



The Original Expansion
Bolt for Structural Steel



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**

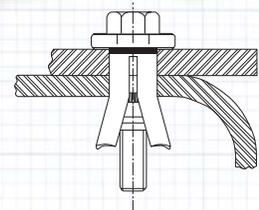
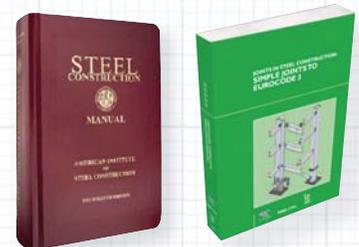
Independently approved product performance

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).

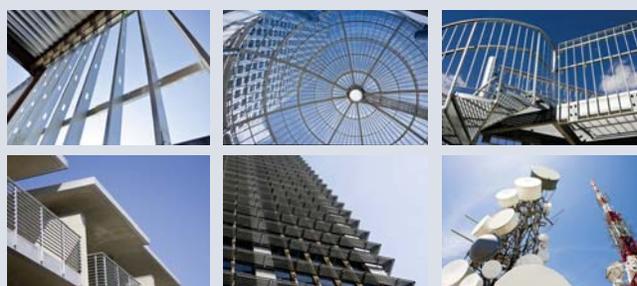


CONTENTS

| | | | |
|-----------------------------------|----------|-----------------------------------|-----------|
| Why use a Hollo-Bolt?..... | 4 | Installation Guidance..... | 20 |
| Hollo-Bolt Options..... | 5 | Design Data..... | 22 |
| Expansion Mechanism..... | 6 | FAQs..... | 24 |
| Clamping Force..... | 7 | Lindapter Service..... | 26 |
| Project Experience..... | 8 | Lindapter Products..... | 27 |

TYPICAL HOLLO-BOLT APPLICATIONS

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



APPROVALS

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

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ALTERNATIVE CONNECTION METHODS

WELDING

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



V

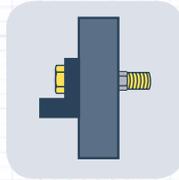


HOLLO-BOLT

- ✅ 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

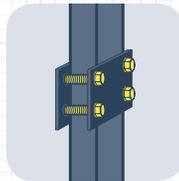


HOLLO-BOLT

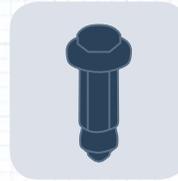
- ✅ A reliable high strength fixing, supported by independently approved Safe Working Loads.

BRACKETS & STRAPPING

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



V



HOLLO-BOLT

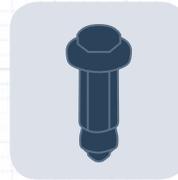
- ✅ Architectural options include the Hollo-Bolt Flush Fit for a very discreet connection.

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

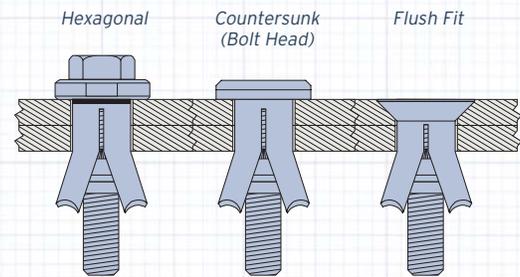
Project Example: Salt River Fields Stadium, Arizona, USA

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 the 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 the rare connection requirement that an off-the-shelf Hollo-Bolt cannot fulfil, Lindapter's Research and 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") | ✓ | ✓ | ✓ |
| HCF M16 (5/8") | ✓ | ✓ | |
| M20 (3/4") | ✓ | | |

➔ Sizes M16 (5/8") and M20 (3/4"), known as the Hollo-Bolt (HCF), feature a patented **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 unique 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**

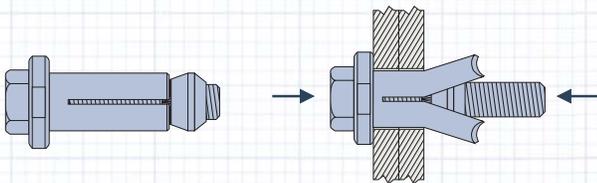
M8
5/16"

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)**

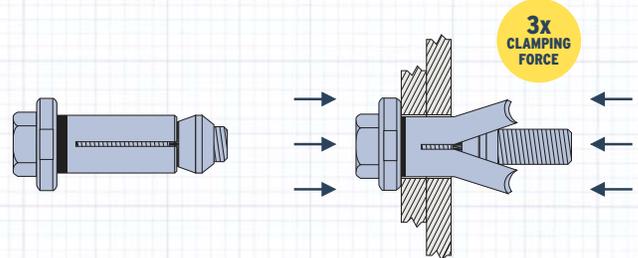
**HIGH
CLAMPING
FORCE**

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**



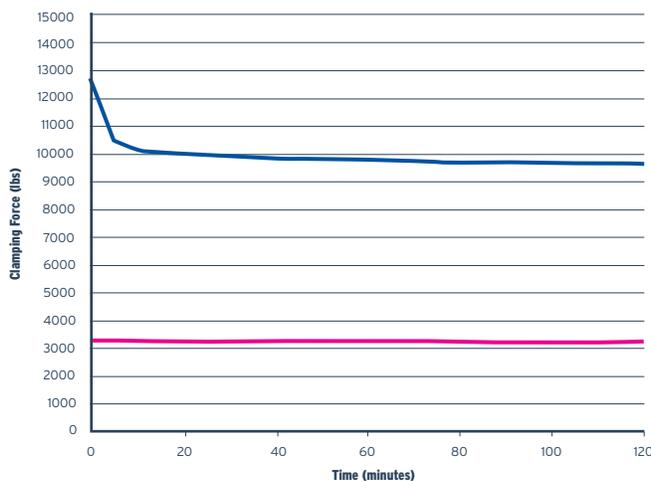
With HCF Mechanism
5-Part Design
▶ Hot Dip Galvanized, Size 2



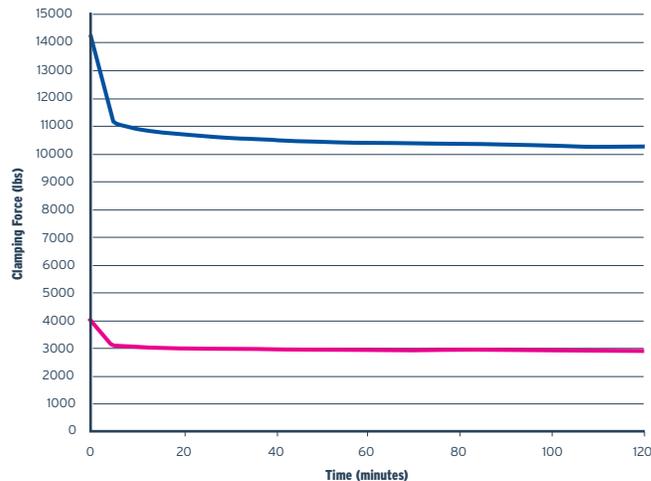
Without HCF Mechanism
3-Part Design
▶ Hot Dip Galvanized, Size 2



