MI Technical Guide

MI Industrial Support System

2009

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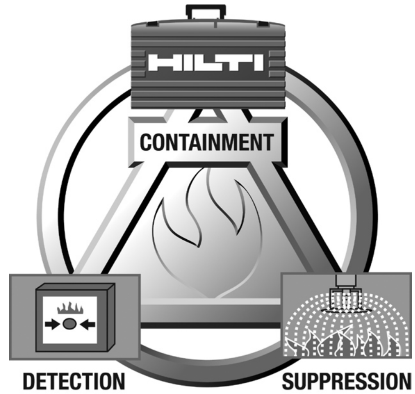

Firestop Systems

When it comes to Life Safety and building code compliance, Hilti provides complete solutions with a wide range of products and unmatched technical support.

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  - Through Penetrations
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- FACT Program
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Hilti Diaphragm Deck Design

The Hilti Diaphragm Deck Design Program allows designers to quickly and accurately design roof deck and composite floor deck diaphragms.

- Ability to design with innovative Hilti fasteners for frame and sidelap connection
- Creates easy to use load tables with span ranges based on user input
- Allows for different safety factors depending on load type, building code and field quality control
- Direct link to Hilti website

Hilti Online

- Technical Library
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- Full-line Product Catalog
- Online Ordering
- Maps to Hilti locations
- "Contact Us" program to answer your questions

North American Product Technical Manual –
A guide to specification and installation

- Fastening Technology
- Powder and Gas Actuated Systems
- Deck Fastening Systems
- Screw Fastening Systems
- Anchoring Systems
- Installation Systems
- Chemical Systems
- Reference – Approvals, listings and standards

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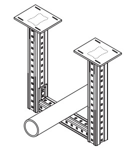

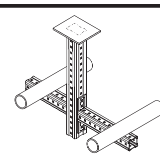

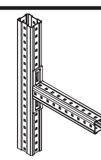

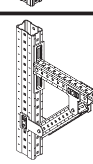

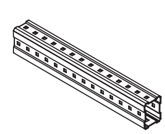

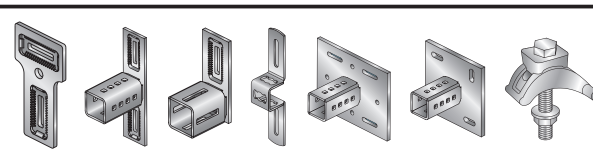

About Published Load Values

Technical data presented herein was current as of the date of publication (see back cover). Load values are based on testing and analytical calculations by Hilti or by contracted testing laboratories using testing procedures and construction materials representative of current practice in North America. Load values obtained from testing represent the average results of multiple identical samples. Variations in base materials such as concrete and local site conditions require on-site testing to determine actual performance at any specific site. Data may also be based on national standards or professional research and analysis.

Note that design values published in reports issued by approval agencies (e.g., ICC-ES, COLA, etc.) may differ from those contained in this Product Technical Guide.

For information regarding updates and changes, please contact Hilti,Inc. (US) Technical Support at **1-877-749-6337** or Hilti (Canada) Corporation at **1-800-363-4458**.

Units

Technical data is provided in both fractional (Imperial) and metric units. Metric values are provided using the International System of units (SI) in observance with the **Metric Conversion Act of 1975** as amended by the **Omnibus Trade and Competitiveness Act of 1988.** MI product dimensions are converted from SI units, shown in parentheses, to Imperial units. Additional information may be found on page 67, Metric Conversions and Equivalents, provided in this Product Technical Guide.

Our Purpose

We passionately create enthusiastic customers and build a better future!

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We create success for our customers by identifying their needs and providing innovative and value-adding solutions.

Build a better future

We embrace our responsibility towards society and environment.

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Hilti is one of a select group of North American companies to receive the ISO 9001 and ISO 14001 Certifications. This recognition of our commitment to quality ensures our customers that Hilti has the systems and procedures in place to maintain our position as the world market leader, and to continually evaluate and improve our performance.

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For Technical Support, contact Hilti, Inc. (US) at 1-877-749-6337 or Hilti (Canada) Corporation at 1-800-363-4458.

The Corrosion Process

Corrosion is defined as the chemical or electrochemical reaction between a material, usually a metal, and its environment that produces a deterioration of the material and its properties (ASTM G 15). The corrosion process can be very complex and has many contributing factors that lead to immediate or delayed destructive results.
In anchorage and fastener design, the most common types of corrosion are direct chemical attack and electro-chemical contact.

Types of Corrosion

Direct Chemical Attack

Corrosion by direct chemical attack occurs when the base material is soluble in the corroding medium. One method of mitigating these effects is to select a product whose base metal is not susceptible to attack by the corroding chemical.

When selection of a base metal compatible with the corroding medium is not possible or economical, another solution is to provide a coating that is resistant to the corroding medium. These might include metallic coatings such as zinc or organic coatings such as epoxies or fluorocarbons.

Electrochemical Contact Corrosion

All metals have an electrical potential relative to each other and have been ranked accordingly to form the “electromotive force series” or galvanic series of metals. When metals of different potential come into contact in the presence of an electrolyte (moisture), the more active metal with more negative potential becomes the anode and corrodes, while the other metal becomes the cathode and is galvanically protected.

The severity and rate of attack will be influenced by:

a. Relative position of the contacting metals in the galvanic series,

b. Relative surface areas of the contacting materials and,

c. Conductivity of the electrolyte.

The effects of electro-chemical contact corrosion may be mitigated by:

a. Using similar metals close together in the electromotive force series,

b. Separating dissimilar metals with gaskets, plastic washers or paint with low electrical conductivity. Materials typically used in these applications include:

1. High Density Polyethylene (HDPE)
2. Polytetrafluoroethylene (PTFE)
3. Polycarbonates
4. Neoprene / chloroprene
5. Cold galvanizing compound
6. Bituminous coatings or paint

Note: Specifiers must ensure that these materials are compatible with other components in the service environment.

c. Selecting materials so that the smaller component is the cathode, most noble or protected component,

d. Providing drainage or weep holes to prevent entrapment of the electrolyte.

Galvanic Series of Metals and Alloys
Corroded End (anodic, or least noble)
Magnesium Magnesium alloys Zinc
Aluminum 1100 Cadmium Aluminum 2024-T4 Steel or Iron Cast Iron Chromium-iron (active) Ni-Resist cast iron
Type 304 Stainless (active) Type 316 Stainless (active)
Lead tin solders Lead Tin
Nickel (active) Inconel nickel-chromium alloy (active) Hastelloy Alloy C (active)
Brasses Copper Bronzes Copper-nickel alloys Monel nickel-copper alloy
Silver solder Nickel (passive) Inconel nickel-chromium alloy (passive)
Chromium-iron (passive) Type 304 Stainless (passive) Type 316 Stainless (passive) Hastelloy Alloy C (passive)
Silver Titanium Graphite Gold Platinum
Protected End (cathodic, or most noble)

Source: IFI Fastener Standards, 6th Edition

Hydrogen Assisted Stress Corrosion Cracking

Often incorrectly referred to as hydrogen embrittlement, hydrogen assisted stress corrosion cracking (HASCC) is an environmentally induced failure mechanism that is sometimes delayed and most times occurs without warning. HASCC occurs when a hardened steel part is stressed (loaded) in a service environment which chemically generates hydrogen (such as when zinc and iron combine in the presence of moisture). The potential for HASCC is directly related to steel hardness. The higher the hardness, the greater the susceptibility to stress corrosion cracking failures. Eliminating or reducing any one of these contributing factors (high steel hardness, corrosion or stress) reduces the overall potential for this type of failure. Hydrogen embrittlement, on the other hand, refers to a potential damaging side effect of the manufacturing process, and is unrelated to project site corrosion. Hydrogen embrittlement is neutralized by proper processing during pickling, cleaning and plating operations, specifically by "baking" the part after the application of the galvanic coating.

Corrosion Protection

The most common material used for corrosion protection of carbon steel parts is zinc. Zinc coatings can be uniformly applied by a variety of methods to achieve a wide range of coating thickness depending on the application. All things being equal, thicker coatings typically provide higher levels of protection.

An estimating table for the mean corrosion rate and service life of zinc coatings in various atmospheres is provided to the right. These values are for reference only, due to the large variances in the research findings and specific project site conditions, but they can provide the specifier with a better understanding of the expected service life of zinc coatings. In controlled environments where the relative humidity is low and no corrosive elements are present, the rate of corrosion of zinc coatings is approximately 0.15 microns per year.

Zinc coatings can be applied to steel components by different methods. These include (in order of increasing coating thickness and corrosion protection):

a. ASTM B 633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

b. ASTM B 695 – Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

c. ASTM A 153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

d. Sherardizing Process – Proprietary Diffusion Controlled Zinc Coating Process

Atmosphere	Mean Corrosion Rate
Industrial	5.6 μm/year
Urban Non-Industrial or Marine	1.5 μm/year
Suburban	1.3 μm/year
Rural	0.8 μm/year
Indoors	Considerably less than 0.5 μm/year

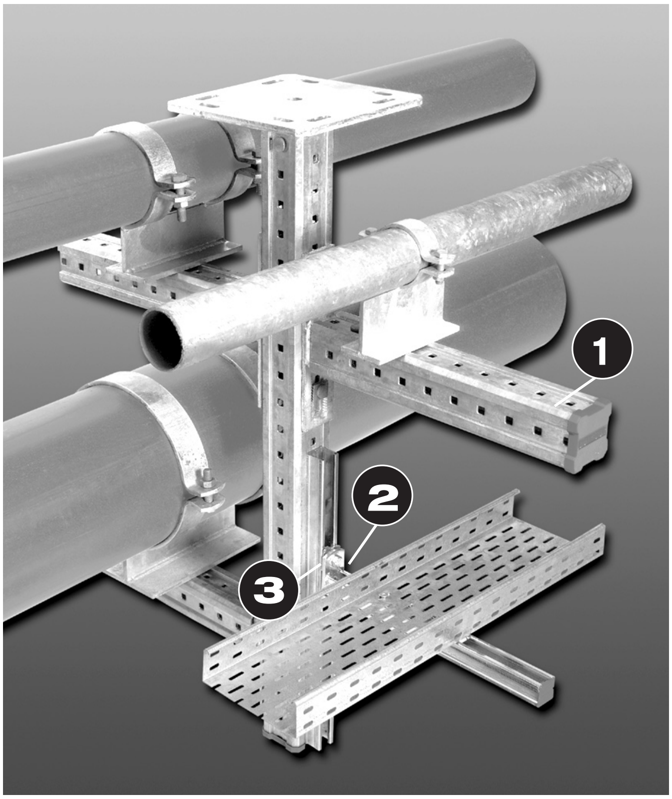
Source: ASTM B 633 Appendix X1. Service Life of Zinc

Suggested Corrosion Resistance

Use of AISI 316 stainless steel in environments where pitting or stress corrosion is likely should be avoided due to the possibility of sudden failure without visual warning. Fastenings in these applications should be regularly inspected for serviceability condition.

Corrosion Resistance	Typical Conditions of Use
Phosphate and Oil Coatings (Black Oxide)	• Interior applications without any particular influence of moisture
Zinc electro-plated 5 – 10 μm (ASTM B 633, SC 1, Type III) Organic Coatings – Kwik Cote ≥ 17.8 μm	• Interior applications without any particular influence of moisture • If covered sufficiently by noncorrosive concrete
Mechanically deposited zinc coating 40 – 107 μm Hot-Dip Galvanizing (HDG) > 50 μm (ASTM A 153) or > 75 μm (ASTM A 123)	• Interior applications in damp environments and near saltwater (ASTM B 695) • Exterior applications in only slightly corrosive atmospheres
Stainless Steel (AISI 303 / 304)	• Interior applications where heavy condensation is present • Exterior applications in corrosive environments
Stainless Steel (AISI 316)	• Near saltwater • Exterior corrosive environments

Cover a wide range of loads with the Hilti MI and MQ systems!



1 MI System

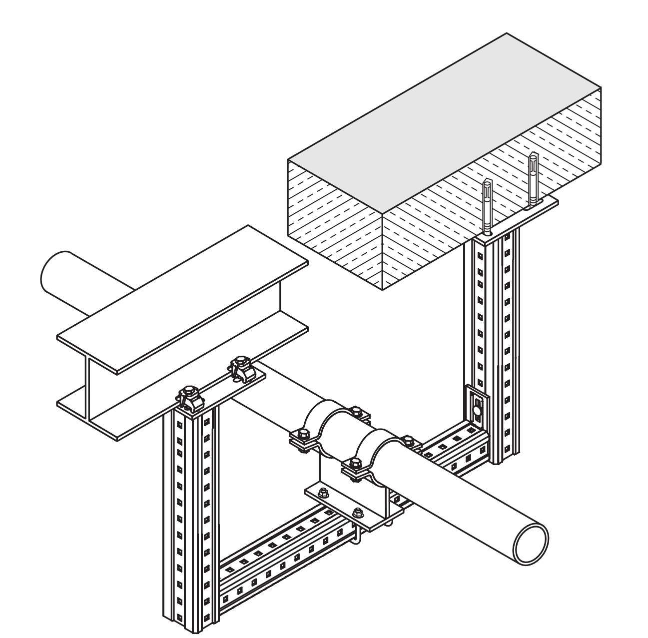
The modular support system for medium to heavy loads without welding: easy to install and extremely dependable, the Hilti MI System is the ideal solution for pipes and cable trays.

2 MQ System

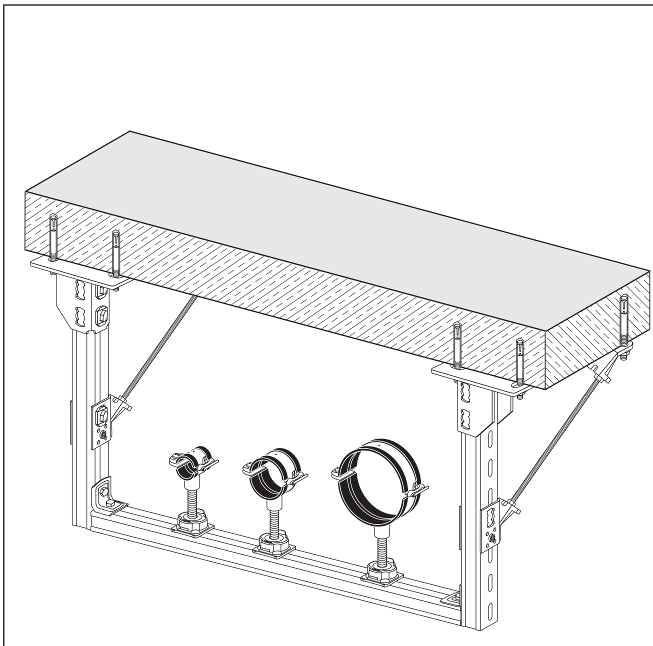
The well-proven Hilti MQ System for loads in the medium range is the versatile extension of the MI System. Ideal for installing pipes and cable trays.

3 The right connection

With the strength of welded structures but much more efficient: a unique, longitudinal swaged indentation ensures easy modular combination of the two systems. The precise fit of the girders and channels allows loads to be taken up optimally and eases installation.



MI System



MQ System

Introduction to the MI System

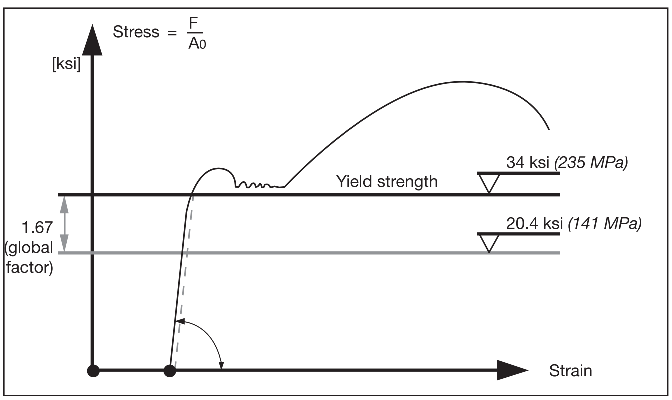
The loading tables and diagrams for individual parts and applications for the MI System are based on the following:

- –AISI (American Iron and Steel Institute) - Specification for the Design of Cold-Formed Steel Structural Members
- –AISC (American Institute of Steel Construction) Structural Steel Design of buildings
- –ASME (American Society of Mechanical Engineers)

The basic design principles in ASME B 31.3 Process Piping are similar and are based to a great extent on the regulations published in AISC. All verification calculations take the partial safety factors into account.

The allowable loads given in the tables are calculated according to ASD (Allowable Stress Design).

Safety factors

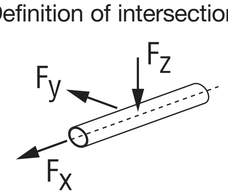


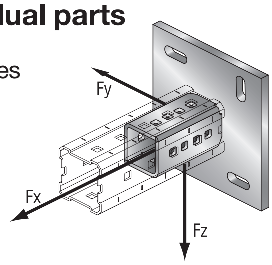
Material: Steel Grade 33 (effective Yield strength: 34 ksi)
Global factor: 1.67

Allowable load according to LRFD (Load and Resistance Factor Design): First multiply given loads by 1.67. The values you get have to be factored by the relevant resistance and load factors according to LRFD regulations.

1) Load tables for individual parts

Definition of intersection of axes





Load force directions are indicated in the tables ± F_{xyz} with + acting in the arrow direction
x-axis = individual parts –> girders; applications –> pipe axis
y-axis = horizontal axis of frame
z-axis = vertical axis of frame

The load values have been determined by structural analysis calculations.

a) The MI-SGC-M12 beam clamp has been designed as an ideal means of rigid fastening. The allowable maximum shear load on these clamps depends on the applicable stress (see load table). **The clamps must always be used in pairs positioned on opposite sides of the flange**. The published load values are based on testing with hot-dip galvanized plate on hot-dip galvanized surface. The allowable maximum shear load will be lower on painted surfaces. In case of doubt, tests should be carried out to determine the applicable maximum shear load. The materials being fastened must be clean and free from oil and grease.

b) Calculations are based on the published allowable load values for the KB3 anchors in 3000 psi uncracked concrete. The other general conditions (i.e. concrete strength, thickness etc.), must comply with the applicable published technical information, approvals and national regulations.

c) Bolting connectors to girders: The minimum edge distance (end of girder to nearest bolt) should be 1". The connector must engage the girder so the girder end is between the connector weld and first hole or slot. Connectors supplied with two bolts must position them perpendicular to each other. Pretension bolts to an installation torque of 62 ft-lbs. In some cases, a higher moment resistance can be achieved by using 3 bolts.

d) Factors such as bolts located in the outermost positions on connectors has been taken into account.

2) Load tables for applications

Published allowable loads are based on static loading conditions. Forces resulting from pipe expansion must be taken into account during design. Where the loads induced by pipes or pipe supports caused by friction between the steel surfaces results in a coefficient of friction μ > 0.15, the MIC-PG low friction insert must be used to reduce the expansion related loads.

The allowable load values given in the tables assume use of the MIC-PG low friction insert with a coefficient of friction of μ = 0.15.

These load values take into account the related friction load at the support (based on a coefficient of friction of μ = 0.15), and thus do not require other special consideration.

a) Single spans and cantilevers: The figures in the tables apply to purely vertical loading or, where indicated, also to horizontal loads. Due to the high torsional rigidity of the girders (MI 90 and MI 120) the resulting increase in tensile stress or twisting is insignificant (less than 1°). Other extreme torsional loads must independently be verified.

b) Buckling: The buckling load table applies to central buckling loads according to Euler's k-value, K = 1. Additional moments resulting from offsetting, angles or other types of loading must be taken into consideration in design calculations (see table on pages 34 and 66).

Introduction to the MI System

c) U-frame, Cantilever, Lorraine Cross Supports: All individual parts of assembled supports has been verified. When any attachment is fastened to steel beams or concrete the base material must be independently verified to ensure it is properly designed to account for all loading conditions.

3) Dynamic loads

a) General

International piping standards (e.g. EN 13480 or ASME B 31.3) specify that the design of a pipe run has to be analyzed to eliminate dynamic loads transmitted to the pipe run. Dynamic decoupling, impact brakes, vibration dampers etc. can be used for this task.

b) Origin and types of dynamic loads

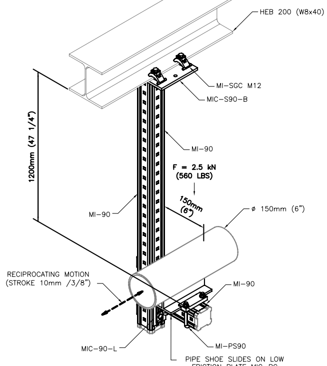
Dynamic load are defined by the load amplitude, frequency, number of load cycles, and direction of loads. For pipe and industrial cable tray supports there are basically two different types of dynamic loads relevant:

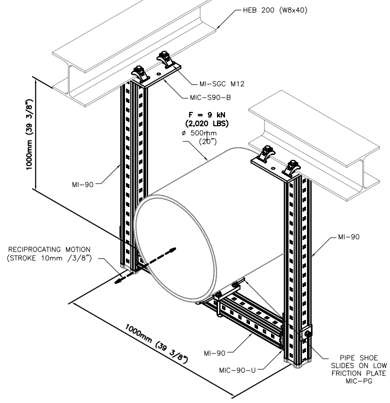
i) Dynamic loads with high frequency and small amplitudes, commonly referred to as vibration, caused by operating rotating equipment such as pumps and motors.
ii) Dynamic loads with low frequency and large amplitudes commonly caused by wind, start or stop of equipment, or individual components

c) Application of Hilti pipe support products under dynamic loads

The MI M12 self locking collar hex nut uses a metal self locking mechanism in the threads to avoid loosening bolted connections. The Junker vibration test DIN 65151 was used for this purpose with the MI bolted connections. In addition to connection parts individually dynamically tested, an MI systems dynamic test, including beam clamps, the MI M12 self locking collar nuts, girders and connectors, was also tested without showing evidence of any reduction in load-carrying capacity.

i) MI system dynamic test
  - Cycles 1 million
  - Frequency 1 Hz
  - Signal Form Sinus
  - Amplitude 5 mm (10 mm total displacement)





4) General points

a) Reusability of components from the Hilti MI System

The reuse of components from the Hilti MI System is possible as long as all of the following conditions are checked and observed in each case before reuse:

- The components must not show any signs of damage such as deformation or cracking.
- The components must not have been subjected to loads exceeding the published allowable loads during previous applications.
- The corrosion protection on MI System components must be undamaged and must meet the demands of the new application.
- Low-friction inserts MIC-PG, item 304842, that show clear signs of wear should not be reused.
- In order to avoid assembly errors, the personnel carrying out the work must have read the installation instructions. Original Hilti connecting parts (bolts, nuts, etc.) must be used.
- MI nuts M12-F-SL WS 3/4, item 382897, can be re-used up to five times.
- In order to avoid damage to the components, structures should be dismantled only by suitably trained personnel.

The user carries responsibility for ensuring that these points are observed.

Even if only one of these prerequisites is not fulfilled, the corresponding parts should not be reused.

b) Corrosion protection

The surfaces of components are hot-dip galvanized according to DIN EN ISO 1461, ASTM A153. The suitability of this level of corrosion protection must be independently verified.

c) Area of applications

The MI System is designed for installations in compliance with the requirements of the ASME B 31.3 Process Piping.

Objectives

Technical data presented herein was current as of the date of publication (see back cover). Variations in base materials such as concrete and local site conditions require on-site testing to determine actual performance at any specific site. Data may also be based on national standards or professional research and analysis.

Great care was taken in the preparation of these tables and diagrams and the results checked several times. The possibility of errors, however, cannot be excluded. These tables and diagrams are intended purely as an aid to the user and no guarantee can be given regarding their correctness or accuracy when used for design calculations for a specific application. Should you, despite the care we have taken, discover an error in the information given here, please notify us accordingly.
In any event, the static system or, respectively, the specific application must always be checked for plausibility by the user.

General information

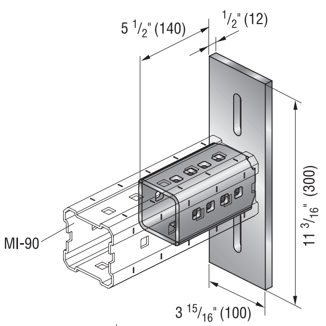
U-frames, Lorraine cross, cantilevers

Various connecting components, according to requirements for connections to existing structures / materials, are available for the applications mentioned above. The components selected have a decisive influence on the recommended allowable loads.

The values given in the subsequent tables take the following into account:

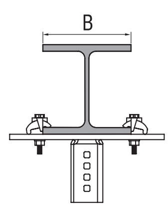
– All load values F are **recommended** allowable loads
– **MIC-PG low-friction inserts coefficient of friction is μ = 0.15**
– Bolt tightening torque for all M10 bolts is 44 ft-lbs.
– Tightening torque for the MI-SGC-M12 and MI-DGC beam clamps, and all M12 diameter bolts is 62 ft-lbs with a coefficient of friction μ = 0.12.

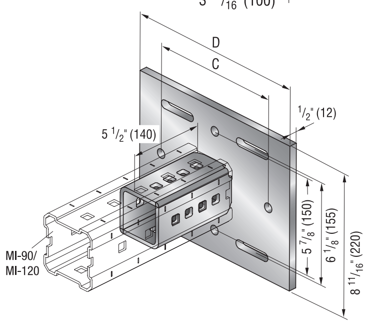
Connections to steel beams



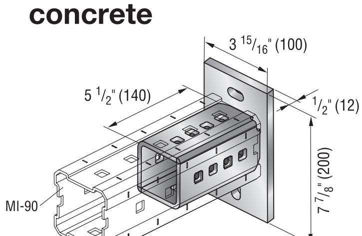
Ordering designation	Steel beam flange width or height B (in)	C (in)	D (in)	For MI girder
MIC-S90-AA	4.4 - 8.0	6-5/8	11-13/16	90
MIC-S90-A	2.9 - 6.5	7.9	11.0	90
MIC-S90-B	6.5 - 9.2	11.8	13.8	90
MIC-S90-C	9.2 - 12.0	13.8	16.9	90
MIC-S120-A	2.9 - 6.5	7.9	11.0	120
MIC-S120-B	6.5 - 9.2	11.8	13.8	120
MIC-S120-C	9.2 - 12.0	13.8	16.9	120

Fastened using **MI-SGC-M12** beam clamps item 233859, page 57.

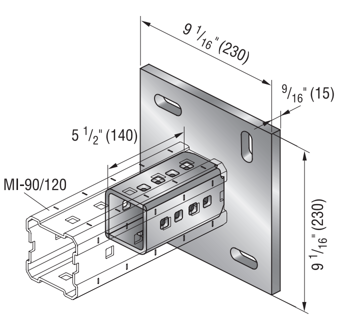




Connections to concrete

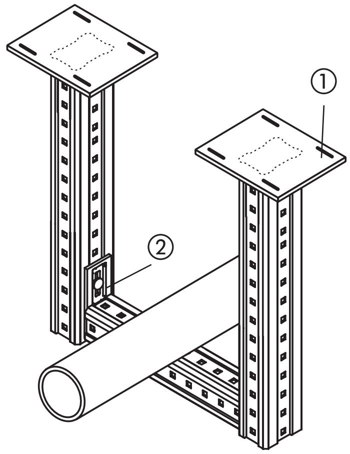


Ordering designation	For MI girder
MIC-C90-AA	90
MIC-C90-D	90
MIC-C120-D	120

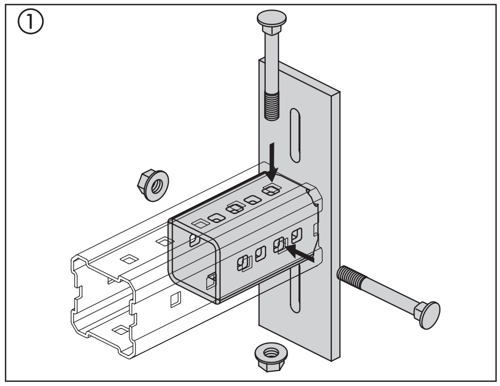


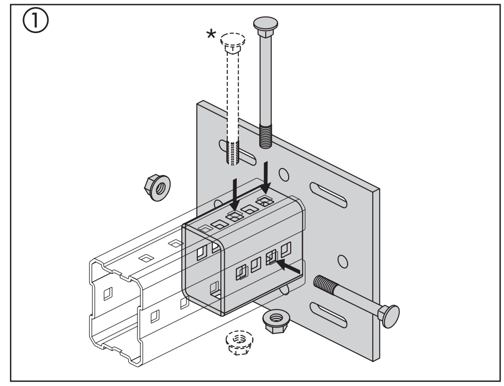
Note: The allowable loads for assemblies attached to concrete base material are based on 3,000 psi NWC, utilizing suitable anchor(s) to properly transmit the loads, taking into account all relevant constraints (e.g. edge distances, anchor spacing, minimum base material thickness, etc.). This must be independently evaluated - see the Hilti North American Technical Guide for complete anchoring details. The forces taken up by the base material (steel, concrete, etc.) must also be verified separately. The application guidelines contained in anchor approvals must be observed.

U-frames: General information

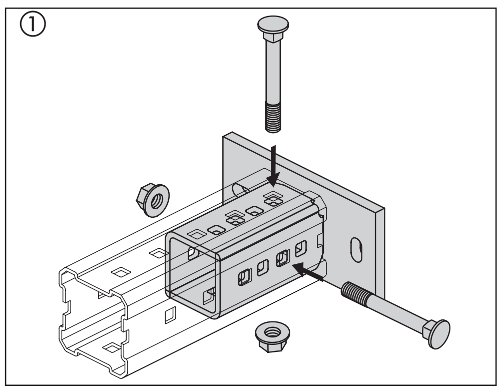


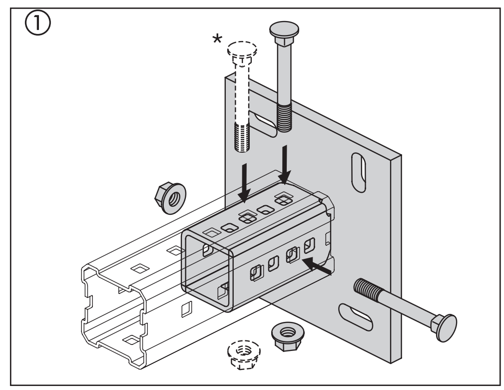
Connections to steel: MIC-S90-AA, MIC-S90-A/B/C/120-A/B/C



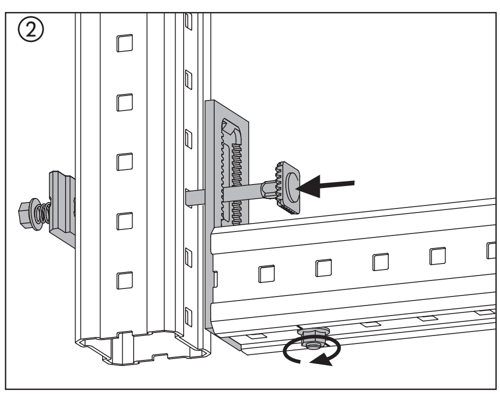


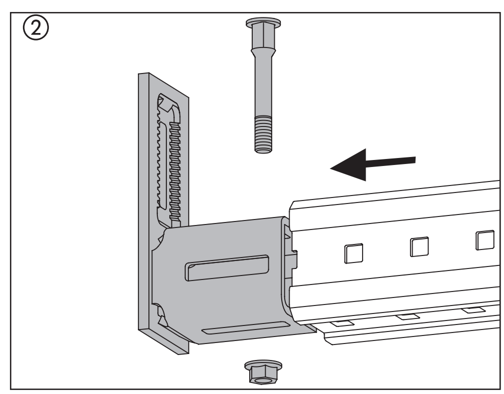
Connections to concrete: MIC-C90-AA, MIC-C90-D/120-D





MI connector: MIC-90-U, MIC-120-U

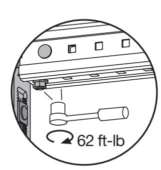


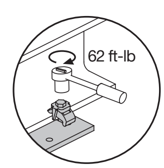


The MI connector must engage the girder so the end of the girder is between the connector weld and first hole or slot. The bolts should be located in the holes closest to the connector base as possible and a minimum of 1" from the girder end. Connectors with two bolts should be positioned perpendicular to each other.

* In some cases, a higher moment resistance can be achieved through the use of a third bolt (see load tables for individual components). The bolt should be fitted in the direction of the largest horizontal force.

Note: The third bolt must be ordered additionally.

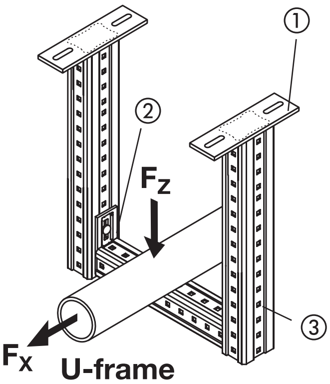




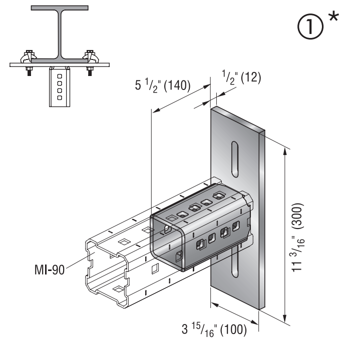
Bolt tightening torque: For connectors For beam clamps

MIC-S90-AA U-frames on steel beams

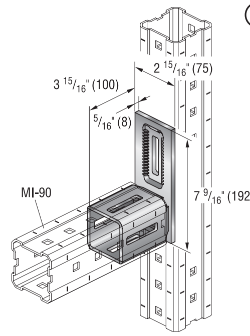
Crossbeam simply supported, columns restrained



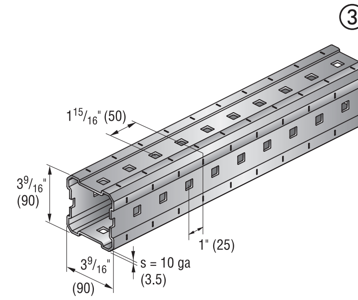
U-frame



MIC-S90-AA

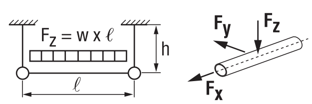


MIC-90-U

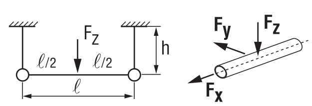


MI-90

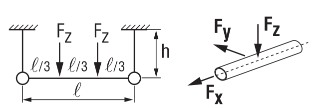
Uniformly distributed allowable load ± Fz (lb) = (w x ℓ) with simultaneous load Fx = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3861	3848	3835	3510	3000	2610	2310	2070	1870
	Fz+Fx	18	2182	2176	2169	2163	2157	2150	2010	1800	1620
		36	1298	1298	1298	1298	1298	1298	1298	1298	1298
		60	779	779	779	779	779	779	779	779	779
		84	556	556	556	556	556	556	556	556	556

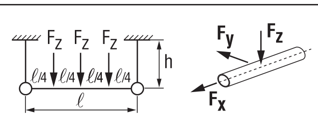
1 single allowable load ± Fz (lb) with simultaneous load Fx = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3520	2640	2110	1750	1500	1300	1150	1030	930
	Fz+Fx	18	2182	2176	1830	1520	1300	1130	1000	900	810
		36	1298	1298	1298	1298	1298	1130	1000	900	810
		60	779	779	779	779	779	779	779	779	779
		84	556	556	556	556	556	556	556	556	556

2 single allowable loads ± Fz (lb) with simultaneous load Fx = Fz x 0.15 unless noted

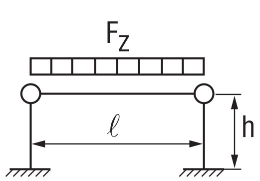
Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1940	1937	1580	1310	1120	980	860	770	700
	Fz+Fx	18	1091	1088	1085	1081	980	850	750	670	610
		36	649	649	649	649	649	649	649	649	610
		60	389	389	389	389	389	389	389	389	389
		84	278	278	278	278	278	278	278	278	278

3 single allowable loads ± Fz (lb) with simultaneous load Fx = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1293	1291	1060	880	760	660	590	530	480
	Fz+Fx	18	727	725	723	721	660	580	510	460	420
		36	433	433	433	433	433	433	433	433	420
		60	260	260	260	260	260	260	260	260	260
		84	185	185	185	185	185	185	185	185	185

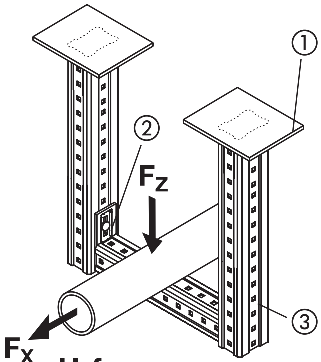
* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

The u-frame configurations shown above can be used standing as illustrated below.

