF)

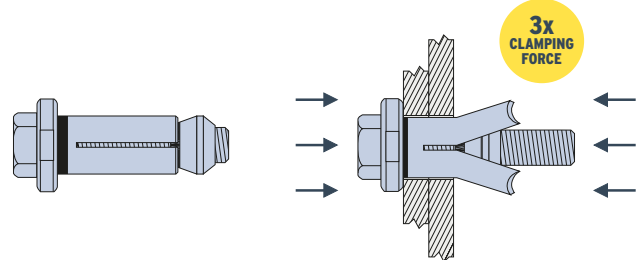
**HIGH  
CLAMPING  
FORCE**

**M16**  
5/8"

**M20**  
3/4"



→ ← = Clamping Force



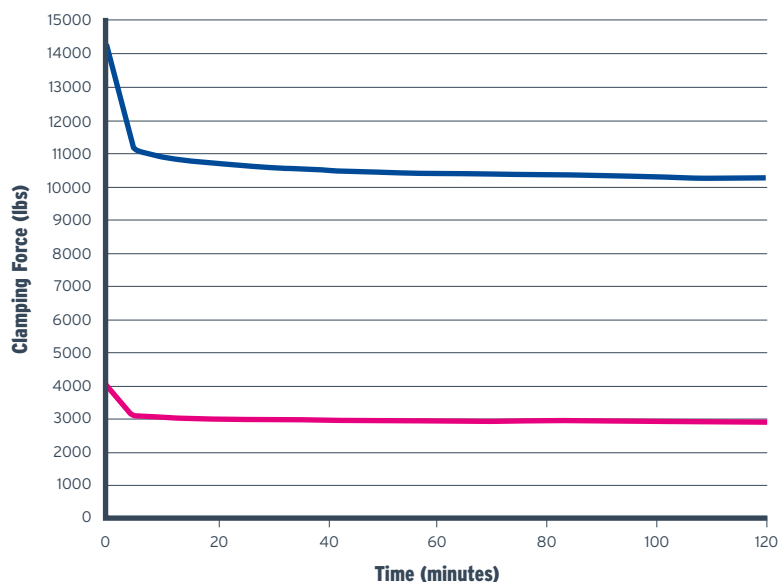
Working closely with Structural Engineers & Steel Fabricators, Lindapter identified the need for the larger M16 & M20 (5/8" & 3/4") Hollo-Bolts to have an increased clamping force suitable for higher strength structural connections. Research & Development led to the invention of the patented 5-part design, optimized for superior performance.

The High Clamping Force (HCF) mechanism consists of a special washer that 'compresses' to significantly increase clamping force between the fixture and hollow section, when compared to a 3-part product of the same size, thereby reducing displacement.

## HOLLO-BOLT (HCF) TYPICAL PERFORMANCE INCREASE

### Clamping Force for Hollo-Bolt HCF (size 3/4")

Graph for illustration purposes only, see pages 22 and 23 for connection design



#### Hollo-Bolt HCF (With Mechanism)

Hot Dip Galvanized, Size 2

#### (Without Mechanism)

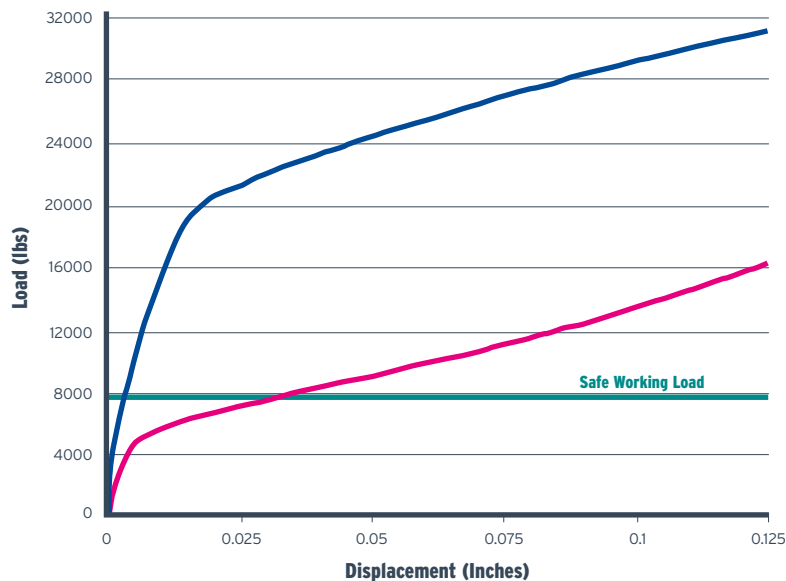
Hot Dip Galvanized, Size 2

#### Typical Performance Increase

As with any structural bolt, immediately after installation the bolt relaxes until a typical clamping force is reached. Typical clamping force of the size 3/4" Hollo-Bolt HCF is over **three and a half times higher** than the same sized product without the HCF mechanism. This results in a more secure connection and a greater force that has to be overcome before displacement begins.

### Connection Load vs Ply Displacement for Hollo-Bolt HCF (size 3/4")

Graph for illustration purposes only, see pages 22 and 23 for connection design



#### Hollo-Bolt HCF (With Mechanism)

Hot Dip Galvanized, Size 2

#### (Without Mechanism)

Hot Dip Galvanized, Size 2

#### Typical Performance Increase

This graph highlights the significance of increased clamping force. The blue curve demonstrates the superior performance of the Hollo-Bolt HCF in contrast to 3/4" sized products without Lindapter's unique mechanism. At Safe Working Load, displacement (movement in the connection) is minimized when using the Hollo-Bolt HCF for a safer and more secure connection.