M16 (5/8"): Up to 3x Clamping Force



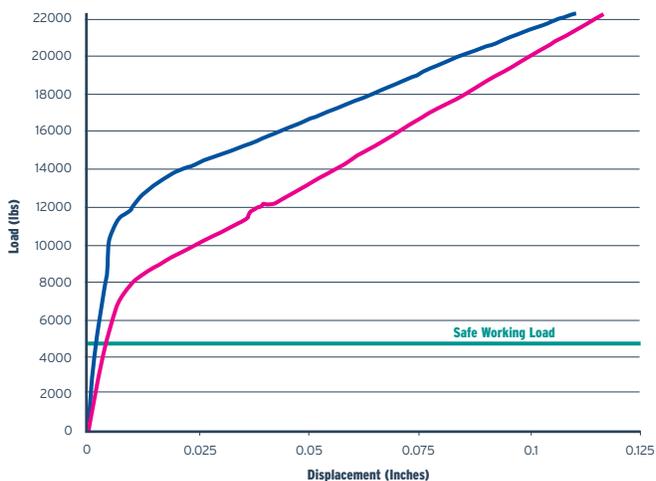
M20 (3/4"): Up to 3.5x Clamping Force



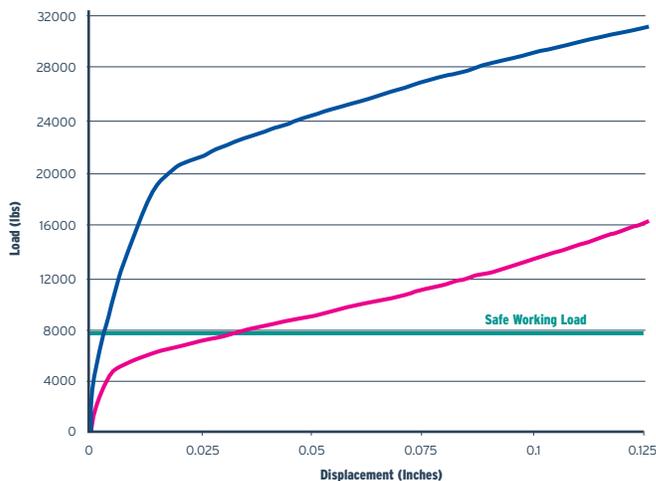
CLAMPING FORCE

As with any structural bolt, immediately after installation the bolt relaxes until a typical clamping force is reached. The typical clamping force of the Hollo-Bolt (HCF) is over three 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.

M16 (5/8") - Connection Load Vs Ply Displacement



M20 (3/4") - Connection Load Vs Ply Displacement



DISPLACEMENT

The significance of increased clamping force is shown in the graphs above. The blue curve demonstrates the superior performance of the Hollo-Bolt (HCF) in contrast to M16 (5/8") & M20 (3/4") sized products without Lindapter's patented HCF mechanism (i.e. the 3-part design in these larger sizes). When using the Hollo-Bolt (HCF), displacement (movement in the connection) is minimized at Safe Working Load for a safer and more secure connection.

SOCIÉTÉ GÉNÉRALE TRADING OFFICE



APPLICATION

Attaching façade glazing to the building's structural steel frame

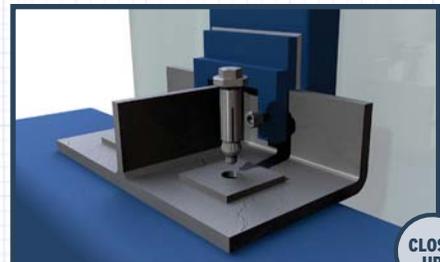
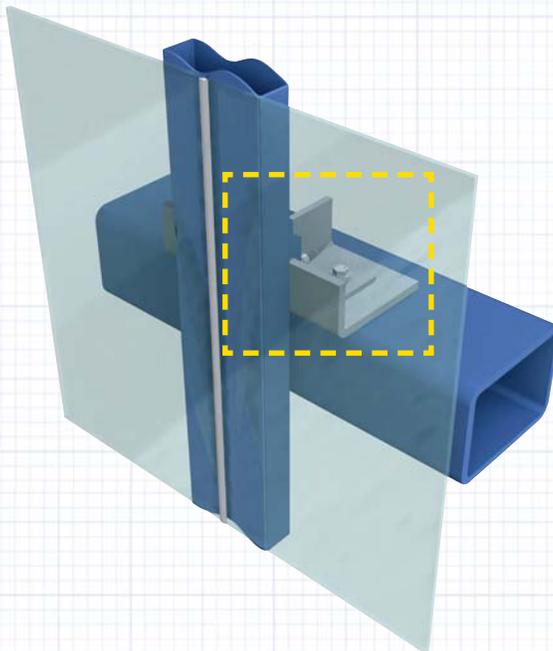
LOCATION