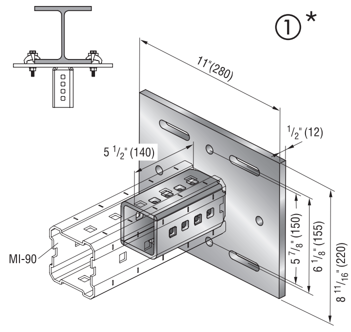


MIC-S90-A U-frames on steel beams

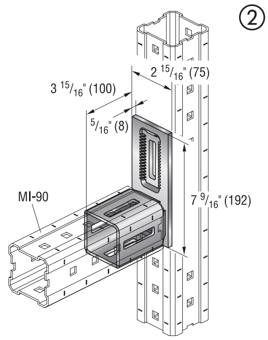
Crossbeam simply supported, columns restrained



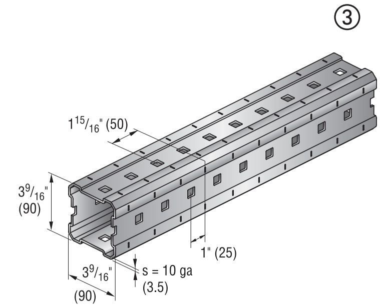
U-frame



MIC-S90-A

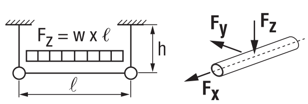


MIC-90-U

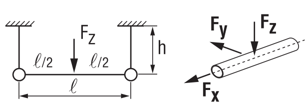


MI-90

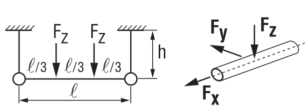
Uniformly distributed allowable load ± Fz (lb) = (w x ℓ) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	5340	5300	4230	3510	3000	2610	2310	2070	1870
	Fz+(Fx or Fy)	18	2182	2176	2169	2163	2157	2150	2010	1800	1620
		36	1809	1809	1809	1809	1809	1809	1809	1800	1620
		60	1085	1085	1085	1085	1085	1085	1085	1085	1085
		84	775	775	775	775	775	775	775	775	775

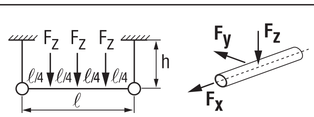
1 single allowable load ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3520	2640	2110	1750	1500	1300	1150	1030	930
	Fz+(Fx or Fy)	18	2182	2176	1830	1520	1300	1130	1000	900	810
		36	1809	1809	1809	1520	1300	1130	1000	900	810
		60	1085	1085	1085	1085	1085	1085	1000	900	810
		84	775	775	775	775	775	775	775	775	775

2 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

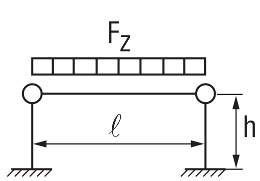
Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	2620	1970	1580	1310	1120	980	860	770	700
	Fz+(Fx or Fy)	18	1091	1088	1085	1081	980	850	750	670	610
		36	904	904	904	904	904	850	750	670	610
		60	543	543	543	543	543	543	543	543	543
		84	388	388	388	388	388	388	388	388	388

3 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1750	1320	1060	880	760	660	590	530	480
	Fz+(Fx or Fy)	18	727	725	723	721	660	580	510	460	420
		36	603	603	603	603	603	580	510	460	420
		60	362	362	362	362	362	362	362	362	362
		84	258	258	258	258	258	258	258	258	258

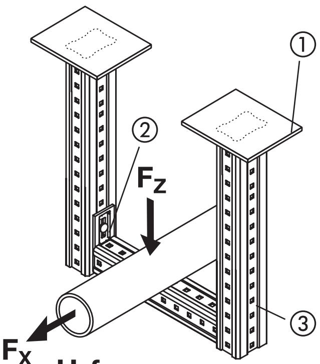
* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

The u-frame configurations shown above can be used standing as illustrated below.

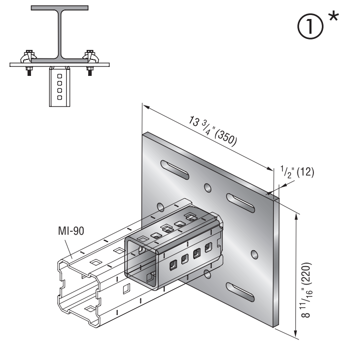


MIC-S90-B U-frames on steel beams

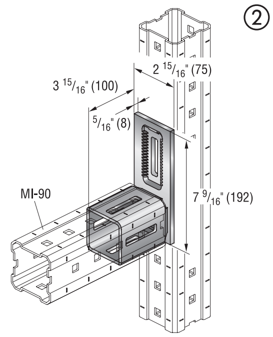
Crossbeam simply supported, columns restrained



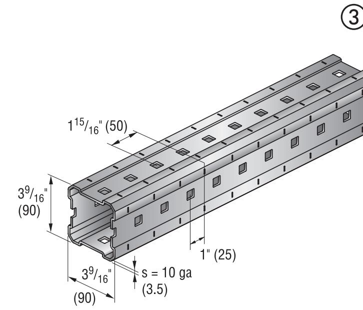
U-frame



MIC-S90-B

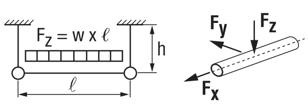


MIC-90-U

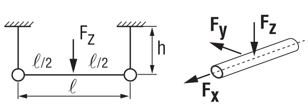


MI-90

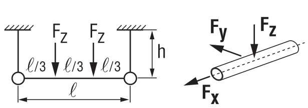
Uniformly distributed allowable load ± Fz (lb) = (w x ℓ) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	4420	4413	4230	3510	3000	2610	2310	2070	1870
	Fz+(Fx or Fy)	18	2182	2176	2169	2163	2157	2150	2010	1800	1620
		36	1809	1809	1809	1809	1809	1809	1809	1800	1620
		60	1085	1085	1085	1085	1085	1085	1085	1085	1085
		84	775	775	775	775	775	775	775	775	775

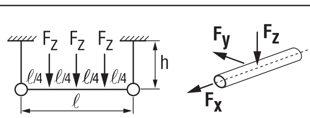
1 single allowable load ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3520	2640	2110	1750	1500	1300	1150	1030	930
	Fz+(Fx or Fy)	18	2182	2176	1830	1520	1300	1130	1000	900	810
		36	1809	1809	1809	1520	1300	1130	1000	900	810
		60	1085	1085	1085	1085	1085	1085	1000	900	810
		84	775	775	775	775	775	775	775	775	775

2 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

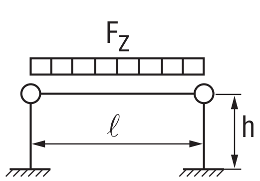
Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	2210	1970	1580	1310	1120	980	860	770	700
	Fz+(Fx or Fy)	18	1091	1088	1085	1081	980	850	750	670	610
		36	904	904	904	904	904	850	750	670	610
		60	543	543	543	543	543	543	543	543	543
		84	388	388	388	388	388	388	388	388	388

3 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1473	1320	1060	880	760	660	590	530	480
	Fz+(Fx or Fy)	18	727	725	723	721	660	580	510	460	420
		36	603	603	603	603	603	580	510	460	420
		60	362	362	362	362	362	362	362	362	362
		84	258	258	258	258	258	258	258	258	258

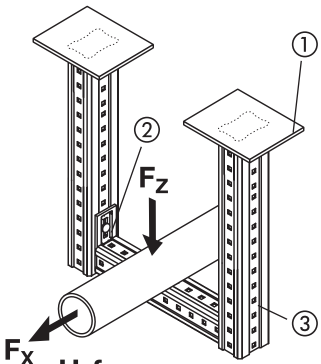
* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

The u-frame configurations shown above can be used standing as illustrated below.

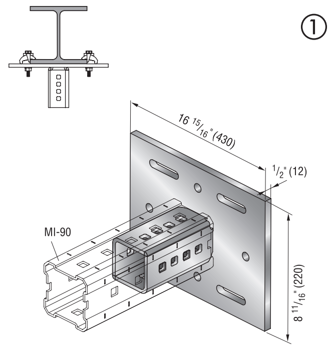


MIC-S90-C U-frames on steel beams

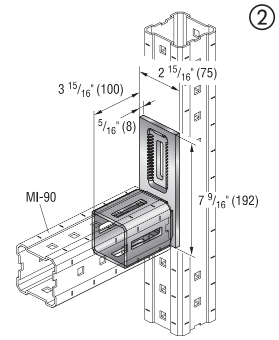
Crossbeam simply supported, columns restrained



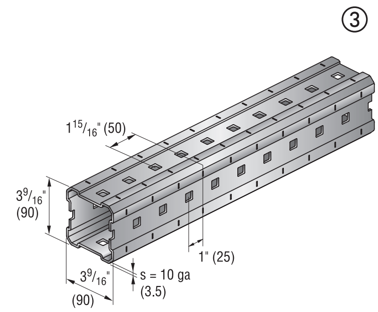
U-frame



MIC-S90-C

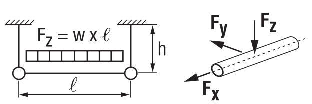


MIC-90-U

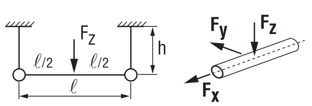


MI-90

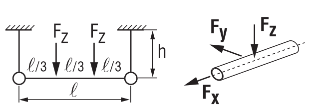
Uniformly distributed allowable load ± Fz (lb) = (w x ℓ) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3080	3073	3067	3061	3000	2610	2310	2070	1870
	Fz+(Fx or Fy)	18	1482	1476	1469	1463	1457	1450	1444	1438	1431
		36	1463	1457	1450	1444	1438	1431	1425	1419	1412
		60	1085	1085	1085	1085	1085	1085	1085	1085	1085
		84	775	775	775	775	775	775	775	775	775

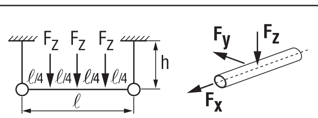
1 single allowable load ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3080	2640	2110	1750	1500	1300	1150	1030	930
	Fz+(Fx or Fy)	18	1482	1476	1469	1463	1300	1130	1000	900	810
		36	1463	1457	1450	1444	1300	1130	1000	900	810
		60	1085	1085	1085	1085	1085	1085	1000	900	810
		84	775	775	775	775	775	775	775	775	775

2 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

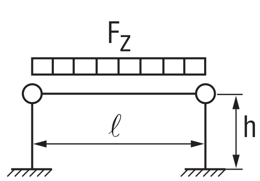
Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1540	1537	1533	1310	1120	980	860	770	700
	Fz+(Fx or Fy)	18	741	738	735	731	728	725	722	670	610
		36	731	728	725	722	719	716	712	670	610
		60	543	543	543	543	543	543	543	543	543
		84	388	388	388	388	388	388	388	388	388

3 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1027	1024	1022	880	760	660	590	530	480
	Fz+(Fx or Fy)	18	494	492	490	488	486	483	481	460	420
		36	488	486	483	481	479	477	475	460	420
		60	362	362	362	362	362	362	362	362	362
		84	258	258	258	258	258	258	258	258	258

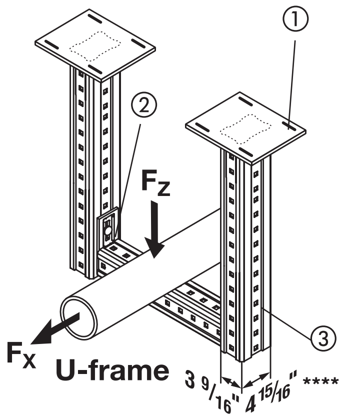
* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

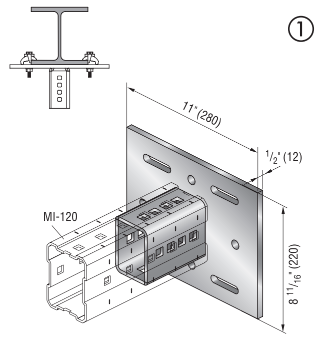
The u-frame configurations shown above can be used standing as illustrated below.



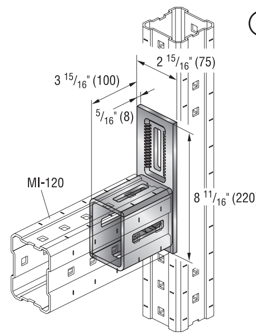
MIC-S120-A U-frames on steel beams

Crossbeam simply supported, columns restrained

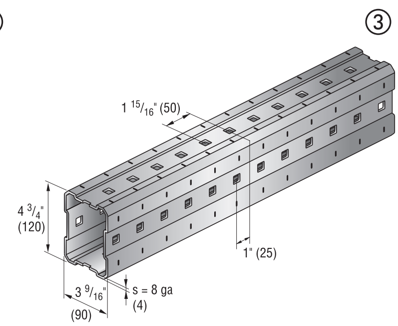




MIC-S120-A

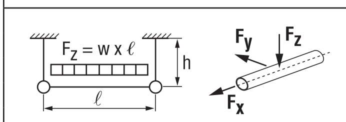


MIC-120-U

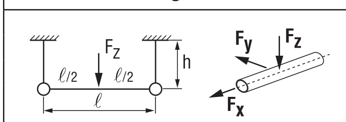


MI-120

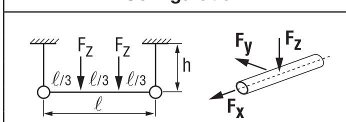
Uniformly distributed allowable load ± Fz (lb) = (w x ℓ) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	5340	5340	5340	5340	5200	4530	4010	3600	3250
	Fz+(Fx or Fy)	18	2649	2641	2632	2624	2615	2607	2598	2590	2581
		36	2493	2493	2493	2493	2493	2493	2493	2493	2493
		60	1496	1496	1496	1496	1496	1496	1496	1496	1496
		84	1069	1069	1069	1069	1069	1069	1069	1069	1069

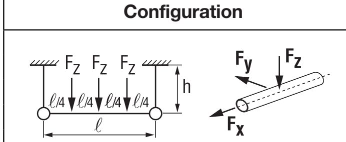
1 single allowable load ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	5340	4570	3650	3040	2600	2260	2010	1800	1630
	Fz+(Fx or Fy)	18	2649	2641	2632	2590	2210	1930	1710	1530	1390
		36	2493	2493	2493	2493	2210	1930	1710	1530	1390
		60	1496	1496	1496	1496	1496	1496	1496	1496	1390
		84	1069	1069	1069	1069	1069	1069	1069	1069	1069

2 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

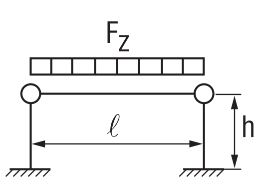
Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	2670	2670	2670	2270	1940	1700	1500	1350	1220
	Fz+(Fx or Fy)	18	1325	1320	1316	1312	1308	1303	1280	1150	1040
		36	1247	1247	1247	1247	1247	1247	1247	1150	1040
		60	748	748	748	748	748	748	748	748	748
		84	534	534	534	534	534	534	534	534	534

3 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1780	1780	1780	1530	1310	1150	1020	920	830
	Fz+(Fx or Fy)	18	883	880	877	875	872	869	866	780	710
		36	831	831	831	831	831	831	831	780	710
		60	499	499	499	499	499	499	499	499	499
		84	356	356	356	356	356	356	356	356	356

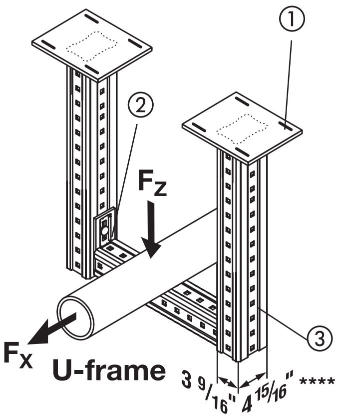
* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

The u-frame configurations shown above can be used standing as illustrated below.

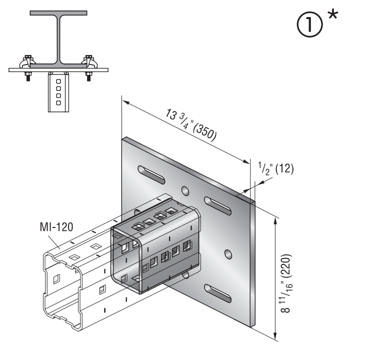


MIC-S120-B U-frames on steel beams

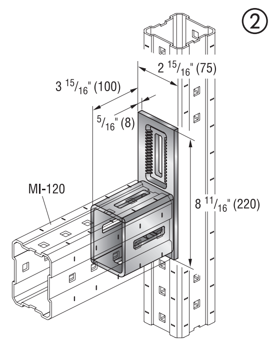
Crossbeam simply supported, columns restrained



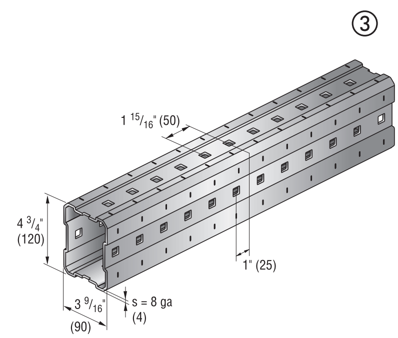
U-frame



MIC-S120-B

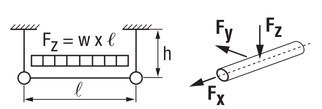


MIC-120-U

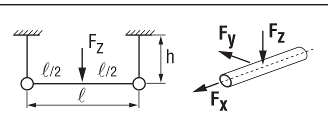


MI-120

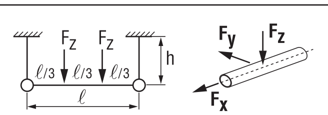
Uniformly distributed allowable load ± Fz (lb) = (w x ℓ) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	4859	4851	4842	4834	4825	4530	4010	3600	3250
	Fz+(Fx or Fy)	18	2709	2701	2692	2684	2675	2667	2658	2650	2641
		36	2040	2040	2040	2040	2040	2040	2040	2040	2040
		60	1224	1224	1224	1224	1224	1224	1224	1224	1224
		84	874	874	874	874	874	874	874	874	874

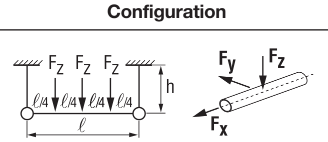
1 single allowable load ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	4859	4570	3650	3040	2600	2260	2010	1800	1630
	Fz+(Fx or Fy)	18	2709	2701	2692	2590	2210	1930	1710	1530	1390
		36	2040	2040	2040	2040	2040	1930	1710	1530	1390
		60	1224	1224	1224	1224	1224	1224	1224	1224	1224
		84	874	874	874	874	874	874	874	874	874

2 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

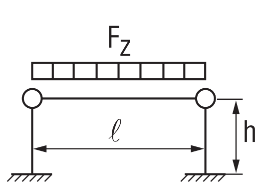
Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	2430	2425	2421	2270	1940	1700	1500	1350	1220
	Fz+(Fx or Fy)	18	1355	1350	1346	1342	1338	1333	1280	1150	1040
		36	1020	1020	1020	1020	1020	1020	1020	1020	1020
		60	612	612	612	612	612	612	612	612	612
		84	437	437	437	437	437	437	437	437	437

3 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1620	1617	1614	1530	1310	1150	1020	920	830
	Fz+(Fx or Fy)	18	903	900	897	895	892	889	870	780	710
		36	680	680	680	680	680	680	680	680	680
		60	408	408	408	408	408	408	408	408	408
		84	291	291	291	291	291	291	291	291	291

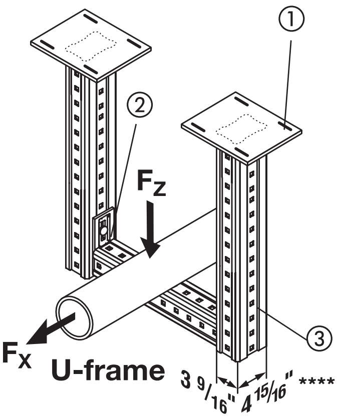
* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

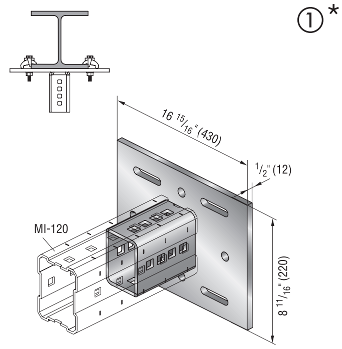
The u-frame configurations shown above can be used standing as illustrated below.

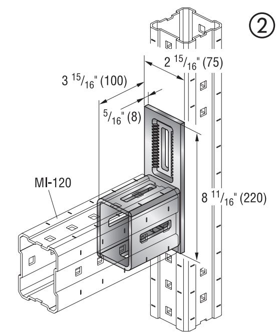


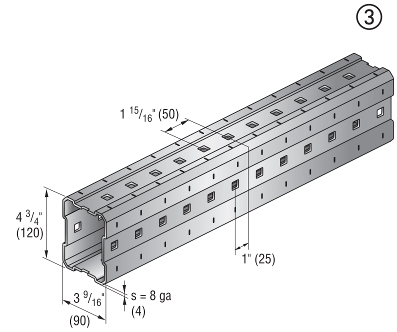
MIC-S120-C U-frames on steel beams

Crossbeam simply supported, columns restrained

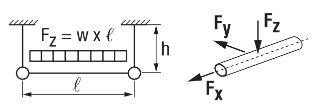




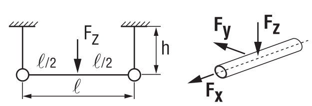




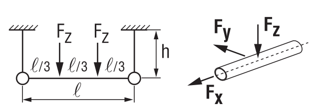
Uniformly distributed allowable load ± Fz (lb) = (w x ℓ) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3439	3431	3422	3414	3405	3397	3388	3380	3250
	Fz+(Fx or Fy)	18	1589	1581	1572	1564	1555	1547	1538	1530	1521
		36	1564	1555	1547	1538	1530	1521	1513	1504	1496
		60	1400	1400	1400	1400	1400	1400	1400	1400	1400
		84	1000	1000	1000	1000	1000	1000	1000	1000	1000

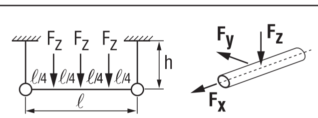
1 single allowable load ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3439	3431	3422	3040	2600	2260	2010	1800	1630
	Fz+(Fx or Fy)	18	1589	1581	1572	1564	1555	1547	1538	1530	1390
		36	1564	1555	1547	1538	1530	1521	1513	1504	1390
		60	1400	1400	1400	1400	1400	1400	1400	1400	1390
		84	1000	1000	1000	1000	1000	1000	1000	1000	1000

2 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

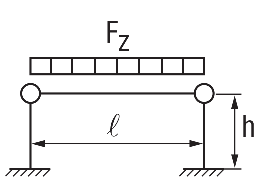
Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1720	1715	1711	1707	1703	1698	1500	1350	1220
	Fz+(Fx or Fy)	18	795	790	786	782	778	773	769	765	761
		36	782	778	773	769	765	761	756	752	748
		60	700	700	700	700	700	700	700	700	700
		84	500	500	500	500	500	500	500	500	500

3 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1146	1144	1141	1138	1135	1132	1020	920	830
	Fz+(Fx or Fy)	18	530	527	524	521	518	516	513	510	507
		36	521	518	516	513	510	507	504	501	499
		60	467	467	467	467	467	467	467	467	467
		84	333	333	333	333	333	333	333	333	333

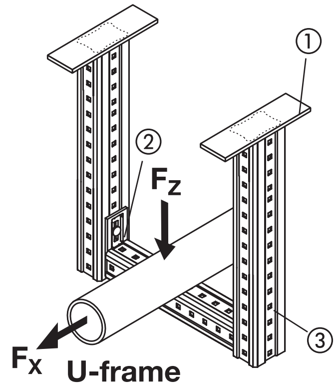
* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

The u-frame configurations shown above can be used standing as illustrated below.

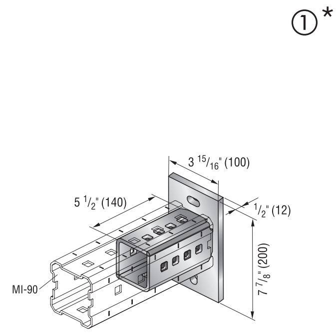


MIC-C90-AA U-frames on concrete

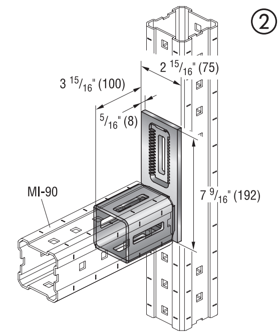
Crossbeam simply supported, columns restrained



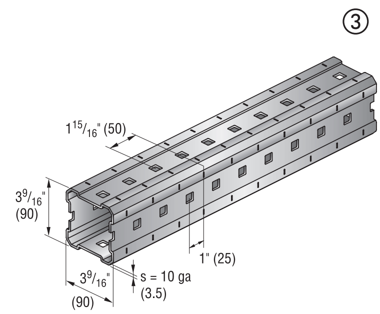
U-frame



MIC-C90-AA

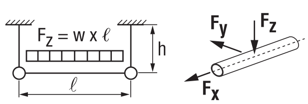


MIC-90-U

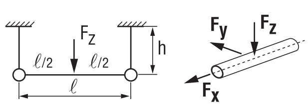


MI-90

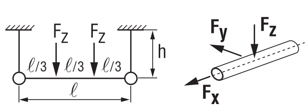
Uniformly distributed allowable load ± Fz (lb) = (w x ℓ) with simultaneous load Fx = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3840	3833	3827	3510	3000	2610	2310	2070	1870
	Fz+Fx	18	1620	1620	1620	1620	1620	1620	1620	1620	1620
		36	1311	1311	1311	1311	1311	1311	1311	1311	1311
		60	787	787	787	787	787	787	787	787	787
		84	562	562	562	562	562	562	562	562	562

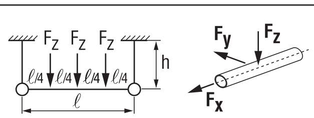
1 single allowable load ± Fz (lb) with simultaneous load Fx = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3840	3833	3827	3510	3000	2610	2310	2070	1870
	Fz+Fx	18	1620	1620	1620	1620	1620	1620	1620	1620	1620
		36	1311	1311	1311	1311	1311	1311	1311	1311	1311
		60	787	787	787	787	787	787	787	787	787
		84	562	562	562	562	562	562	562	562	562

2 single allowable loads ± Fz (lb) with simultaneous load Fx = Fz x 0.15 unless noted

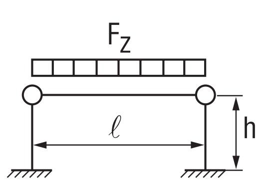
Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1920	1917	1580	1310	1120	980	860	770	700
	Fz+Fx	18	1311	1311	1311	1140	980	850	750	670	610
		36	656	656	656	656	656	656	656	656	610
		60	393	393	393	393	393	393	393	393	393
		84	281	281	281	281	281	281	281	281	281

3 single allowable loads ± Fz (lb) with simultaneous load Fx = Fz x 0.15 unless noted

Configuration	Load	h (in.) \ ℓ (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1280	1278	1060	880	760	660	590	530	480
	Fz+Fx	18	874	874	874	770	660	580	510	460	420
		36	437	437	437	437	437	437	437	437	420
		60	262	262	262	262	262	262	262	262	262
		84	187	187	187	187	187	187	187	187	187

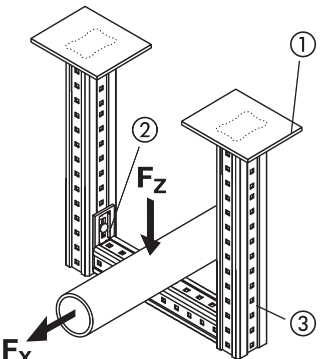
* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

The u-frame configurations shown above can be used standing as illustrated below.

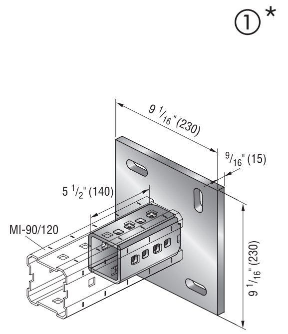


MIC-C90-D U-frames on concrete

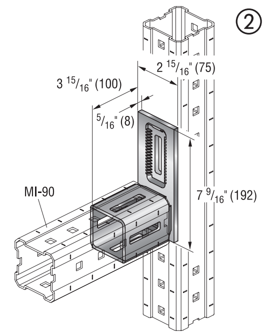
Crossbeam simply supported, columns restrained



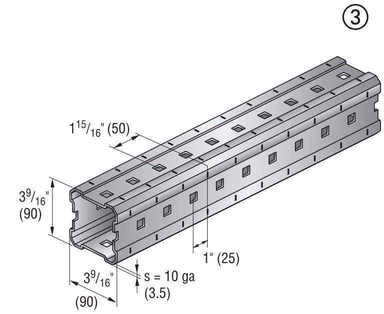
U-frame



MIC-C90-D

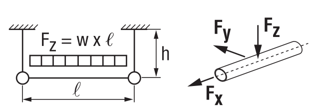


MIC-90-U

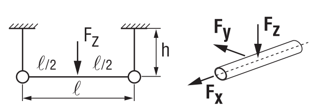


MI-90

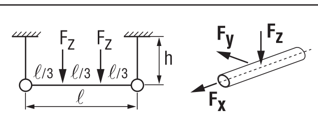
Uniformly distributed allowable load ± Fz (lb) = (w x ℓ) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	5340	5300	4230	3510	3000	2610	2310	2070	1870
	Fz+(Fx or Fy)	18	3618	3618	3618	3050	2610	2270	2010	1800	1620
		36	1809	1809	1809	1809	1809	1809	1809	1800	1620
		60	1085	1085	1085	1085	1085	1085	1085	1085	1085
		84	775	775	775	775	775	775	775	775	775

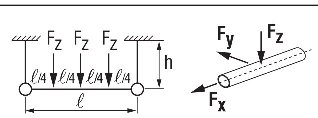
1 single allowable load ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	3520	2640	2110	1750	1500	1300	1150	1030	930
	Fz+(Fx or Fy)	18	3060	2300	1830	1520	1300	1130	1000	900	810
		36	1809	1809	1809	1520	1300	1130	1000	900	810
		60	1085	1085	1085	1085	1085	1085	1000	900	810
		84	775	775	775	775	775	775	775	775	775

2 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

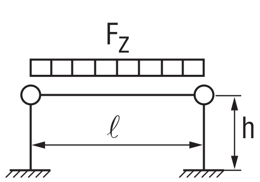
Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	2620	1970	1580	1310	1120	980	860	770	700
	Fz+(Fx or Fy)	18	1809	1720	1370	1140	980	850	750	670	610
		36	904	904	904	904	904	850	750	670	610
		60	543	543	543	543	543	543	543	543	543
		84	388	388	388	388	388	388	388	388	388

3 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1750	1320	1060	880	760	660	590	530	480
	Fz+(Fx or Fy)	18	1206	1150	920	770	660	580	510	460	420
		36	603	603	603	603	603	580	510	460	420
		60	362	362	362	362	362	362	362	362	362
		84	258	258	258	258	258	258	258	258	258

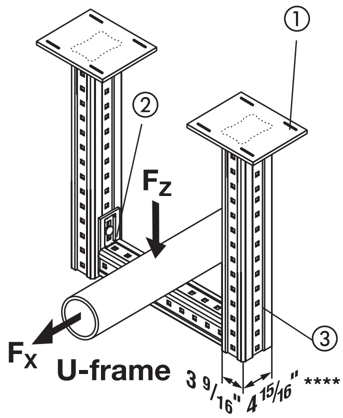
* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

The u-frame configurations shown above can be used standing as illustrated below.

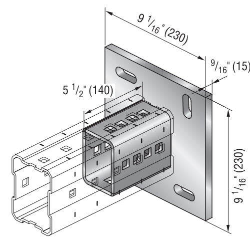


MIC-C120-D U-frames on concrete

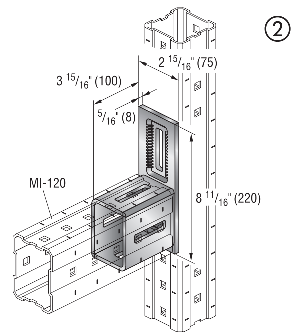
Crossbeam simply supported, columns restrained



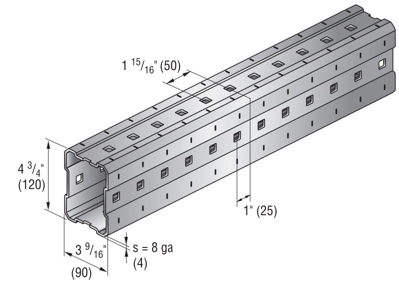
U-frame



MIC-C120-D

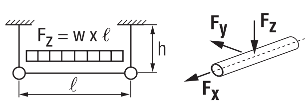


MIC-120-U

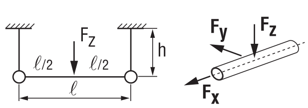


MI-120

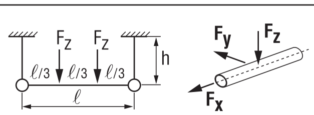
Uniformly distributed allowable load ± Fz (lb) = (w x ℓ) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	5340	5340	5340	5340	5200	4530	4010	3600	3250
	Fz+(Fx or Fy)	18	5022	5022	5022	5022	4430	3870	3420	3070	2770
		36	2511	2511	2511	2511	2511	2511	2511	2511	2511
		60	1507	1507	1507	1507	1507	1507	1507	1507	1507
		84	1076	1076	1076	1076	1076	1076	1076	1076	1076

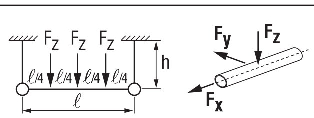
1 single allowable load ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	5340	4570	3650	3040	2600	2260	2010	1800	1630
	Fz+(Fx or Fy)	18	5022	3900	3120	2590	2210	1930	1710	1530	1390
		36	2511	2511	2511	2511	2210	1930	1710	1530	1390
		60	1507	1507	1507	1507	1507	1507	1507	1507	1390
		84	1076	1076	1076	1076	1076	1076	1076	1076	1076

2 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

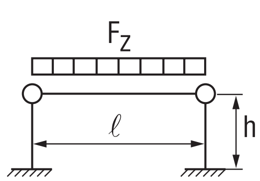
Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	2670	2670	2670	2270	1940	1700	1500	1350	1220
	Fz+(Fx or Fy)	18	2511	2511	2330	1940	1660	1450	1280	1150	1040
		36	1256	1256	1256	1256	1256	1256	1256	1150	1040
		60	753	753	753	753	753	753	753	753	753
		84	538	538	538	538	538	538	538	538	538

3 single allowable loads ± Fz (lb) with either simultaneous load Fx or Fy = Fz x 0.15 unless noted

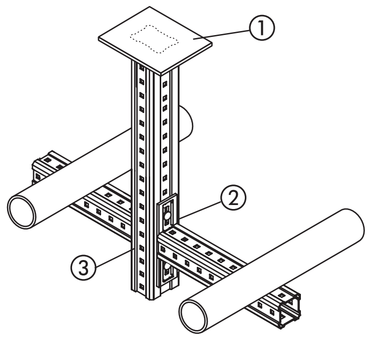
Configuration	Load	ℓ (in.) / h (in.)	36	48	60	72	84	96	108	120	132
	Fz	–	1780	1780	1780	1530	1310	1150	1020	920	830
	Fz+(Fx or Fy)	18	1674	1674	1560	1300	1120	980	870	780	710
		36	837	837	837	837	837	837	837	780	710
		60	502	502	502	502	502	502	502	502	502
		84	359	359	359	359	359	359	359	359	359

* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

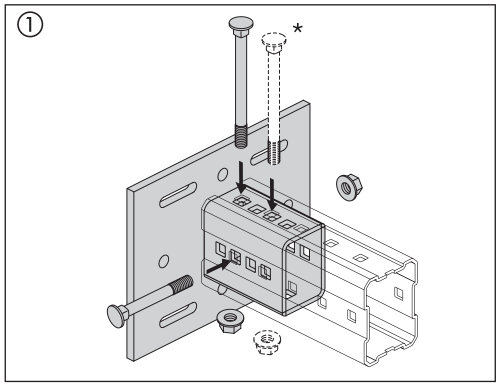
The u-frame configurations shown above can be used standing as illustrated below.