SOCIÉTÉ GÉNÉRALE TRADING OFFICE



APPLICATION

Attaching façade glazing to the building's structural steel frame

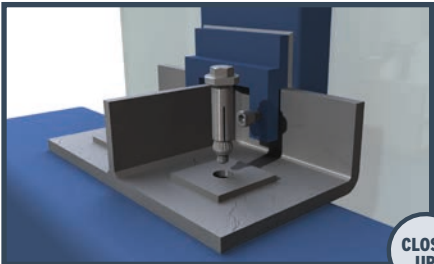
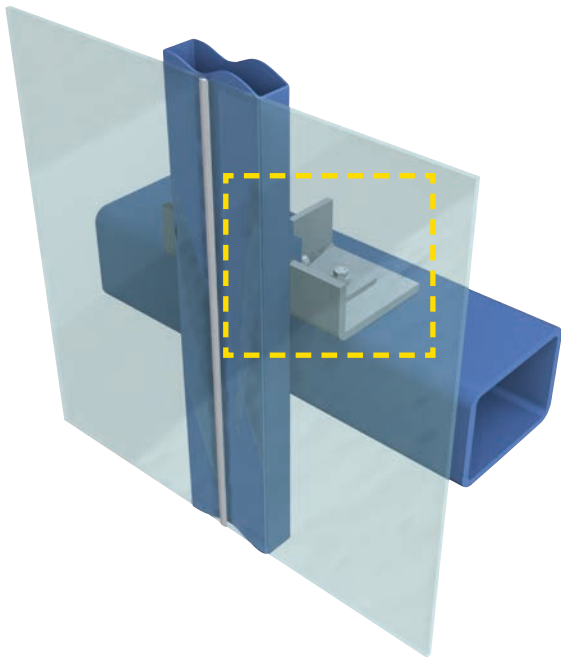
LOCATION

Paris, France



HEAD TYPE

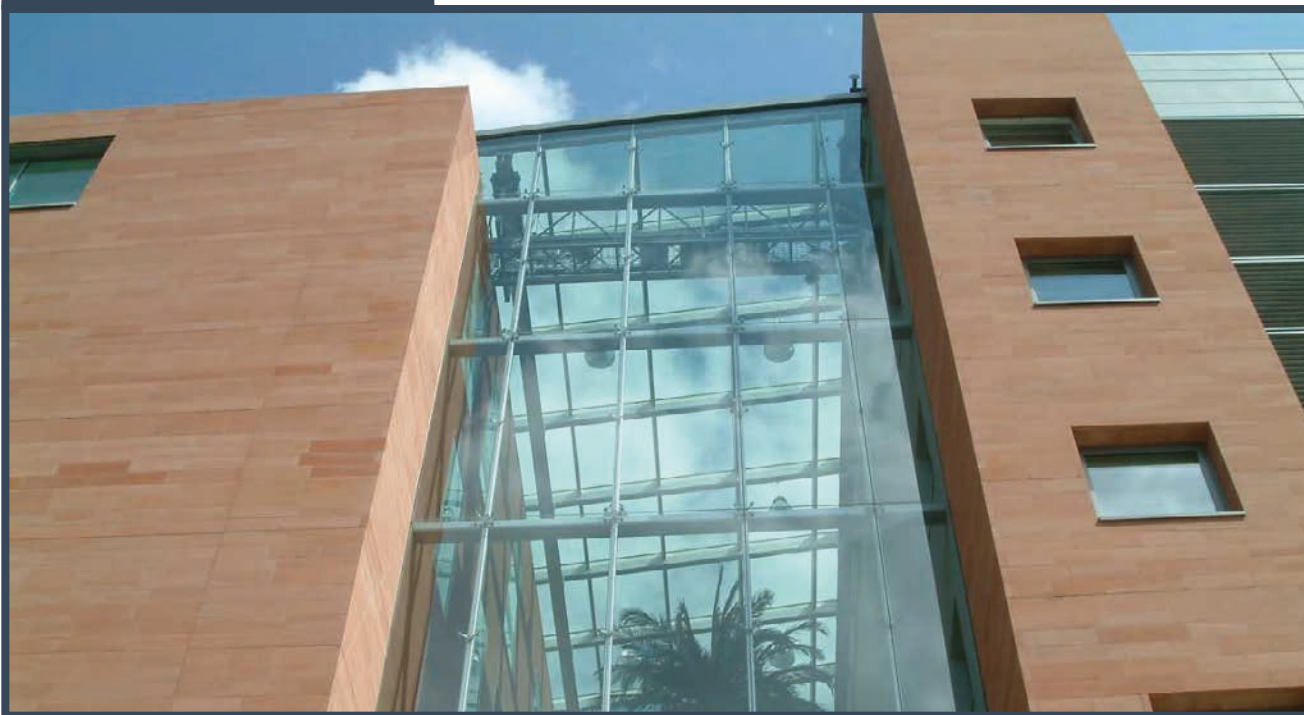
Hexagonal



CLOSE  
UP



## MANCHESTER MAGISTRATES COURT

**APPLICATION**

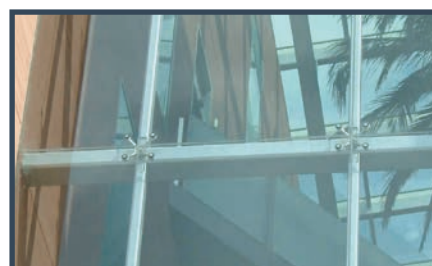
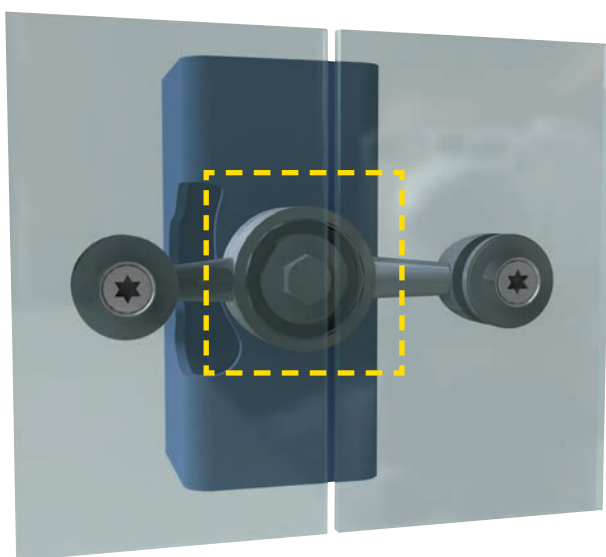
Connecting façade spider brackets to hollow structural section