Paris, France



HEAD TYPE

Hexagonal

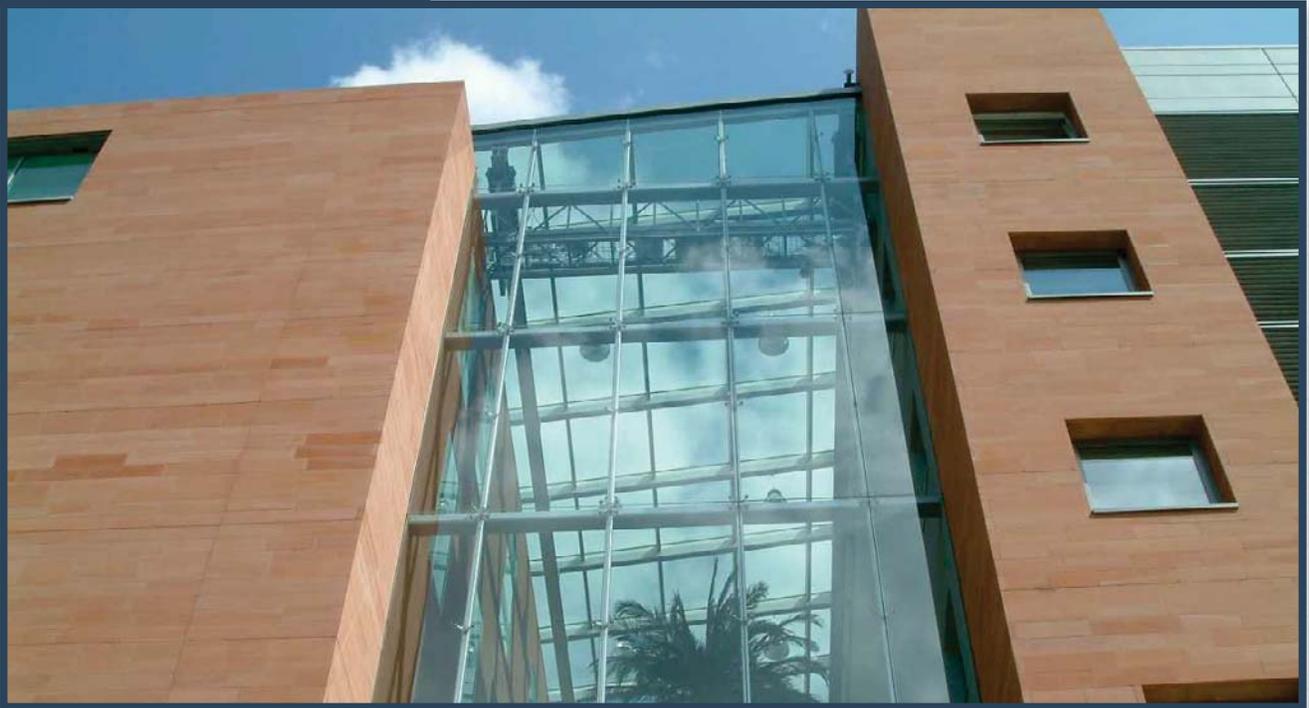


CLOSE UP



www.hollo-bolt.com

MANCHESTER MAGISTRATES COURT



APPLICATION

Connecting façade spider brackets to hollow structural section

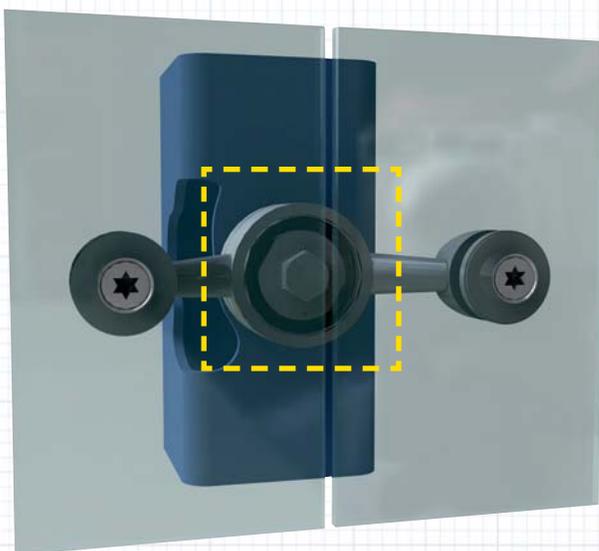
LOCATION

Manchester, UK



HEAD TYPE

Hexagonal



CLOSE UP

HISTORY MUSEUM



APPLICATION

Connecting perforated steel cladding to hollow structural section

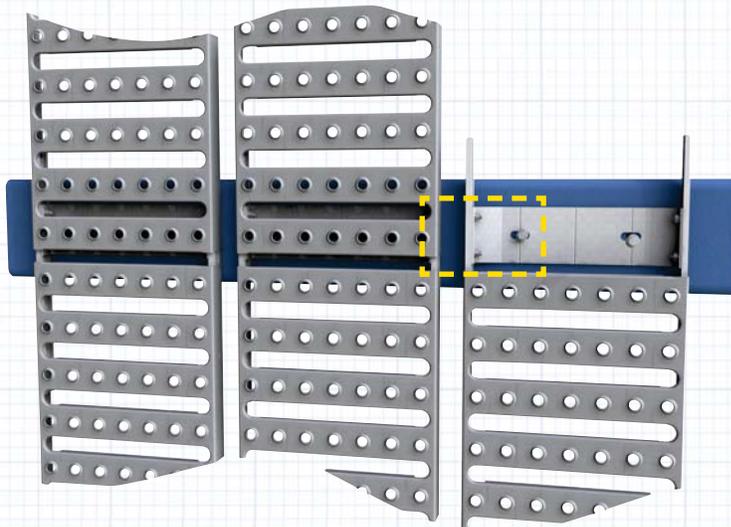
LOCATION

Dresden, Germany



HEAD TYPE

Hexagonal



CLOSE UP

THAMES EXCHANGE

Image courtesy of OAG UK



APPLICATION

Structural connections of the elevator glazing frame

LOCATION

London, UK



HEAD TYPE

Countersunk
(Bolt Head)



CLOSE UP

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

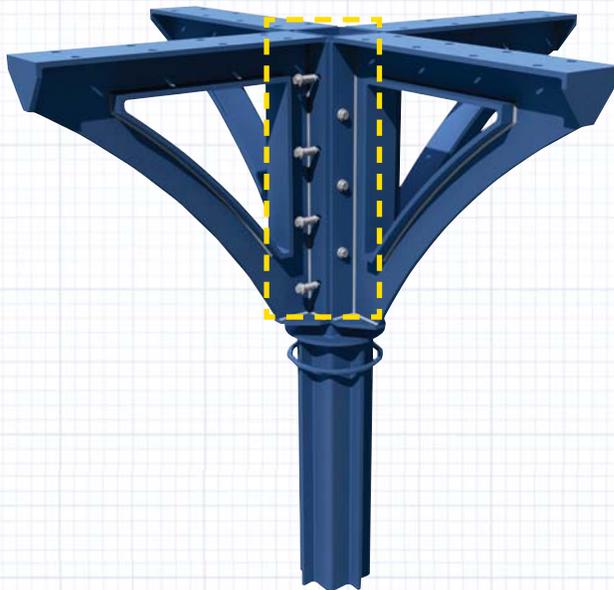


Image: Far Out Flora (faroutflora.com)



CLOSE UP



www.hollo-bolt.com

HAFEN CITY

Image: Quantum Immobilien AG



APPLICATION

Connecting the glazing support frame and roof

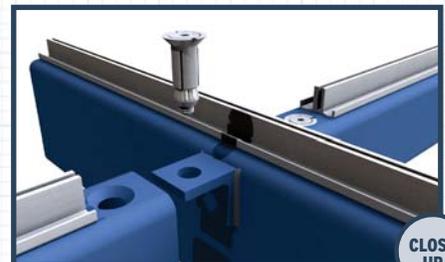
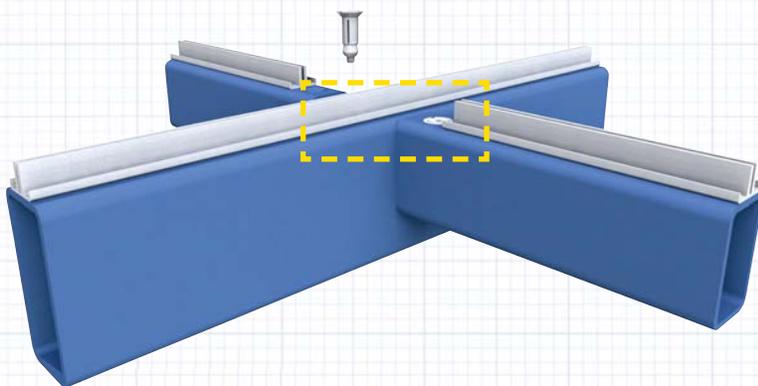
LOCATION