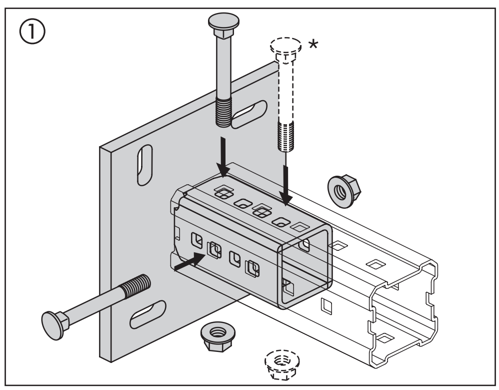
Lorraine cross: General information



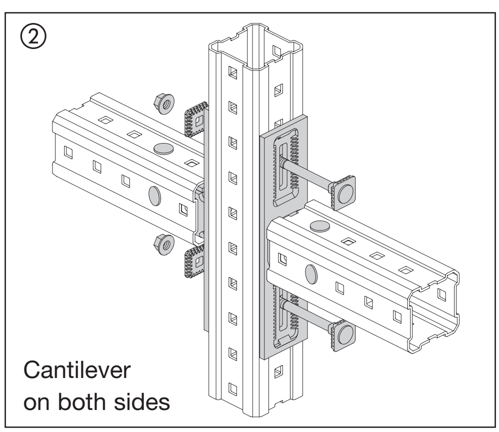
Connections to steel: MIC-S90-A/B/C/120-A/B/C

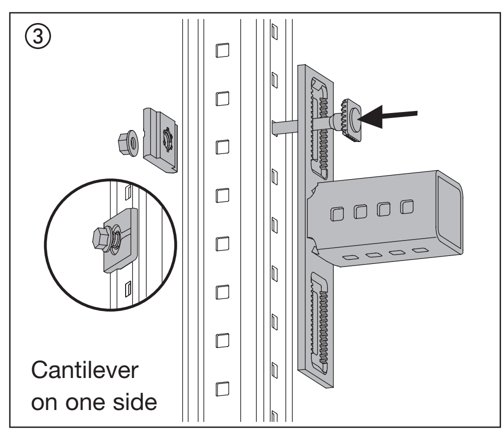


Connections to concrete: MIC-C90-D/120-D



MI connector: ② MIC-90-L/MIA-TP ; ③ MIC-90-L

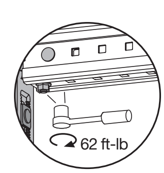


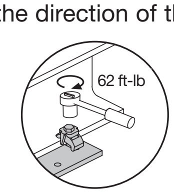


The MI connector must engage the girder so the end of the girder is between the connector weld and first hole or slot. The bolts should be located in the holes closest to the connector base as possible and a minimum of 1" from the girder end. Connectors with two bolts should be positioned perpendicular to each other.

* In some cases, a higher moment resistance can be achieved through the use of a third bolt (see load tables for individual components). The bolt should be fitted in the direction of the largest horizontal force.

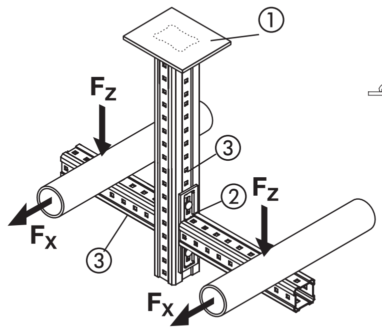
Note: The third bolt must be ordered additionally.



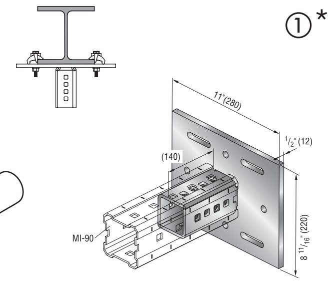


Bolt tightening torque: For connectors For beam clamps

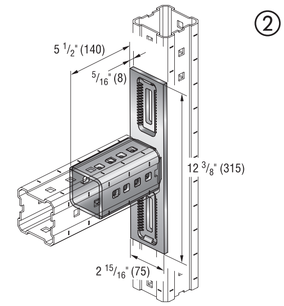
MIC-S90-A Lorraine cross on steel beam



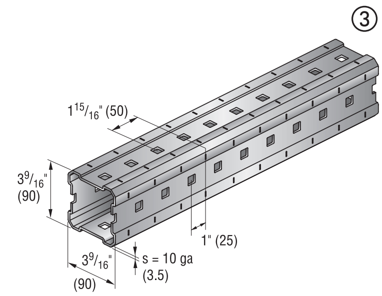
Lorraine cross



MIC-S90-A

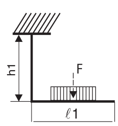
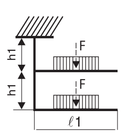
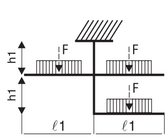
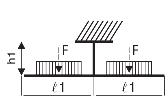
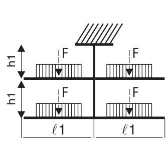


MIC-90-L



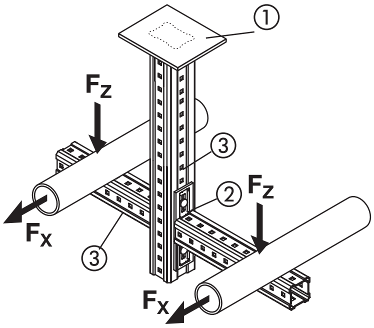
MI-90

Allowable load ± Fz (lb) with vertical MI-90 girder and simultaneous load Fx = Fz x 0.15 unless noted

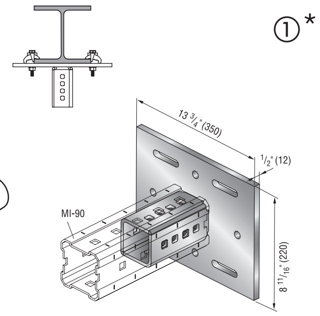
Configuration	Height and Length (inch)	Loading condition 1 uniform loading ($F_z = w \cdot \ell$) Fz (lb)			Loading condition 2 (F_z at 1/2, 1/2) Fz (lb)			Loading condition 3 (F_z at end) Fz (lb)			Loading condition 4 (F_z F_z at 1/3, 1/3, 1/3) Fz (lb)			Loading condition 5 (F_z F_z F_z at 1/4, 1/4, 1/4, 1/4) Fz (lb)		
	ℓ1 \ h1	18	24	36	18	24	36	18	24	36	18	24	36	18	24	36
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	533	533	533	533	533	533	352	352	352	267	267	267	178	178	178
	18	485	485	485	485	485	485	243	243	243	243	243	243	162	162	162
	12	407	407	407	407	407	407	204	204	204	204	204	204	136	136	136
	18	271	271	271	271	271	271	136	136	136	136	136	136	90	90	90
	Fx = Fz × 0.15															
	12	352	352	243	352	352	243	176	176	176	176	176	121	117	117	81
	18	243	243	243	243	243	243	121	121	121	121	121	121	81	81	81
	12	370	370	370	370	370	370	370	370	370	185	185	185	123	123	123
	18	370	370	370	370	370	370	258	258	258	185	185	185	123	123	123
	Fx = Fz × 0.15															
	12	364	273	182	364	273	182	364	273	182	182	137	91	121	91	61
	18	364	273	182	364	273	182	258	258	182	182	137	91	121	91	61
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	533	533	364	533	533	364	387	387	364	267	267	182	178	178	121
	18	516	516	364	516	516	364	258	258	258	258	258	182	172	172	121
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	243	182	121	243	182	121	243	182	121	121	91	61	81	61	40
	18	243	182	121	243	182	121	243	182	121	121	91	61	81	61	40

* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

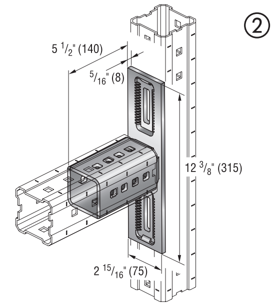
MIC-S90-B Lorraine cross on steel beam



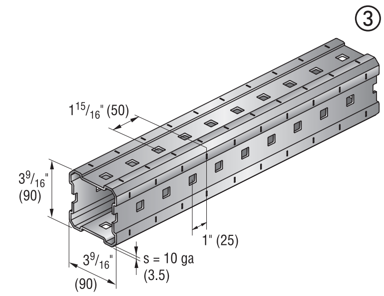
Lorraine cross



MIC-S90-B

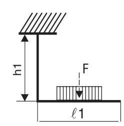
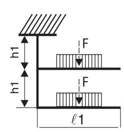
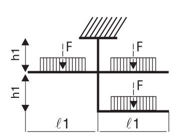
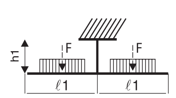
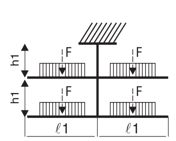


MIC-90-L



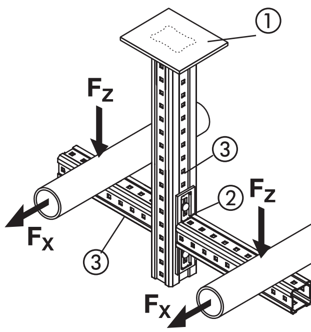
MI-90

Allowable load ± Fz (lb) with vertical MI-90 girder and simultaneous load Fx = Fz x 0.15 unless noted

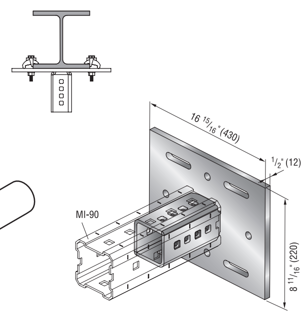
Configuration	Height and Length (inch)	Loading condition 1 uniform loading ($F_z = w \cdot \ell$) Fz (lb)			Loading condition 2 (Fz at 1/2, 1/2) Fz (lb)			Loading condition 3 (Fz at end) Fz (lb)			Loading condition 4 (Fz Fz at 1/3, 1/3, 1/3) Fz (lb)			Loading condition 5 (Fz Fz Fz at 1/4, 1/4, 1/4, 1/4) Fz (lb)		
	ℓ1 \ h1	18	24	36	18	24	36	18	24	36	18	24	36	18	24	36
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	533	533	453	533	533	453	352	352	352	267	267	267	178	178	178
	18	485	485	453	485	485	453	243	243	243	243	243	243	162	162	162
	12	407	407	407	407	407	407	204	204	204	204	204	204	136	136	136
	18	271	271	271	271	271	271	136	136	136	136	136	136	90	90	90
	Fx = Fz × 0.15															
	12	302	227	151	302	227	151	176	176	151	151	113	76	101	76	50
	18	243	227	151	243	227	151	121	121	121	121	113	76	81	76	50
	12	273	273	273	273	273	273	273	273	273	137	137	137	91	91	91
	18	273	273	273	273	273	273	258	258	258	137	137	137	91	91	91
	Fx = Fz × 0.15															
	12	227	170	113	227	170	113	227	170	113	113	85	57	76	57	38
	18	227	170	113	227	170	113	227	170	113	113	85	57	76	57	38
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	410	340	227	410	340	227	410	340	227	205	170	113	137	113	76
	18	410	340	227	410	340	227	387	340	227	205	170	113	137	113	76
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	151	113	76	151	113	76	151	113	76	76	57	38	50	38	25
	18	151	113	76	151	113	76	151	113	76	76	57	38	50	38	25

* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

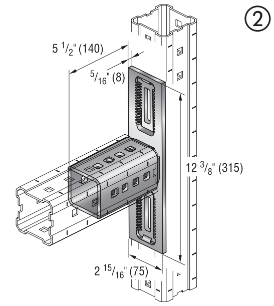
MIC-S90-C Lorraine cross on steel beam



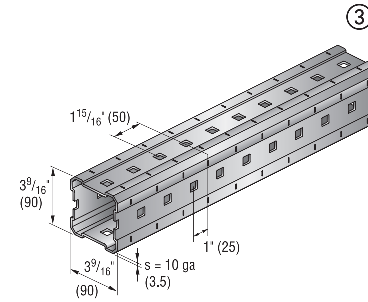
Lorraine cross



MIC-S90-C

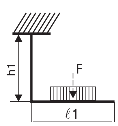
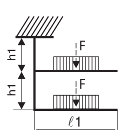
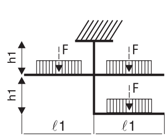
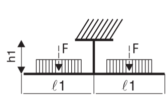
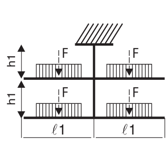


MIC-90-L



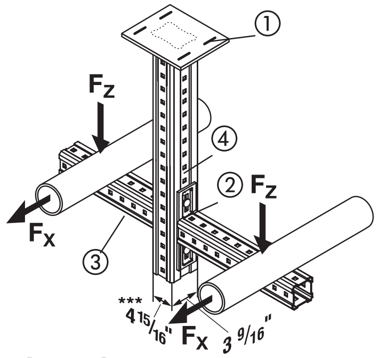
MI-90

Allowable load ± Fz (lb) with vertical MI-90 girder and simultaneous load Fx = Fz x 0.15 unless noted

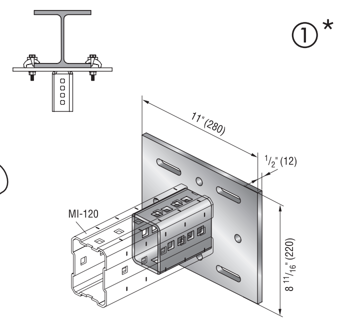
Configuration	Height and Length (inch)	Loading condition 1 uniform loading (Fz = w · ℓ) Fz (lb)			Loading condition 2 (Fz at 1/2, 1/2) Fz (lb)			Loading condition 3 (Fz at end) Fz (lb)			Loading condition 4 (Fz Fz at 1/3, 1/3, 1/3) Fz (lb)			Loading condition 5 (Fz Fz Fz at 1/4, 1/4, 1/4, 1/4) Fz (lb)		
	ℓ1 \ h1	18	24	36	18	24	36	18	24	36	18	24	36	18	24	36
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	171	171	171
	Fx = Fz × 0.15															
	12	533	533	373	533	533	373	372	372	372	267	267	267	178	178	178
	18	513	513	373	513	513	373	257	257	257	257	257	257	172	172	172
	12	335	335	335	335	335	335	215	215	215	168	168	168	112	112	112
	18	287	287	287	287	287	287	143	143	143	143	143	143	96	96	96
	Fx = Fz × 0.15															
	12	249	187	124	249	187	124	186	186	124	124	93	62	83	62	41
	18	249	187	124	249	187	124	128	128	124	124	93	62	83	62	41
	12	223	223	223	223	223	223	223	223	223	112	112	112	74	74	74
	18	223	223	223	223	223	223	223	223	223	112	112	112	74	74	74
	Fx = Fz × 0.15															
	12	187	140	93	187	140	93	187	140	93	93	70	47	62	47	31
	18	187	140	93	187	140	93	187	140	93	93	70	47	62	47	31
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	335	280	187	335	280	187	335	280	187	168	140	93	112	93	62
	18	335	280	187	335	280	187	258	258	187	168	140	93	112	93	62
	12	391	390	389	391	390	389	387	387	387	196	195	194	130	130	130
	18	388	387	386	388	387	386	258	258	258	194	194	193	129	129	129
	Fx = Fz × 0.15															
	12	124	93	62	124	93	62	124	93	62	62	47	31	41	31	21
	18	124	93	62	124	93	62	124	93	62	62	47	31	41	31	21

* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

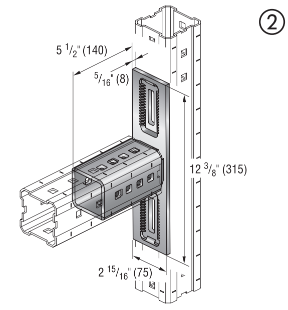
MIC-S120-A Lorraine cross on steel beam



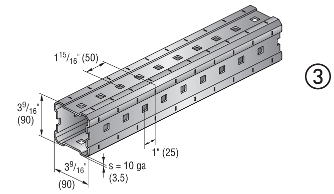
Lorraine cross



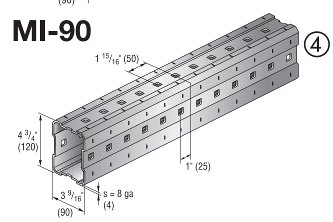
MIC-S120-A



MIC-90-L

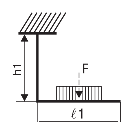
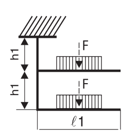
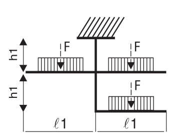
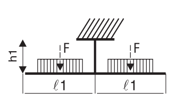
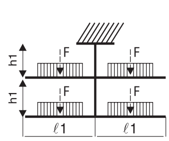


MI-90



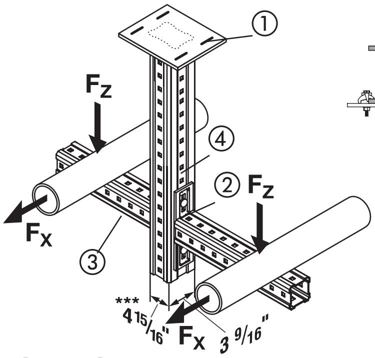
MI-120

Allowable load ± Fz (lb) with vertical MI-120 girder and simultaneous load Fx = Fz x 0.15 unless noted

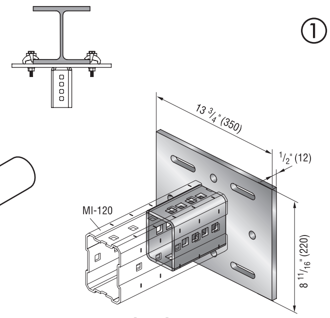
Configuration	Height and Length (inch)	Loading condition 1 uniform loading (Fz = w · ℓ) Fz (lb)			Loading condition 2 (Fz at 1/2, 1/2) Fz (lb)			Loading condition 3 (Fz at end) Fz (lb)			Loading condition 4 (Fz Fz at 1/3, 1/3, 1/3) Fz (lb)			Loading condition 5 (Fz Fz Fz at 1/4, 1/4, 1/4, 1/4) Fz (lb)		
	ℓ1 \ h1	18	24	36	18	24	36	18	24	36	18	24	36	18	24	36
	12 (Fz)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12 (Fz, Fx)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	12 (Fz)	533	533	533	533	533	533	283	283	283	267	267	267	178	178	178
	18	377	377	377	377	377	377	188	188	188	188	188	188	126	126	126
	Fx = Fz × 0.15															
	12 (Fz, Fx)	486	364	243	486	364	243	245	245	243	243	182	121	162	121	81
	18	338	338	243	338	338	243	169	169	169	169	169	121	113	113	81
	12 (Fz)	443	443	443	443	443	443	387	387	387	222	222	222	148	148	148
	18	443	443	443	443	443	443	258	258	258	222	222	222	148	148	148
	Fx = Fz × 0.15															
	12 (Fz, Fx)	364	273	182	364	273	182	364	273	182	182	137	91	121	91	61
	18	364	273	182	364	273	182	258	258	182	182	137	91	121	91	61
	12 (Fz)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12 (Fz, Fx)	533	533	364	533	533	364	387	387	364	267	267	182	178	178	121
	18	516	516	364	516	516	364	258	258	258	258	258	182	172	172	121
	12 (Fz)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12 (Fz, Fx)	243	182	121	243	182	121	243	182	121	121	91	61	81	61	40
	18	243	182	121	243	182	121	243	182	121	121	91	61	81	64	40

* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

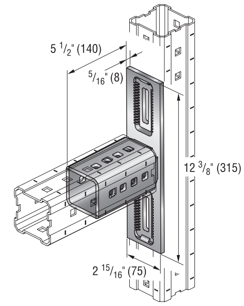
MIC-S120-B Lorraine cross on steel beam



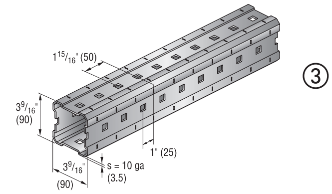
Lorraine cross



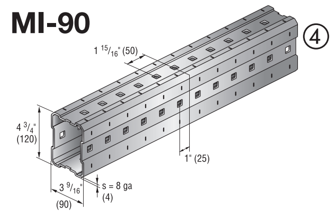
MIC-S120-B



MIC-90-L

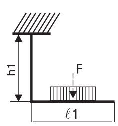
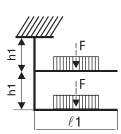
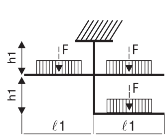
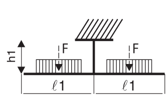
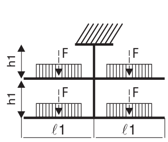


MI-90



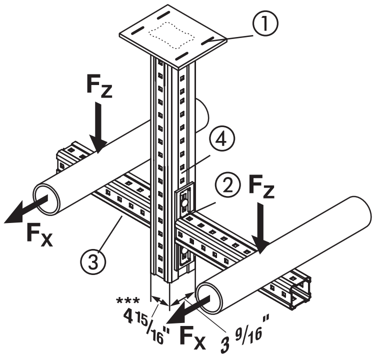
MI-120

Allowable load ± Fz (lb) with vertical MI-120 girder and simultaneous load Fx = Fz x 0.15 unless noted

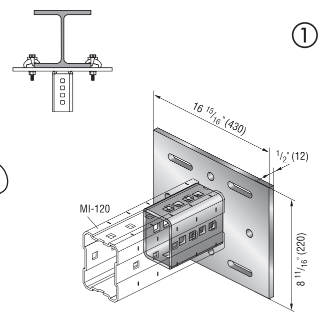
Configuration	Height and Length (inch)	Loading condition 1 uniform loading ($F_z = W \cdot \ell$) Fz (lb)			Loading condition 2 (Fz at 1/2, 1/2) Fz (lb)			Loading condition 3 (Fz at end) Fz (lb)			Loading condition 4 (Fz Fz at 1/3, 1/3, 1/3) Fz (lb)			Loading condition 5 (Fz Fz Fz at 1/4, 1/4, 1/4, 1/4) Fz (lb)		
	ℓ1 \ h1	18	24	36	18	24	36	18	24	36	18	24	36	18	24	36
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	533	533	469	533	533	469	387	387	387	267	267	267	178	178	178
	18	516	516	469	516	516	469	258	258	258	258	258	258	172	172	172
	12	435	435	435	435	435	435	277	277	277	218	218	218	145	145	145
	18	369	369	369	369	369	369	185	185	185	185	185	185	123	123	123
	Fx = Fz × 0.15															
	12	313	234	156	313	234	156	240	234	156	156	117	78	104	78	52
	18	313	234	156	313	234	156	166	166	156	156	117	78	104	78	52
	12	290	290	290	290	290	290	290	290	290	145	145	145	97	97	97
	18	290	290	290	290	290	290	258	258	258	145	145	145	97	97	97
	Fx = Fz × 0.15															
	12	234	176	117	234	176	117	234	176	117	117	88	59	78	59	39
	18	234	176	117	234	176	117	234	176	117	117	88	59	78	59	39
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	435	352	234	435	352	234	387	352	234	218	176	117	145	117	78
	18	435	352	234	435	352	234	258	258	234	218	176	117	145	117	78
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	156	117	78	156	117	78	156	117	78	78	59	39	52	39	26
	18	156	117	78	156	117	78	156	117	78	78	59	39	52	39	26

* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

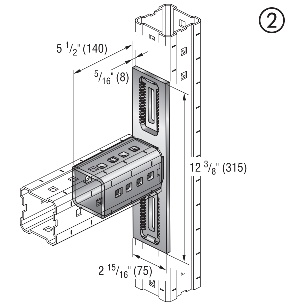
MIC-S120-C Lorraine cross on steel beam



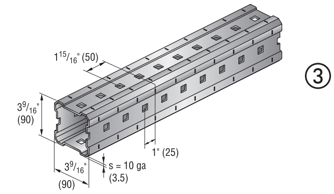
Lorraine cross



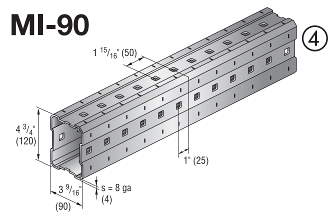
MIC-S120-C



MIC-90-L

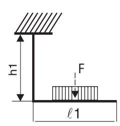
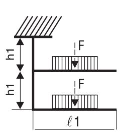
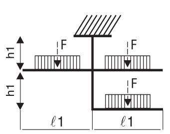
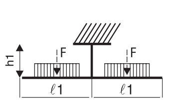
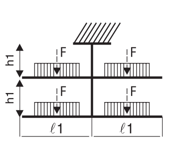


MI-90



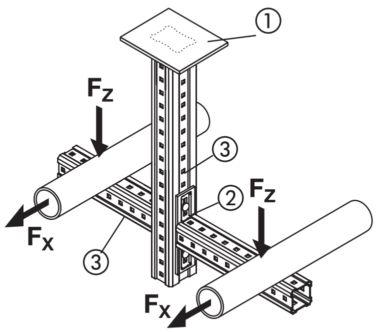
MI-120

Allowable load ± Fz (lb) with vertical MI-120 girder and simultaneous load Fx = Fz x 0.15 unless noted

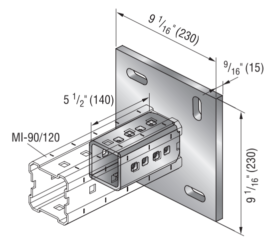
Configuration	Height and Length (inch)	Loading condition 1 uniform loading ($F_z = w \cdot \ell$) Fz (lb)			Loading condition 2 (Fz at 1/2, 1/2) Fz (lb)			Loading condition 3 (Fz at end) Fz (lb)			Loading condition 4 (Fz Fz at 1/3, 1/3, 1/3) Fz (lb)			Loading condition 5 (Fz Fz Fz at 1/4, 1/4, 1/4, 1/4) Fz (lb)		
	ℓ1 \ h1	18	24	36	18	24	36	18	24	36	18	24	36	18	24	36
	12 (Fz)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15 12 (Fz, Fx)	533	533	404	533	533	404	387	387	387	267	267	267	178	178	178
	18	516	516	404	516	516	404	258	258	258	258	258	258	172	172	172
	12 (Fz)	365	365	365	365	365	365	233	233	233	183	183	183	122	122	122
	18	311	311	311	311	311	311	155	155	155	155	155	155	104	104	104
	Fx = Fz × 0.15 12 (Fz, Fx)	270	202	135	270	202	135	202	202	135	135	101	67	90	67	45
	18	270	202	135	270	202	135	139	139	135	135	101	67	90	67	45
	12 (Fz)	243	243	243	243	243	243	243	243	243	122	122	122	81	81	81
	18	243	243	243	243	243	243	243	243	243	122	122	122	81	81	81
	Fx = Fz × 0.15 12 (Fz, Fx)	202	152	101	202	152	101	202	152	101	101	76	51	67	51	34
	18	202	152	101	202	152	101	202	152	101	101	76	51	67	51	34
	12 (Fz)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15 12 (Fz, Fx)	365	303	202	365	303	202	365	303	202	183	152	101	122	101	67
	18	365	303	202	365	303	202	258	258	202	183	152	101	122	101	67
	12 (Fz)	441	440	439	441	440	439	387	387	387	221	220	219	147	147	146
	18	438	437	436	438	437	436	258	258	258	219	219	218	146	146	145
	Fx = Fz × 0.15 12 (Fz, Fx)	135	101	67	135	101	67	135	101	67	67	51	34	45	34	22
	18	135	101	67	135	101	67	135	101	67	67	51	34	45	34	22

* Fastened to steel beam with MI-SGC-M12 beam clamps (item 233859)

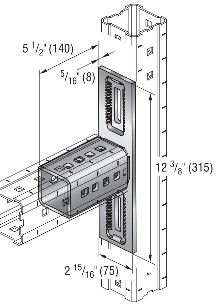
MIC-C90-D Lorraine cross on concrete



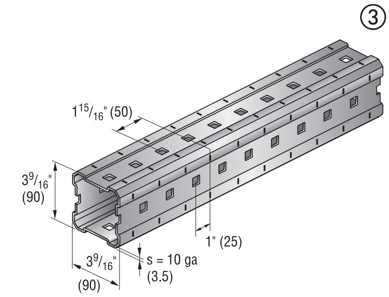
Lorraine cross



MIC-C90-D

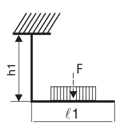
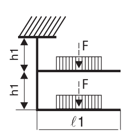
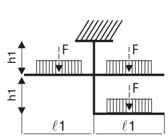
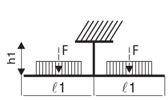
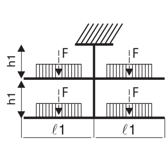


MIC-90-L



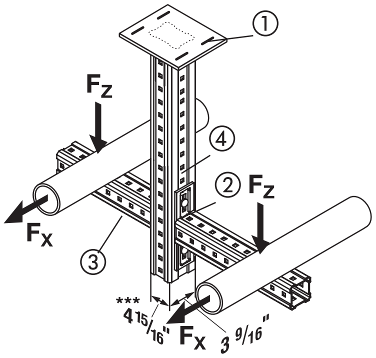
MI-90

Allowable load ± Fz (lb) with vertical MI-90 girder and simultaneous load Fx = Fz x 0.15 unless noted

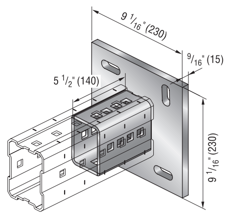
Configuration	Height and Length (inch)	Loading condition 1 uniform loading ($F_Z = W \cdot \ell$) Fz (lb)			Loading condition 2 (Fz at 1/2, 1/2) Fz (lb)			Loading condition 3 (Fz at end) Fz (lb)			Loading condition 4 (Fz Fz at 1/3, 1/3, 1/3) Fz (lb)			Loading condition 5 (Fz Fz Fz at 1/4, 1/4, 1/4, 1/4) Fz (lb)		
	ℓ1 \ h1	18	24	36	18	24	36	18	24	36	18	24	36	18	24	36
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	533	533	533	533	533	533	352	352	352	267	267	267	178	178	178
	18	485	485	485	485	485	485	243	243	243	243	243	243	162	162	162
	12	407	407	407	407	407	407	204	204	204	204	204	204	136	136	136
	18	271	271	271	271	271	271	136	136	136	136	136	136	90	90	90
	Fx = Fz × 0.15															
	12	352	352	301	352	352	301	176	176	176	176	176	151	117	117	100
	18	243	243	243	243	243	243	121	121	121	121	121	121	81	81	81
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	452	339	226	452	339	226	387	339	226	226	170	113	151	113	75
	18	452	339	226	452	339	226	258	258	226	226	170	113	151	113	75
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	533	533	452	533	533	452	387	387	387	267	267	226	178	178	151
	18	516	516	452	516	516	452	258	258	258	258	258	226	172	172	151
	12	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15															
	12	301	226	151	301	226	151	301	226	151	151	113	75	100	75	50
	18	301	226	151	301	226	151	301	226	151	151	113	75	100	75	50

* For anchoring to concrete, consult project engineer for proper type and size anchor

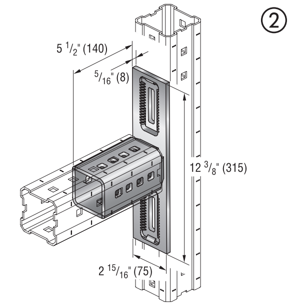
MIC-C120-D Lorraine cross on concrete



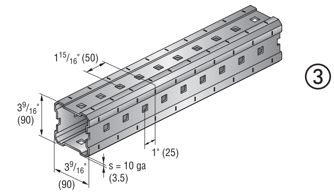
Lorraine cross



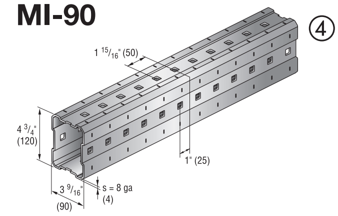
MIC-S120-D



MIC-90-L

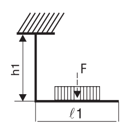
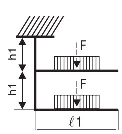
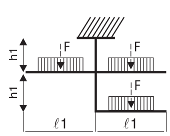
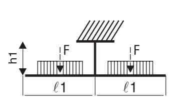
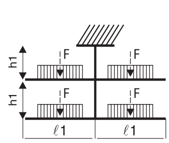


MI-90



MI-120

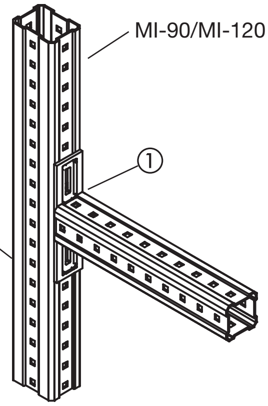
Allowable load ± Fz (lb) with vertical MI-120 girder and simultaneous load Fx = Fz x 0.15 unless noted

Configuration	Height and Length (inch)	Loading condition 1 uniform loading $F_Z = w \cdot \ell$ Fz (lb)			Loading condition 2 (1/2, Fz, 1/2) Fz (lb)			Loading condition 3 (Fz) Fz (lb)			Loading condition 4 (1/3, Fz, 1/3, Fz, 1/3) Fz (lb)			Loading condition 5 (1/4, Fz, 1/4, Fz, 1/4, Fz, 1/4) Fz (lb)		
	ℓ1 \ h1	18	24	36	18	24	36	18	24	36	18	24	36	18	24	36
	12 (Fz)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15 12 (Fz, Fx)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	12 (Fz)	533	533	533	533	533	533	283	283	283	267	267	267	178	178	178
	18	377	377	377	377	377	377	188	188	188	188	188	188	126	126	126
	Fx = Fz × 0.15 12 (Fz, Fx)	489	452	301	489	452	301	245	245	245	245	226	151	163	151	100
	18	338	338	301	338	338	301	169	169	169	169	169	151	113	113	100
	12 (Fz)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15 12 (Fz, Fx)	452	339	226	452	339	226	387	339	226	226	170	113	151	113	75
	18	452	339	226	452	339	226	258	258	226	226	170	113	151	113	75
	12 (Fz)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15 12 (Fz, Fx)	533	533	452	533	533	452	387	387	387	267	267	226	178	178	151
	18	516	516	452	516	516	452	258	258	258	258	258	226	172	172	151
	12 (Fz)	533	533	533	533	533	533	387	387	387	267	267	267	178	178	178
	18	516	516	516	516	516	516	258	258	258	258	258	258	172	172	172
	Fx = Fz × 0.15 12 (Fz, Fx)	301	226	151	301	226	151	301	226	151	151	113	75	100	75	50
	18	301	226	151	301	226	151	301	226	151	151	113	75	100	75	50

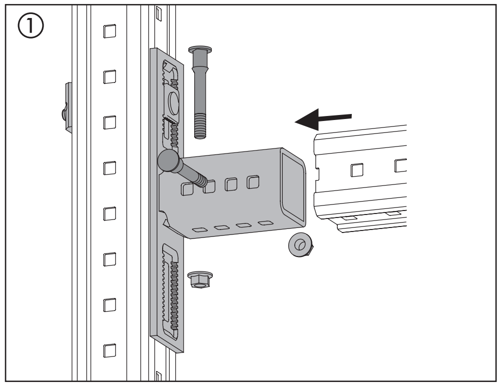
* For anchoring to concrete, consult project engineer for proper type and size anchor

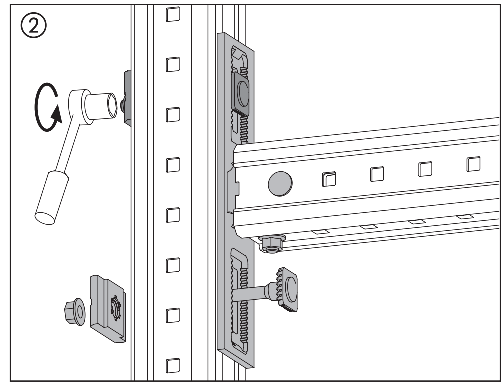
Unsupported cantilever: General information

MI girder

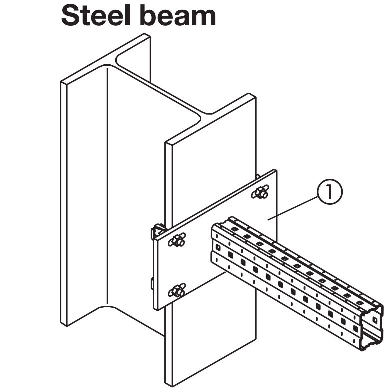


MI Connectors:
MIC-90-L

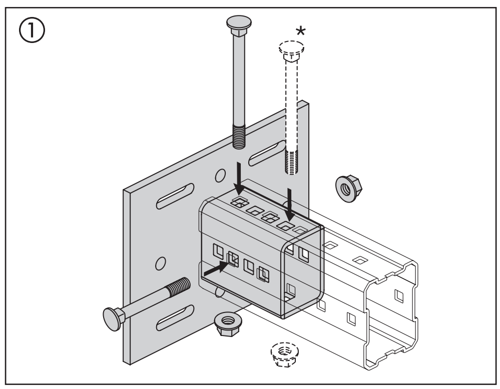




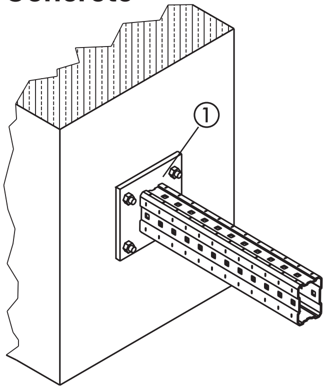
Steel beam



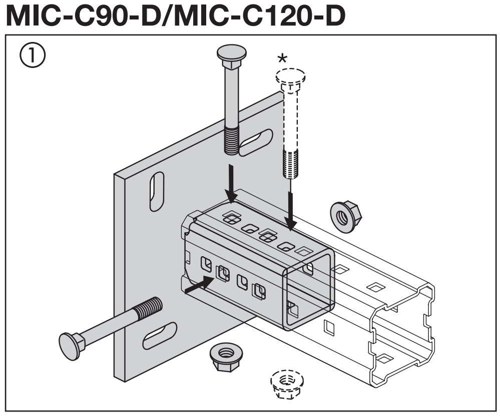
Connections to steel:
MIC-S90-A/B/C/MIC-S120-A/B/C



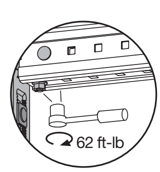
Concrete

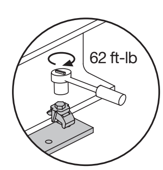


Connections to concrete:
MIC-C90-D/MIC-C120-D



The MI connector must engage the girder so the end of the girder is between the connector weld and first hole or slot. The bolts should be located in the holes closest to the connector base as possible and a minimum of 1" from the girder end. Connectors with two bolts should be positioned perpendicular to each other.
* In some cases, a higher moment resistance can be achieved through the use of a third bolt (see load tables for individual components). The bolt should be fitted in the direction of the largest horizontal force.
Note: The third bolt must be ordered additionally.