**LOCATION**

Manchester, UK

**HEAD TYPE**

Hexagonal



CLOSE  
UP

HISTORY MUSEUM



APPLICATION

Connecting perforated steel cladding to hollow structural section

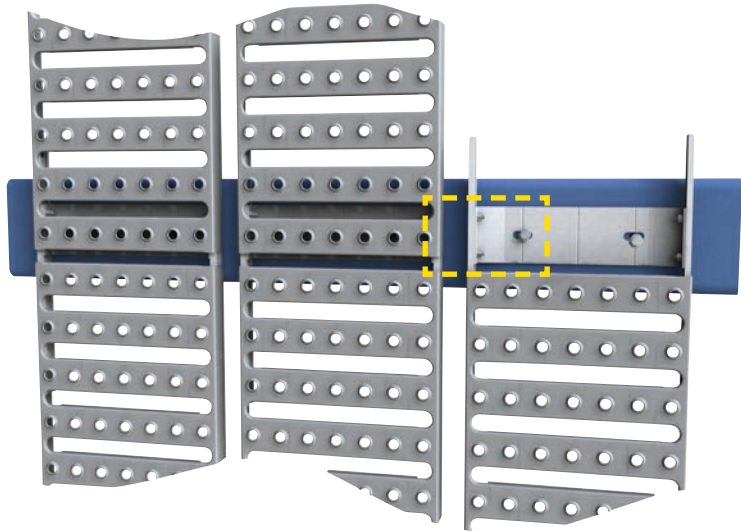
LOCATION

Dresden, Germany



HEAD TYPE

Hexagonal





## THAMES EXCHANGE

Image courtesy of OAG UK



## APPLICATION

Structural connections of the elevator  
glazing frame

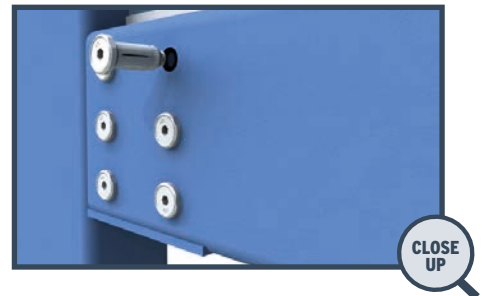
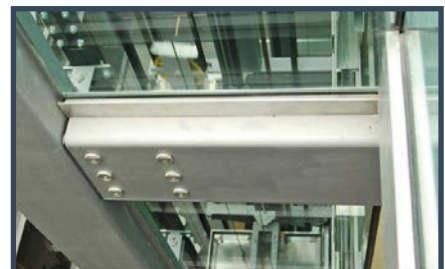
## LOCATION

London, UK



## HEAD TYPE

Countersunk  
(Bolt Head)



ROSE HILL CONSERVATORY

Image: The Huntington Library Art Collections and Botanical Gardens



APPLICATION

Structural steel truss connections of the conservatory frame

LOCATION

San Marino, CA, USA



HEAD TYPE

Hexagonal

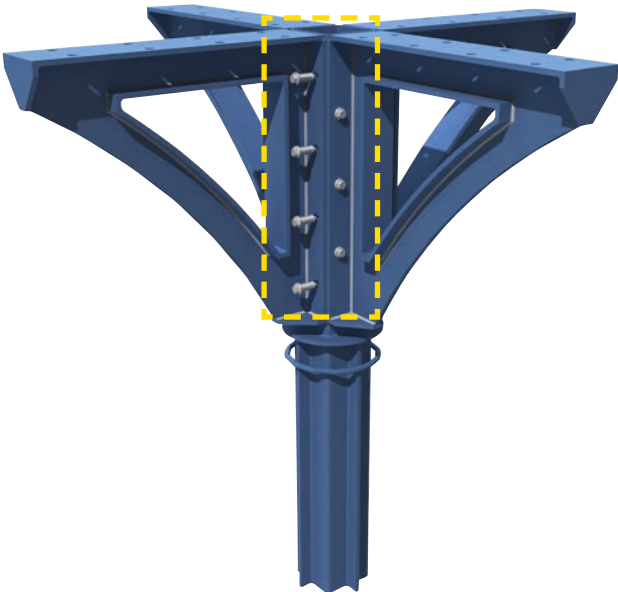


Image: Far Out Flora (faroutflora.com)



CLOSE UP



## HAFEN CITY

Image: Quantum Immobilien AG

**APPLICATION**

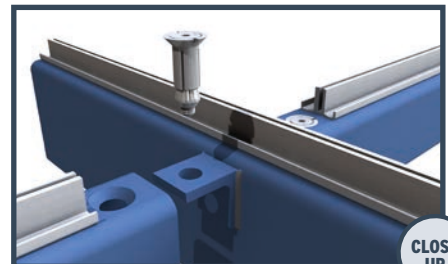
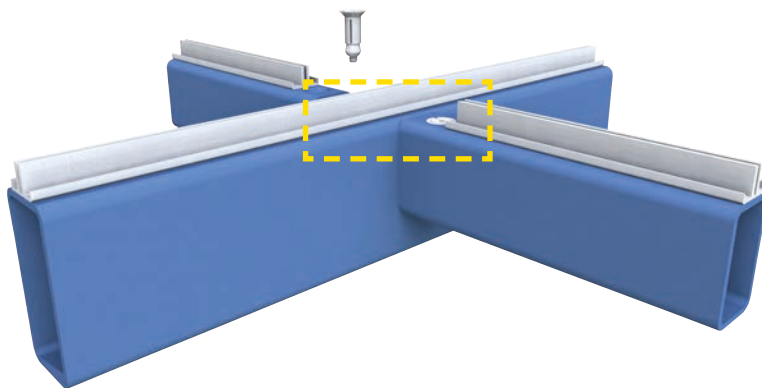
Connecting the glazing support frame and roof

**LOCATION**

Hamburg, Germany

**HEAD TYPE**

Flush Fit



CLOSE  
UP



KIMMEL CENTER



Image: Jeff Goldberg/Esto, courtesy of Kimmel Center

APPLICATION

Connecting the barrel-vault roof

LOCATION

Philadelphia, PA,  
USA



HEAD TYPE

Hexagonal



Image: R. Bradley Maule



## SALT RIVER FIELDS - SPRING TRAINING FACILITY

**APPLICATION**

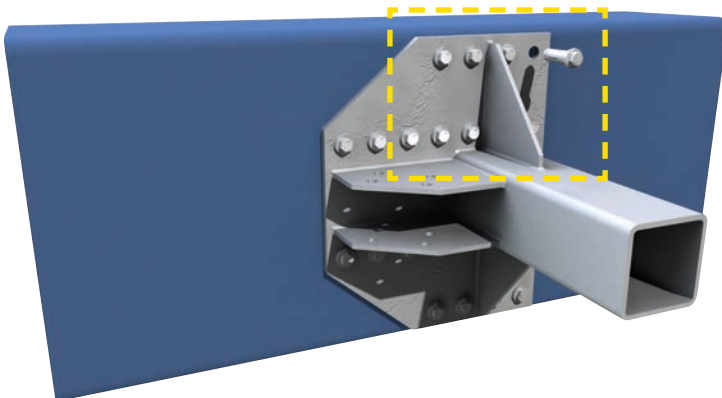
HSS connections for the floodlighting frame