Hamburg, Germany



HEAD TYPE

Flush Fit



CLOSE UP

KIMMEL CENTER

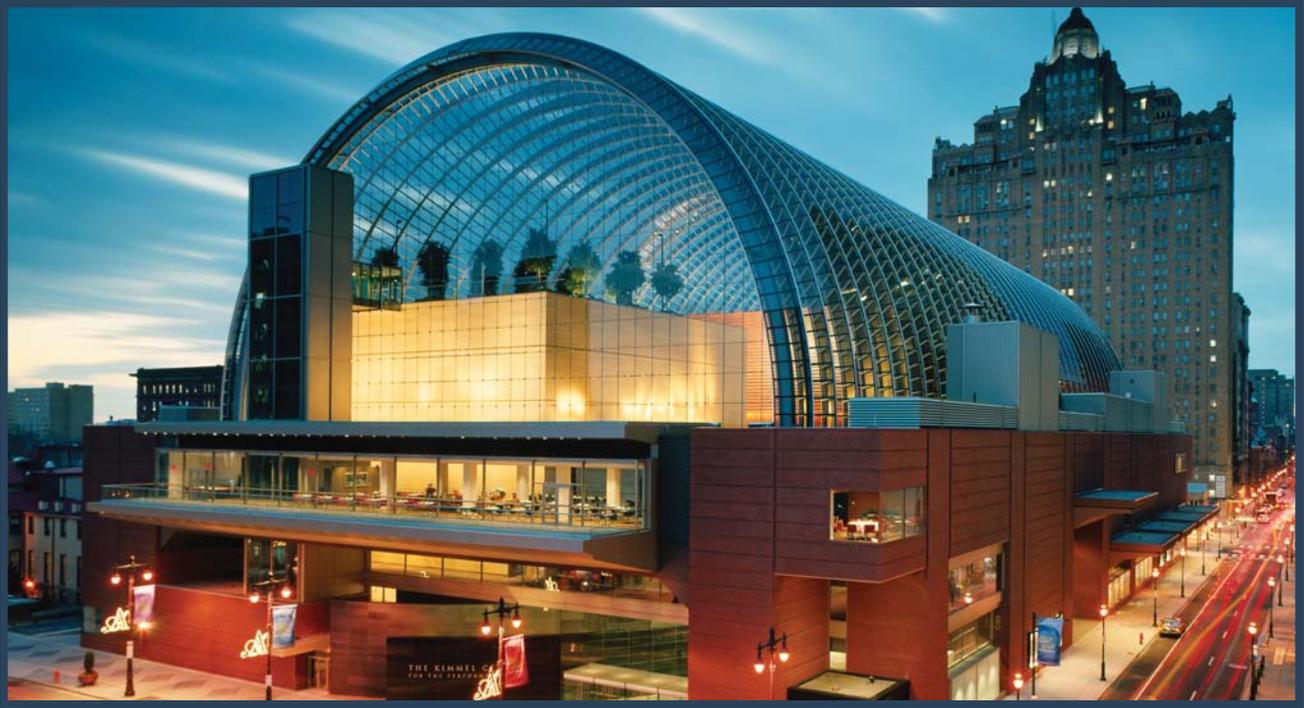


Image: Jeff Goldberg/Esto, courtesy of Kimmel Center

APPLICATION

Connecting the barrel-vault roof

LOCATION

Philadelphia, PA,
USA



HEAD TYPE

Hexagonal

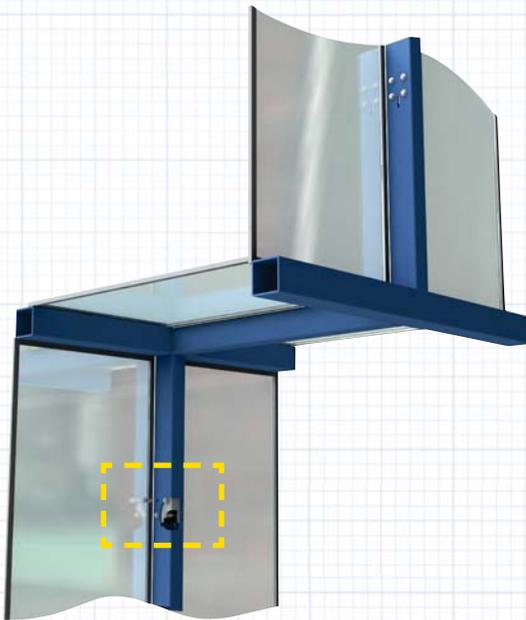
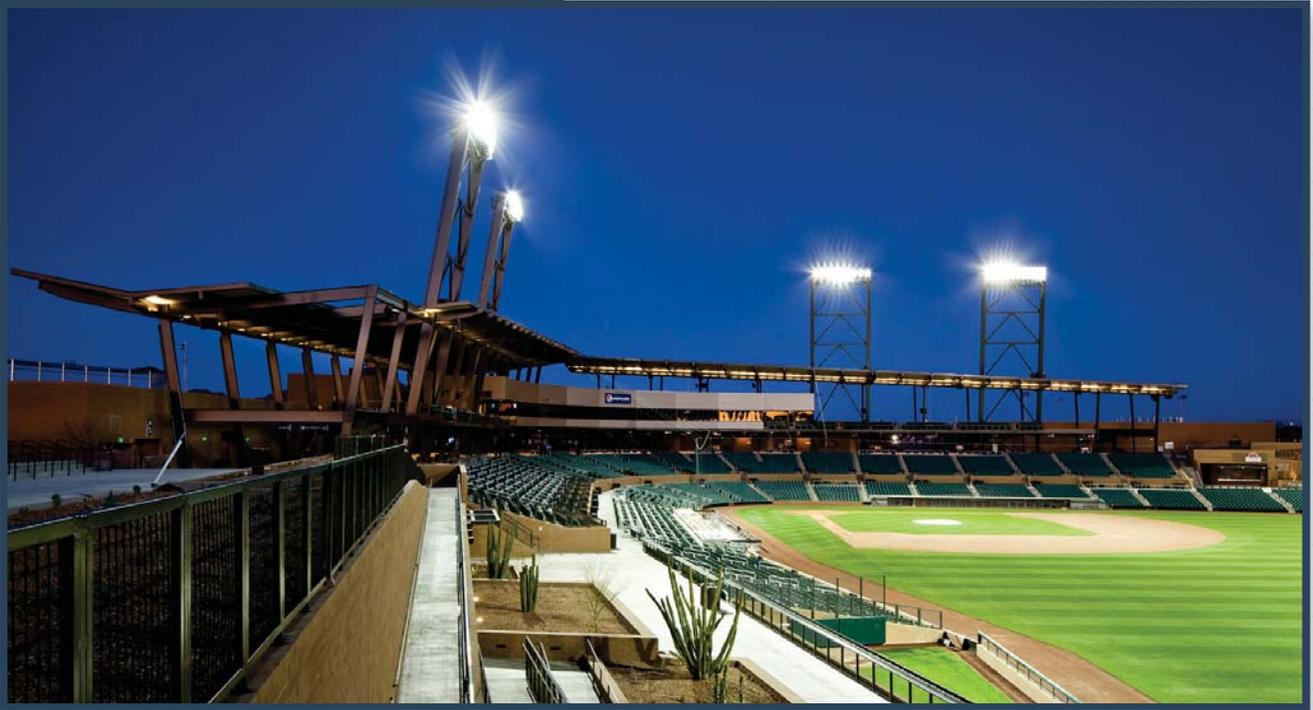