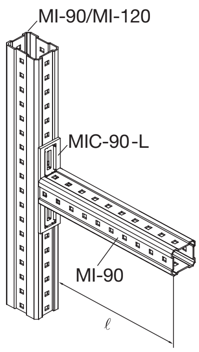


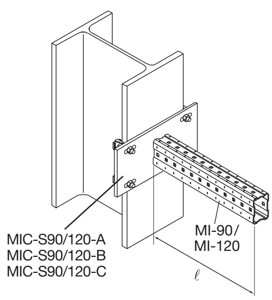


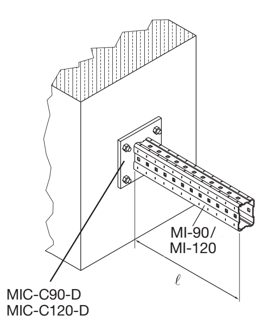
Bolt tightening torque: For connectors For beam clamps

Unsupported cantilever MI-90 / 120

Allowable load ± Fz (lb) with simultaneous load Fx = Fz x 0.15 unless noted







Cantilever connector type	Cantilever length ℓ (in)	Loading condition 1 uniform loading ($F_z = w \cdot \ell$) Fz (lb)	Loading condition 2 single load (1/2, 1/2) Fz (lb)	Loading condition 3 Fz (lb)	Loading condition 4 (1/3, 1/3, 1/3) Fz (lb)	Loading condition 5 (1/4, 1/4, 1/4, 1/4) Fz (lb)
MIC-90-L	12	808	808	401	401	265
	18	533	533	262	262	171
	36	252	252	117	117	71
MIC-90-L	12	527	527	380	260	171
	18	506	506	248	248	162
	36	239	239	110	110	67
MIC-S90-A/B/C	18	533	533	262	262	171
	36	252	252	117	117	71
MIC-S90-A/B/C	18	533	533	262	262	171
	36	252	252	117	117	71
MIC-S120-A/B/C	18	744	744	367	367	242
	36	358	358	169	169	107
MIC-S120-A/B/C	18	744	744	367	367	242
	36	358	358	169	169	107
MIC-C90-D	18	533	533	262	262	171
	36	252	252	117	117	71
MIC-C90-D	18	533	533	262	262	171
	36	252	252	117	117	71
MIC-C120-D	18	744	744	367	367	242
	36	358	358	169	169	107
MIC-C120-D	18	744	744	367	367	242
	36	358	358	169	169	107

Deformation of ℓ/180 is adhered to in all cases, measured at the outermost point of load action.

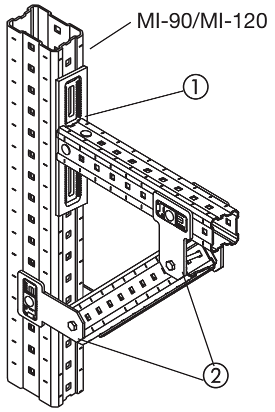
Connectors

For anchoring to concrete, see general information page 8.

For connection to steel beams use four MI-SGC-M12 beam clamps (item 233859).

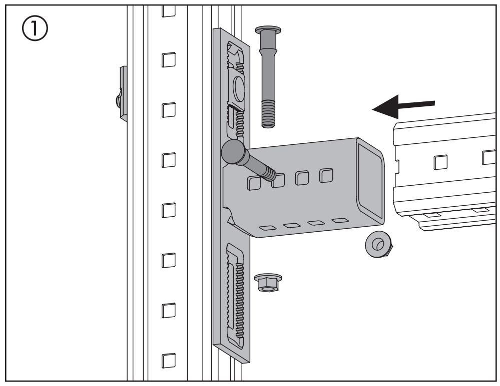
Supported cantilever: General information

MI girder

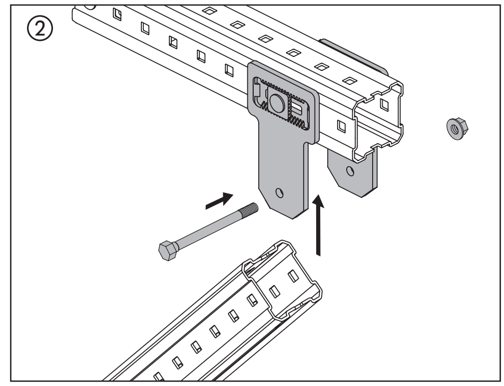


MI Connectors:

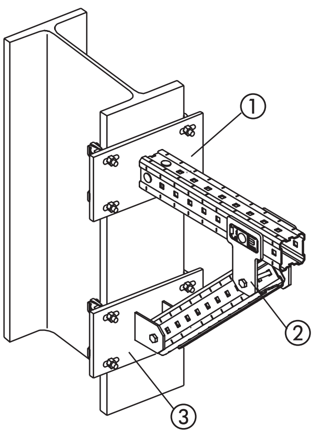
MIC-90-L



MIC-U-MA

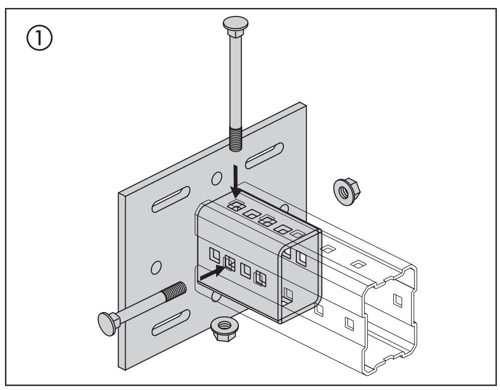


Steel beam

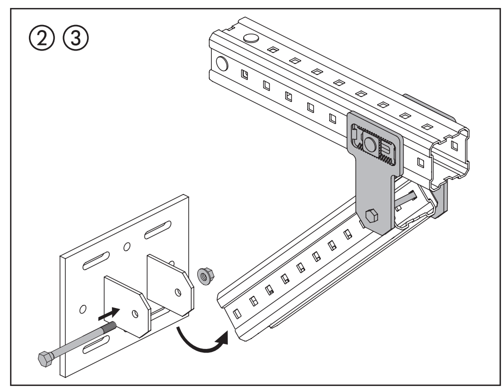


Connections to steel:

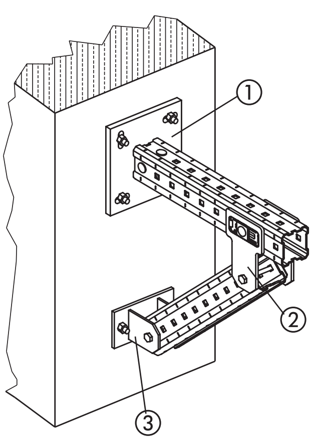
MIC-S90-A/B/C/MIC-S120-A/B/C



MIC-U-MA; MIC-SA/SB/SC-MA

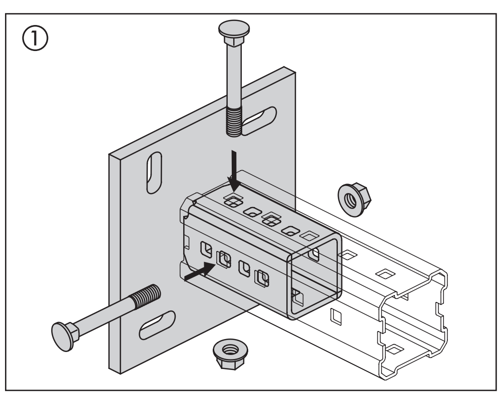


Concrete

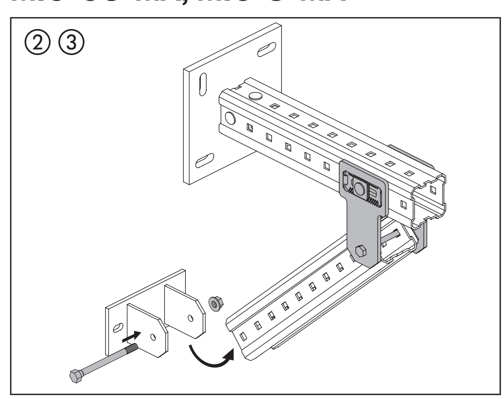


Connections to concrete:

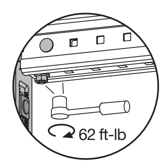
MIC-C90-D/MIC-C120-D

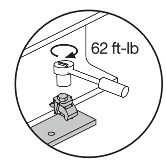


MIC-CU-MA; MIC-U-MA



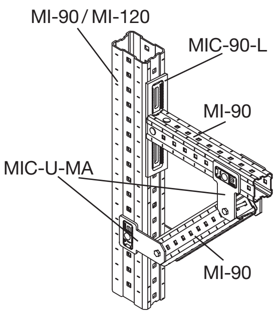
The MI connector must engage the girder so the end of the girder is between the connector weld and first hole or slot. The bolts should be located in the holes closest to the connector base as possible and a minimum of 1" from the girder end. Connectors with two bolts should be positioned perpendicular to each other.

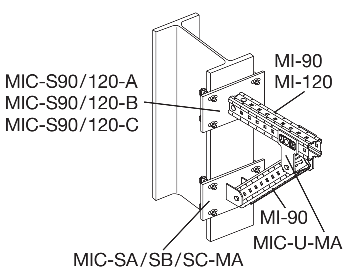


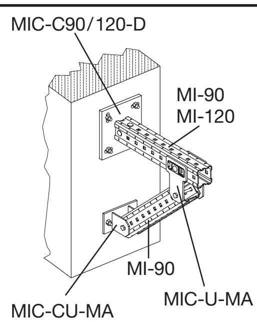


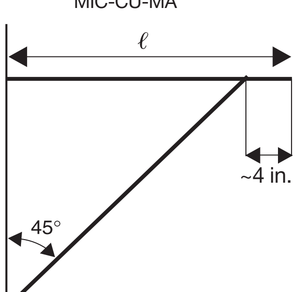
Bolt tightening torque: For connectors For beam clamps

Supported cantilever MI-90 / 120









Allowable load ± Fz (lb) with simultaneous load Fx = Fz x 0.15 unless noted

Cantilever connector type	Cantilever length ℓ (in)	Fz = w · ℓ Loading condition 1 Fz (lb)	Fz ½ ½ Loading condition 2 Fz (lb)	Fz Loading condition 3 Fz (lb)	Fz Fz ⅓ ⅓ ⅓ Loading condition 4 Fz (lb)	Fz Fz Fz ¼ ¼ ¼ ¼ Loading condition 5 Fz (lb)
Fz	18	2443	2443	1221	1221	814
MIC-90-L	36	2777	2777	1388	1388	926
Fz, Fx	18	590	590	315	290	190
MIC-90-L	36	305	305	143	143	89
Fz	18	2067	2067	1033	1033	689
MIC-S90/120-A, MIC-SA-MA	36	2348	2348	1174	1174	783
Fx, Fz	18	2067	2067	1033	1033	689
MIC-S90/120-A, MIC-SA-MA	36	1790	1790	1174	1174	783
Fz	18	2067	2067	1033	1033	689
MIC-S90/120-B, MIC-SA-MA	36	2348	2348	1174	1174	783
Fx, Fz	18	2067	2067	1033	1033	689
MIC-S90/120-B, MIC-SA-MA	36	1790	1790	1174	1174	783
Fz	18	2067	2067	1033	1033	689
MIC-S90/120-C, MIC-SA-MA	36	2348	2348	1174	1174	783
Fx, Fz	18	2067	2067	1033	1033	689
MIC-S90/120-C, MIC-SA-MA	36	1634	1634	1174	1174	783
Fz	18	2443	2443	1222	1222	814
MIC-C90/120-D, MIC-SA-MA	36	2777	2777	1389	1389	926
Fx, Fz	18	2443	2443	1222	1222	814
MIC-C90/120-D, MIC-SA-MA	36	1790	1790	1389	1389	926

Deformation of ℓ/180 is adhered to in all cases, measured at the outermost point of load action.

Connectors

For anchoring to concrete, see general information page 8.

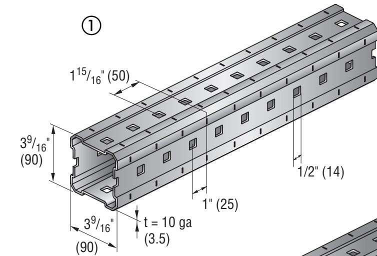
For connection to steel beams use four MI-SGC-M12 beam clamps (item 233859).

MI girder 90/120

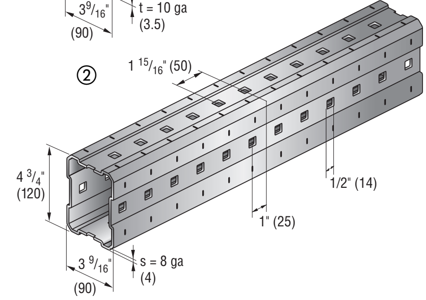
Technical data

Material	S235 JRG2 (DIN 10025), ASTM A283 (C)
Galvanizing	Hot-dip galvanized 3 mils (75 µm) DIN EN ISO 1461, ASTM A123

①



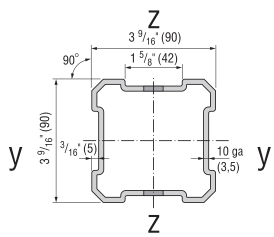
②

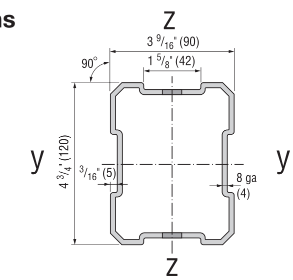


Item No.	Description	Section Height in (mm)	Length ft (m)	Metal Thickness Gauge (mm)	Weight lb/ft (kg/m)	Packaged In Lengths of	
304798	MI-90 3m	3-9/16" (90)	9' 10" (3)	10 (3.5)	6.3 (9.4)	9' 8-1/4" (3m)	①
304799	MI-90 6m	3-9/16" (90)	19' 8-1/4" (6)	10 (3.5)	6.3 (9.4)	19' 4-1/2" (6m)	①
304800	MI-120 3m	4-3/4" (120)	9' 10" (3)	8 (4)	8.4 (12.6)	9' 8-1/4" (3m)	②
304801	MI-120 6m	4-3/4" (120)	19' 8-1/4" (6)	8 (4)	8.4 (12.6)	19' 4-1/2" (6m)	②

Values for cross sections

Cross sections



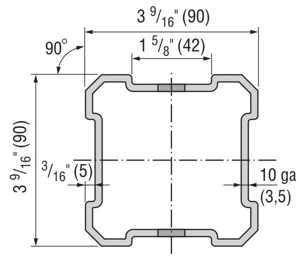


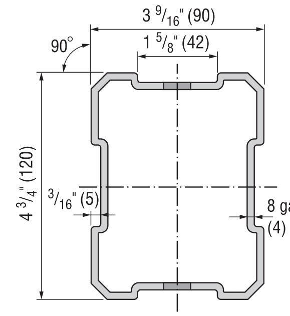
Technical Data		MI-90	MI-120
Material thickness	t (in)	0.1378 (~10 ga)	0.1575 (~8 ga)
Cross sectional area	A (in2)	1.55	2.13
Weight of girder	(lb/ft)	6.34	8.47
Lengths available (unbraced length)	(ft)	9' 8-1/4" / 19' 4-1/2"	9' 8-1/4" / 19' 4-1/2"
Material			
Yield strength	$f_{y,k}$ (ksi)	34	34
Allowable tensile stress[1]	σ (ksi)	20.40	20.40
Allowable shear stress[1]	τ (ksi)	11.80	11.80
Modulus of elasticity	E (ksi)	30388	30388
Shear modulus	G (ksi)	11721	11721
Surface			
Hot-dip galvanized (acc. to ASTM A 123)	(µm)	75	75
Cross section values			
Y-axis			
Moment of inertia	I_y (in^4)	2.77	6.38
Section modulus	S_y (in^3)	1.56	2.70
Radius of gyration	r_y (in)	1.33	1.73
Static moment	$S_{y\,max.}$ (in^3)	0.98	1.72
Allowable moment[2]	M_y (lb-ft)	2651.67	4590.00
Z-axis			
Moment of inertia	I_z (in^4)	2.77	4.17
Section modulus	S_z (in^3)	1.56	2.35
Radius of gyration	r_z (in)	1.33	1.40
Static moment	$S_{z\,max}$ (in^3)	0.98	1.42
Allowable moment[2]	M_z (lb-ft)	2661.67	4600.83
Torsion values			
Torsional moment of inertia	I_t (in^4)	3.73	7.13
Torsional section modulus	S(in^3)	2.76	4.37
Warping moment of inertia	$I_{\omega\omega} = C_M$ (in^6)	0.50	5.04
Uniform warping	ω_{max} (in^2)	0.08	0.24
Warping area moment	$S\omega_{max}$ (in^4)	0.02	0.13

[1] Calculation according to ASD: safety factor for bending $\Omega_b = 1.67$

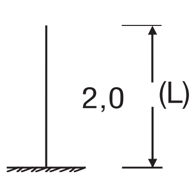
[2] $M_y = Mn_y/\Omega_b$ or $M_z = Mn_z/\Omega_b$

Recommended buckling loads for MI girders

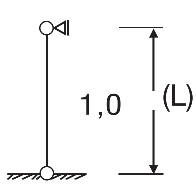




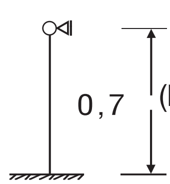
Buckling Loads **Effective Length (L) (in)**	**MI-90 (k)**	**MI-120 (k)**
12	29.43	40.38
24	29.43	40.38
36	28.85	39.71
48	28.17	38.83
60	27.39	37.84
72	26.47	36.68
84	25.35	35.30
96	23.98	33.62
108	22.33	31.60
120	20.47	29.26
132	18.50	26.72
144	16.58	24.15
156	14.80	21.70
168	13.20	19.46
180	11.80	17.46
192	10.58	15.70
204	9.53	14.16
216	8.61	12.81
228	7.81	11.64
240	7.11	10.61
252	6.50	9.71
264	5.97	8.91
276	5.49	8.21
288	5.07	7.58
300	4.69	7.02
312	4.36	6.52
324	4.06	6.07



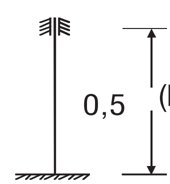
Condition 1



Condition 2



Condition 3



Condition 4

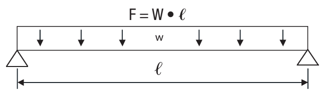
Single-span with bending load in one axis

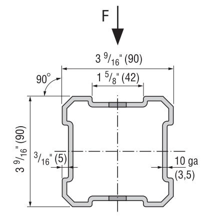
F_1 at $\Delta = \ell/180$; F_2 at $\Delta = \ell/240$; F_3 at $\Delta = \ell/360$; F at σ_{all} including weight of girder

Δ = deflection

σ_{all} = allowable stress

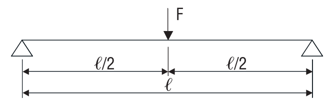
MI-90, uniformly distributed load

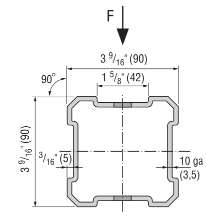




Length of span (in)	w (lb/in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	443	10630	0.02	–	–	–	–	–	–
36	197	7080	0.05	–	–	–	–	–	–
48	110	5300	0.09	–	–	–	–	–	–
60	71	4230	0.14	–	–	–	–	–	–
72	49	3510	0.20	–	–	–	–	3440	0.20
84	36	3000	0.28	–	–	–	–	2510	0.23
96	27	2610	0.36	–	–	–	–	1900	0.27
108	21	2310	0.46	–	–	2260	0.45	1490	0.30
120	17	2070	0.57	–	–	1810	0.50	1190	0.33
132	14	1870	0.69	–	–	1480	0.55	970	0.37
144	12	1700	0.82	1660	0.80	1230	0.60	790	0.40
156	10	1560	0.96	1400	0.87	1030	0.65	660	0.43
168	9	1430	1.11	1190	0.93	870	0.70	550	0.47
180	7	1330	1.28	1020	1.00	740	0.75	460	0.50
192	6	1230	1.45	880	1.07	630	0.80	390	0.53
204	6	1150	1.64	760	1.13	540	0.85	330	0.57
216	5	1070	1.84	660	1.20	470	0.90	280	0.60
228	4	1000	2.05	580	1.27	400	0.95	230	0.63
240	4	940	2.27	500	1.33	350	1.00	190	0.67

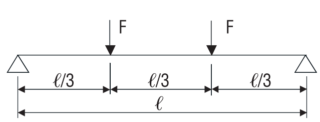
MI-90, one single load

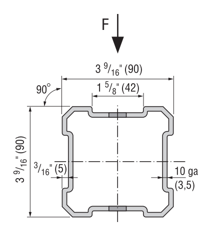




Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	5260	0.02	–	–	–	–	–	–
36	3520	0.04	–	–	–	–	–	–
48	2640	0.07	–	–	–	–	–	–
60	2110	0.11	–	–	–	–	–	–
72	1750	0.16	–	–	–	–	–	–
84	1500	0.22	–	–	–	–	–	–
96	1300	0.29	–	–	–	–	1190	0.27
108	1150	0.37	–	–	–	–	930	0.30
120	1030	0.46	–	–	–	–	740	0.33
132	930	0.55	–	–	930	0.55	600	0.37
144	850	0.66	–	–	770	0.60	500	0.40
156	780	0.78	–	–	640	0.65	410	0.43
168	720	0.90	–	–	540	0.70	350	0.47
180	660	1.04	640	1.00	460	0.75	290	0.50
192	620	1.18	550	1.07	400	0.80	240	0.53
204	570	1.34	480	1.13	340	0.85	210	0.57
216	540	1.51	410	1.20	290	0.90	170	0.60
228	500	1.68	360	1.27	250	0.95	140	0.63
240	470	1.87	310	1.33	220	1.00	120	0.67

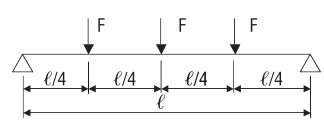
MI-90, two single loads

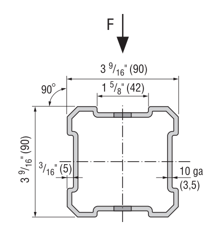




Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	3890	0.02	–	–	–	–	–	–
36	2620	0.05	–	–	–	–	–	–
48	1970	0.09	–	–	–	–	–	–
60	1580	0.14	–	–	–	–	–	–
72	1310	0.21	–	–	–	–	–	–
84	1120	0.28	–	–	–	–	920	0.23
96	980	0.37	–	–	–	–	700	0.27
108	860	0.47	–	–	–	–	550	0.30
120	770	0.58	–	–	–	–	440	0.33
132	700	0.70	–	–	540	0.55	350	0.37
144	640	0.83	610	0.80	450	0.60	290	0.40
156	580	0.98	510	0.87	380	0.65	240	0.43
168	540	1.14	440	0.93	320	0.70	200	0.47
180	500	1.30	370	1.00	270	0.75	170	0.50
192	460	1.48	320	1.07	230	0.80	140	0.53
204	430	1.67	280	1.13	200	0.85	120	0.57
216	400	1.88	240	1.20	170	0.90	100	0.60
228	380	2.09	210	1.27	150	0.95	80	0.63
240	350	2.32	180	1.33	130	1.00	70	0.67

MI-90, three single loads





Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	2590	0.02	–	–	–	–	–	–
36	1750	0.05	–	–	–	–	–	–
48	1320	0.09	–	–	–	–	–	–
60	1060	0.13	–	–	–	–	–	–
72	880	0.19	–	–	–	–	–	–
84	760	0.26	–	–	–	–	670	0.23
96	660	0.34	–	–	–	–	510	0.27
108	590	0.44	–	–	–	–	400	0.30
120	530	0.54	–	–	490	0.50	330	0.33
132	480	0.65	–	–	410	0.55	270	0.37
144	440	0.77	440	0.80	340	0.60	230	0.40
156	410	0.91	370	0.87	290	0.65	190	0.43
168	380	1.05	310	0.93	250	0.70	170	0.47
180	350	1.21	270	1.00	220	0.75	140	0.50
192	330	1.37	230	1.07	190	0.80	130	0.53
204	310	1.55	200	1.13	170	0.85	110	0.57
216	290	1.73	170	1.20	150	0.90	100	0.60
228	280	1.93	150	1.27	130	0.95	90	0.63
240	260	2.13	130	1.33	120	1.00	80	0.67

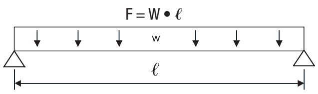
Single-span with bending load in one axis

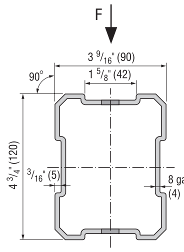
F_1 at $\Delta = \ell/180$; F_2 at $\Delta = \ell/240$; F_3 at $\Delta = \ell/360$; F at σ_{all} including weight of girder

Δ = deflection

σ_{all} = allowable stress

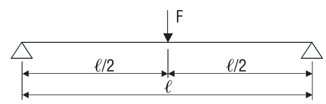
MI-120, uniformly distributed load

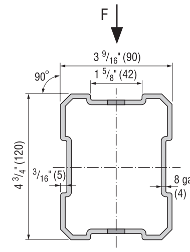




Length of span (in)	w (lb/in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	765	18370	0.02	–	–	–	–	–	–
36	340	12230	0.04	–	–	–	–	–	–
48	191	9160	0.07	–	–	–	–	–	–
60	122	7310	0.11	–	–	–	–	–	–
72	84	6080	0.15	–	–	–	–	–	–
84	62	5200	0.21	–	–	–	–	–	–
96	47	4530	0.27	–	–	–	–	4440	0.27
108	37	4010	0.34	–	–	–	–	3480	0.30
120	30	3600	0.43	–	–	–	–	2800	0.33
132	25	3250	0.52	–	–	–	–	2290	0.37
144	21	2970	0.61	–	–	2900	0.60	1900	0.40
156	17	2720	0.72	–	–	2450	0.65	1600	0.43
168	15	2510	0.83	–	–	2090	0.70	1350	0.47
180	13	2330	0.96	–	–	1800	0.75	1160	0.50
192	11	2170	1.09	2120	1.07	1560	0.80	990	0.53
204	10	2020	1.23	1850	1.13	1360	0.85	860	0.57
216	9	1890	1.38	1630	1.20	1190	0.90	740	0.60
228	7	1780	1.54	1440	1.27	1040	0.95	640	0.63
240	6	1670	1.70	1280	1.33	920	1.00	560	0.67

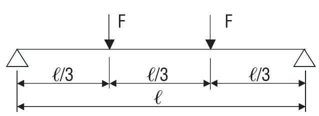
MI-120, one single load

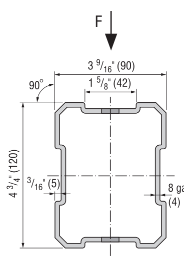




Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	9080	0.01	–	–	–	–	–	–
36	6090	0.03	–	–	–	–	–	–
48	4570	0.05	–	–	–	–	–	–
60	3650	0.09	–	–	–	–	–	–
72	3040	0.12	–	–	–	–	–	–
84	2600	0.17	–	–	–	–	–	–
96	2260	0.22	–	–	–	–	–	–
108	2010	0.28	–	–	–	–	–	–
120	1800	0.34	–	–	–	–	1750	0.33
132	1630	0.41	–	–	–	–	1430	0.37
144	1480	0.49	–	–	–	–	1190	0.40
156	1360	0.58	–	–	–	–	1000	0.43
168	1260	0.67	–	–	–	–	850	0.47
180	1160	0.78	–	–	1120	0.75	720	0.50
192	1080	0.88	–	–	970	0.80	620	0.53
204	1010	1.00	–	–	850	0.85	540	0.57
216	950	1.12	–	–	740	0.90	460	0.60
228	890	1.25	–	–	650	0.95	400	0.63
240	840	1.39	800	1.33	570	1.00	350	0.67

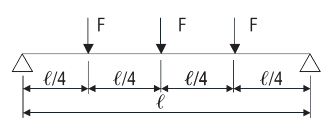
MI-120, two single loads

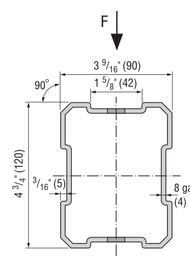




Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	6720	0.02	–	–	–	–	–	–
36	4540	0.04	–	–	–	–	–	–
48	3410	0.07	–	–	–	–	–	–
60	2730	0.11	–	–	–	–	–	–
72	2270	0.16	–	–	–	–	–	–
84	1940	0.21	–	–	–	–	–	–
96	1700	0.28	–	–	–	–	–	–
108	1500	0.35	–	–	–	–	–	–
120	1350	0.43	–	–	–	–	1030	0.33
132	1220	0.53	–	–	–	–	840	0.37
144	1110	0.63	–	–	1060	0.60	700	0.40
156	1020	0.73	–	–	900	0.65	590	0.43
168	940	0.85	–	–	770	0.70	500	0.47
180	870	0.98	–	–	660	0.75	420	0.50
192	810	1.11	780	1.07	570	0.80	360	0.53
204	760	1.26	680	1.13	500	0.85	310	0.57
216	710	1.41	600	1.20	430	0.90	270	0.60
228	670	1.57	530	1.27	380	0.95	240	0.63
240	630	1.74	470	1.33	340	1.00	200	0.67