**LOCATION**

Scottsdale, AZ,  
USA

**HEAD TYPE**

Hexagonal



CLOSE  
UP



BMW WORLD



APPLICATION

Connection of mounting points for solar panels

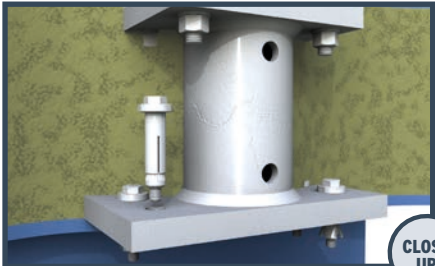
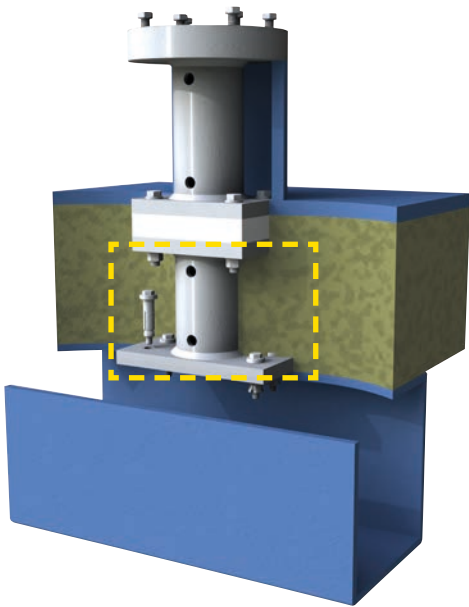
LOCATION

Munich, Germany



HEAD TYPE

Hexagonal



CLOSE UP

## SNORRE OFFSHORE

**APPLICATION**

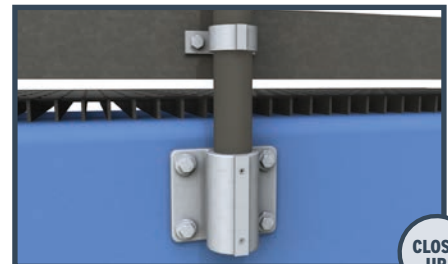
Securing handrails to fabricated hollow section

**LOCATION**

Norwegian  
North Sea

**HEAD TYPE**

Hexagonal





PHOENIX METRO LIGHT RAIL



APPLICATION

Securing station signage and seating to structural frames

LOCATION

Phoenix, AZ, USA



HEAD TYPE

Button Security



CLOSE UP



## TELSTRA STADIUM / OLYMPIC STADIUM

Image: Brian Parcy

**APPLICATION**

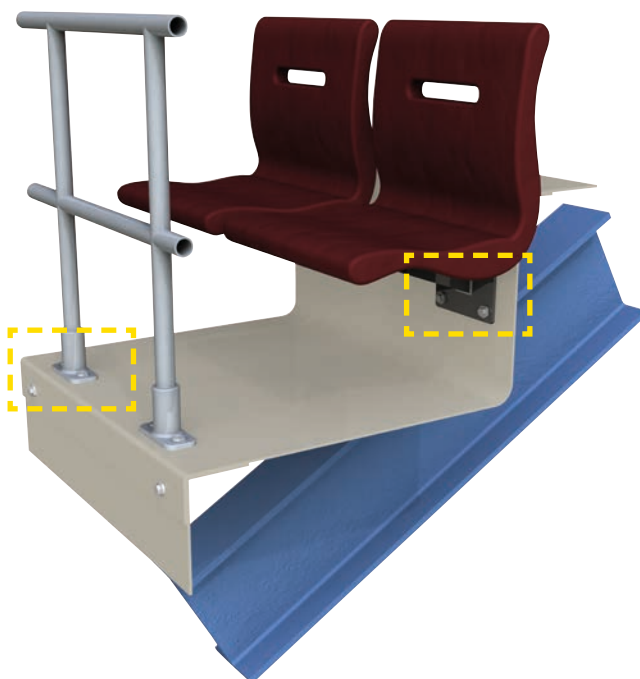
Securing temporary seating to supporting steel structure

**LOCATION**

Sydney, Australia

**HEAD TYPE**

Hexagonal & Countersunk



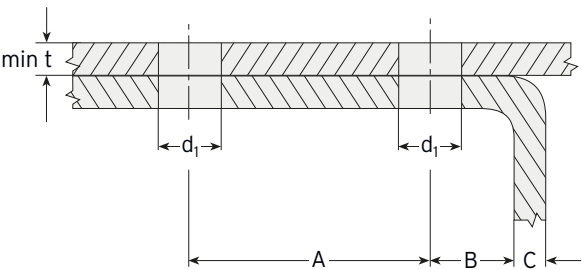
CLOSE  
UP

HEXAGONAL & COUNTERSUNK (BOLT HEAD)



DRILLING & PREPARATION

To comply with ICC-ES ESR-3330 Section 4.2 ensure that the holes are drilled into both the fixture and the section according to the drilling guidelines below. Please note that the holes are slightly larger than standard bolt drill diameters to accommodate the sleeve and cone.

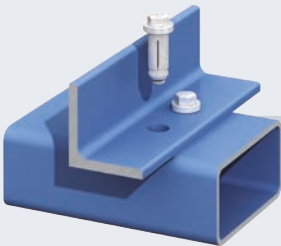


Size	Outer Ply min t	Drill Diameter $\varnothing$ $d_1$	Hole Distances		Edge Distances B+C
			min A	min B	
M8 (5/16")	-	9/16"	1 3/8"	1/2"	1 1/16"
M10 (3/8")	-	3/4"	1 9/16"	9/16"	7/8"
M12 (1/2")	-	13/16"	2"	3/4"	1"
M16 (5/8")	5/16"	1 1/16"	2 3/16"	13/16"	1 5/16"
M20 (3/4")	5/16"	1 5/16"	2 3/4"	1"	1 5/16"

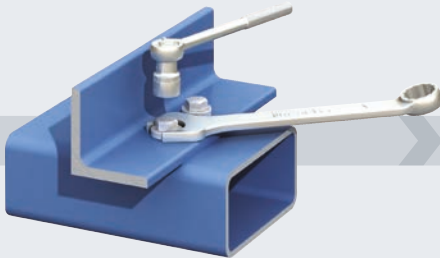
➤ Sizes M16 (5/8") and M20 (3/4") require the thickness of the outer ply (min t) to be at least 5/16".