Image: R. Bradley Maulie



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SALT RIVER FIELDS - SPRING TRAINING FACILITY



APPLICATION

HSS connections for the floodlighting frame

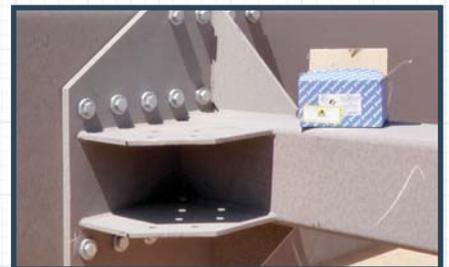
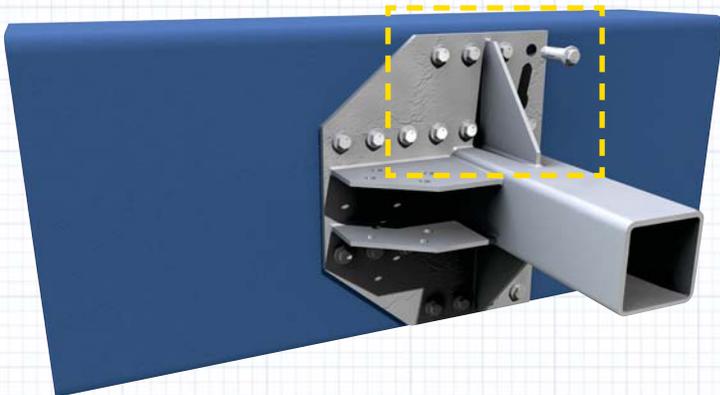
LOCATION

Scottsdale, AZ,
USA



HEAD TYPE

Hexagonal



CLOSE
UP

BMW WORLD



APPLICATION

Connection of mounting points for solar panels

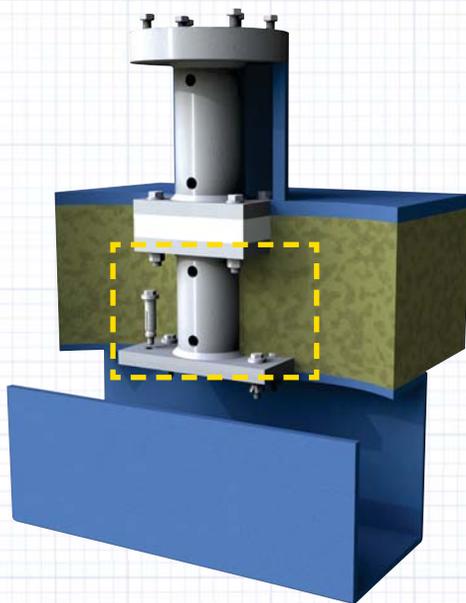
LOCATION

Munich, Germany



HEAD TYPE

Hexagonal



CLOSE UP

SNORRE OFFSHORE



APPLICATION

Securing handrails to fabricated hollow section

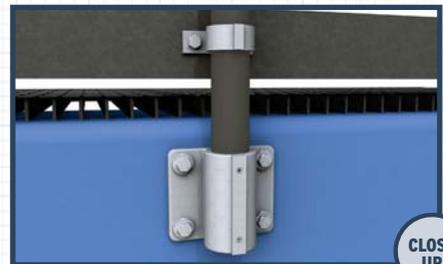
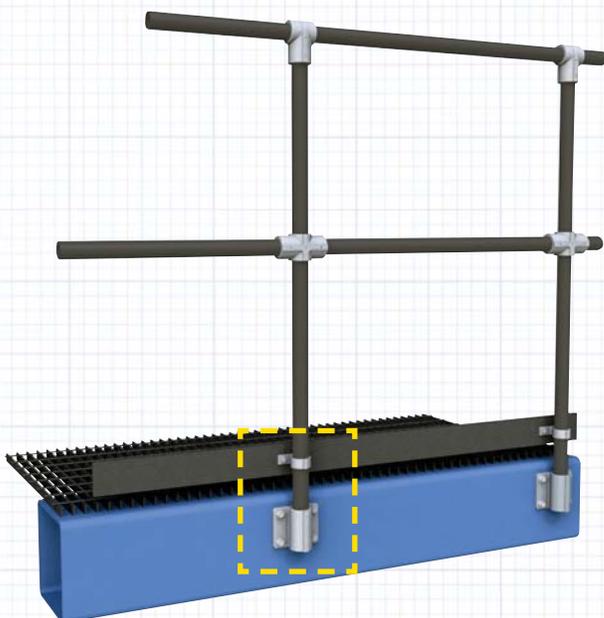
LOCATION

Norwegian
North Sea



HEAD TYPE

Hexagonal



CLOSE UP

PHOENIX METRO LIGHT RAIL



APPLICATION

Securing station signage and seating to structural frames

LOCATION

Phoenix, AZ, USA



HEAD TYPE

Button Security



CLOSE UP



www.hollo-bolt.com

TELSTRA STADIUM / OLYMPIC STADIUM

Image: Brian Parcy



APPLICATION

Securing temporary seating to supporting steel structure

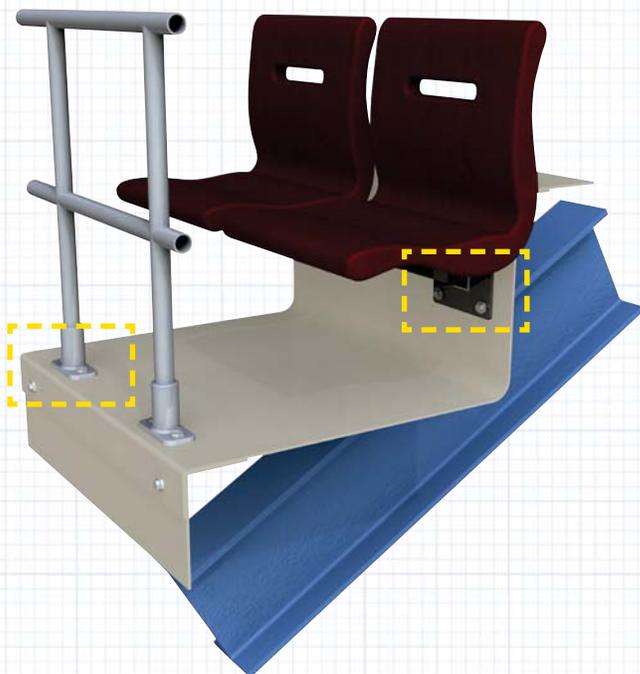
LOCATION

Sydney, Australia



HEAD TYPE

Hexagonal & Countersunk



CLOSE UP

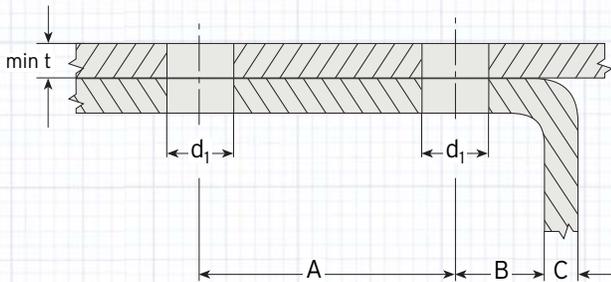
HEXAGONAL & COUNTERSUNK (BOLT HEAD)



DRILLING & PREPARATION

Ensure that holes are drilled in both the fixture and the section according to the drilling guidance below.

Please note that clearance holes are slightly larger than standard bolt clearance holes to accommodate the sleeve and cone.



| Size | Clearance Hole Ø | Hole Distances | | Edge Distances |
|-------------|------------------|----------------|--------|----------------|
| | | min A | min B | |
| M8 (5/16") | 9/16" | 1 3/8" | 1/2" | 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") | 1 1/16" | 2 3/16" | 13/16" | 1 5/16" |
| M20 (3/4")* | 1 5/16" | 2 3/4" | 1" | 1 5/16" |

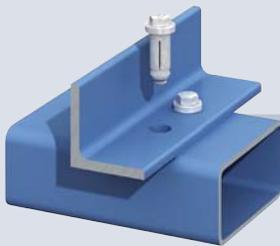
➤ Clearance Holes can be drilled with a -0 / + 1/16" tolerance.