MI-120, three single loads

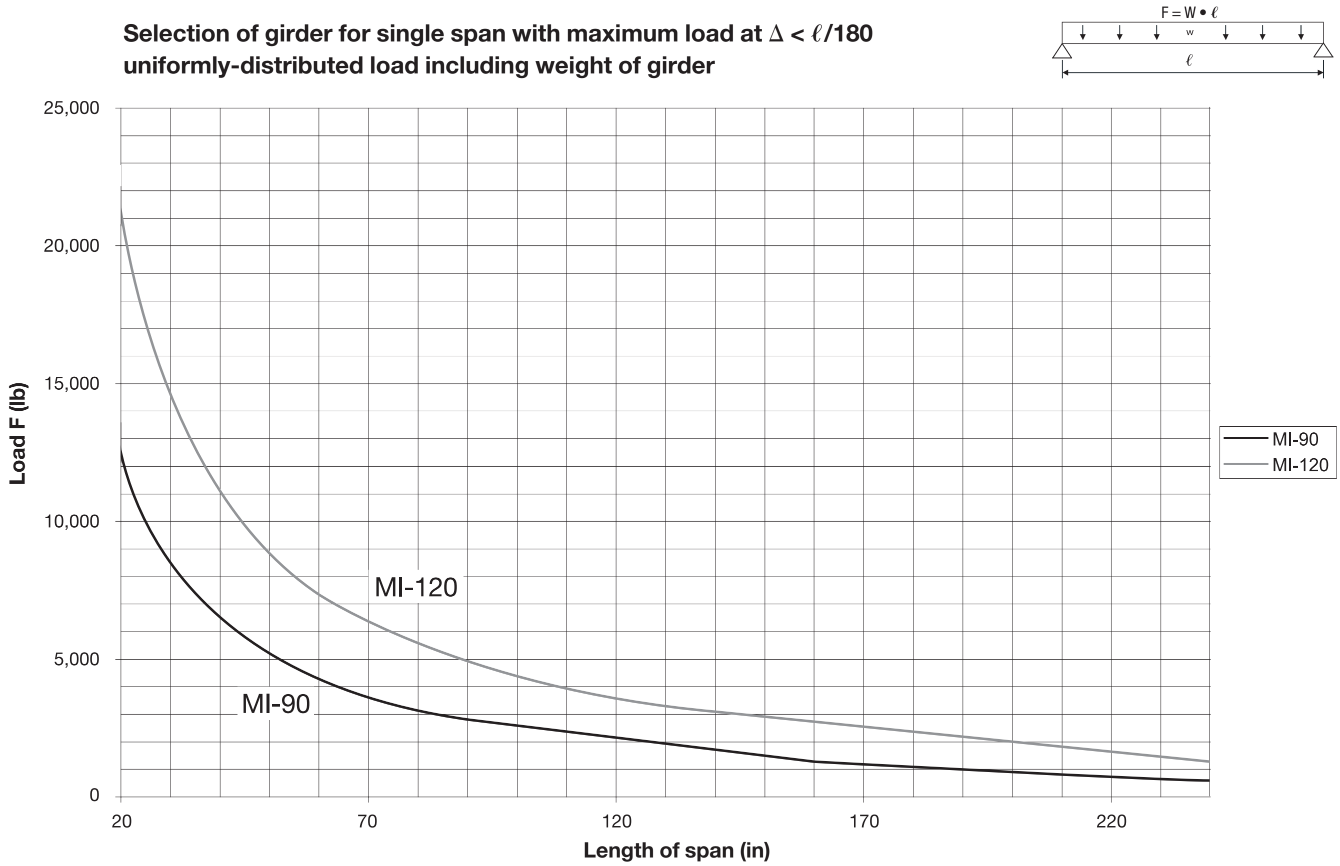




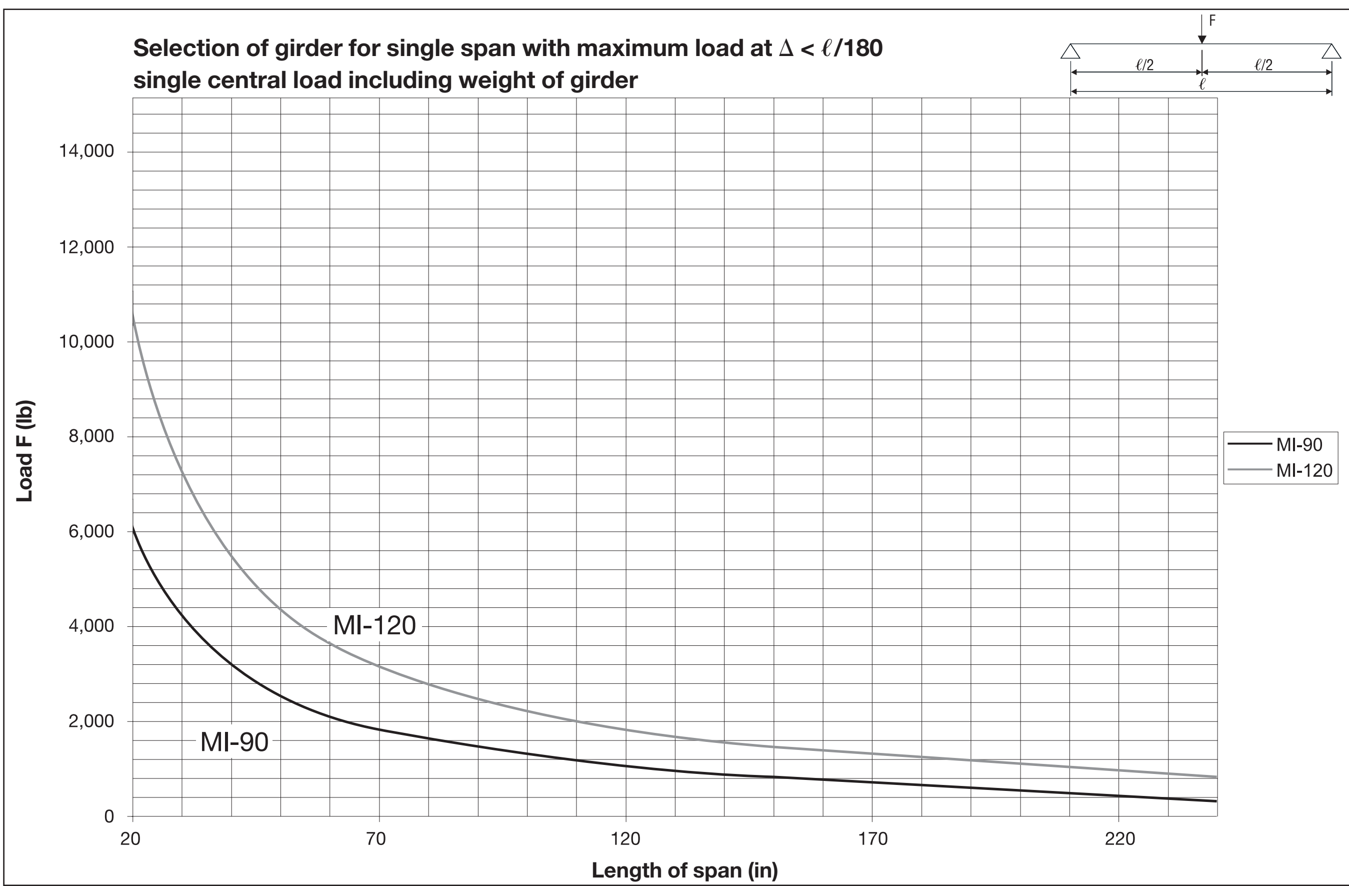
Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	4480	0.02	–	–	–	–	–	–
36	3030	0.04	–	–	–	–	–	–
48	2280	0.06	–	–	–	–	–	–
60	1830	0.10	–	–	–	–	–	–
72	1530	0.15	–	–	–	–	–	–
84	1310	0.20	–	–	–	–	–	–
96	1150	0.26	–	–	–	–	–	–
108	1020	0.33	–	–	–	–	930	0.30
120	920	0.40	–	–	–	–	760	0.33
132	830	0.49	–	–	–	–	620	0.37
144	760	0.58	–	–	–	–	520	0.40
156	700	0.68	–	–	670	0.65	450	0.43
168	650	0.79	–	–	580	0.70	380	0.47
180	610	0.91	–	–	500	0.75	330	0.50
192	570	1.03	560	1.07	440	0.80	290	0.53
204	540	1.16	490	1.13	390	0.85	260	0.57
216	510	1.30	430	1.20	350	0.90	230	0.60
228	480	1.45	380	1.27	310	0.95	210	0.63
240	460	1.60	340	1.33	280	1.00	190	0.67

Single-span with bending load in one axis

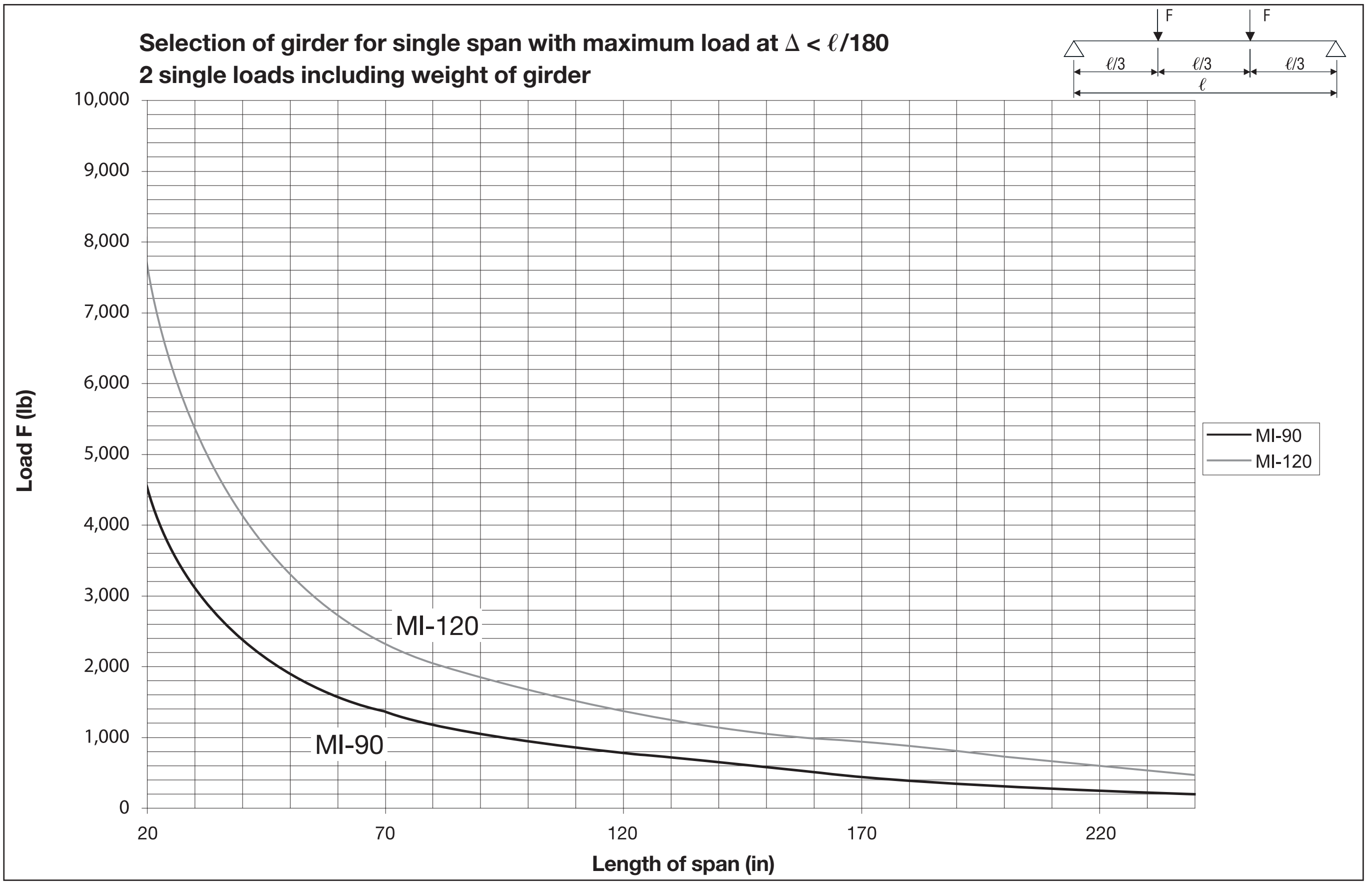
Selection of girder for single span with maximum load at Δ < ℓ/180
uniformly-distributed load including weight of girder

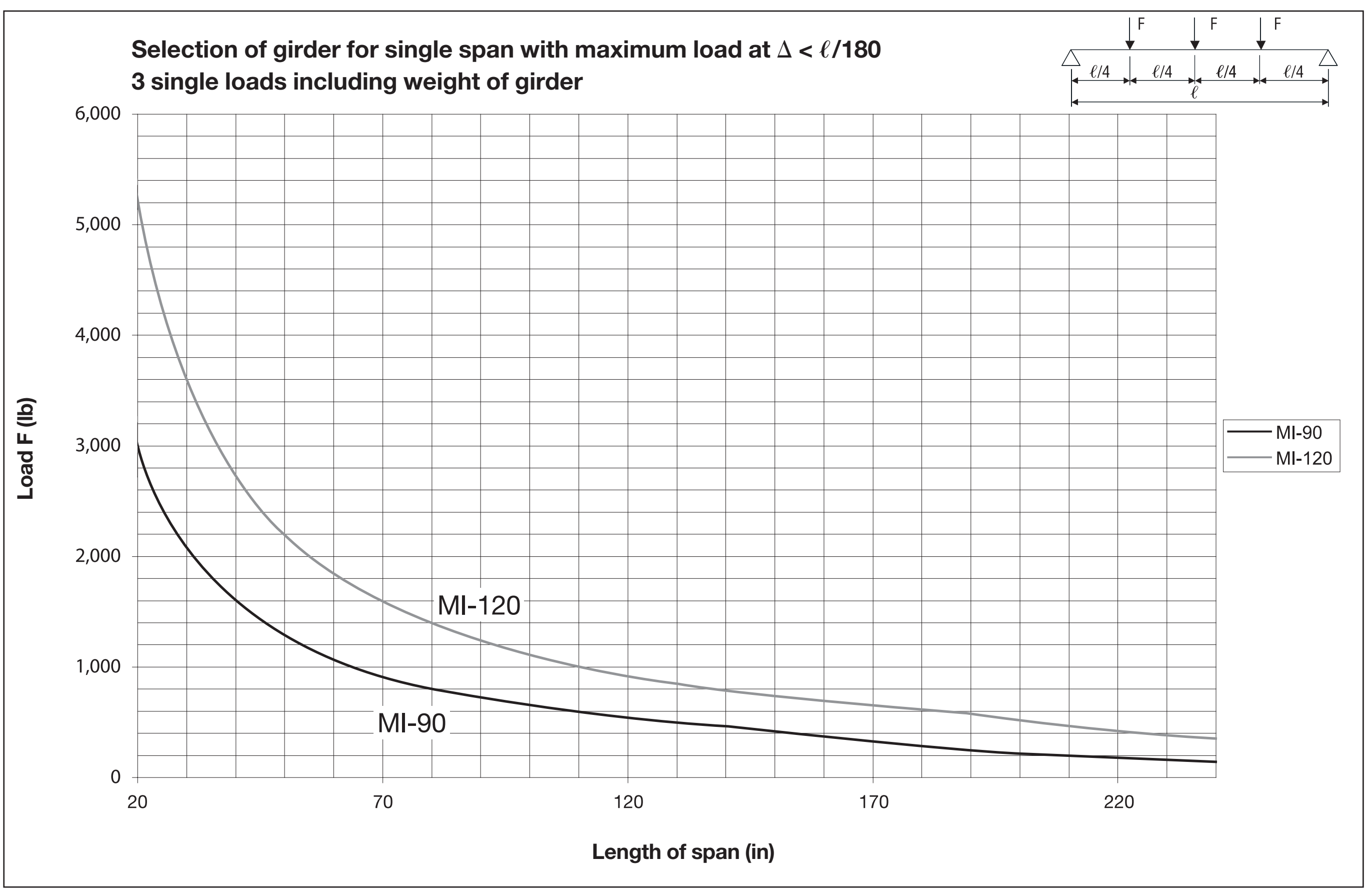


Selection of girder for single span with maximum load at Δ < ℓ/180
single central load including weight of girder



Single-span with bending load in one axis





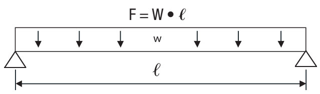
Single-span with bending load in two axes (F_y = F*0.15)

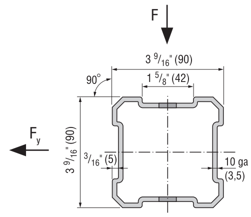
F_1 at Δ = ℓ/180; F_2 at Δ = ℓ/240; F_3 at Δ = ℓ/360; F at σ_{all} including weight of girder

Δ = deflection

σ_{all} = allowable stress

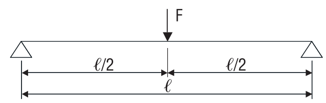
MI-90, uniformly distributed load

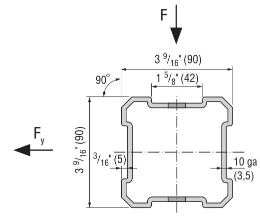




Length of span (in)	w (lb/in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	385	9240	0.02	–	–	–	–	–	–
36	171	6150	0.04	–	–	–	–	–	–
48	96	4600	0.08	–	–	–	–	–	–
60	61	3670	0.12	–	–	–	–	–	–
72	42	3050	0.18	–	–	–	–	–	–
84	31	2610	0.24	–	–	–	–	2510	0.23
96	24	2270	0.32	–	–	–	–	1900	0.27
108	19	2010	0.40	–	–	–	–	1490	0.30
120	15	1800	0.50	–	–	–	–	1190	0.33
132	12	1620	0.60	–	–	1480	0.55	970	0.37
144	10	1480	0.72	–	–	1230	0.60	790	0.40
156	9	1350	0.84	–	–	1030	0.65	660	0.43
168	7	1250	0.98	1190	0.93	870	0.70	550	0.47
180	6	1150	1.12	1020	1.00	740	0.75	460	0.50
192	6	1070	1.28	880	1.07	630	0.80	390	0.53
204	5	1000	1.44	760	1.13	540	0.85	330	0.57
216	4	930	1.62	660	1.20	470	0.90	280	0.60
228	4	870	1.81	580	1.27	400	0.95	230	0.63
240	3	820	2.01	500	1.33	350	1.00	190	0.67

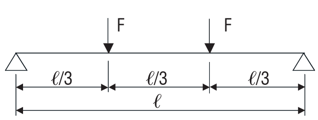
MI-90, one single load

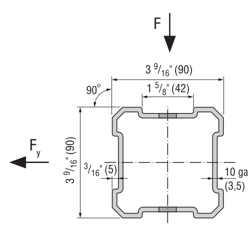




Length of span (in)	F (lb)	Δ (in) ≤ σ_{alw}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	4580	0.02	–	–	–	–	–	–
36	3060	0.04	–	–	–	–	–	–
48	2300	0.06	–	–	–	–	–	–
60	1830	0.10	–	–	–	–	–	–
72	1520	0.14	–	–	–	–	–	–
84	1300	0.19	–	–	–	–	–	–
96	1130	0.25	–	–	–	–	–	–
108	1000	0.32	–	–	–	–	930	0.30
120	900	0.40	–	–	–	–	740	0.33
132	810	0.49	–	–	–	–	600	0.37
144	740	0.58	–	–	–	–	500	0.40
156	680	0.68	–	–	640	0.65	410	0.43
168	620	0.79	–	–	540	0.70	350	0.47
180	580	0.91	–	–	460	0.75	290	0.50
192	540	1.04	–	–	400	0.80	240	0.53
204	500	1.18	480	1.13	340	0.85	210	0.57
216	470	1.33	410	1.20	290	0.90	170	0.60
228	440	1.49	360	1.27	250	0.95	140	0.63
240	410	1.66	310	1.33	220	1.00	120	0.67

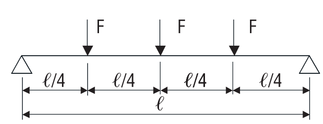
MI-90, two single loads

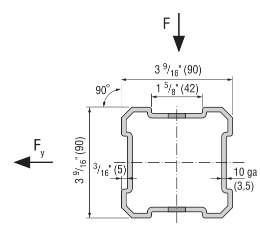




Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	3400	0.02	–	–	–	–	–	–
36	2290	0.05	–	–	–	–	–	–
48	1720	0.08	–	–	–	–	–	–
60	1370	0.13	–	–	–	–	–	–
72	1140	0.18	–	–	–	–	–	–
84	980	0.25	–	–	–	–	920	0.23
96	850	0.32	–	–	–	–	700	0.27
108	750	0.41	–	–	–	–	550	0.30
120	670	0.51	–	–	–	–	440	0.33
132	610	0.61	–	–	540	0.55	350	0.37
144	550	0.73	–	–	450	0.60	290	0.40
156	510	0.86	–	–	380	0.65	240	0.43
168	470	1.00	440	0.93	320	0.70	200	0.47
180	430	1.14	370	1.00	270	0.75	170	0.50
192	400	1.30	320	1.07	230	0.80	140	0.53
204	370	1.47	280	1.13	200	0.85	120	0.57
216	350	1.65	240	1.20	170	0.90	100	0.60
228	330	1.85	210	1.27	150	0.95	80	0.63
240	310	2.05	180	1.33	130	1.00	70	0.67

MI-90, three single loads





Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	2270	0.02	–	–	–	–	–	–
36	1530	0.04	–	–	–	–	–	–
48	1150	0.07	–	–	–	–	–	–
60	920	0.12	–	–	–	–	–	–
72	770	0.17	–	–	–	–	–	–
84	660	0.23	–	–	–	–	–	–
96	580	0.30	–	–	–	–	510	0.27
108	510	0.38	–	–	–	–	400	0.30
120	460	0.47	–	–	–	–	330	0.33
132	420	0.57	–	–	410	0.55	270	0.37
144	380	0.67	–	–	340	0.60	230	0.40
156	350	0.79	–	–	290	0.65	190	0.43
168	330	0.91	310	0.93	250	0.70	170	0.47
180	310	1.05	270	1.00	220	0.75	140	0.50
192	290	1.19	230	1.07	190	0.80	130	0.53
204	270	1.34	200	1.13	170	0.85	110	0.57
216	250	1.51	170	1.20	150	0.90	100	0.60
228	240	1.68	150	1.27	130	0.95	90	0.63
240	230	1.85	130	1.33	120	1.00	80	0.67

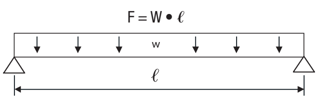
Single-span with bending load in two axes (F_y = F*0.15)

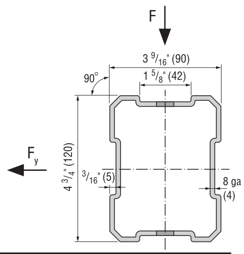
F_1 at Δ = ℓ/180; F_2 at Δ = ℓ/240; F_3 at Δ = ℓ/360; F at σ_{all} including weight of girder

Δ = deflection

σ_{all} = allowable stress

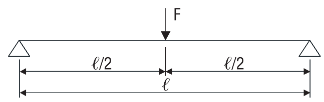
MI-120, uniformly distributed load

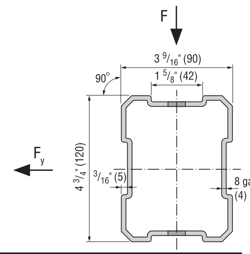




Length of span (in)	w (lb/in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	653	15670	0.01	–	–	–	–	–	–
36	290	10440	0.03	–	–	–	–	–	–
48	163	7820	0.06	–	–	–	–	–	–
60	104	6240	0.09	–	–	–	–	–	–
72	72	5190	0.13	–	–	–	–	–	–
84	53	4430	0.18	–	–	–	–	–	–
96	40	3870	0.23	–	–	–	–	–	–
108	32	3420	0.30	–	–	–	–	–	–
120	26	3070	0.36	–	–	–	–	2800	0.33
132	21	2770	0.44	–	–	–	–	2290	0.37
144	18	2530	0.53	–	–	–	–	1900	0.40
156	15	2320	0.62	–	–	–	–	1600	0.43
168	13	2140	0.72	–	–	2090	0.70	1350	0.47
180	11	1990	0.82	–	–	1800	0.75	1160	0.50
192	10	1850	0.94	–	–	1560	0.80	990	0.53
204	8	1730	1.06	–	–	1360	0.85	860	0.57
216	8	1620	1.19	–	–	1190	0.90	740	0.60
228	7	1520	1.33	1440	1.27	1040	0.95	640	0.63
240	6	1430	1.48	1280	1.33	920	1.00	560	0.67

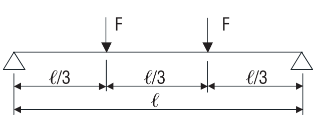
MI-120, one single load

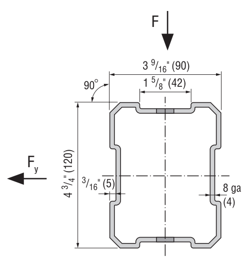




Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	7770	0.01	–	–	–	–	–	–
36	5200	0.03	–	–	–	–	–	–
48	3900	0.05	–	–	–	–	–	–
60	3120	0.07	–	–	–	–	–	–
72	2590	0.10	–	–	–	–	–	–
84	2210	0.14	–	–	–	–	–	–
96	1930	0.19	–	–	–	–	–	–
108	1710	0.24	–	–	–	–	–	–
120	1530	0.29	–	–	–	–	–	–
132	1390	0.36	–	–	–	–	–	–
144	1260	0.42	–	–	–	–	1190	0.40
156	1160	0.50	–	–	–	–	1000	0.43
168	1070	0.58	–	–	–	–	850	0.47
180	990	0.67	–	–	–	–	720	0.50
192	920	0.76	–	–	–	–	620	0.53
204	860	0.87	–	–	850	0.85	540	0.57
216	810	0.97	–	–	740	0.90	460	0.60
228	760	1.09	–	–	650	0.95	400	0.63
240	710	1.21	–	–	570	1.00	350	0.67

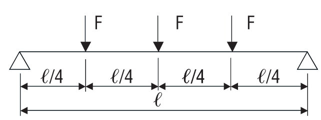
MI-120, two single loads

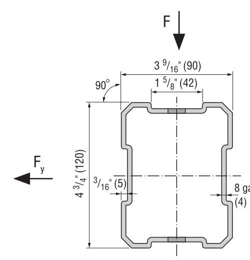




Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	5770	0.01	–	–	–	–	–	–
36	3880	0.03	–	–	–	–	–	–
48	2920	0.06	–	–	–	–	–	–
60	2330	0.09	–	–	–	–	–	–
72	1940	0.13	–	–	–	–	–	–
84	1660	0.18	–	–	–	–	–	–
96	1450	0.24	–	–	–	–	–	–
108	1280	0.30	–	–	–	–	–	–
120	1150	0.37	–	–	–	–	1030	0.33
132	1040	0.45	–	–	–	–	840	0.37
144	950	0.54	–	–	–	–	700	0.40
156	870	0.63	–	–	–	–	590	0.43
168	800	0.73	–	–	770	0.70	500	0.47
180	740	0.84	–	–	660	0.75	420	0.50
192	690	0.96	–	–	570	0.80	360	0.53
204	650	1.08	–	–	500	0.85	310	0.57
216	610	1.22	600	1.20	430	0.90	270	0.60
228	570	1.36	530	1.27	380	0.95	240	0.63
240	540	1.50	470	1.33	340	1.00	200	0.67

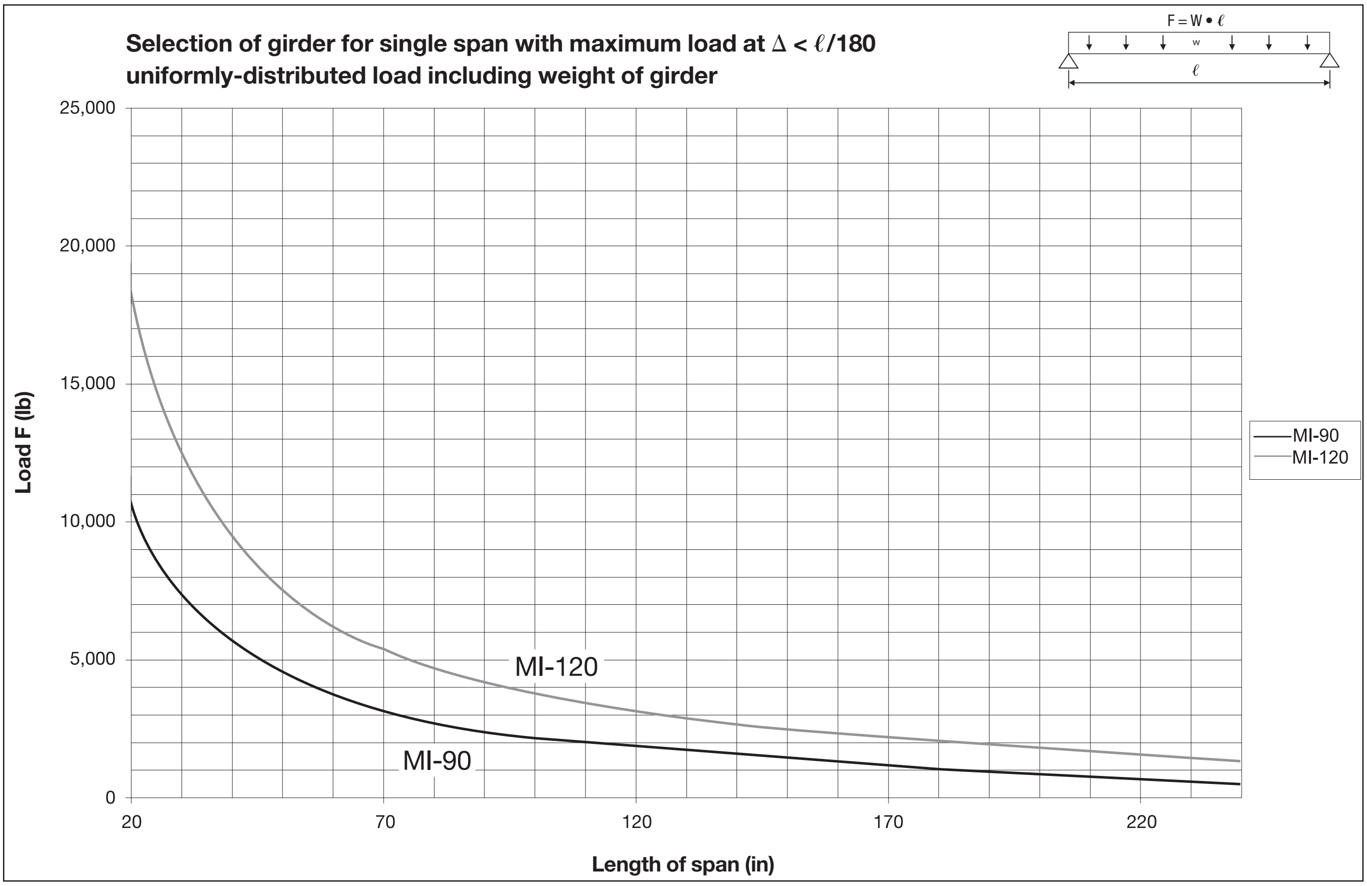
MI-120, three single loads

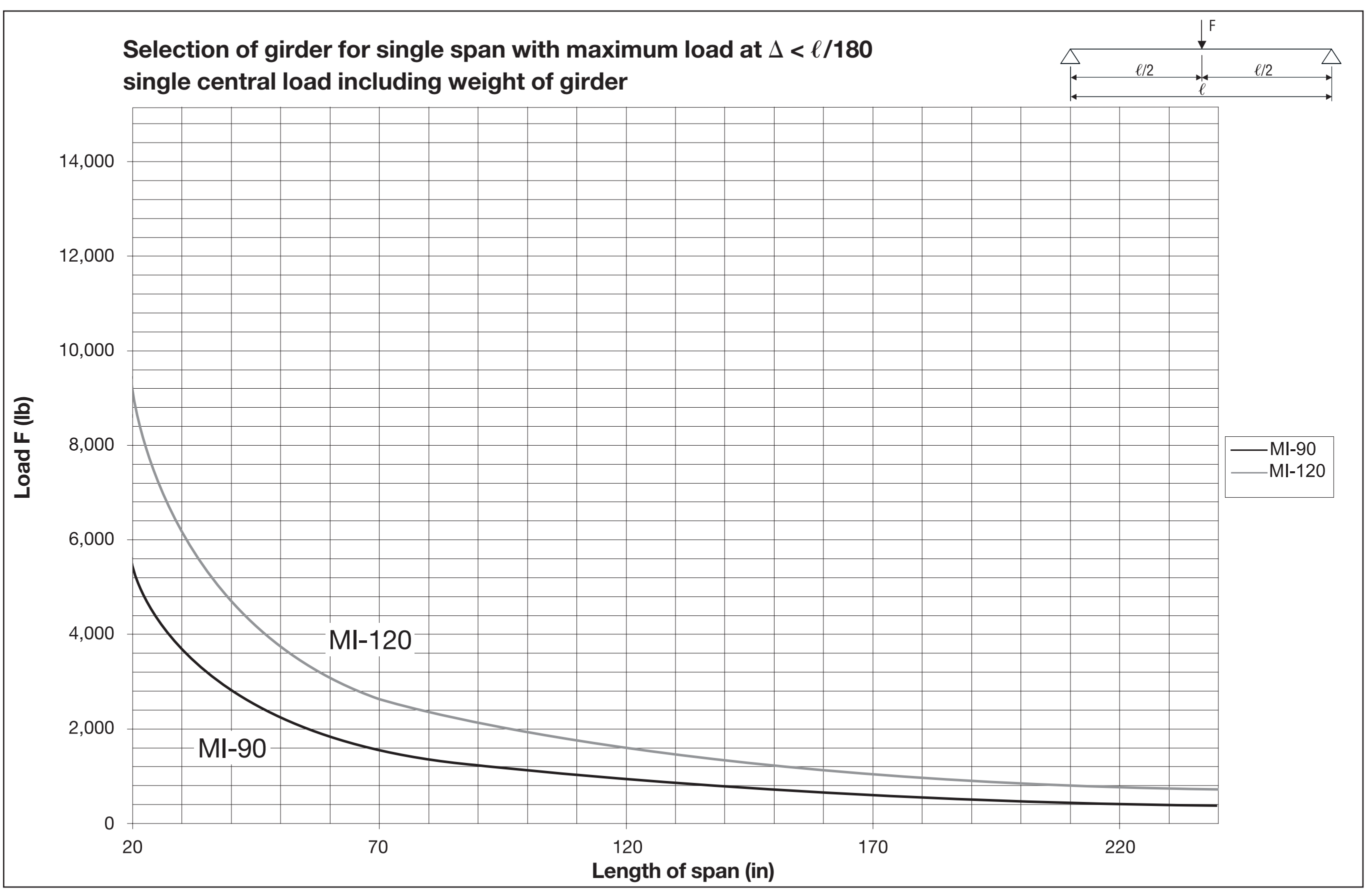




Length of span (in)	F (lb)	Δ (in) at σ_{all}	F1 (lb)	Δ (in) ≤ ℓ/180	F2 (lb)	Δ (in) ≤ ℓ/240	F3 (lb)	Δ (in) ≤ ℓ/360
24	3850	0.01	–	–	–	–	–	–
36	2590	0.03	–	–	–	–	–	–
48	1950	0.05	–	–	–	–	–	–
60	1560	0.09	–	–	–	–	–	–
72	1300	0.12	–	–	–	–	–	–
84	1120	0.17	–	–	–	–	–	–
96	980	0.22	–	–	–	–	–	–
108	870	0.28	–	–	–	–	–	–
120	780	0.34	–	–	–	–	760	0.33
132	710	0.42	–	–	–	–	620	0.37
144	650	0.50	–	–	–	–	520	0.40
156	600	0.58	–	–	–	–	450	0.43
168	560	0.67	–	–	–	–	380	0.47
180	520	0.77	–	–	500	0.75	330	0.50
192	490	0.88	–	–	440	0.80	290	0.53
204	460	0.99	–	–	390	0.85	260	0.57
216	430	1.11	430	1.20	350	0.90	230	0.60
228	410	1.24	380	1.27	310	0.95	210	0.63
240	390	1.37	340	1.33	280	1.00	190	0.67