INSTALLATION

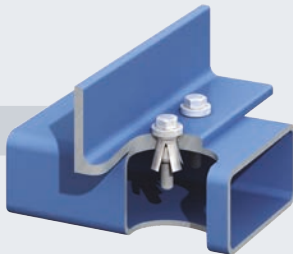
1 Align pre-drilled fixture and section and insert Hollo-Bolt.<sup>a)</sup>



2 Grip the Hollo-Bolt collar with an open ended wrench.



3 Using a calibrated torque wrench, tighten the central bolt to the recommended torque.<sup>b)</sup>



- a) Before tightening, ensure that the materials that are to be connected together are touching.  
b) See page 22 for tightening torque.

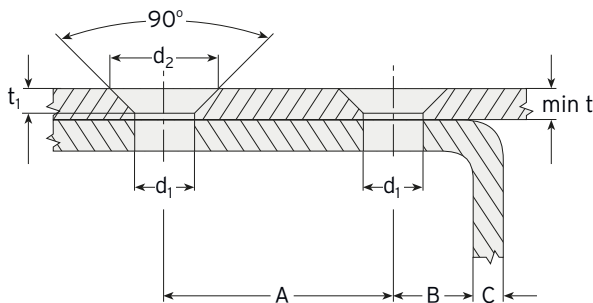
Power tools, such as an impact wrench, may be used to speed up the tightening of the Hollo-Bolt. However, when using power tools, always complete the tightening process with a torque wrench to ensure the correct torque is applied to the Hollo-Bolt.

FLUSH FIT



## DRILLING & PREPARATION

Ensure that countersunk holes are drilled in the fixture, and standard holes are drilled in the section, according to the drilling guidance below. Please note that the holes are slightly larger than standard bolt drill diameters to accommodate the sleeve and cone.



Size	Outer Ply min t	Drill Diameter Ø d <sub>1</sub>	Countersunk Ø d <sub>2</sub>	Countersunk Depth t <sub>1</sub>	Hole Distances		Edge Distances
					min A	min B	B+C
M8 (5/16")	5/16"	9/16"	1 1/16"	1/4"	1 3/8"	1/2"	11/16"
M10 (3/8")	3/8"	3/4"	1 1/4"	1/4"	1 9/16"	9/16"	7/8"
M12 (1/2")	3/8"	13/16"	1 3/8"	5/16"	2"	3/4"	1"

## INSTALLATION

- 1 Align pre-drilled fixture and section and insert Hollo-Bolt.<sup>a)</sup>

- 2 Apply installation nut and grip with an open ended wrench.

- 3 Using a calibrated torque wrench, tighten the central countersunk bolt to the recommended torque.<sup>b)</sup>



➤ a) Before tightening, ensure that the materials that are to be connected together are touching.

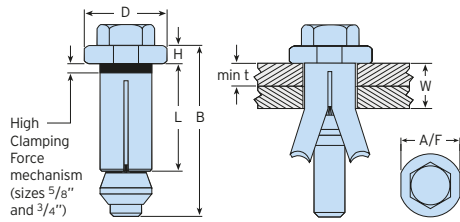
b) See page 22 for tightening torque.

Power tools, such as an impact wrench, may be used to speed up the tightening of the Hollo-Bolt. However, when using power tools, always complete the tightening process with a torque wrench to ensure the correct torque is applied to the Hollo-Bolt.

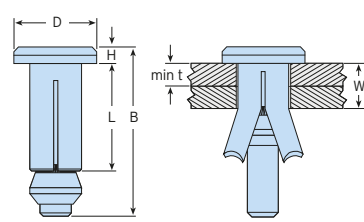
## HOLLO-BOLT SAFE WORKING LOADS

➤ See Page 23 for ICC-ES approved data to LRFD and ASD design methods.

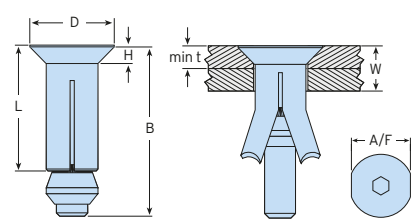
### a) Hexagonal



### b) Countersunk



### c) Flush Fit



	a) HEXAGONAL		b) COUNTERSUNK		Clamping Thickness W	Outer Ply min t	Sleeve Length L	Collar Height H D A/F			Tightening Torque ft lb	Safe Working Loads (FOS 5:1)	
	Product Code	Bolt B	Product Code	Countersunk Bolt B								Tensile lbs	Shear lbs
High Clamping Force (HCF)	LHBM08#1	5/16" x 2"	LHBCSKM08#1	5/16" x 2"	1/8" - 7/8"	-	1 3/16"						
	LHBM08#2	5/16" x 2 3/4"	LHBCSKM08#2	5/16" x 2 3/4"	7/8" - 1 5/8"	-	1 15/16"	3/16"	7/8"	3/4"	17	899	1124
	LHBM08#3	5/16" x 3 9/16"	LHBCSKM08#3	5/16" x 3 9/16"	1 5/8" - 2 3/8"	-	2 11/16"						
	LHBM10#1	3/8" x 2 3/16"	LHBCSKM10#1	3/8" x 2"	1/8" - 7/8"	-	1 3/16"						
	LHBM10#2	3/8" x 2 3/4"	LHBCSKM10#2	3/8" x 2 3/4"	7/8" - 1 5/8"	-	1 7/8"	1/4"	1 1/8"	15/16"	33	1910	2248
	LHBM10#3	3/8" x 3 9/16"	LHBCSKM10#3	3/8" x 3 9/16"	1 5/8" - 2 3/8"	-	2 5/8"						
	LHBM12#1	1/2" x 2 3/8"	LHBCSKM12#1	1/2" x 2 3/16"	1/8" - 1"	-	1 3/8"						
	LHBM12#2	1/2" x 3 5/32"	LHBCSKM12#2	1/2" x 3 1/8"	1" - 1 13/16"	-	2 1/4"	1/4"	1 1/4"	1 3/16"	59	2360	3372
	LHBM12#3	1/2" x 4"	LHBCSKM12#3	1/2" x 4"	1 13/16" - 2 3/4"	-	3 1/8"						
	LHBM16#1	5/8" x 3"	LHBCSKM16#1	5/8" x 2 3/4"	1/2" - 1 1/8"	5/16"	1 5/8"	5/16"	1 1/2"	1 7/16"	140	4720	6744
	LHBM16#2	5/8" x 4"	LHBCSKM16#2	5/8" x 4"	1 1/8" - 2"	5/16"	2 1/2"						
	LHBM16#3	5/8" x 4 3/4"	LHBCSKM16#3	5/8" x 4 3/4"	2" - 2 13/16"	5/16"	3 5/16"						
	LHBM20#1	3/4" x 3 9/16"	-	-	1/2" - 1 5/16"	5/16"	1 15/16"						
	LHBM20#2	3/4" x 4 3/4"	-	-	1 5/16" - 2 3/8"	5/16"	3"	3/8"	2"	1 13/16"	221	7868	8992
	LHBM20#3	3/4" x 5 7/8"	-	-	2 3/8" - 3 3/8"	5/16"	4"						