* Hexagonal Head only

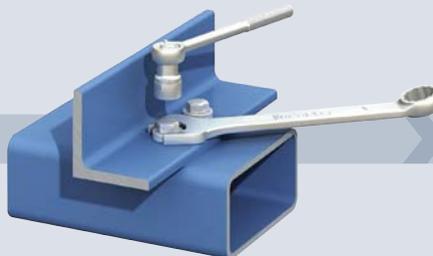
➤ Sizes M16 (5/8") and M20 (3/4") require the thickness of the outer ply (min t) to be at least 5/16". If necessary, spacer washers should be used beneath the collar to increase the thickness to 5/16".

INSTALLATION

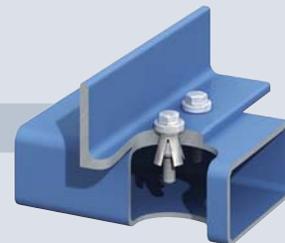
1 Align pre-drilled fixture and section and insert Hollo-Bolt^{a)}.



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^{b)}.



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

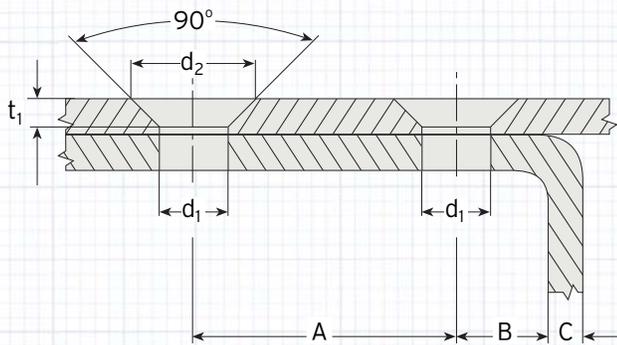
Power tools, such as an impact wrench, may be used to speed up the tightening of the Hollo-Bolt. However, when using power tools, always complete the tightening process with a torque wrench to ensure the correct torque is applied to the Hollo-Bolt.

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 clearance holes are slightly larger than standard bolt clearance holes to accommodate the sleeve and cone.



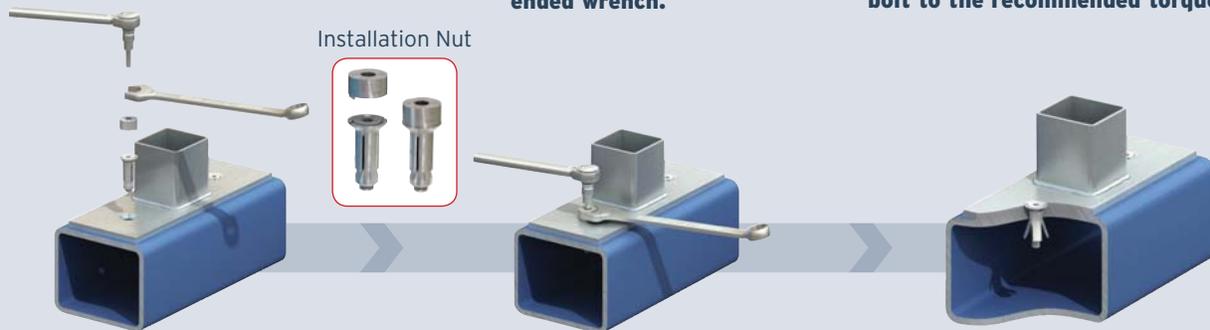
| Size | Clearance Hole \varnothing d_1 | Countersunk Depth | | Hole Distances | | Edge Distances B+C |
|------------|---------------------------------------|-------------------|-------|----------------|-------|-----------------------|
| | | d_2 | t_1 | min A | min B | |
| M8 (5/16") | 9/16" | 1 1/16" | 1/4" | 1 3/8" | 1/2" | 11/16" |
| M10 (3/8") | 3/4" | 1 1/4" | 1/4" | 1 9/16" | 9/16" | 7/8" |
| M12 (1/2") | 13/16" | 1 3/8" | 5/16" | 2" | 3/4" | 1" |

INSTALLATION

1 Align pre-drilled fixture and section and insert Hollo-Bolt^{a)}.

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^{b)}.



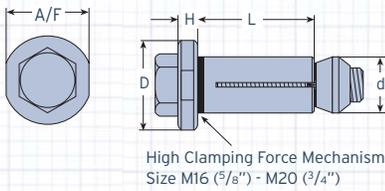
- a) Before tightening, ensure that the materials that are to be connected together are touching.
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HOLLO-BOLT SAFE WORKING LOADS

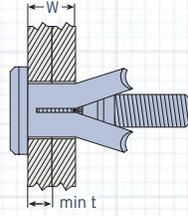
a HEXAGONAL

Across Flats

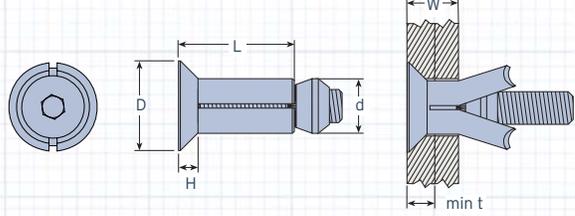


High Clamping Force Mechanism
Size M16 (5/8") - M20 (3/4")

b COUNTERSUNK (BOLT HEAD)