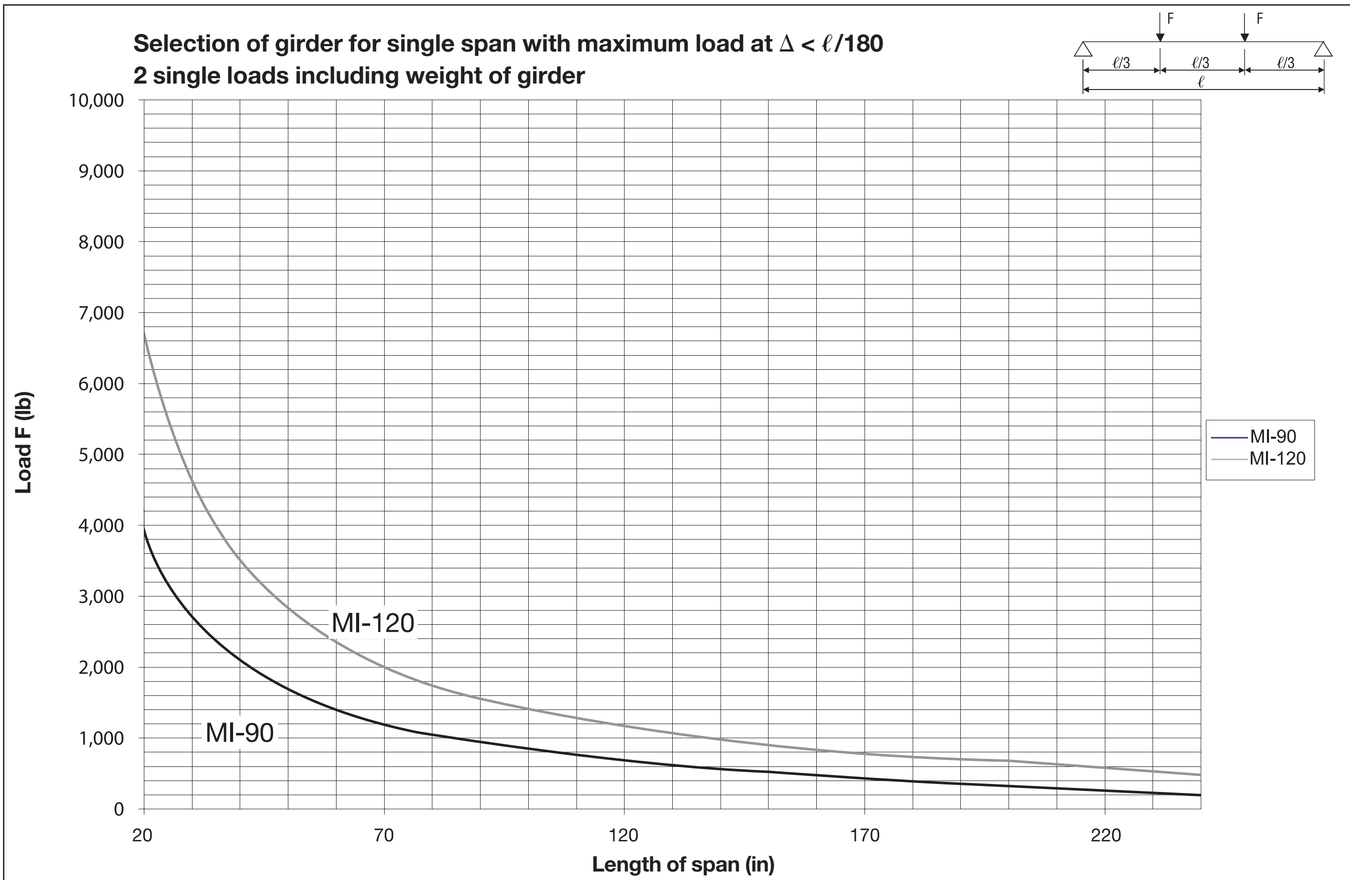
Single-span with bending load in two axes (F_y = F*0.15)



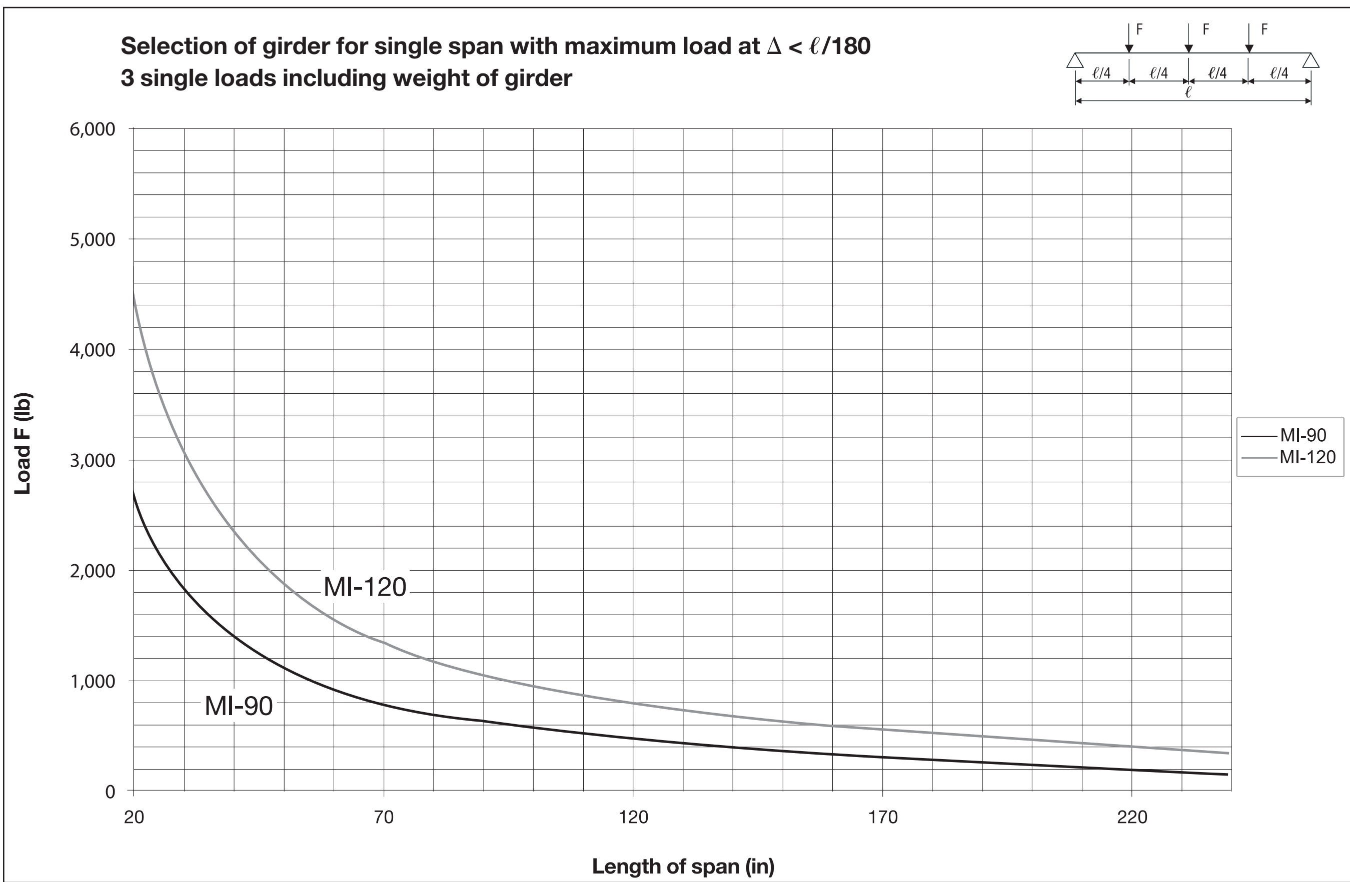


Single-span with bending load in two axes (F_y = F*0.15)

Selection of girder for single span with maximum load at Δ < ℓ/180
2 single loads including weight of girder



Selection of girder for single span with maximum load at Δ < ℓ/180
3 single loads including weight of girder



MIC-90 / 120-U crossbeam connector

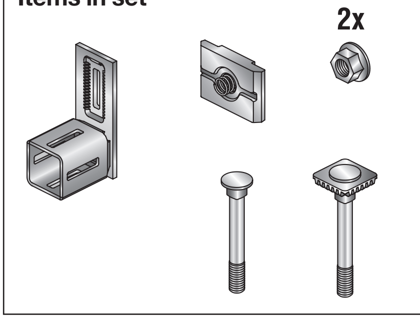
Technical data

Material	S235 JRG2 (DIN 10025) ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 μm) DIN EN ISO 1461, ASTM A153

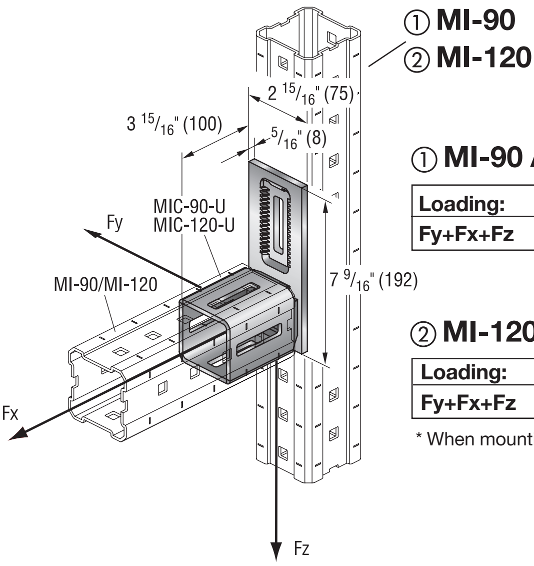
Note:
Connector must always be used at both ends of a girder.

Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents
304803	MIC-90-U	MI-90	5.2 (2.3)	4
304804	MIC-120-U	MI-120	6.1 (2.7)	4

Items in set



MIC-90-U or MIC-120-U on MI-90/120* girder



① MI-90 Allowable loads

Loading:	$\pm Fy_{all}$ (lb)	$\pm Fx_{all}$ (lb)	$\pm Fz_{all}$ (lb)
Fy+Fx+Fz	2150	380	2670

② MI-120* Allowable loads

Loading:	$\pm Fy_{all}$ (lb)	$\pm Fx_{all}$ (lb)	$\pm Fz_{all}$ (lb)
Fy+Fx+Fz	2290	380	3040

* When mounting to 120 mm width, order separately bolt MIA-EH-120, item 304888

MIC-90-L cantilever connector

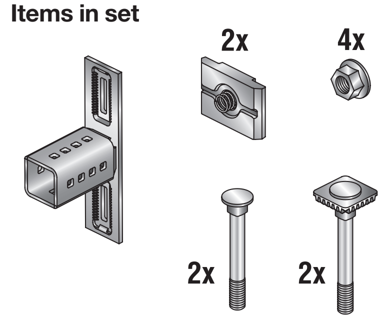
Technical data

Material	S235 JRG2 (DIN 10025) ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm) DIN EN ISO 1461, ASTM A153

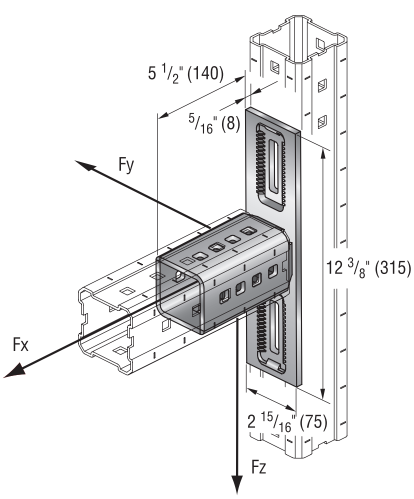
Note:
Connector designed for cantilever applications.

Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents
304805	MIC-90-L	MI-90	8.7 (3.9)	2

Items in set



MIC-90-L on MI-90 or MI-120 girder*



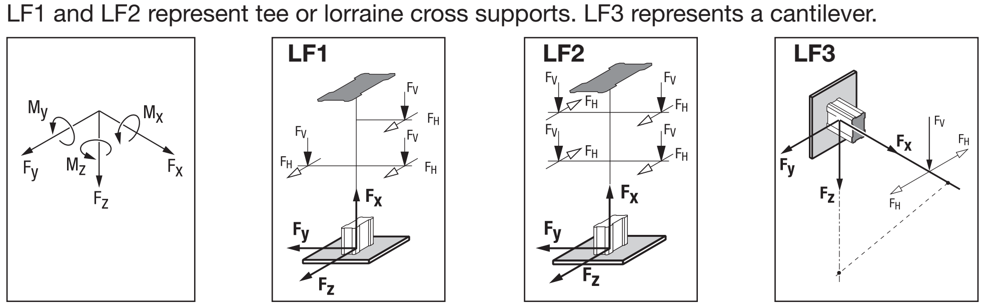
Allowable loads

Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		1830				
Fy + Fz	2930		4130			
Fy + Mz	130					109
Fz + My			1130	407		
Fx + My		780		407		
Fx + Fy + Mz	90	310				73
Fy + Mx	560				364	
Fz + Mx			560		364	
LF1	2930	690	4130	407	73	
LF2a		1400	440		364	
LF2b	440	1400	440		364	
LF3 oST	80		560	401	22	58

* When mounting to 120 mm width, order separately bolt MIA-EH-120, item 304888

Moments and loading configurations, (LF), for MIC-90-L on MI-90/120

LF1 and LF2 represent tee or lorraine cross supports. LF3 represents a cantilever.



F_V = vertical load
F_H = horizontal load

LF2a = Moment M_x induced by F_z
LF2b = Moment M_x induced by F_y

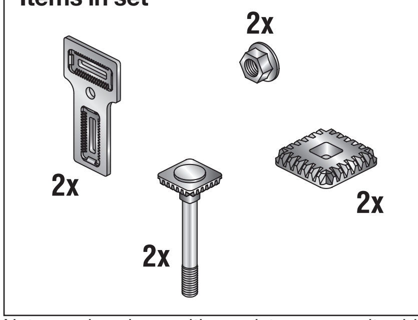
LF3oST = cantilever without support

MIC-T pedestal connector

Technical data

Material	S235 JRG2 (DIN 10025) ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm) DIN EN ISO 1461, ASTM A153

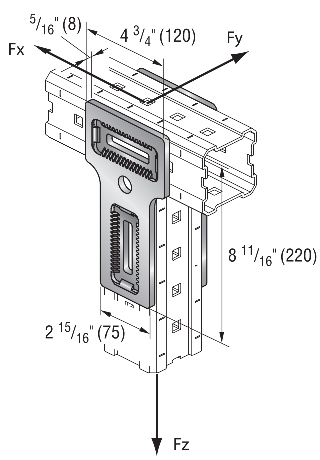
Items in set



Note: use in pairs, position a plate on opposite sides of a girder.

Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents
304807	MIC-T	MI-90/MI-120	4.4 (2.0)	2

MIC-T on MI-90 or MI-120



Allowable loads

Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)
Fx	–	2180	–
Fy	310	–	–
Fz	–	–	4440
Fy+Fz	–	1330	2220
Fx+Fy+Fz	220	780	2220

Loads apply only when MIC-T pedestal connector is used in pairs (on opposite sides of the girder).

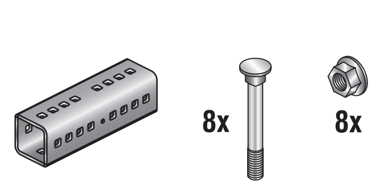
MIC-90 / 120-E girder extension

Technical data

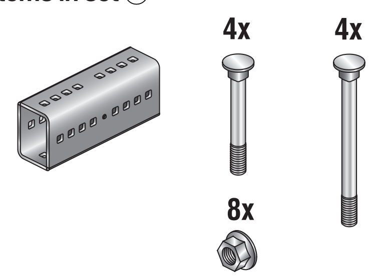
Material	S235 JRG2 (DIN 10025), ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm) DIN EN ISO 1461, ASTM A153

Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents	
304809	MIC-90-E	MI-90	7.8 (3.5)	2	①
304810	MIC-120-E	MI-120	9.5 (4.3)	2	②

Items in set ①

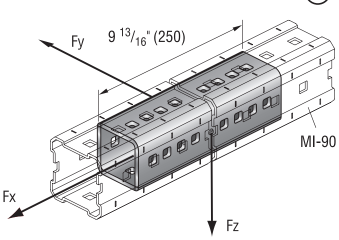


Items in set ②



MIC-90-E
MI-90 extension

①



Allowable loads

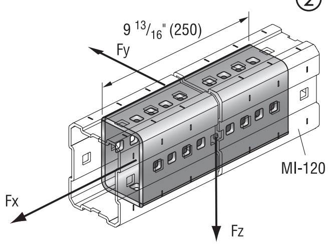
Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		7550				
Fy + Fz	970*		970*			
Mz						729
My				729		
Mx					1326	
Fy + Fz + My + Mz	970*		970*	729		729

The end of each girder must be fastened with 4 bolts inserted perpendicular.

* The loads apply at midspan to a maximum span length of 36 inches. For information on greater span lengths, please contact Hilti technical services department.

MIC-120-E
MI-120 extension

②



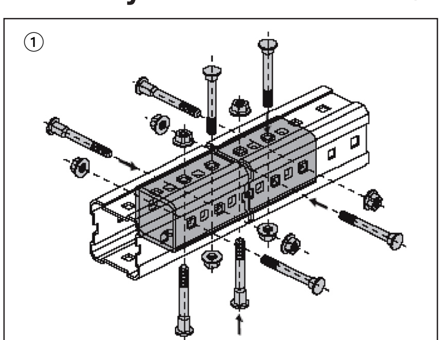
Allowable loads

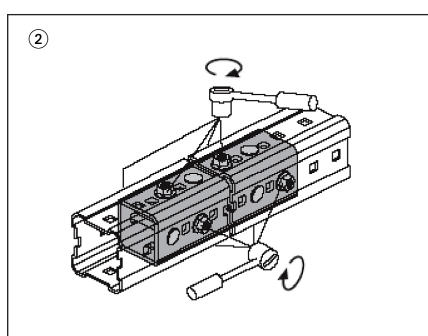
Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		8570				
Fy + Fz	970*		1480*			
Mz						729
My				1215		
Mx					1807	
Fy + Fz + My + Mz	970*		1480*	1215		729

The end of each girder must be fastened with 4 bolts inserted perpendicular.

* The loads apply at midspan to a maximum span length of 36 inches. For information on greater span lengths, please contact Hilti technical services department.

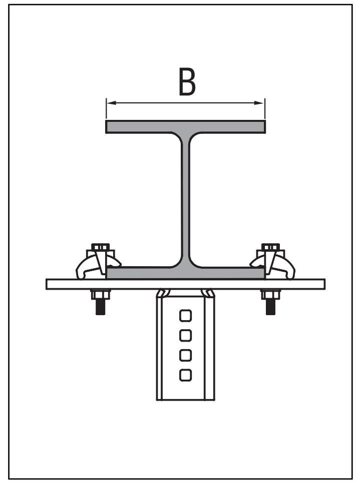
Assembly Instructions for MIC-90-E / MIC-120-E





Note: Ends of girder must be cut through the center of a square hole.

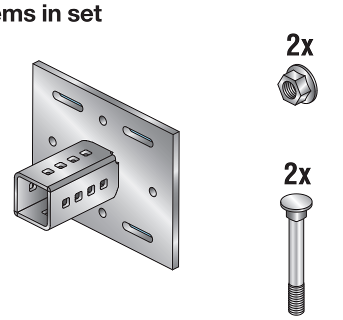
MI steel connectors: Connection to steel beams



Technical data

Material	S235 JRG2 (DIN 10025), ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm) DIN EN ISO 1461, ASTM A153

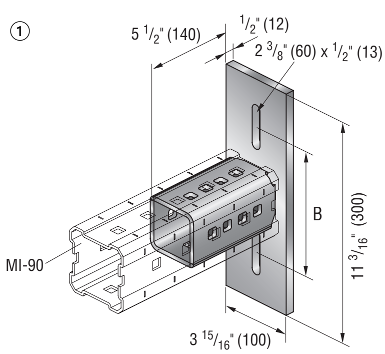
Items in set



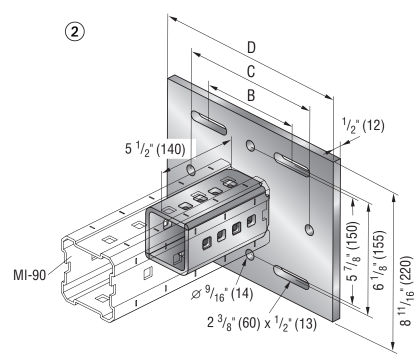
Steel connectors with connecting parts

Item No.	Description	For Girder Type	Steel Beam Width B in (mm)	C in (mm)	D in (mm)	Weight Per Set lb (kg)	Package Contents	
304811	MIC-S90-AA	MI-90	4-3/8"–8" (110–205)	6-5/8" (170)	11-13/16"(300)	9.6 (4.3)	2	①
304812	MIC-S90-A	MI-90	2-15⁄16"–6-1/2" (75–165)	7-7/8" (200)	11" (280)	15.7 (7.1)	2	②
304813	MIC-S90-B	MI-90	6-1/2"–9-1/4"(165–235)	11-13/16" (300)	13-3/4" (350)	18.9 (8.5)	2	②
304814	MIC-S90-C	MI-90	9-1/4"–12"(235–305)	13-3/4" (350)	16-15/16" (430)	22.5 (10.2)	2	②
304818	MIC-S120-A	MI-120	2-15/16"–6-1/2" (75–165)	7-7/8" (200)	11" (280)	16.6 (7.5)	2	③
304819	MIC-S120-B	MI-120	6-1/2"–9-1/4" (165–235)	11-13/16" (300)	13-3/4" (350)	19.8 (8.9)	2	③
304820	MIC-S120-C	MI-120	9-1/4"–12" (235–305)	13-3/4" (350)	16-15/16" (430)	23.4 (10.6)	2	③

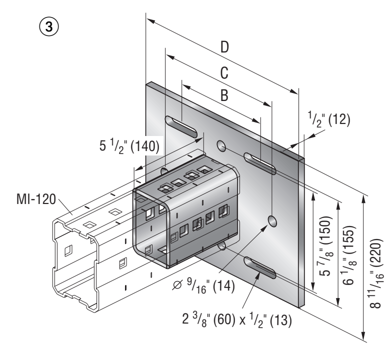
①



②



③

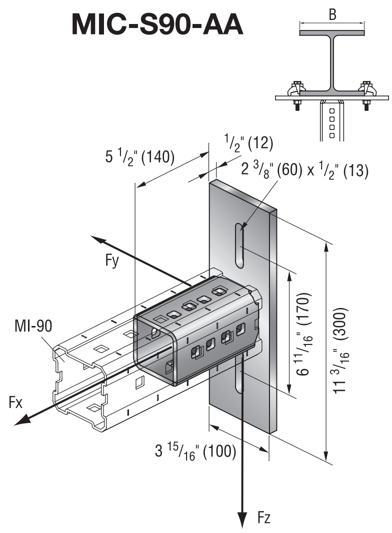


Note: ①
Connector must always be used at both ends of a girder.

Note: ② **and** ③
Connectors designed for cantilever applications.

MI steel connectors: MIC-S90-AA / A connector on steel beam

MIC-S90-AA



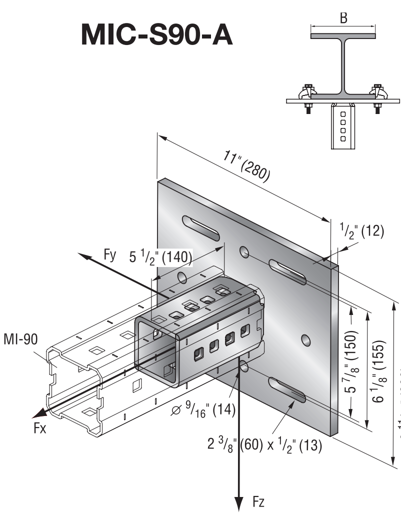
Allowable loads

Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		2000				
Fy or Fz*	670		670			
Fy + Fz	470		470			
Fy + Mz	490					364
Fz + My			490	401		
Fx + My		1110		292		
Fy + Fx + Mz	270	1110				219
Fy + Mx	110				76	
Fz + Mx			110		76	
Fy + Fx + Fz + My	350	1110	350	292		

* Loading permissible in only one direction

Fastened with two MI-SGC-M12 beam clamps (item 233859).

MIC-S90-A



Allowable loads

Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		3260				
Fy or Fz*	1330		1330			
Fy + Fz	940		940			
Fz + My			980	407 (534)**		
Fy + Mz	530					407
Fy + Fx + Mz	890	1110				407
Fx + Fz + My		1110	980	407 (481)**		
Fz + Mx			180		343	
Fy + Mx	180				343	
LF1	310	1110	310	306	153	306
LF2a		1930	240		200	
LF2b	240	1930			200	
LF3 oST	150		960	407 (534)**		87
LF3 ST	330	1550	920			407
LF4	690	3260	690			

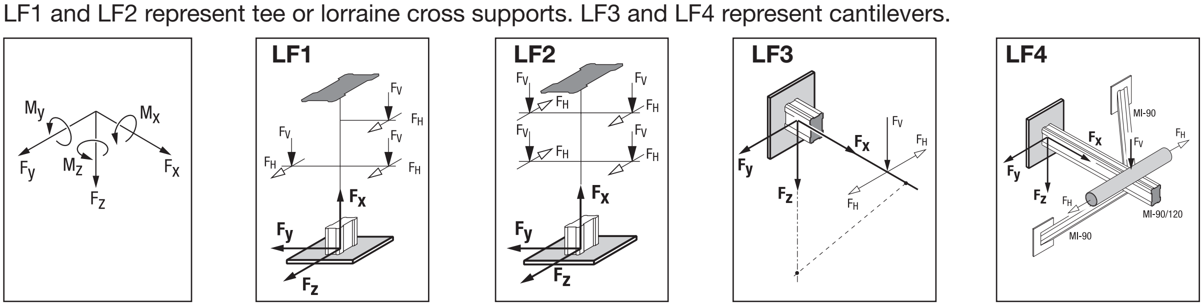
* Loading permissible in only one direction

Fastened with four MI-SGC-M12 beam clamps (item 233859).

** Values in brackets ( ) apply to use of three bolts in girder connection. The third bolt (MIA-OH-90 item 304889) must be ordered additionally.

Moments and loading configurations, (LF), for MIC-S90-AA/A on steel beams

LF1 and LF2 represent tee or lorraine cross supports. LF3 and LF4 represent cantilevers.



F_V = vertical load
F_H = horizontal load

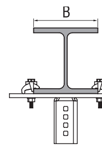
LF2a = Moment M_x induced by F_z
LF2b = Moment M_x induced by F_y

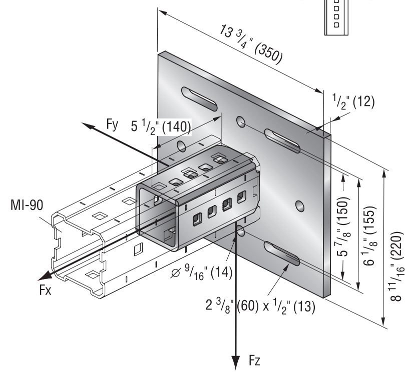
LF3ST = cantilever with support
LF3oST = cantilever without support

LF4 = cantilever with vertical and horizontal supports

MI steel connectors:
MIC-S90-B / C connector on steel beam

MIC-S90-B





Allowable loads

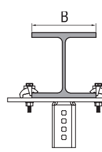
Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		2270				
Fy or Fz*	1330		1330			
Fy + Fz	940		940			
Fz + My			980	407 (534)**		
Fy + Mz	710					407
Fy + Fx + Mz	890	1110				407
Fx + Fz + My		1110	980	407 (459)**		
Fz + Mx			410		339	
Fy + Mx	410				339	
LF1	380	970	380	255**	153	255
LF2a		1930	300		246	
LF2b	300	1930			246	
LF3 oST	150		980	407 (534)**		95
LF3 ST	330	1060	920			407
LF4	690	2270	690			

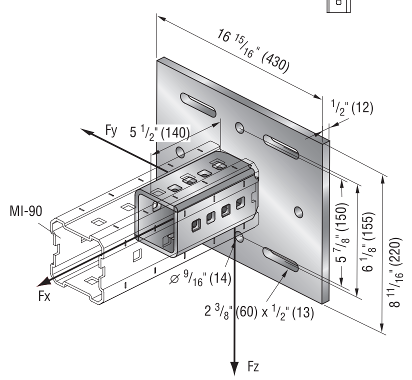
* Loading permissible in only one direction

Fastened with four MI-SGC-M12 beam clamps (item 233859).

** Values in brackets ( ) apply to use of three bolts in girder connection. The third bolt (MIA-OH-90 item 304889) must be ordered additionally.

MIC-S90-C





Allowable loads

Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		1600				
Fy or Fz*	1330		1330			
Fy + Fz	940		940			
Fz + My			890	407 (534)**		
Fy + Mz	840					407
Fy + Fx + Mz	890	910				364
Fx + Fz + My		760	980	407 (481)**		
Fz + Mx			470		383	
Fy + Mx	470				383	
LF1	440	790	200	204**	153	204
LF2a		1600	250		343	
LF2b	250	1600			343	
LF3 oST	150		980	407 (534)**		102
LF3 ST	330	860	920			372
LF4	690	1600	690			

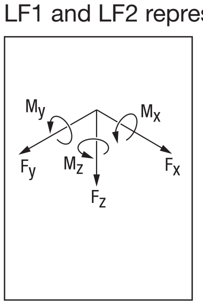
* Loading permissible in only one direction

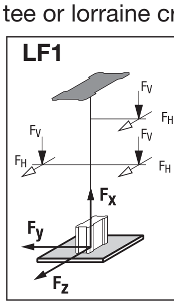
Fastened with four MI-SGC-M12 beam clamps (item 233859).

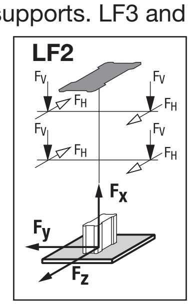
** Values in brackets ( ) apply to use of three bolts in girder connection. The third bolt (MIA-OH-90 item 304889) must be ordered additionally.

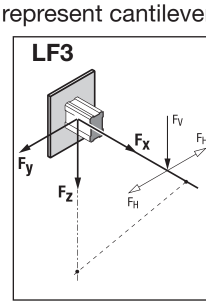
Moments and loading configurations, (LF), for MIC-S90-B/C on steel beams

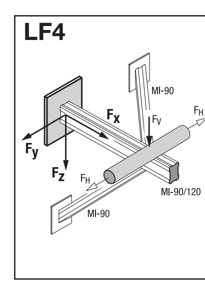
LF1 and LF2 represent tee or lorraine cross supports. LF3 and LF4 represent cantilevers.











F_V = vertical load
F_H = horizontal load

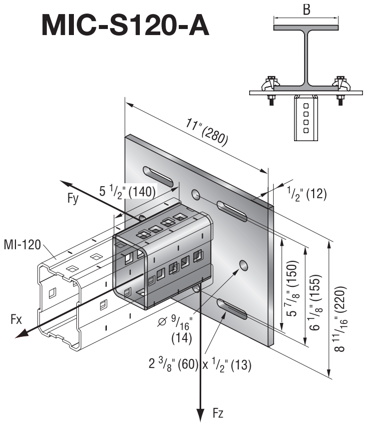
LF2a = Moment M_X induced by F_Z
LF2b = Moment M_X induced by F_y

LF3ST = cantilever with support
LF3oST = cantilever without support

LF4 = cantilever with vertical and horizontal supports

MI steel connectors: MIC-S120-A/B connector on steel beam

MIC-S120-A



Allowable loads

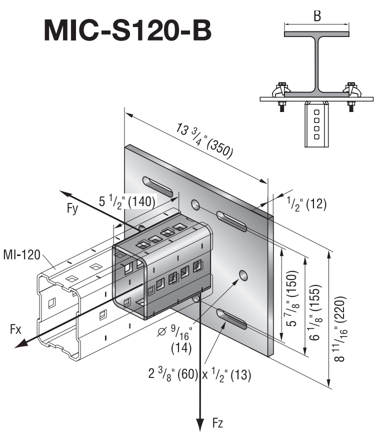
Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		3660				
Fy or Fz*	1330		1330			
Fy + Fz	940		940			
Fz + My			980	565 (777)**		
Fy + Mz	620					407
Fy + Fx + Mz	890	1330				407
Fx + Fz + My		1350	980	561		
Fz + Mx			180		343	
Fy + Mx	180				343	
LF1	310	1330	310	357	153	357
LF2a		2150	240		200	
LF2b	240	2150			200	
LF3 oST	150		960	565 (729)**		109
LF3 ST	330	1550	920			407
LF4	690	3660	690			

* Loading permissible in only one direction

Fastened with four MI-SGC-M12 beam clamps (item 233859).

** Values in brackets ( ) apply to use of three bolts in girder connection. The third bolt (MIA-OH-120 item 304890) must be ordered additionally.

MIC-S120-B



Allowable loads

Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		2510				
Fy or Fz*	1330		1330			
Fy + Fz	940		940			
Fz + My			890	565 (777)		
Fy + Mz	980					407
Fy + Fx + Mz	890	1330				407
Fx + Fz + My		1380	980	459		
Fz + Mx			410		339	
Fy + Mx	410				339	
LF1	380	970	380	255	153	255
LF2a		2150	300		246	
LF2b	300	2150			246	
LF3 oST	150		980	565 (729)		109
LF3 ST	330	1060	920			407
LF4	690	2510	690			

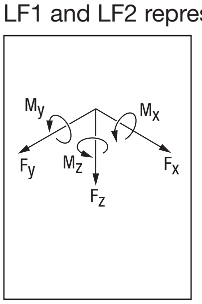
* Loading permissible in only one direction

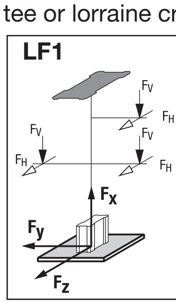
Fastened with four MI-SGC-M12 beam clamps (item 233859).

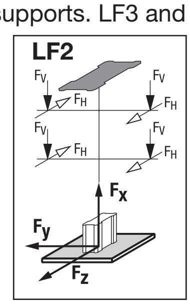
** Values in brackets ( ) apply to use of three bolts in girder connection. The third bolt (MIA-OH-120 item 304890) must be ordered additionally.

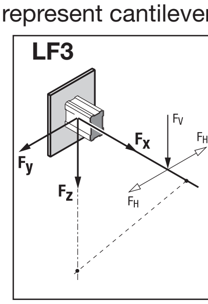
Moments and loading configurations, (LF), for MIC-S120-A/B on steel beams

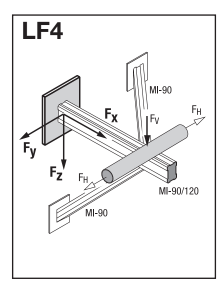
LF1 and LF2 represent tee or lorraine cross supports. LF3 and LF4 represent cantilevers.