➤ Sizes M16 (5/8") and M20 (3/4"), known as the Hollo-Bolt (HCF), feature a unique **High Clamping Force** mechanism to produce three times more clamping force than the same sized product without the mechanism. The significance of clamping force and the superior performance of Lindapter's Hollo-Bolt (HCF) is illustrated on page 6.

c) FLUSH FIT										
Product Code	Countersunk Bolt	Max Clamping Range	Outer Ply	Sleeve Length	Collar		Installation Nut	Tightening Torque	Safe Working Loads (FOS 5:1)	
	B	W	min t	L	H	D	A/F	ft lb	Tensile lbs	Shear lbs
LHBF08#1	5/16" x 2"	3/8" - 1 1/16"	5/16"	1 3/16"						
LHBF08#2	5/16" x 2 3/4"	1 1/16" - 1 3/4"	5/16"	2 1/8"	3/16"	15/16"	3/4"	17	899	1124
LHBF08#3	5/16" x 3 9/16"	1 3/4" - 2 1/2"	5/16"	2 7/8"						
LHBF10#1	3/8" x 2"	1/2" - 1 1/16"	3/8"	1 7/16"						
LHBF10#2	3/8" x 2 3/4"	1 1/16" - 1 3/4"	3/8"	2 1/8"	1/4"	1 3/16"	15/16"	33	1910	2248
LHBF10#3	3/8" x 3 9/16"	1 3/4" - 2 1/2"	3/8"	2 7/8"						
LHBF12#1	1/2" x 2 3/16"	1/2" - 1 3/16"	3/8"	1 5/8"						
LHBF12#2	1/2" x 3 1/8"	1 3/16" - 2 1/32"	3/8"	2 1/2"	1/4"	1 5/16"	1 3/16"	59	2360	3372
LHBF12#3	1/2" x 4"	2 1/32" - 2 7/8"	3/8"	3 3/8"						

➤ The Hollo-Bolt can be used on a wide variety of steel hollow sections; safe working loads shown are based on use in A36 Structural Tube. The safe working loads, in both tension and shear, are applicable to the Hollo-Bolt only. Failure of the section, particularly on those with thin walls and a wide chord face, could occur at a lower figure and strength of the section should be checked by a qualified Structural Engineer.

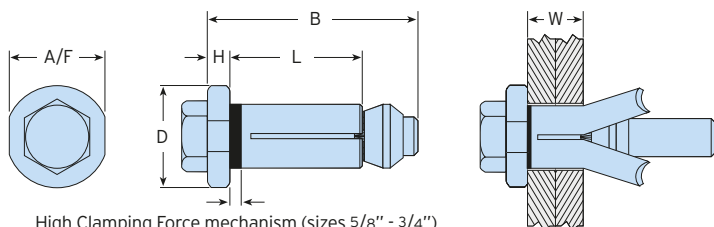
➤ Drilling information can be found on pages 20 and 21.

## HOLLO-BOLT ALLOWABLE LOADING (LRFD AND ASD METHODS)

The Hollo-Bolt LRFD and ASD Design Strengths (taken from ESR 3330) are to be used only when designing a bolted connection to AISC 360, AISC 341 and AISI S-100 as referenced in Section 2205 of the IBC.



(Hexagonal head, HDG finish only)



High Clamping Force mechanism (sizes 5/8" - 3/4")

Download the full Evaluation Report  
ESR-3330 from [www.LindapterUSA.com](http://www.LindapterUSA.com)



High Clamping Force mechanism (sizes 5/8" - 3/4")									ALLOWABLE LOADING							
									Static and SDC* A, B, C				SDC* D, E, F			
Product Code	Bolt  B	Max Clamping Range  W	Sleeve Length  L	Collar Ø  H      D      A/F			Tightening Torque  ft lb	LRFD Method		ASD Method		LRFD Method		ASD Method		
				Tensile lbs	Shear lbs	Tensile lbs		Shear lbs	Tensile lbs	Shear lbs	Tensile lbs	Shear lbs				
LHBM08#1	5/16" x 2"	1/4" - 7/8"	1 3/16"	3/16"	7/8"	3/4"	17	3775	3215	2340	2000	3305	2675	2045	1665	
LHBM08#2	5/16" x 2 3/4"	7/8" - 1 5/8"	1 15/16"	3/16"	7/8"	3/4"	17	3775	3215	2340	2000	3305	2675	2045	1665	
LHBM08#3	5/16" x 3 9/16"	1 5/8" - 2 3/8"	2 11/16"	3/16"	7/8"	3/4"	17	3775	3215	2340	2000	3305	2675	2045	1665	
LHBM10#1	3/8" x 2 3/16"	5/16" - 7/8"	1 3/16"	1/4"	1 1/8"	15/16"	33	6160	5485	3820	3415	5485	4565	3395	2830	
LHBM10#2	3/8" x 2 3/4"	7/8" - 1 5/8"	1 7/8"	1/4"	1 1/8"	15/16"	33	6160	5485	3820	3415	5485	4565	3395	2830	
LHBM10#3	3/8" x 3 9/16"	1 5/8" - 2 3/8"	2 5/8"	1/4"	1 1/8"	15/16"	33	6160	5485	3820	3415	5485	4565	3395	2830	
LHBM12#1	1/2" x 2 3/8"	5/16" - 1"	1 3/8"	1/4"	1 1/4"	1 3/16"	59	8545	7485	5305	4675	7465	6250	4630	3890	
LHBM12#2	1/2" x 3 5/32"	1" - 1 13/16"	2 1/4"	1/4"	1 1/4"	1 3/16"	59	8545	7485	5305	4675	7465	6250	4630	3890	
LHBM12#3	1/2" x 4"	1 13/16" - 2 3/4"	3 1/8"	1/4"	1 1/4"	1 3/16"	59	8545	7485	5305	4675	7465	6250	4630	3890	
High Clamping Force (HCF)	LHBM16#1	5/8" x 3"	1 1/2" - 1 1/8"	1 5/8"	5/16"	1 1/2"	1 7/16"	140	13915	11645	8635	7285	13330	9780	8270	6090
	LHBM16#2	5/8" x 4"	1 1/8" - 2"	2 1/2"	5/16"	1 1/2"	1 7/16"	140	13915	11645	8635	7285	13330	9780	8270	6090
	LHBM16#3	5/8" x 4 3/4"	2" - 2 13/16"	3 5/16"	5/16"	1 1/2"	1 7/16"	140	13915	11645	8635	7285	13330	9780	8270	6090
	LHBM20#1	3/4" x 3 9/16"	1/2" - 1 5/16"	1 15/16"	3/8"	2"	1 13/16"	221	19985	18390	12410	11490	19355	15330	12005	9555
	LHBM20#2	3/4" x 4 3/4"	1 5/16" - 2 3/8"	3"	3/8"	2"	1 13/16"	221	19985	18390	12410	11490	19355	15330	12005	9555
	LHBM20#3	3/4" x 5 7/8"	2 3/8" - 3 3/8"	4"	3/8"	2"	1 13/16"	221	19985	18390	12410	11490	19355	15330	12005	9555