c FLUSH FIT



| | a HEXAGONAL | | | b COUNTERSUNK | | | | | | Tightening Torque ft lb | Safe Working Loads ²⁾ (5:1 Factor of Safety) | | | |
|---------------------------|--------------------|----------------|--------------|----------------------|-------------------------|----------------------------------|--------------------|--------------|--------------------|----------------------------|------------------------------------------------------------|-----|-------------|------------------|
| | Product Code | Bolt | Product Code | Countersunk Bolt | Clamping Thickness W | Outer Ply ^{b)} min t | Sleeve Length L | Outer Ø d | Collar Height H | | Collar Ø D | A/F | Tensile lbs | Single Shear lbs |
| | 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 5/16" | 9/16" | 3/16" | 7/8" | 3/4" | 17 | 899 | 1124 |
| | LHBM08#3 | 5/16" x 3 5/8" | LHBCSKM08#3 | 5/16" x 3 5/8" | 1 5/8" - 2 3/8" | - | 2 11/16" | | | | | | | |
| | LHBM10#1 | 3/8" x 2 1/4" | LHBCSKM10#1 | 3/8" x 2" | 1/8" - 7/8" | - | 1 3/16" | | | | | | | |
| | LHBM10#2 | 3/8" x 3" | LHBCSKM10#2 | 3/8" x 3" | 7/8" - 1 5/8" | - | 1 7/8" | 3/4" | 1/4" | 1 1/8" | 1 5/16" | 33 | 1910 | 2248 |
| | LHBM10#3 | 3/8" x 3 5/8" | LHBCSKM10#3 | 3/8" x 3 5/8" | 1 5/8" - 2 3/8" | - | 2 5/8" | | | | | | | |
| | LHBM12#1 | 1/2" x 2 3/8" | LHBCSKM12#1 | 1/2" x 2 1/4" | 1/8" - 1" | - | 1 3/8" | | | | | | | |
| | LHBM12#2 | 1/2" x 3 5/8" | LHBCSKM12#2 | 1/2" x 3 5/8" | 1" - 1 13/16" | - | 2 1/4" | 13/16" | 1/4" | 1 1/4" | 1 3/16" | 59 | 2360 | 3372 |
| | LHBM12#3 | 1/2" x 4 1/4" | LHBCSKM12#3 | 1/2" x 4 1/4" | 1 13/16" - 2 3/4" | - | 3 1/8" | | | | | | | |
| High Clamping Force (HCF) | LHBM16#1 | 5/8" x 3" | LHBCSKM16#1 | 5/8" x 2 3/4" | 1/2" - 1 1/8" | 5/16" | 1 5/8" | | | | | | | |
| | LHBM16#2 | 5/8" x 4" | LHBCSKM16#2 | 5/8" x 4" | 1 1/8" - 2" | 5/16" | 2 1/2" | 1 1/16" | 5/16" | 1 1/2" | 1 3/8" | 140 | 4720 | 6744 |
| | 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 5/8" | - | - | 1/2" - 1 5/16" | 5/16" | 1 5/16" | | | | | | | |
| | LHBM20#2 | 3/4" x 4 3/4" | - | - | 1 5/16" - 2 3/8" | 5/16" | 3" | 1 5/16" | 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 Holo-Bolt (HCF), feature a patented **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 unique Holo-Bolt (HCF) is illustrated on page 6.

| c FLUSH FIT | | | | | | | | | | Tightening Torque ft lb | Safe Working Loads ²⁾ (5:1 Factor of Safety) | |
|--------------------|------------------|-------------------------|--------------------|--------------------|--------------|-------------------------|--|--|----|----------------------------|------------------------------------------------------------|------------------|
| Product Code | Countersunk Bolt | Clamping Thickness W | Outer Ply min t | Sleeve Length L | Outer Ø d | Installation Nut A/F | | | | | Tensile lbs | Single 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" | 9/16" | 3/4" | | | 17 | 899 | 1124 | |
| LHBF08#3 | 5/16" x 3 5/8" | 1 3/4" - 2 1/2" | 5/16" | 2 7/8" | | | | | | | | |
| LHBF10#1 | 3/8" x 2 3/8" | 1/2" - 1 1/16" | 3/8" | 1 3/16" | | | | | | | | |
| LHBF10#2 | 3/8" x 3" | 1 1/16" - 1 3/4" | 3/8" | 2 1/8" | 3/4" | 1 5/16" | | | 33 | 1910 | 2248 | |
| LHBF10#3 | 3/8" x 3 5/8" | 1 3/4" - 2 1/2" | 5/16" | 2 7/8" | | | | | | | | |
| LHBF12#1 | 1/2" x 2 3/8" | 1/2" - 1 3/16" | 3/8" | 1 3/8" | | | | | | | | |
| LHBF12#2 | 1/2" x 3 1/8" | 1 3/16" - 2 1/32" | 3/8" | 2 1/2" | 13/16" | 1 5/16" | | | 59 | 2360 | 3372 | |
| LHBF12#3 | 1/2" x 4" | 2 1/32" - 2 7/8" | 3/8" | 3 3/8" | | | | | | | | |

1) Sizes M16 (5/8") and M20 (3/4") require the thickness of the outer ply (min t) to be at least 5/16". If necessary, spacer washers should be used beneath the collar to increase the thickness to 5/16".

2) The Holo-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 Holo-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.



HOLLO-BOLT CHARACTERISTIC VALUES



Characteristic values of tensile and shear resistance for Hollo-Bolt taken from ETA-10/0416.

For more information visit www.lindapter.com/about/ce

For designing to
Eurocode 3 standard only

HOLLO-BOLT HEXAGONAL

| Product Code | European Code | Nominal Size | Tensile $F_{t,Rk}$ (lbs) | Shear $F_{v,Rk}$ (lbs) | Material Strength of Sleeve (ksi) |
|--------------|---------------|--------------|--------------------------|------------------------|-----------------------------------|
| LHBM08 | HB08 | M8 | 5193 | 7396 | 62.37 |
| LHBM10 | HB10 | M10 | 8902 | 12185 | 62.37 |
| LHBM12 | HB12 | M12 | 10296 | 15961 | 62.37 |
| HCF | LHBM16 | HB16 | 18951 | 31248 | 62.37 |
| | LHBM20 | HB20 | 27876 | 47434 | 56.56 |

HOLLO-BOLT HEXAGONAL STAINLESS STEEL

| Product Code | European Code | Nominal Size | Tensile $F_{t,Rk}$ (lbs) | Shear $F_{v,Rk}$ (lbs) | Material Strength of Sleeve (ksi) |
|--------------|---------------|--------------|--------------------------|------------------------|-----------------------------------|
| LHBSTM08 | HBST08 | M8 | 6025 | 6902 | 72.52 |
| LHBSTM10 | HBST10 | M10 | 10341 | 11465 | 72.52 |
| LHBSTM12 | HBST12 | M12 | 11982 | 14613 | 72.52 |
| HCF | LHBSTM16 | HBST16 | 22031 | 28775 | 72.52 |
| | LHBSTM20 | HBST20 | 34620 | 46086 | 72.52 |

HOLLO-BOLT COUNTERSUNK (BOLT HEAD)

| Product Code | European Code | Nominal Size | Tensile $F_{t,Rk}$ (lbs) | Shear $F_{v,Rk}$ (lbs) | Material Strength of Sleeve (ksi) |
|--------------|---------------|--------------|--------------------------|------------------------|-----------------------------------|
| LHBCSKM08 | HBCSK08 | M8 | 5193 | 7396 | 62.37 |
| LHBCSKM10 | HBCSK10 | M10 | 8902 | 12185 | 62.37 |
| LHBCSKM12 | HBCSK12 | M12 | 10296 | 15961 | 62.37 |
| HCF | LHBCSKM16 | HBCSK16 | 18951 | 31248 | 62.37 |

HOLLO-BOLT COUNTERSUNK (BOLT HEAD) STAINLESS STEEL

| Product Code | European Code | Nominal Size | Tensile $F_{t,Rk}$ (lbs) | Shear $F_{v,Rk}$ (lbs) | Material Strength of Sleeve (ksi) |
|--------------|---------------|--------------|--------------------------|------------------------|-----------------------------------|
| LHBSTCSKM08 | HBSTCSK08 | M8 | 6025 | 6902 | 72.52 |
| LHBSTCSKM10 | HBSTCSK10 | M10 | 10341 | 11465 | 72.52 |
| LHBSTCSKM12 | HBSTCSK12 | M12 | 11982 | 14613 | 72.52 |
| HCF | LHBSTCSKM16 | HBSTCSK16 | 22031 | 28775 | 72.52 |

➤ Sizes M16 ($\frac{5}{8}$ "") and M20 ($\frac{3}{4}$ ""), known as the Hollo-Bolt (HCF), feature a patented **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 unique Hollo-Bolt (HCF) is illustrated on page 6.