F_V = vertical load
F_H = horizontal load

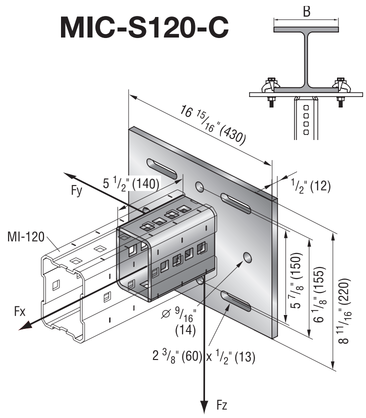
LF2a = Moment M_x induced by F_z
LF2b = Moment M_x induced by F_y

LF3ST = cantilever with support
LF3oST = cantilever without support

LF4 = cantilever with vertical and horizontal supports

MI steel connectors: MIC-S120-C connector on steel beam

MIC-S120-C



Allowable loads

Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		1800				
Fy or Fz*	1330		1330			
Fy + Fz	940		940			
Fz + My			980	565 (777)**		
Fy + Mz	890					407
Fy + Fx + Mz	890	970				364
Fx + Fz + My		820	980	525		
Fz + Mx			470		383	
Fy + Mx	470				383	
LF1	440	790	200	204	153	204
LF2a		1800	250		343	
LF2b	250	1800			343	
LF3 oST	150		980	565 (729)**		109
LF3 ST	330	860	920			372
LF4	690	1800	690			

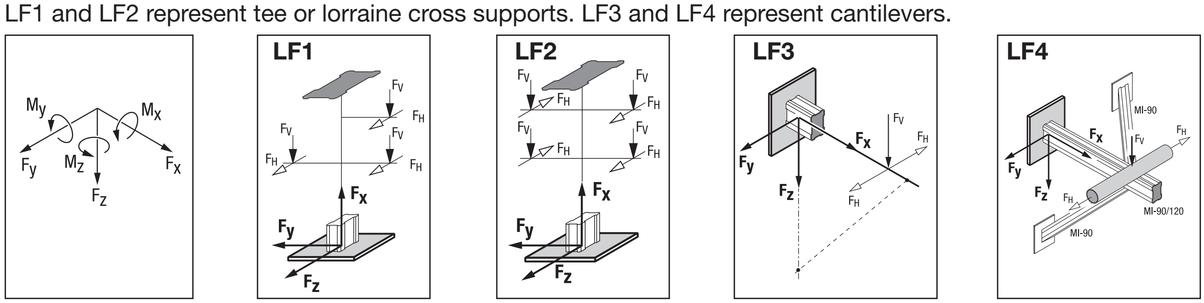
* Loading permissible in only one direction

Fastened with four MI-SGC-M12 beam clamps (item 233859).

** Values in brackets ( ) apply to use of three bolts in girder connection. The third bolt (MIA-OH-90 item 304889) must be ordered additionally.

Moments and loading configurations, (LF), for MIC-S120-C on steel beams

LF1 and LF2 represent tee or lorraine cross supports. LF3 and LF4 represent cantilevers.



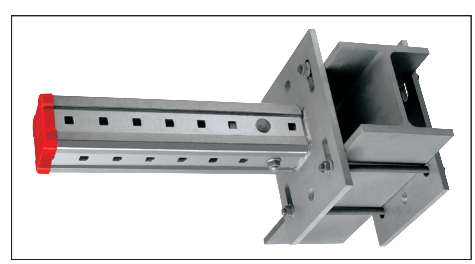
F_V = vertical load
F_H = horizontal load

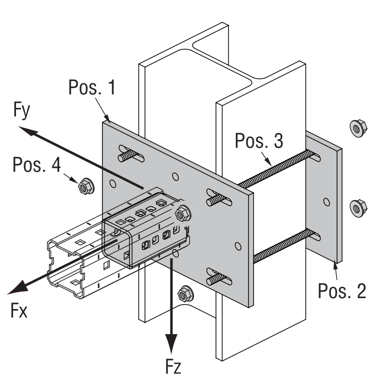
LF2a = Moment M_x induced by F_z
LF2b = Moment M_x induced by F_y

LF3ST = cantilever with support
LF3oST = cantilever without support

LF4 = cantilever with vertical and horizontal supports

MIC-S90/120-A/B/C connector on steel beam or channel





Item No.	Description	Information	Connection Quantity	Position
304812/304813/304814*	MIC-S (A/B/C)*	To suit beam size	1	Pos. 1
304821/304822/304823*	MIB-S (A/B/C)*	To suit beam size	1	Pos. 2
304774	AM 12-F	M12-F threaded rod	4	Pos. 3
382897	M12-F-SL WS 3/4	Self-locking nuts	8	Pos. 4

Note: Choose A, B or C according to steel beam or channel size, see page 47 and 63

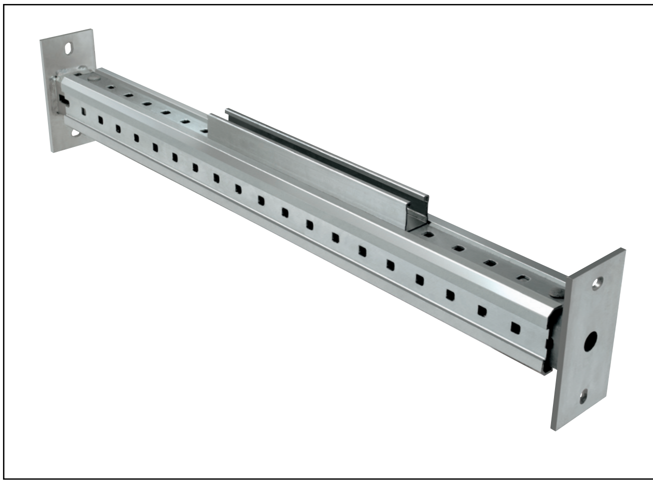
Allowable loads

Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)
Fx	–	See respective connector	–
Fy or Fz	1330	–	1300
Fy + Fz	940	–	920

MI concrete connectors: MIC-C90-U connector on concrete

Technical data

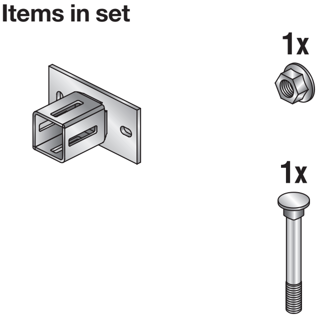
Material	S235 JRG2 (DIN 10025), ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm) DIN EN ISO 1461, ASTM A153



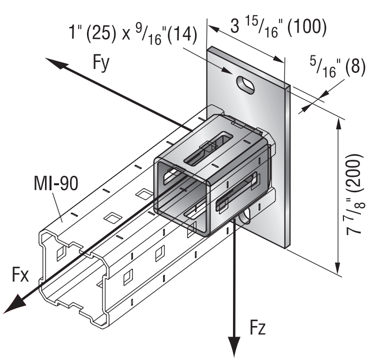
Note Connector:
Always to be used at both ends of a girder.

Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents
304826	MIC-C90-U	MI-90	5.0 (2.2)	2

Items in set



MIC-C90-U crossbeam connector



Allowable loads

Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)
Fx	–	380	–
Fy or Fz*	1310	–	2430
Fy + Fz	1310	–	2050

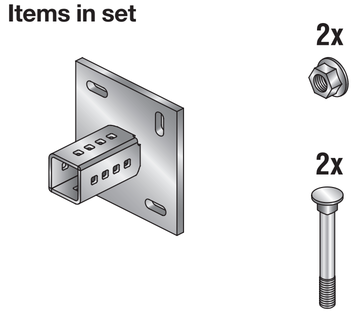
* Loading permissible in only one direction

MI concrete connectors: MIC-C90-AA connector on concrete

Technical data

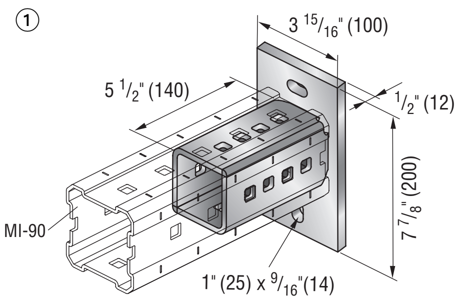
Material	S235 JRG2 (DIN 10025), ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm) DIN EN ISO 1461, ASTM A153

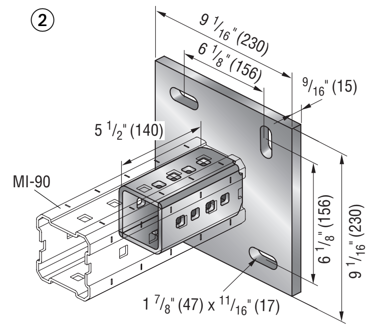
Items in set

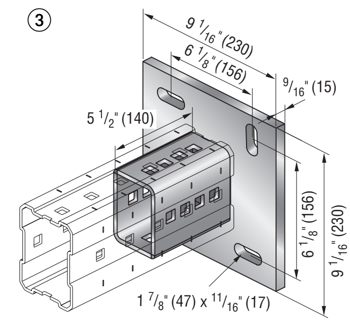


Concrete connector with connecting parts

Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents	
304825	MIC-C90-AA	MI-90	7.7 (3.5)	2	①
304827	MIC-C90-D	MI-90	16.1 (7.3)	2	②
304829	MIC-C120-D	MI-120	16.9 (7.6)	2	③

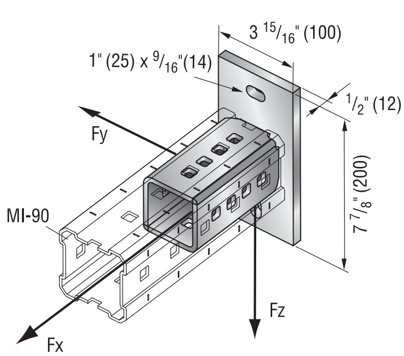






Note: ①, ② **and** ③
Connectors designed for cantilever applications.

MIC-C90-AA connector



Allowable loads

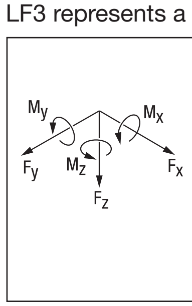
Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		1980				
Fy or Fz*	1960		2430			
Fy + Fz	1960		1440			
Fx + Fz		1570	1120			
Fz + My			560	407 (534)**		
Fx + My		810	450			
LF3	360	810	360	295		

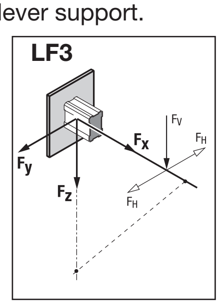
* Loading permissible in only one direction

** Values in brackets ( ) apply to use of three bolts in square sections, two inserted in the direction of the horizontal force and girder connection. The third bolt (MIA-OH-90 item 304889) must be ordered additionally.

Moments and loading configurations, (LF), for MIC-C90-AA on concrete

LF3 represents a cantilever support.

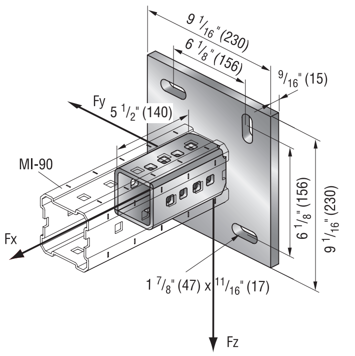




F_V = vertical load
F_H = horizontal load

MI concrete connectors: MIC-C90 / 120-D connector on concrete

MIC-C90-D

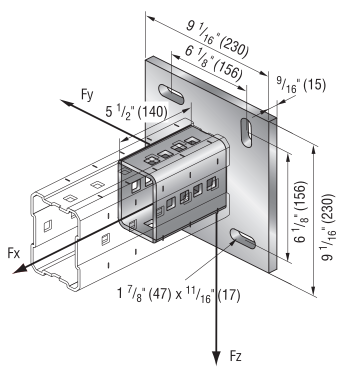


Allowable loads

Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		5490				
Fy + Fz	5980		5980			
Fz + My			1600	407 (534)*		
Fy + Mz	1600					407
Fy + Fx + Mz	1260	1550				407
Fy + Fx + My		1550	1260	407 (534)*		
Fz + Mx			2920		1329	
Fy + Mx	2920				1329	
LF1	600	1640	600	407 (488)*	153	407
LF2a		1930	440		364	
LF2b	440	1930			364	
LF3 oST	440		1550	407 (534)*		168
LF3 ST	560	1550	1550			407
LF4	330	2670	3330			

* Values in brackets ( ) apply to use of three bolts in girder connection. The third bolt (MIA-OH-120 item 304890) must be ordered additionally.

MIC-C120-D



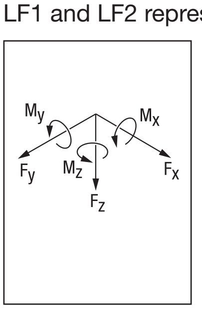
Allowable loads

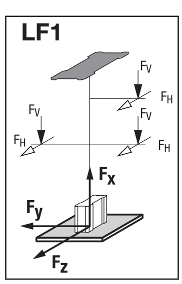
Loading:	± Fy_{all} (lb)	± Fx_{all} (lb)	± Fz_{all} (lb)	± My_{all} (ft-lb)	± Mx_{all} (ft-lb)	± Mz_{all} (ft-lb)
Fx		6330				
Fy + Fz	5980		5980			
Fz + My			1750	565 (777)*		
Fy + Mz	1750					407
Fy + Fx + Mz	1260	1800				407
Fy + Fx + My		1800	1260	565 (678)*		
Fz + Mx			2920		1401	
Fy + Mx	2920				1401	
LF1	600	2020	600	565 (777)*	153	407
LF2a		2150	440		364	
LF2b	440	2150			364	
LF3 oST	440		1550	565 (777)*		175
LF3 ST	560	1550	1550			407
LF4	330	2670	3330			

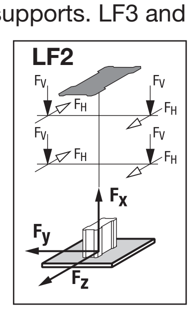
* Values in brackets ( ) apply to use of three bolts in girder connection. The third bolt (MIA-OH-120 item 304890) must be ordered additionally.

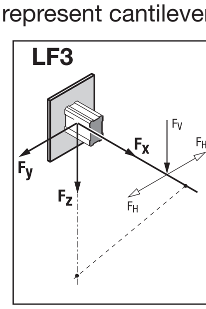
Moments and loading configurations, (LF), for MIC-C90/120-D on concrete

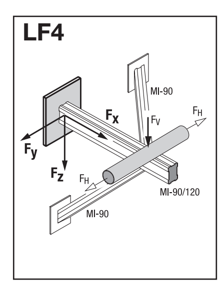
LF1 and LF2 represent tee or lorraine cross supports. LF3 and LF4 represent cantilevers.











F_V = vertical load
F_H = horizontal load

LF2a = Moment M_x induced by F_z
LF2b = Moment M_x induced by F_y

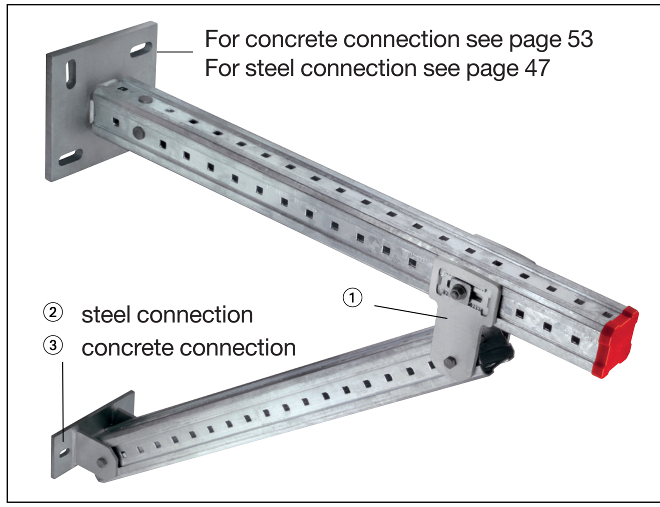
LF3ST = cantilever with support
LF3oST = cantilever without support

LF4 = cantilever with vertical and horizontal supports

MI multi-angle connectors

Technical data

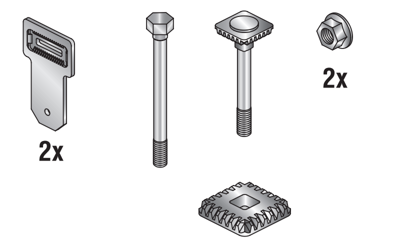
Material	S235 JRG2 (DIN 10025), ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm) DIN EN ISO 1461, ASTM A153

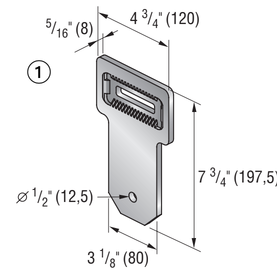


MI angle connectors for girder, with connecting parts

Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents	
304806	MIC-U-MA	MI-90/MI-120	5.5 (2.5)	2 sets	①

Items in set



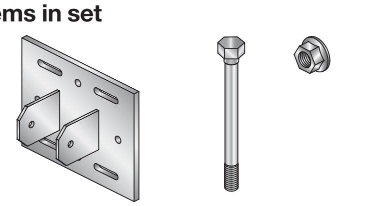


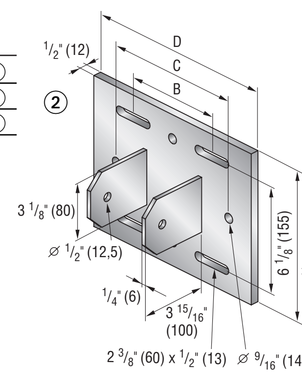
Note: Connector must always be used in pairs on opposite sides of the girder. Distance from angle connector bolt and end of girder ≥ 1" (25 mm).

MI angle connectors for steel, with connecting parts

Item No.	Description	For Girder Type	Steel Beam Width B in (mm)	C in (mm)	D in (mm)	Weight Per Set lb (kg)	Package Contents	
304815	MIC-SA-MA	MI-90/MI-120	2-15/16 – 6-1/2" (75–165)	7-7/8" (200)	11" (280)	13.8 (6.2)	4	②
304816	MIC-SB-MA	MI-90/MI-120	6-1/2" – 9-1/4" (165–235)	11-13/16" (300)	13-3/4" (350)	17.0 (7.7)	2	②
304817	MIC-SC-MA	MI-90/MI-120	9-1/4" – 12" (235–305)	13-3/4" (350)	16-15/16" (430)	20.7 (9.4)	2	②

Items in set

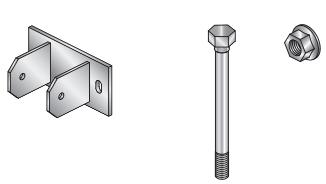


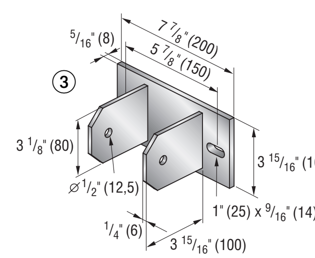


MI angle connectors for concrete, with connecting parts

Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents	
304828	MIC-CU-MA	MI-90/MI-120	4.4 (2.0)	4	③

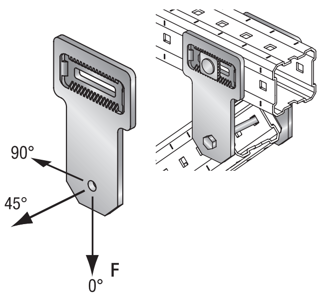
Items in set





MI multi-angle connectors: MIC-U-MA angle connector on girder

MIC-U-MA on MI-90/MI-120



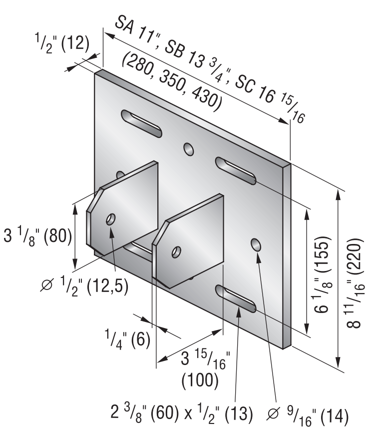
Tension and compression allowable loads

	MIC-U-MA girder connector ±F (lb)
0°	5330
30°	2620
45°	2220
60°	2040
90°	2150

Always to be used in pairs on opposite sides of the girder.

MIC-SA/SB/SC-MA angle connector on steel

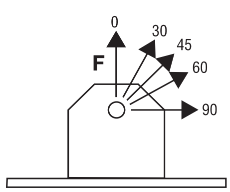
MIC-SA-MA/ MIC-SB-MA/MIC-SC-MA for MI-90/MI-120



Tension and compression allowable loads

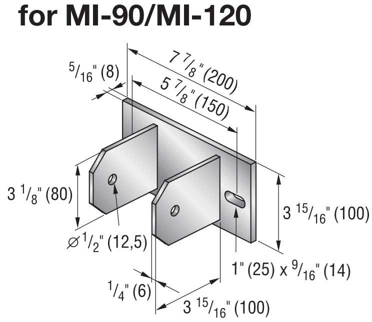
	MIC-SA-MA steel connector ±F (lb)	MIC-SB-MA steel connector ±F (lb)	MIC-SC-MA steel connector ±F (lb)
0°	3550	2670	1780
30°	2220	2220	1780
45°	1550	1550	1550
45° compression only	**-F** = 1880	**-F** = 1880	**-F** = 1880
60°	1330	1330	1330
90°	1110	1110	1110

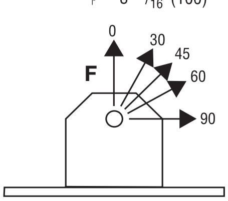
The recommended load is limited by fastening to the steel beam with four MI-SGC-M12 beam clamps (item 233859).



MIC-CU-MA angle connector on concrete

MIC-CU-MA for MI-90/MI-120





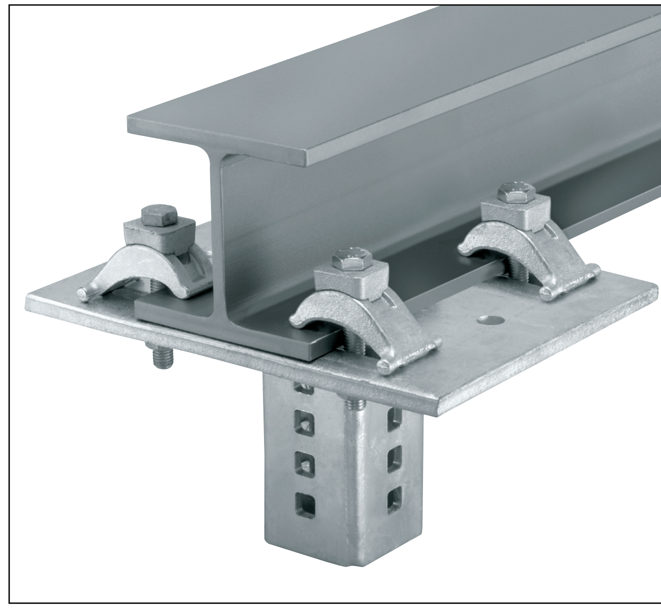
Tension and compression allowable loads

	MIC-CU-MA ±F (lb)
0°	1580
30°	1110
45°	1110
45° compression only	**-F** = 2220
60°	1110
90°	1220

MI-SGC-M12 beam clamp

Technical data

Material	Malleable cast iron
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm)
Screw	M12, 8.8 grade

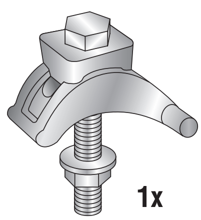


Note
- The screw must be positioned against the flange of the steel beam and the wider side of the beam clamp on the base plate of the MI connector
- Beam clamps must always be used in pairs
- Tightening torque = 62 ft-lb

MI beam clamp for direct connection of MI girder to steel beam

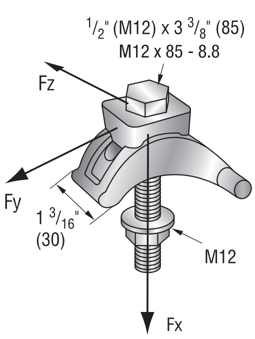
Item no.	Description	for girder type	Weight per set [lb/kg]	Package contents
233859	MI-SGC M12	MI-90/MI-120	0.8 (0.4)	16

Items in set :



Advantages
- For steel beams with flange thicknesses from 1/8" to 1-7/16" (3 to 36 mm) and flange angle of up to 15°
- Corrosion protection of steel beam is not damaged by beam clamp
- Beam clamp is equipped with self-locking nut

MI-SGC-M12



Allowable loads

Loading:	± Fy (lb)	+ Fx (lb)	± Fz (lb)
Fx		1290	
Fy or Fz*	330		330
Fy + Fz	240		240
Fy + Fx	240	1290	
Fz + Fx		1290	240
Fx+Fy+Fz	170	1290	170

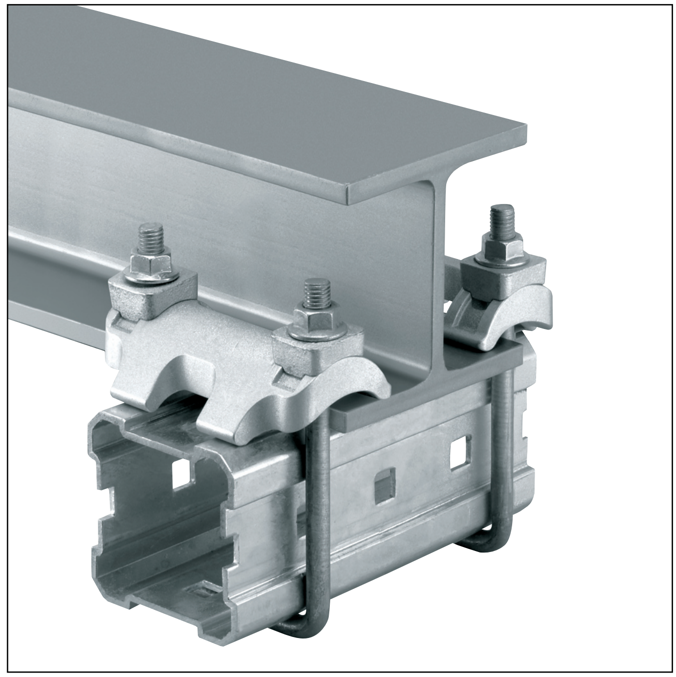
All loads apply to 1 beam clamp.

* Only one loading direction permissible

MI-DGC beam clamp for direct connection to steel beam

Technical data

Material	Malleable cast iron
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm)
U-bolt	M12, 8.8 grade

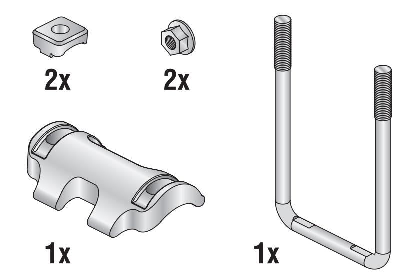


Note

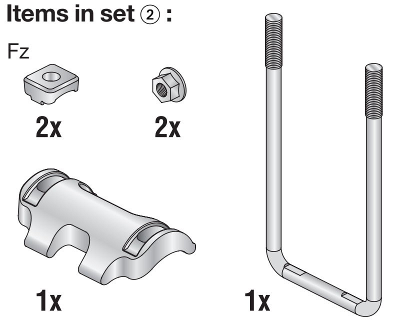
- The U-bolt must be positioned against the flange of the steel beam.
- Beam clamps must always be used in pairs positioned on opposite sides of the flange.
- Tightening torque 62 ft-lb.

Item no.	Description	for girder	Weight per set [lb]	Package contents	
233860	MI-DGC 90	MI-90	7.5 (3.4)	4	①
233861	MI-DGC 120	MI-120	8.0 (3.6)	4	②

Items in set ① :

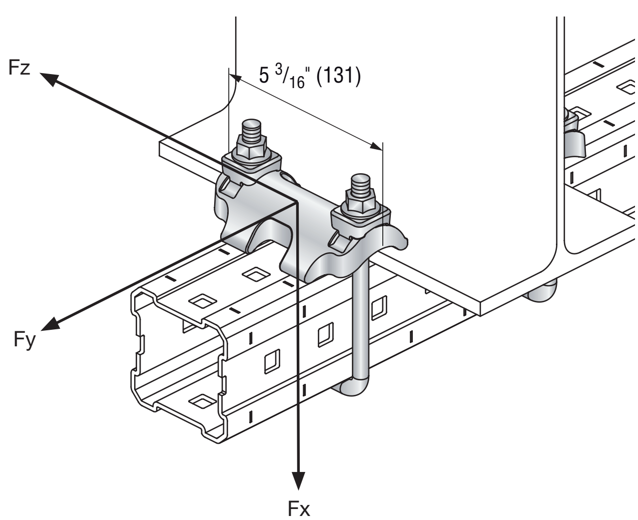


Items in set ② :



Advantages

- For steel beams with flange thicknesses from 1/8" to 1-7/16" (3 to 36 mm) and flange angle of up to 15°
- Corrosion protection of steel beam is not damaged by beam clamp
- Beam clamp is equipped with self-locking nuts



Allowable loads

Loading:	± Fy_{all} (lb)	+ Fx_{all} (lb)	± Fz_{all} (lb)
Fx		2770	
Fy or Fz	1350		1350

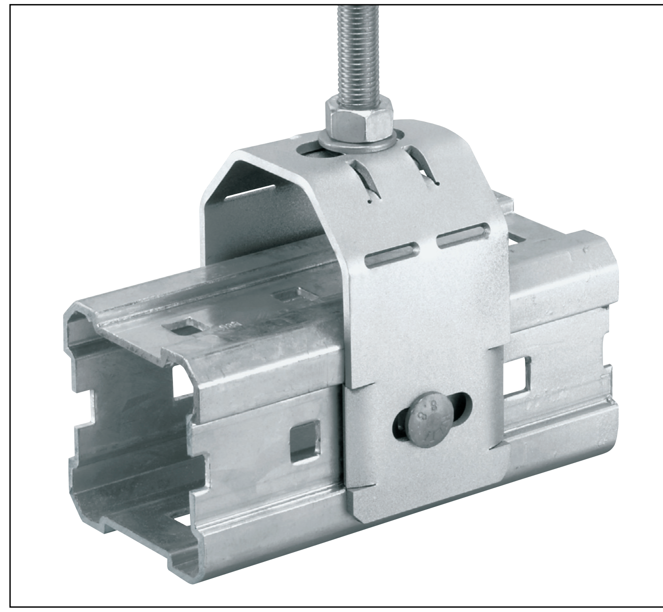
All loads apply to 1 pair.

Beam clamps must always be used in pairs positioned on opposite sides of the flange.

MIC-TRC connection for threaded rod

Technical data

Material	S235 JRG2 (DIN 10025), ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm), DIN EN ISO 1461, ASTM A153
Connecting bolt	M12 (connection to MI girder)



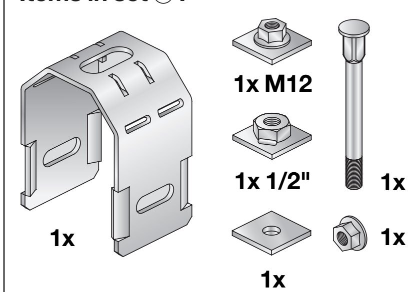
Advantages

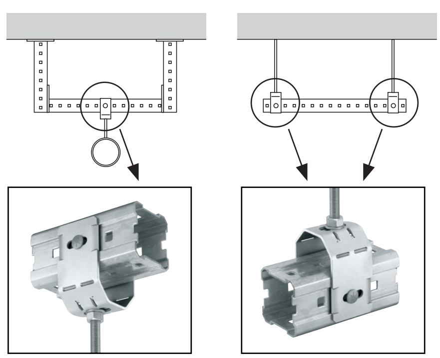
- Opposite side of MI girder still usable for other applications
- Connector can be used on top or bottom of MI girder
- With MI-90 = 1-3/16" (30 mm) height adjustability; for MI-120 = 9/16" (14 mm)
- MQ channel strut fits between MIC-TRC and MI girder

Item No.	Description	For Girder Types	For Threaded Rod Sizes*	Weight Per Set lb (kg)	Package Contents	
233856	MIC-TRC M12-1/2	MI-90/MI-120	M12, 1/2", 5/8"	2.1 (0.9)	2	①
233858	MIC-TRC M20-3/4	MI-90/MI-120	M20, 3/4", 5/8"	2.2 (1.0)	2	②

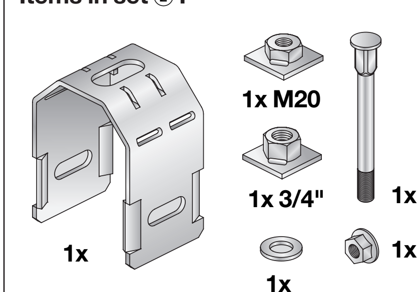
* Use with threaded rod sizes shown and two nuts and washers; one nut/washer supplied except for 5/8", items ordered separately.

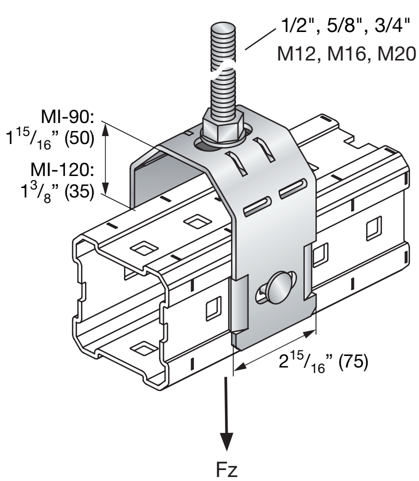
Items in set ① :





Items in set ② :





MIC-TRC M12, 1/2", M16, 5/8" allowable loads

Loading:	± Fy (lb)	± Fx (lb)	± Fz_{all} (lb)
Fz	–	–	2800

MIC-TRC M20, 3/4" allowable loads

Loading:	± Fy (lb)	± Fx (lb)	± Fz_{all} (lb)
Fz	–	–	2200

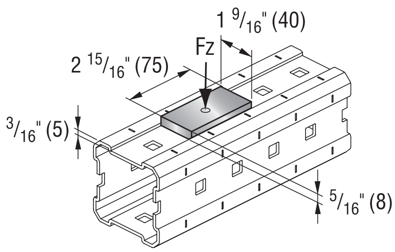
MIC-PG low friction insert for sliding support

Technical data for low-friction system

Material	PE-UHMW
Friction value	μ = 0.15
Temperature resistance	–238°F to 176°F

Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents
304842	MIC-PG	MI-90/MI-120	0.2 (0.1)	10

Note: Includes KwikTog to hold MIC-PG to Girder



Allowable loads

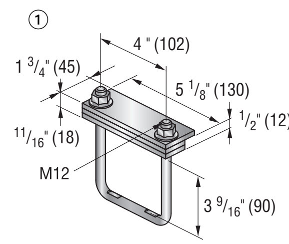
Loading:	± Fy (lb)	± Fx (lb)	± Fz (lb)
Fz	–	–	6740

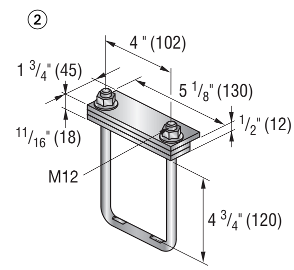
MIC-PS90/120 sliding support clamps

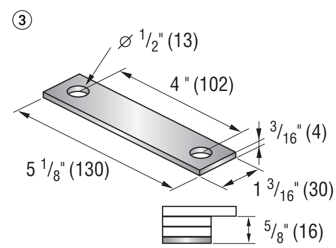
Technical data for the clamping system

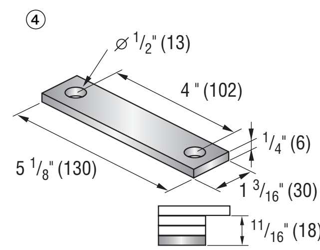
Material	S235JRG2 (DIN EN 10025), ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 1.8 mils (45 µm)

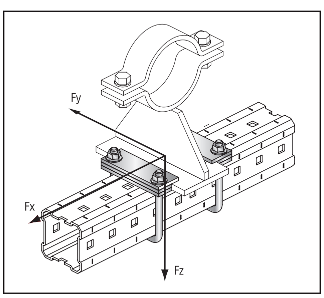
Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents	
304838	MIC-PS90	MI-90	3.9 (1.8)	4 pairs	①
304839	MIC-PS120	MI-120	4.1 (1.8)	4 pairs	②
283593	MIC-PSP-4MM	MI-90/MI-120	0.4 (0.2)	5 pairs	③
283594	MIC-PSP-6MM	MI-90/MI-120	0.7 (0.3)	5 pairs	④











Note: pipe ring sold separately.