➤ Sizes M16 (5/8") and M20 (3/4"), known as the Hollo-Bolt (HCF), feature a unique **High Clamping Force** mechanism to produce three times more clamping force than the same sized product without the mechanism. The significance of clamping force and the superior performance of Lindapter's Hollo-Bolt (HCF) is illustrated on page 6.

➤ Clearance hole details can be found on page 20.

### ICC-ES approved use

ICC-ES is North America's leading evaluation service for innovative building products, providing evidence that products meet the requirements of building codes and technical standards. Evaluation report ESR-3330 states:

**"Hollo-Bolt fasteners are designed for connecting structural steel to hollow structural section (HSS) steel members and other structural steel elements where access is difficult or restricted to one side only."**

**"Hollo-Bolt fasteners may be used to resist wind loads, and seismic loads in Seismic Design categories A through F."**







## YOUR QUESTIONS ANSWERED...

**Can Lindapter Hollo-Bolts be used in all sizes & shapes of structural tube?**

Yes, the Lindapter Hollo-Bolt can be used in all sizes of structural tube and is suitable for use in those of square, rectangular, circular or elliptical shape.

**The capacity figures for the Lindapter Hollo-Bolts shown in both SCI 'Green Books' are different to the figures shown in the Lindapter catalog. Which figures should I use?**

The loads shown on page 22 of this brochure are Safe Working Loads, with Lindapter's typical Factor of Safety of 5:1, and are for general use.

For structural use, the loads shown in the SCI design guides are not Safe Working Loads, they are Design Capacities, to be compared in calculations with the structural capacity of the supporting column wall (HSS).

**Who is responsible for checking the capacity of the structural section when using Lindapter Hollo-Bolts?**

It is the responsibility of a Structural Engineer to ensure a structural tube has sufficient capacity to take the necessary loads. Help can be found within either of the current SCI/BCSA 'Green Books', where P.212 should be used if designing simple connections to BS5950 whilst P.358 should be used if designing simple joints to Eurocode 3.

**How does the HCF mechanism increase clamping force?**

Without the HCF mechanism on the larger sizes M16 ( $\frac{5}{8}$ " ) & M20 ( $\frac{3}{4}$ " ), the majority of the preload in the bolt is transferred into expanding the sleeve. Lindapter's patented HCF mechanism in the 5-part Hollo-Bolt (HCF) allows the sleeve to expand & converts some of the preload into clamping force to hold the connection securely together.

**What is the significance of increased clamping force?**

Clamping force is the compressive force which holds the connection together. An M16 ( $\frac{5}{8}$ " ) or M20 ( $\frac{3}{4}$ " ) connection using the 5-part Hollo-Bolt (HCF) will be held together with a greater force than a 3-part product of the same size, & have less movement at safe working load. With the 5-part Hollo-Bolt (HCF), a higher load is needed initially to pull the connection apart.

**Why don't you make all Hollo-Bolts to the 5-part design?**

The M16 ( $\frac{5}{8}$ " ) & M20 ( $\frac{3}{4}$ " ) sized Hollo-Bolt (HCF) was designed specifically for larger structural connections that require high clamping force. The Hollo-Bolt M8 ( $\frac{5}{16}$ " ), M10 ( $\frac{3}{8}$ " ) & M12 ( $\frac{1}{2}$ " ) are not generally used for structural joints & adding the HCF mechanism to these smaller sizes would not create a significant advantage when compared to the superior performance of the M16 ( $\frac{5}{8}$ " ) & M20 ( $\frac{3}{4}$ " ) Hollo-Bolt (HCF).

**Why is there some displacement, even on the Hollo-bolt (HCF)?**

The Hollo-Bolt is a ductile connection & the chord face of the hollow section can deflect. The Safe Working Load for the Hollo-Bolt has been set at an area of minimal displacement (please view the Load/Displacement graphs on page 7).

**Can Hollo-Bolts be used in slotted holes?**

Yes, it is possible to use Hollo-Bolts with slotted holes in the outer bracket or end plate as long as there is no horizontal load in the direction of the slot. However, the hole in the hollow section into which the Hollo-Bolt is to be installed must be circular and within the tolerance stated in this brochure.

**Can Lindapter Hollo-Bolts be sealed to prevent water ingress?**

Yes. Although the vast majority of Lindapter Hollo-Bolts used globally do not use any sealing method, special washers have been supplied on a limited number of occasions. However, it is important not to ignore the interface between the structural tube and plate or bracket which is being attached.

**Can I use stainless steel Hollo-Bolts to connect brackets to mild steel hollow section?**

Where possible the best option is to ensure that the section, bracket and Hollo-Bolt are all produced from the same material, or are close to each other on the galvanic corrosion chart. If stainless components are in contact with mild steel, bimetallic corrosion will be accelerated.

**Can I use Hollo-Bolt in concrete filled sections?**

The Hollo-Bolt was designed for connecting to structural sections and needs an obstacle free area for the sleeve to expand. Once the component is installed correctly the section can then be filled with concrete.