HOLLO-BOLT FLUSH FIT

| Product Code | European Code | Nominal Size | Tensile $F_{t,Rk}$ (lbs) | Shear $F_{v,Rk}$ (lbs) | Material Strength of Sleeve (ksi) |
|--------------|---------------|--------------|--------------------------|------------------------|-----------------------------------|
| LHBFFM08 | HBFF08 | M8 | 5193 | 7396 | 62.37 |
| LHBFFM10 | HBFF10 | M10 | 8902 | 12185 | 62.37 |
| LHBFFM12 | HBFF12 | M12 | 10296 | 15961 | 62.37 |

HOLLO-BOLT FLUSH FIT STAINLESS STEEL

| Product Code | European Code | Nominal Size | Tensile $F_{t,Rk}$ (lbs) | Shear $F_{v,Rk}$ (lbs) | Material Strength of Sleeve (ksi) |
|--------------|---------------|--------------|--------------------------|------------------------|-----------------------------------|
| LHBSTFFM08 | HBSTFF08 | M8 | 6025 | 6902 | 72.52 |
| LHBSTFFM10 | HBSTFF10 | M10 | 10341 | 11465 | 72.52 |
| LHBSTFFM12 | HBSTFF12 | M12 | 11982 | 14613 | 72.52 |

HOLLO-BOLT BUTTON HEAD / SECURITY

Please contact Lindapter to discuss the available options.

| Product Code | European Code | Nominal Size | Tensile $F_{t,Rk}$ (lbs) | Shear $F_{v,Rk}$ (lbs) | Material Strength of Sleeve (ksi) |
|-----------------------|--------------------|--------------|--------------------------|------------------------|-----------------------------------|
| LHBBH/LHBFT/ LHBPR | HBBH/HBFT /HBPR | M8 | 5193 | 7396 | 62.37 |
| LHBBH/LHBFT/ LHBPR | HBBH/HBFT /HBPR | M10 | 8902 | 12185 | 62.37 |
| LHBBH/LHBFT/ LHBPR | HBBH/HBFT /HBPR | M12 | 10296 | 15961 | 62.37 |

➤ The characteristic values for the Hollo-Bolt listed in the above tables are for use when designing bolted connections to Eurocode 3 only, these are not standard safe working loads.

Hollo-Bolt lengths 1, 2 and 3 are covered by this ETA 10/0416. The characteristic values are used to determine the design resistance of the Hollo-Bolt. The design resistance is calculated by dividing the characteristic value by a partial factor γ_{m2} . The partial factor is a nationally determined parameter (for example: $\gamma_{m2} = 1.25$ in the UK). For Hollo-Bolt safe working loads with a factor of safety of 5:1 please refer to the Hollo-Bolt tables on Page 22 of this brochure.

The characteristic values are valid for the Hollo-Bolt assembly itself, in any connection detail the design resistance of the connection may be limited to a lesser value. For example, when the thickness of the connected component is small, pull out failure may occur before failure of the Hollo-Bolt.

Design checks should be carried out on the section member to determine the static design resistance. The SCI Greenbook publication P.358 Joints in Steel construction, Simple Joints to Eurocode 3 contains a number of checks on the section. The characteristic values are only valid when the Hollo-Bolts are installed as per our installation instructions.



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

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.

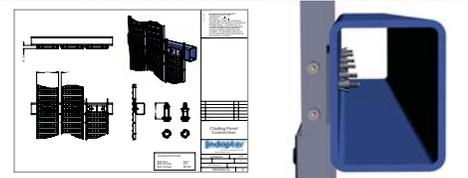
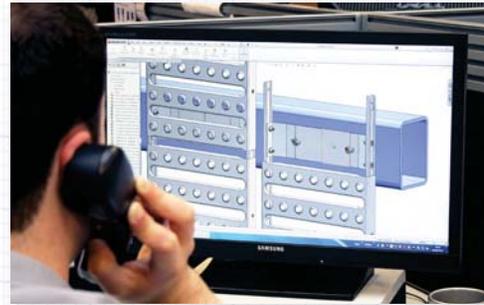
Why aren't the Flush Fit, Countersunk & Button Head Hollo-Bolts available in Hot Dip Galvanized finish?

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 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
- Bespoke drawings delivered in 2D and interactive 3D formats
- CAD files for import into major software applications
- Contractor training



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

R&D Facility >
One of two
224800 lbs
hydraulic
testing machines

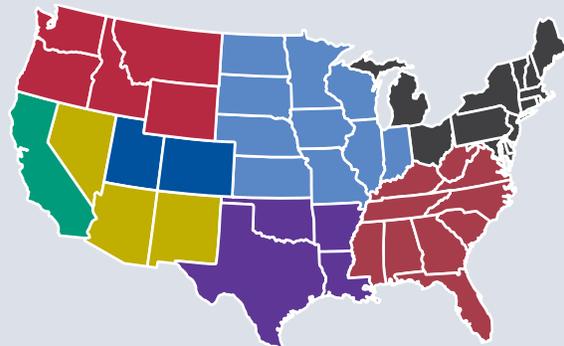


^ Type 1055
Custom product designed to fit solid plate flooring to open grid flooring for Amec/Shell

lindapter USA | **Authorized distribution network**

Original Lindapter products are readily available across the USA from multiple distributor locations, offering buyers greater availability and faster delivery.

To find your nearest distributor visit www.lindapterusa.com



www.hollo-bolt.com

FULL PRODUCT LINE

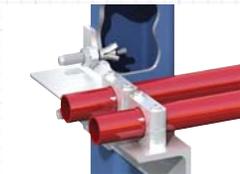
LINDAPTER USA CATALOG

WHAT'S INSIDE?



STEEL CONNECTIONS

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



PIPE / CONDUIT SUPPORTS

Lindapter provides a wide range of connection solutions for suspending building services, such as pipe work, sprinklers & 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 & checker plate flooring can be installed by one person from above.

AVAILABLE NOW!



Type AF
Steel Connections 1

Typical Applications

Type AF
Clamp for pipe and conduit

Type AF & HSS
Expansion Bolt

Type AF & HSS
Clamp with the Hollo-Bolt

Typical Applications
(see also page 21-22)

| Product Code | Hole Size | Hole Spacing | Hole Diameter | Hole Depth | Hole Spacing | Hole Spacing | | Hole Spacing | Hole Spacing | Hole Spacing | Hole Spacing |
|--------------|-----------|--------------|---------------|------------|--------------|--------------|------|--------------|--------------|--------------|--------------|
| | | | | | | Min | Max | | | | |
| AF-100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| AF-125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 |
| AF-150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| AF-200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| AF-250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| AF-300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| AF-350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 |
| AF-400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| AF-450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 |
| AF-500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| AF-550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 |
| AF-600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| AF-650 | 650 | 650 | 650 | 650 | 650 | 650 | 650 | 650 | 650 | 650 | 650 |
| AF-700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 |
| AF-750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| AF-800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 |
| AF-850 | 850 | 850 | 850 | 850 | 850 | 850 | 850 | 850 | 850 | 850 | 850 |
| AF-900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 |
| AF-950 | 950 | 950 | 950 | 950 | 950 | 950 | 950 | 950 | 950 | 950 | 950 |
| AF-1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |

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