Allowable loads*

Loading:	± Fy (lb)	± Fx (lb)	Fz (lb)
Fx or Fz**	–	940	-1350 + 6740

* Values apply only to clamps. Install appropriate spacers so there is no clamping force between the attached parts, to allow unrestricted movement in the y-axis (i.e., Fy = 0). Must be used in pairs. Tightening torque = 44 ft-lb.

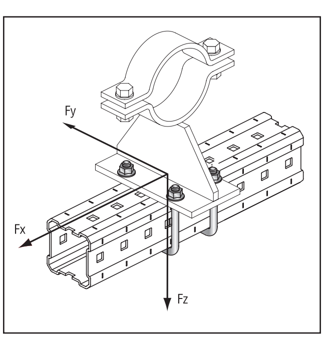
** Only one loading direction permissible

MIA-B090/120-M12 fixed point clamps

Technical data for the clamping system

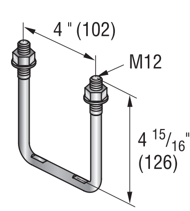
Material	S235JRG2 (DIN EN 10025), ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 1.8 mils (45 µm)

Item No.	Description	For Girder Type	Weight Per Set lb (kg)	Package Contents
304840	MIA-B090-M12	MI-90	1.3 (0.6)	8 pairs
304841	MIA-B0120-M12	MI-120	1.4 (0.6)	8 pairs

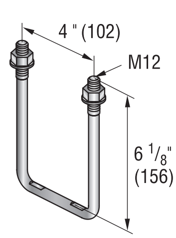


Note: pipe ring sold separately.

MIA-B090-M12 for MI-90



MIA-B120-M12 for MI-120



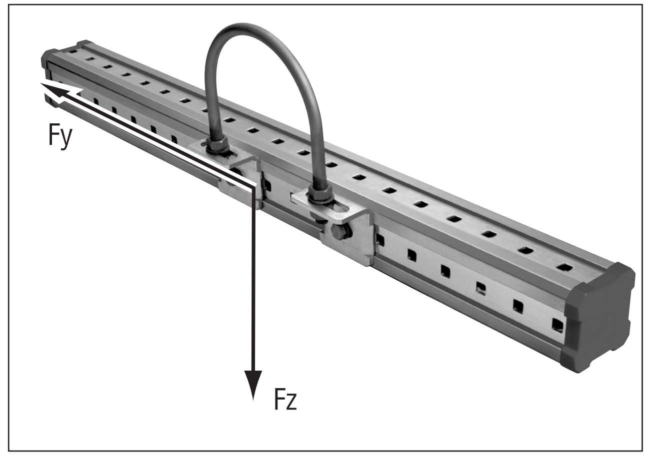
Allowable loads*

Loading:	± Fy (lb)	± Fx (lb)	Fz (lb)
Fy or Fx or Fz**	2690	2250	-2250 + 6740

* Values apply only to clamps. Install appropriate spacers so there is no clamping force between the attached parts, to allow unrestricted movement in the y-axis (i.e., Fy = 0). Must be used in pairs. Tightening torque = 44 ft-lb.

** Only one loading direction permissible

MIC-UB90 U-bolt clamps for uninsulated pipes



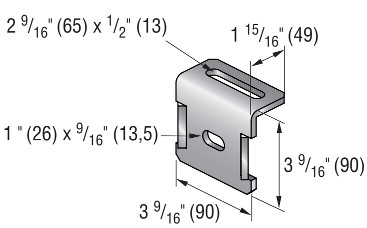
Technical data for the clamping system

Material	S235 JRG2 (DIN 10025), ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm) DIN EN ISO 1461, ASTM A153
Connecting screws	M12 (connection to MI-girder)

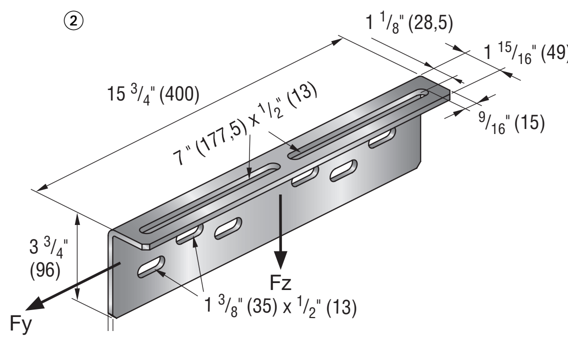
MI U-bolt clamps with connecting parts

Item No.	Description	Weight Per Set For Girder Type	Package lb (kg)	Diameter U-Bolt	Package Contents	
304831	MIC-UB90	MI-90	2.7 (1.2)	≤ 1/2"	10 pairs	①
304832	MIC-UB90 L400	MI-90	5.6 (2.5)	≤ 1/2"	2	②
304833	MIC-UB120	MI-120	3.0 (1.3)	≤ 1/2"	10 pairs	③
304834	MIC-UB90-M16	MI-90	2.7 (1.2)	5/8"	6 pairs	④
304835	MIC-UB120-M16	MI-120	2.9 (1.3)	5/8"	6 pairs	⑤

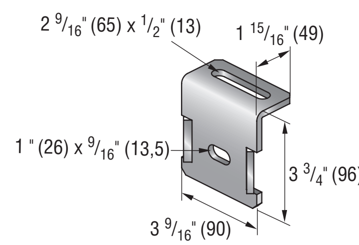
①



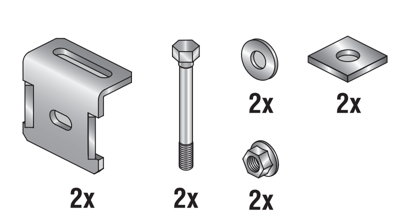
②



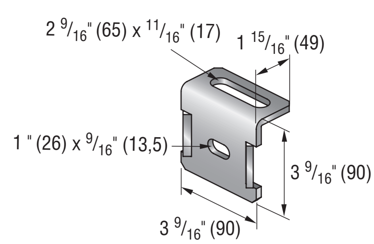
③



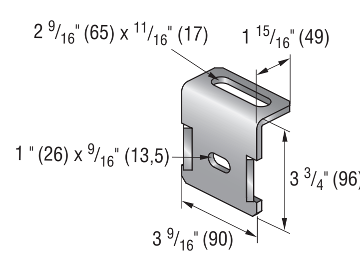
Items in set ①③④⑤ :



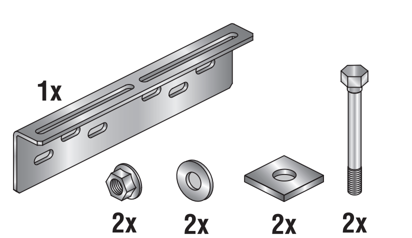
④



⑤



Items in set ② :



Allowable loads*

Loading ①③④⑤ :	± Fy_{all} (lb)	± Fx_{all} (lb)	– Fz_{all} (lb)
Fy or Fz**	112	–	225

* Values apply to one pair, must be used in pairs

** Only one loading direction permissible

Allowable loads

Loading ② :	± Fy_{all} (lb)	± Fx_{all} (lb)	– Fz_{all} (lb)
Fy or Fz***	34	–	34*/67**

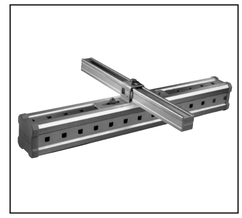
For fastening several pipes * for a single pipe ** combined load per elongated hole

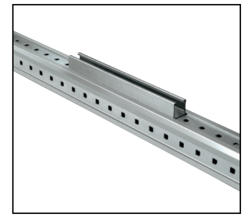
*** Only one loading direction permissible

MI / MQ connectors

Technical data

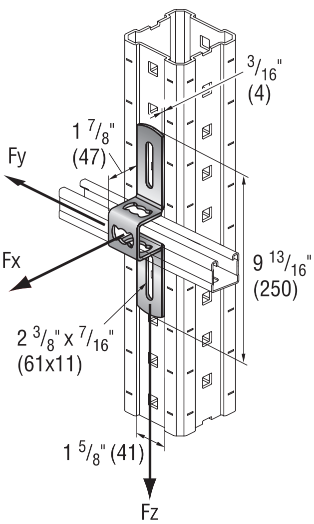
Material	S235 JRG2 (DIN 10025), ASTM A1011 (36)
Galvanizing	Hot-dip galvanized 2.2 mils (55 µm) DIN EN ISO 1461, ASTM A153





Item No.	Description	For Attaching Channel Strut	Weight Per Set lb (kg)	Package Contents	
304881	MIC-MI/MQ-X	MQ21F, 13/16" HDG, MQ41F, 1-5/8" HDG	0.7 (0.3)	16	①
304889	MIA-OH90 (Bolt)	all strut except B2B, (back to back)	0.2 (0.1)	10	④
382897	M12-F-SL WS 3/4 (Nut)	–	0.0 (0.0)	100	③
304164	MQP-45°-F	MQ21F, 13/16" HDG, MQ41F, 1-5/8" HDG	0.7 (0.3)	10	②
369623	MQN	all galvanized	0.15 (0.07)	50	
304130	MQN-F	all hot-dip galvanized	0.19 (0.09)	25	
304012	MQN-R	all stainless steel	0.17 (0.08)	25	

MIC-MI/MQ-X ① on MI-90 or 120 girder**



Channel:	Loading:	± Fy_{all} (lb)	+ Fx_{all} (lb)	± Fz_{all} (lb)
13/16" (21)	Fy or Fx or Fz*	1120	560	270
1-5/8" (41)	Fy or Fx or Fz*	1120	560	270

* Only one loading direction permissible. Bolt M10 tightening torque = 44 ft-lb. Use with appropriate MQN Pushbutton (sold separately).

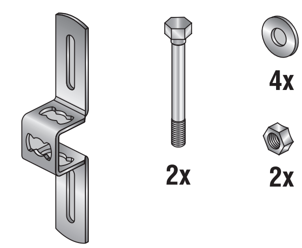
** When mounting to 120 mm width, use appropriate length (140 mm, 5-1/2" minimum) M10 (3/8") bolt

MQN:	Tension (lb)*	Shear (lb)**
MQN	1800	1100
MQN-F	1800	400
MQN-R	1800	1100

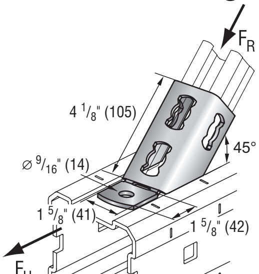
* Based on 12 gauge strut and a safety factor of 2.2

** Applies to a single fastening using Hilti serrated strut and a safety factor of 2.2

Items in set ①:



MQP-45°-F ② on MI-90* or 120 girder**

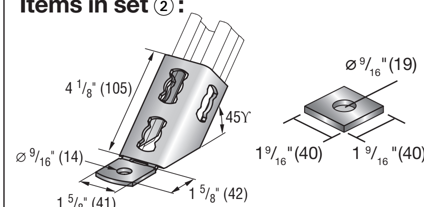


Loading	± F_R (lb)	± F_H (lb)
F_R or F_H	945	670

* When mounting to 90 mm width, order 283595 Hex Head Bolt M12 x 120-F/8.8 and M12 nut item 382897.

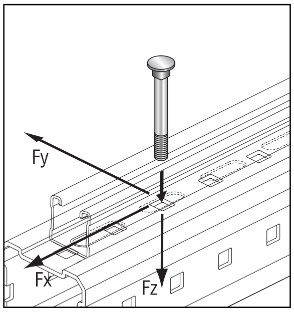
** When mounting to 120 mm width, order separately bolt MIA-EH120 item 304888 and M12 nut item 382897.

Items in set ②:



Note: Use with appropriate MQN Pushbutton (sold separately) to attach strut to connector.

MIC-MI/MQ ③ and ④ on MI-90 or 120 girder**

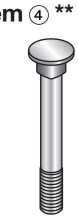


Loading:	MQ channel gauge	± Fy_{all} (lb)	± Fx_{all} (lb)	- Fz_{all} (lb)
Fy or Fx or Fz*	14	645	1970	2240
Fy or Fx or Fz*	12	1110	1815	3435

Values apply only to MQ strut connected using two bolts at 12" spacing. Bolt tightening torque = 62 ft-lb. Other connected parts must be evaluated independently.

* Only one loading direction permissible

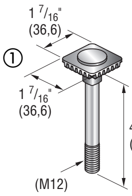
** When mounting to 120 mm width, order separately bolt MIA-OH 120 item 304890.

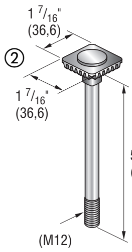
Item ④ **	Item ③
	

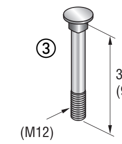
MI accessories: Individual connecting parts

Technical data

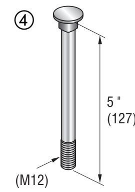
Material	EN-GJMW-400-5 (DIN EN 1562), malleable cast iron or ASTM A1011
Screws/Bolts	8.8 grade; thread length 25 mm (1")
Nuts	8 grade DIN 1661, self locking
Galvanizing	1.8 mils (45 µm)
Material-Plastic	Moplen EP 240H -22°F to +194°F (-30°C to +90°C)

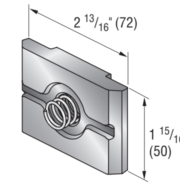
① 

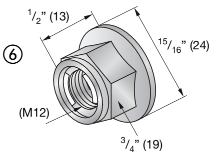
② 

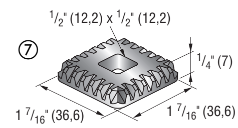
③ 

Item No.	Description	For MI Girder Type	Weight Per Each lb (kg)	Package Contents	
304887	MIA-EH90	90	0.3 (0.16)	10	①
304888	MIA-EH120	120	0.4 (0.19)	10	②
304889	MIA-OH90	90	0.2 (0.10)	10	③
304890	MIA-OH120	120	0.2 (0.13)	10	④
304891	MIA-EH-P	90/120	0.6 (0.28)	10	⑤
382897	M12-F-SL WS¾ nut	90/120	0.04 (0.02)	100	⑥
305707	MIA-TP	90/120	0.1 (0.06)	20	⑦
283595	Hex. head bolt M12x120-F/8.8	90/120	0.2 (0.10)	40	
304771	A 13-F washer	90/120	0.01 (0.005)	100	
304774	Threaded rod AM 12-F (1M(3.28 ft.))	—	23.9 (10.9)	15	

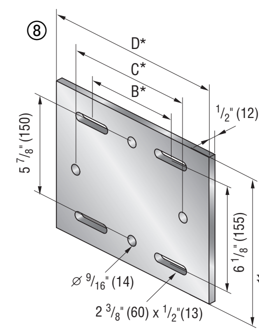
④ 

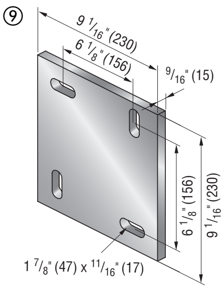
⑤ 

⑥ 

⑦ 

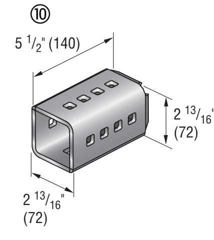
Item No.	Description	For MI Girder Type	Weight Per Each lb (kg)	Package Contents	
304821	MIB-SA	90/120	12.0 (5.4)	2	⑧
304822	MIB-SB	90/120	15.2 (6.9)	2	⑧
304823	MIB-SC	90/120	18.8 (8.5)	2	⑧
304830	MIB-CD	90/120	12.9 (5.8)	2	⑨

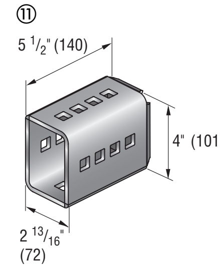
⑧ 

⑨ 

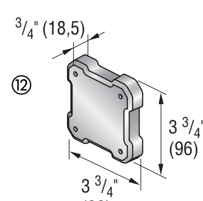
* Note: See page 47 for dimensions.

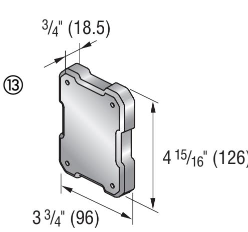
Item No.	Description	For MI Girder Type	Weight Per Each lb (kg)	Package Contents	
304824	MIC-SC90	90	3.1 (1.4)	2	⑩
304808	MIC-SC120	120	3.9 (1.8)	2	⑪

⑩ 

⑪ 

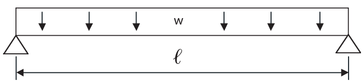
Item No.	Description	For MI Girder Type	Weight Per Each lb (kg)	Package Contents	
304892	MIA-EC-90	90	0.06 (0.03)	25	⑫
304893	MIC-EC-120	120	0.08 (0.04)	25	⑬

⑫ 

⑬ 

Single span: formulas

Loading condition 1:
Single-span with uniform load, distance between supports: ℓ



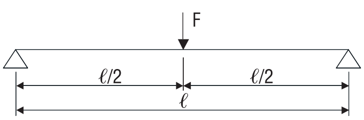
$$M_{max} = \frac{w * \ell^2}{8} = \sigma_{all} * S$$

$$w = \frac{8 * \sigma_{all} * S}{\ell^2}$$

$$\Delta_{max} = \frac{5}{384} * \frac{w * \ell^4}{E * I}$$

$$w = \frac{384}{5} * \frac{E * I * \Delta_{max}}{\ell^4}$$

Loading condition 2:
Single span with single load in center of span $\ell/2$



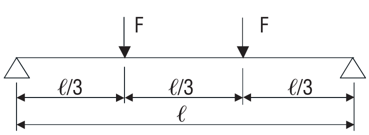
$$M_{max} = \frac{F * \ell}{4} = \sigma_{all} * S$$

$$F = \frac{4 * \sigma_{all} * S}{\ell}$$

$$\Delta_{max} = \frac{1}{48} * \frac{F * \ell^3}{E * I}$$

$$F = 48 * \frac{E * I * \Delta_{max}}{\ell^3}$$

Loading condition 3:
Single span with 2 loads, each at $\ell/3$



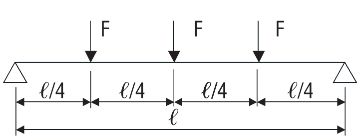
$$M_{max} = \frac{F * \ell}{3} = \sigma_{all} * S$$

$$F = \frac{3 * \sigma_{all} * S}{\ell}$$

$$\Delta_{max} = \frac{23}{648} * \frac{F * \ell^3}{E * I}$$

$$F = \frac{648}{23} * \frac{E * I * \Delta_{max}}{\ell^3}$$

Loading condition 4:
Single span with 3 loads, each at $\ell/4$



$$M_{max} = \frac{F * \ell}{2} = \sigma_{all} * S$$

$$F = \frac{2 * \sigma_{all} * S}{\ell}$$

$$\Delta_{max} = \frac{38}{768} * \frac{F * \ell^3}{E * I}$$

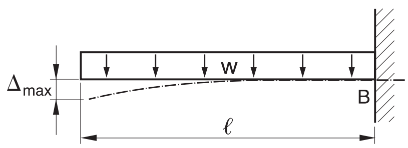
$$F = \frac{768}{38} * \frac{E * I * \Delta_{max}}{\ell^3}$$

M = Bending Moment
F = Single Load
w = Uniform Load
ℓ = Girder Length
σ_{all} = Allowable Stress

E = Modulus of Elasticity
I = Moment of Inertia
S = Section Modulus
Δ = Deflection

Cantilever: formulas

Loading condition 1:
Cantilever with uniform load, cantilever length: ℓ



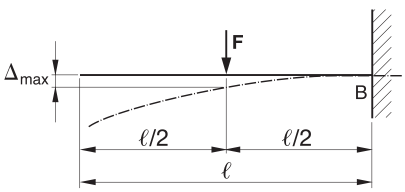
$$M = \frac{w * \ell^2}{2} = \sigma_{all} * S$$

$$\Delta_{max} = \frac{1}{8} * \frac{w * \ell^4}{E * I}$$

$$w = \frac{2 * \sigma_{all} * S}{\ell^2}$$

$$w = 8 * \frac{E * I * \Delta_{max}}{\ell^4}$$

Loading condition 2:
Cantilever with single load in center of cantilever length ℓ/2



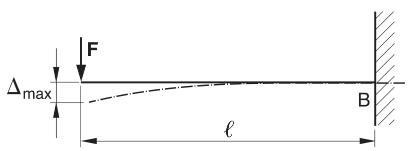
$$M = F * \ell/2 = \sigma_{all} * S$$

$$\Delta_{max} = \frac{1}{24} * \frac{F * \ell^3}{E * I}$$

$$F = \frac{2 * \sigma_{all} * S}{\ell}$$

$$F = 24 * \frac{E * I * \Delta_{max}}{\ell^3}$$

Loading condition 3:
Cantilever with single load at end of cantilever length ℓ



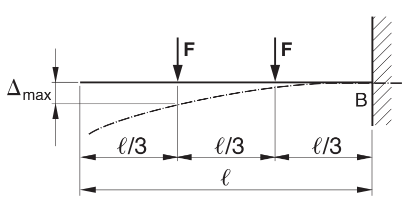
$$M = F * \ell = \sigma_{all} * S$$

$$\Delta_{max} = \frac{1}{3} * \frac{F * \ell^3}{E * I}$$

$$F = \frac{\sigma_{all} * S}{\ell}$$

$$F = 3 * \frac{E * I * \Delta_{max}}{\ell^3}$$

Loading condition 4:
Cantilever with 2 loads, each at ℓ/3



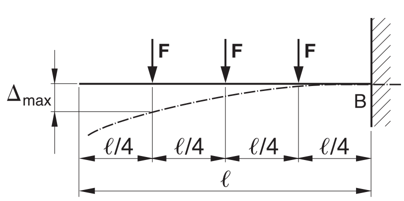
$$M = F * \ell$$

$$\Delta_{max} = \frac{7}{54} * \frac{F * \ell^3}{E * I}$$

$$F = \frac{\sigma_{all} * S}{\ell}$$

$$F = \frac{54}{7} * \frac{E * I * \Delta_{max}}{\ell^3}$$

Loading condition 5:
Cantilever with 3 loads, each at ℓ/4



$$M = \frac{3 * F * \ell}{2} = \sigma_{all} * S$$

$$\Delta_{max} = \frac{31}{128} * \frac{F * \ell^3}{E * I}$$

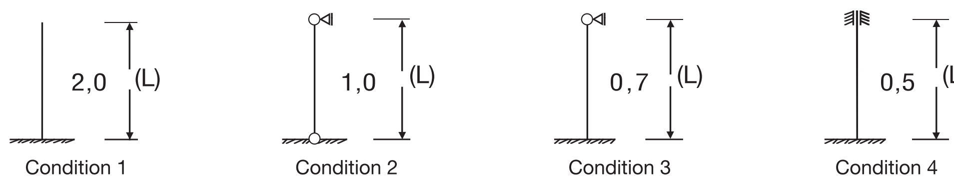
$$F = \frac{2 * \sigma_{all} * S}{3 * \ell}$$

$$F = \frac{128}{31} * \frac{E * I * \Delta_{max}}{\ell^3}$$

M = Bending Moment
F = Single Load
w = Uniform Load
ℓ = Girder Length
σ_{all} = Allowable Stress
E = Modulus of Elasticity
I = Moment of Inertia
S = Section Modulus
Δ = Deflection

Flexural buckling: formulas

Flexural bending:
Member length L (in)
Euler factor K
Effective Length = K * L
r (in) Radius of Gyration
A (in^2) Surface Area
Modulus of elasticity, E(ksi) = 30,388 ksi
Yield point (ksi) = $f_{y,k}$



Determination of relative slenderness ratio and auxiliary variable

y-axis:

$\lambda_y = (KL)_y / r_y \leq 250$
$\sigma'_{Ki} = \pi^2 * E / \lambda_y^2$
$\lambda_a = \pi * \sqrt{(E / f_{y,k})}$
$\bar{\lambda}'_{ky} = \lambda_y / \lambda_a$

z-axis:

$\lambda_z = (KL)_z / r_z < 250$
$\sigma'_{Ki} = \pi^2 * E / \lambda_z^2$
$\lambda_a = \pi * \sqrt{(E / f_{y,k})}$
$\bar{\lambda}'_{kz} = \lambda_z / \lambda_a$

Determining the ultimate load under normal force

Hollow profile —> buckling stress line «α» —> α = 0.21.
The cross section is able to carry the load over its entire surface (verified in buckling tests)

Buckling coefficient

y-axis:

$k'_y = 0.5 * (1 + \alpha' * (\bar{\lambda}'_{ky} - 0.2) + \bar{\lambda}'^2_{ky})$

$\kappa'_y = \dfrac{1}{k'_y + \sqrt{k'^2_y - \bar{\lambda}'^2_{ky}}} \leq 1$

z-axis:

$k'_z = 0.5 * (1 + \alpha' * (\lambda'_{kz} - 0.2) + \lambda'^2_{kz})$

$\kappa'_z = \dfrac{1}{k'_z + \sqrt{k'^2_z - \bar{\lambda}'^2_{kz}}} \leq 1$

1) Upsetting force

y-axis:

$N_u^D = A * f_{y,k}$

z-axis:

$N_u^D = A * f_{y,k}$

2) Buckling load

y-axis:

$N_{u;y}^B = \kappa'_y * A * f_{y,k}$

z-axis:

$N_{u;z}^B = \kappa'_z * A * f_{y,k}$

3) Ultimate load

y-axis:

$N_u = \min. (N_u^D; N_{u;y,z}^B)$

4) Safety and verification

	λ_F **action**	λ_M **action**
Constant action	$1.35 = \gamma_G$	$1.10 = \gamma_M$
Variable action	$1.50 = \gamma_Q$	$1.10 = \gamma_M$

Action: $S_D = G_K * \gamma_G + Q_K * \lambda_Q$
Resistance: $R_D = N_u / \gamma_M$

Verification: $S_D / R_D \leq 1$

Metric Conversions and Equivalents

The Metric Conversion Act of 1975, as amended by the Omnibus Trade and Competitiveness Act of 1988, establishes the SI (System International) metric system as the preferred system of measurement in the United States.

Many products are currently manufactured and supplied in SI or "hard" metric sizes such as MI and anchor bolts of 10 mm, 12 mm, 26 mm, etc. diameter. Where the inch-pound system is given or used, "soft" metric conversion can sometimes be used (but specifically not when selecting a drill bit for installing mechanical anchors, where it is critical to only use the specified Imperial or Metric diameter bit). The soft conversion diameters for anchor bolts is given by Table 1. Standard metric conversion factors commonly used for modular support and fastening products are given in Tables 2 & 3.

Table 1 : Diameters

Inch-Pound System Inch	*Hard Metric Conversion mm*	*Use for Soft Metric Conversion mm*
1/4	6.35	6
5/16	7.94	8
3/8	9.52	10
1/2	12.70	12
5/8	15.88	16
3/4	19.05	20
1	25.40	25
1-1/4	31.75	32

Table 2 : Imperial Units to SI Units

To Convert	Into	Multiply By
Length		
inch (in.)	millimeter (mm)	25.4000
foot (ft)	meter (m)	0.3048
Area		
square inch (in.^{2})	square millimeter (mm^2)	645.1600
square inch (in.^{2})	square centimeter (cm^2)	6.4516
square foot (ft^2)	square meter (m^2)	0.0929
Volume		
cubic inch (in.^{3})	cubic centimeter (cm^3)	16.3871
cubic foot (ft^3)	cubic meter (m^3)	0.0283
gallon (US gal)	liter (L)	3.7854
Force		
pound force (lbf)	newton (N)	4.4482
pound force (lbf)	kilonewton (kN)	0.0044
Pressure		
pound/square inch (psi)	newton/square millimeter (N/mm^2)	0.0069
pound/square inch (psi)	mega pascal (MPa)	0.0069
KIP/square inch (ksi)	mega pascal (MPa)	6.8946
pounds/square foot (psf)	newton/square meter (N/m^2)	47.8801
Torque or Bending Moment		
foot pound (ft-lb)	newton meter (N·m)	1.3558
inch pound (in-lb)	newton meter (N·m)	0.1130
Diaphragm Shear		
pounds/foot (plf)	newton/meter (N/m)	14.5939

Table 3 : SI Units to Imperial Units

To Convert	Into	Multiply By
Length		
millimeter (mm)	inch (in.)	0.0394
meter (m)	foot (ft)	3.2808
Area		
square millimeter (mm^2)	square inch (in^2)	0.0016
square centimeter (cm^2)	square inch (in^2)	0.1550
square meter (m^2)	square foot (ft^2)	10.7639
Volume		
cubic centimeter (cm^3)	cubic inch (in^3)	0.0610
cubic meter (m^3)	cubic foot (ft^3)	35.3147
liter (L)	gallon (US gal)	0.2642
Force		
newton (N)	pound force (lbf)	0.2248
kilonewton (kN)	pound force (lbf)	224.8089
Pressure		
newton/square millimeter (N/mm^2)	pound/square inch (psi)	145.0400
mega pascal (MPa)	pound/square inch (psi)	145.0400
mega pascal (MPa)	KIP/square inch (ksi)	0.1450
newton/square meter (N/m^2)	pounds/square foot (psf)	0.0209
Torque or Bending Moment		
newton meter (N·m)	foot pound (ft-lb)	0.7376
newton meter (N·m)	inch pound (in-lb)	8.8496
Diaphragm Shear		
newton/meter (N/m)	pounds/lineal foot (plf)	0.0685

In The United Sates

PAYMENT TERMS: Net 30 days from date of invoice. Customer agrees to pay all costs incurred by Hilti in collecting any delinquent amounts, including attorney's fees.

FREIGHT: All sales are F.O.B. Destination, except transportation costs shall be at Customer's expense, via Hilti designated mode unless otherwise directed by Customer. Delivery dates are estimates only.

CREDIT: All orders sold on credit are subject to Credit Department approval.

RETURN POLICY: Products must be in saleable condition to qualify for return. Saleable condition is defined as unused items in original undamaged packaging and unbroken quantities and in as-new condition. All returns are subject to Hilti inspection and acceptance, and a $125 restocking charge if returned more than 90 days after invoice date. Proof of purchase is required for all returned materials. **Special orders products and discontinued items are not eligible for return credit. Dated materials are only returnable in case quantity, and within 30 days after invoice date.** In no event shall any product be returnable after 1 year from invoice date.

WARRANTY: Hilti warrants that for a period of 12 months from the date it sells a product it will, at its sole option and discretion, refund the purchase price, repair, or replace such product if it contains a defect in material or workmanship. Absence of Hilti's receipt of notification of any such defect within this 12-month period shall constitute a waiver of all claims with regard to such product.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Hilti shall in no event be liable for, and Customer hereby agrees to indemnify Hilti against all claims related to special, direct, indirect, incidental, consequential, or any other damages arising out of or related to the sale, use, or inability to use the product.

ACCEPTANCE OF ORDER: Acceptance is limited to the express terms contained herein, and terms are subject to change by Hilti without notice. Additional or different terms proposed by Customer are deemed material and are objected to and rejected, but such rejection shall not operate as a rejection of the offer unless it contains variances in the terms of the description, quantity, price or delivery schedule of the goods. Orders are not deemed "accepted" by Hilti unless and until it ships the associated items.

DOMESTIC ORIGIN: Any non-domestic Hilti product will be so identified on shipping documents and invoices for customers who properly identify themselves as a federal government entity. All other customers may obtain such information by written request to Hilti, Inc., Contract Compliance, P.O. Box 21148, Tulsa, Oklahoma 74121. Hilti's Quality Department personnel are the only individuals authorized to warrant the country of origin of Hilti products.

BUSINESS SIZE: Hilti is a large business.

PRICES: Prices are those stated on the order, and unless otherwise noted are based on purchasing all items on the order – pricing for individual products may vary for purchases of different quantities or item combinations. Hilti does not maintain most favored customer records, makes no representation with respect to same, and rejects any price warranty terms proposed by Customer. Hilti's published net price list is subject to change without notice.

CONSENT TO JURISDICTION: All transactions made pursuant hereto shall be deemed to have been made and entered into in Tulsa, Oklahoma. Any and all disputes arising directly or indirectly from such transactions shall be resolved in the courts of the County of Tulsa, State of Oklahoma, to the exclusion of any other court, and any resulting judgment may be enforced by any court having jurisdiction of such an action. All transactions shall be governed by and construed in accordance with the laws of the State of Oklahoma.

INDEMNIFICATION: Customer hereby agrees to indemnify Hilti for any costs, including attorney's fees, incurred by Hilti as a result, in whole or in part, of any violation by Customer of any Federal, State or Local statute or regulation, or of any nationally accepted standard. It shall be Customer's sole responsibility to comply with all applicable laws and regulations regarding the handling, use, transportation, or disposal of products upon taking possession of same.

AUTHORIZATION: HILTI LEGAL DEPARTMENT PERSONNEL ARE THE ONLY INDIVIDUALS AUTHORIZED TO MODIFY THESE TERMS AND CONDITIONS, WARRANT PRODUCT SUITABILITY FOR SPECIFIC APPLICATIONS, ACCEPT INFORMATION ON THE POTENTIAL FOR CONSEQUENTIAL DAMAGES, OR EXECUTE CUSTOMER DOCUMENTS, AND ANY SUCH ACTION IS NULL AND VOID UNLESS IN WRITTEN FORM SIGNED BY SUCH INDIVIDUAL. HILTI SALES REPRESENTATIVES HAVE NO SUCH AUTHORITY.

In Canada

PAYMENT TERMS: Net 30 days from date of invoice. Customer agrees to pay all costs incurred by Hilti in collecting delinquent amounts, if any, including reasonable attorney's fees.

FREIGHT: Sales are F.O.B. Destination, except transportation costs shall be at Customer's expense, via Hilti designated mode unless otherwise directed by Customer. Delivery dates are estimates only.

CREDIT: All orders sold on credit are subject to Credit Department approval.

RETURN POLICY: Product may be returned (prepaid, unless otherwise authorized) to Hilti provided:

i) it is returned by the original purchaser, with proof of purchase

ii) it is not dated product returned more than 30 days after the original delivery date (dated material only returnable in case quantities)

iii) it is not discontinued, clearance or special order product

iv) it is unused, in original packaging and in unbroken quantities, in as-new condition.

All returns are subject to inspection by Hilti – if the above requirements are satisfied, Hilti will credit to customer the original purchase price, except that if the return is more than 90 days since invoice date, a $125 restocking fee applies.

WARRANTY: Other than the manufacturer's published warranty, no warranties or conditions, express or implied, written or oral, statutory or otherwise are implied. Any and all conditions and warranties implied by law or by the Sale of Goods Act or any similar statutes of any Province are hereby expressly waived.

TITLE TO PRODUCT: Title to product remains with Hilti until the total purchase price of product is paid.

PRICES: Customer agrees to pay Hilti prices set out on invoice. Customer agrees to pay taxes as indicated on invoice unless Hilti receives acceptable exemption certificates.

INDEMNIFICATION: Customer agrees to use product at own risk and to indemnify Hilti against all liabilities, including legal fees, to third parties arising out of the use or possession thereof. Hilti shall in no event be liable for special, incidental or consequential damages.

CHANGES: Only Hilti legal department personnel are authorized to modify these Terms and Conditions, warrant product suitability for specific applications, or modify credit terms. Hilti Sales Representatives have no such authority. Terms are subject to change by Hilti without notice.

CASH SALES: Payment in full is due prior to goods being released.

QUOTATIONS: All terms and conditions apply once customer agrees to purchase product. Quotations on special promotion products are only valid until end of promotion period. Quotations based on purchasing all items listed – pricing for individual products may vary for purchases of different quantities or item combinations.

Hilti. Outperform. Outlast.

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