If you have any further questions please contact [inquiries@LindapterUSA.com](mailto:inquiries@LindapterUSA.com)

**Are Lindapter Hollo-Bolts removable?**

Yes. Although designed as a permanent connection, it is possible to remove the Hexagon and Countersunk (Bolt Head) variants by following the procedure below:

1. Grip the Hollo-Bolt collar with an open ended wrench to prevent the collar from rotating.
2. Use an impact wrench / torque wrench to remove the bolt (anticlockwise rotation).
3. Hollo-Bolt sizes M8 ( $\frac{5}{16}$ " ), M10 ( $\frac{3}{8}$ " ) & M12 ( $\frac{1}{2}$ " ) only: remove the sleeve by prying the collar with a pinch or crow bar. Note: this additional step is not required to remove the M16 ( $\frac{5}{8}$ " ) & M20 ( $\frac{3}{4}$ " ) due to their 5-part design.

The special Security Button Head Hollo-Bolt is designed so that it cannot be easily removed without the Security Key.

**Can I use the Hollo-Bolt to connect timber to steel?**

Yes, although it is important to ensure that the timber is capable of withstanding the clamping force created when applying torque to the Hollo-Bolt. In some cases a spreader washer can be used under the collar of the Hollo-Bolt to distribute the force over a greater area.

**Why aren't the Flush Fit, Countersunk & Button Head Hollo-Bolts available in Hot Dip Galvanized finish?**

When components with a hexagon socket are Hot Dip Galvanized, the high build up of zinc in the recess results in a reduced A/F dimension meaning that a standard Allen/Hexagon Key no longer fits correctly. This would make it very difficult for the installer to apply the required torque to ensure the Hollo-Bolt expands correctly.

## TECHNICAL SUPPORT

The comprehensive technical support from Lindapter's experienced engineers ensures an efficient specification process with a free connection design service (*see below*) and bills of materials upon request. Lindapter's philosophy is to deliver the highest quality at every stage of the service, from initial connection design to installation guidance.

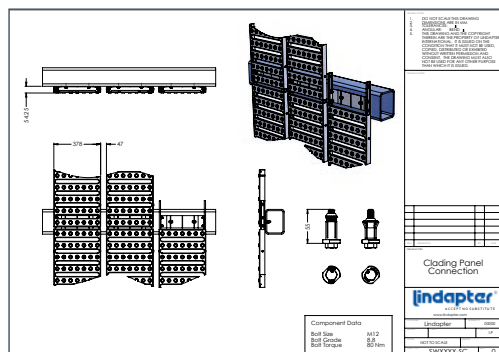
- Free connection design based on your requirement
- Optimized solution for cost and performance
- Custom drawings delivered in 2D and interactive 3D formats
- CAD files for import into major software applications
- Contractor training



## FREE CONNECTION DESIGN

Lindapter's Engineers ensure to create a custom solution that delivers on cost and performance, ultimately saving you time and money. Drawings are provided in 2D and interactive 3D formats as well as CAD files that are suitable to import into all major software applications. If you would like Lindapter to design your custom connection, please make sure to have the following:

- Member sizes to be used or flange width and thickness
- Loads to be resisted (eg. 2000lbs tension and 3000lbs slip)
- General arrangement sketch and/or verbal description
- Project Name/Title/Location (*optional*)



## ENGINEERED SOLUTIONS

Lindapter's unique R&D capability facilitates a custom product development service, passionately referred to as 'Engineered Solutions'. The service offered to clients includes:

- Design and development of custom products
- Full strength and performance analysis
- Thoroughly tested with detailed reports
- Manufactured to Lindapter's exacting standards



**Type 1055 (right)** Custom product designed to fit solid plate flooring to open grid flooring for Amec/Shell.

**R&D Facility (far right)** One of two 224800 lbs hydraulic testing machines.

## FULL PRODUCT LINE

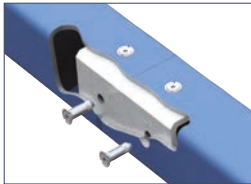
## LINDAPTER USA CATALOG

What's inside?



## STEEL CONNECTIONS

Lindapter has pioneered a unique and proven concept: innovative clamping systems that eliminate the need to weld or drill, reducing installation time and labor costs.



## HOLLOW STEEL (HSS) CONNECTIONS

Besides the Hollo-Bolt, Lindapter also invented the Lindibolt: a self-heading expansion bolt that uses a standard clearance hole, for a simple and cost-effective HSS connection.



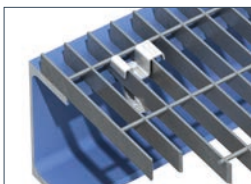
## CONCRETE DECKING CONNECTIONS

Lindapter offers the Toggle Clamp as the ideal service suspension connection for pre-cast hollow core concrete slabs. This versatile connector is also compatible with HSS, steel sheeting and purlins.



## PIPE / CONDUIT SUPPORTS

Lindapter provides a wide range of connection solutions for suspending building services, such as pipe work, sprinklers and suspended ceilings, from structural or supporting steel.



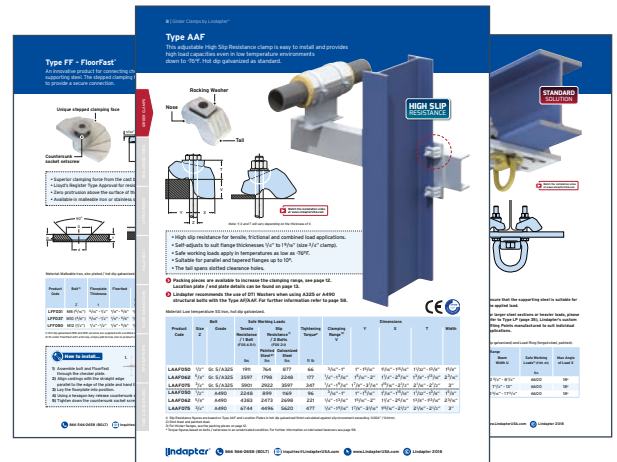
## STEEL FLOOR CONNECTIONS

Lindapter's unique no-weld no-drill concept extends to the connection of steel flooring. Open bar grating and checker plate flooring can be installed by one person from above.

AVAILABLE NOW!



Technical Innovation in Steel Connections



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**PRODUCT INFORMATION:**

[www.Hollo-Bolt.com](http://www.Hollo-Bolt.com)

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