Terms of common cooperation / Legal disclaimer

The product technical data published in these Technical Data Sheets are only valid for the mentioned codes or technical data generation methods and the defined application conditions (e.g. ambient temperature load capacity not valid in case of fire, data not valid in support structures when mixed with third party products, values only apply to static loading conditions). Technical data applies to the component only -- suitability and capacity of all other components must be checked separately by the responsible engineer (e.g., other assembly components, attachments, base materials, and building structures).

Suitability of structures combining different products for specific applications needs to be verified by conducting a system design and calculation, using for example Hilti PROFIS software. In addition, it is crucial to fully respect the Instructions for Use and to assure clean, unaltered and undamaged state of all products at any time in order to achieve optimum performance (e.g. avoid misuse, modification, overload, corrosion).

As products but also technical data generation methodologies evolve over time, technical data might change at any time without prior notice. We recommend to use the latest technical data sheets published by Hilti.

In any case the suitability of structures combining different products for specific applications need to be checked and cleared by an expert, particularly with regard to compliance with applicable norms, codes, and project specific requirements, prior to using them for any specific facility. This book only serves as an aid to interpret the capacity of the components listed, without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application. User must take all necessary and reasonable steps to prevent or limit damage. The suitability of structures combining different products for specific applications need to be confirmed with a professional designer and/or structural engineers to ensure compliance with User’s specific jurisdiction and project requirements.
MIQA-T T-head bolt

Designation: MIQA-T  
Item number: 2120142

Corrosion protection:
Hot dipped galvanized per DIN EN ISO 1461:
T-bolt: 1.6 mils (40 μm)

Weight:
0.17lb (75g) incl. all components

Description:
Hilti T-head bolt is a simple but sturdy and secure bolt to fasten connectors and other construction elements to MIQ girders. It can be inserted at any point along the girder and allows for full adjustability along the girder. Comes in M12 size.

Material properties

<table>
<thead>
<tr>
<th>Material</th>
<th>Yield strength</th>
<th>Ultimate strength</th>
<th>E-modulus</th>
<th>Shear modulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-bolt:  Class 8.8 - DIN EN 1993-1-8</td>
<td>$f_y = 92.8$ ksi ($640 \text{ N/mm}^2$)</td>
<td>$f_u = 116.0$ ksi ($800 \text{ N/mm}^2$)</td>
<td>29000 ksi ($200000 \text{ N/mm}^2$)</td>
<td>11000 ksi ($75845 \text{ N/mm}^2$)</td>
</tr>
</tbody>
</table>

Instruction For Use:
MIQA-T T-head bolt

Approved loading cases

<table>
<thead>
<tr>
<th>Single</th>
<th>Double</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image of Single bolt]</td>
<td>![Image of Double bolt]</td>
</tr>
</tbody>
</table>

Governing Conditions

Methodology:
Connection strength values are determined with a combination of simulation (ANSYS), calculation (Microsoft Excel and Mathcad) and testing.

Standards and codes:
- ANSI/AISC 360-10 Specification for Structural Steel Buildings
- ANSI/AISC 360-10 Appendix 1 Inelastic analysis
- EN 10025-2 Hot rolled products of structural steels- Part 2: technical delivery conditions for non-alloy structural steels

Validity:
Temperature limits: -22°F (-30°C) to 200°F (+93°C).
Published allowable loads for applications are based on static loading conditions. Non-static forces, including those resulting from thermal or other expansion must be taken into account during design.
MIQA-T T-head bolt

Approved loading cases

<table>
<thead>
<tr>
<th>Single</th>
<th>Double</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.jpg" alt="Single Loading Case" /></td>
<td><img src="image2.jpg" alt="Double Loading Case" /></td>
</tr>
</tbody>
</table>

Loading case: Standard

Bill of Material for this loading case:
For connection on MIQ-90 girder
T-bolt, incl. nut
1x MIQA-T T-head bolt 2120142

Associated channel
MIQ-90 3m 2119866
MIQ-90 6m 2129867

Combinations covered by loading case

T-head bolt used for connecting connectors or equipment into MIQ girder

Usage of Values for Design Strength and Allowable Strength

The Design Strength and Allowable Strength tables on the following pages include strength reduction factors:

1. **ASD**: Safety Factor (omega) > 1.0 as per AISC specifications.
2. **LRFD**: Strength Reduction Factor (phi) < 1.0 as per AISC specifications. \( \Omega = \frac{1}{\text{phi}} \) (Reference AISC 360 C-B3-5)

Factored loads are required for input to the given interaction equations. Factored loads are the responsibility of the user. Factored loads are noted as P, V and M

Limiting components of capacity evaluated in following tables:

1. Connection system, including T-head bolt, nut and affected portion of MIQ-90 girder, per FEA simulation
NOTE: Calculate interaction separately for each group only using values from that group. Limiter is defined by highest interaction. Use absolute values. Values refer to the coordinate system shown.

1. Connection system, including T-head bolt, nut and affected portion of MIQ-90 girder, per FEA simulation

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.88</td>
<td>1.88</td>
<td>0.00</td>
<td>0.00</td>
<td>3.56</td>
<td>3.56</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>1.25</td>
<td>1.25</td>
<td>0.00</td>
<td>0.00</td>
<td>2.37</td>
<td>2.37</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Interaction for LRFD:
\[
\frac{P_{ax}}{F_x} + \frac{V_{ay}}{F_y} + \frac{V_{az}}{F_z} + \frac{M_{ax}}{M_x} + \frac{M_{ay}}{M_y} + \frac{M_{az}}{M_z} \leq 1,00
\]

Interaction for ASD:
\[
\frac{P_{ax}}{F_x} + \frac{V_{ay}}{F_y} + \frac{V_{az}}{F_z} + \frac{M_{ax}}{M_x} + \frac{M_{ay}}{M_y} + \frac{M_{az}}{M_z} \leq 1,00
\]

*Values already include LRFD strength reduction (Φ) or ASD safety (Ω) factors in accordance with AISI, and are based on nominal geometry.
## MIQA-T T-head bolt

### Approved loading cases

<table>
<thead>
<tr>
<th></th>
<th>Single</th>
<th>Double</th>
</tr>
</thead>
</table>

### Loading case: Standard

<table>
<thead>
<tr>
<th>Bill of Material for this loading case:</th>
<th>Combinations covered by loading case</th>
</tr>
</thead>
<tbody>
<tr>
<td>For connection on MIQ-90 girder</td>
<td>T-head bolt used for connecting connectors or equipment into MIQ girder</td>
</tr>
<tr>
<td>T-bolt, incl. nut</td>
<td></td>
</tr>
<tr>
<td>2x MIQA-T T-head bolt</td>
<td>2120142</td>
</tr>
<tr>
<td>Associated channel</td>
<td></td>
</tr>
<tr>
<td>MIQ-90 3m</td>
<td>2119866</td>
</tr>
<tr>
<td>MIQ-90 6m</td>
<td>2129867</td>
</tr>
</tbody>
</table>

### Usage of Values for Design Strength and Allowable Strength

The Design Strength and Allowable Strength tables on the following pages include strength reduction factors:

1. **ASD:** Safety Factor (omega) > 1.0 as per AISC specifications.
2. **LRFD:** Strength Reduction Factor (phi) < 1.0 as per AISC specifications. \( \Omega = \frac{1}{\phi} \) (Reference AISC 360 C-B3-5)

Factored loads are required for input to the given interaction equations. Factored loads are the responsibility of the user. Factored loads are noted as P, V and M.

### Limiting components of capacity evaluated in following tables:

1. Connection system, including 2x T-head bolt, nut and affected portion of MIQ-90 girder, per FEA simulation
**MIQA-T T-head bolt**

### Approved loading cases

<table>
<thead>
<tr>
<th>Single</th>
<th>Double</th>
</tr>
</thead>
</table>

### Values for Design Strength and Allowable Strength

**NOTE:** Calculate interaction separately for each group only using values from that group. Limiter is defined by highest interaction. Use absolute values. Values refer to the coordinate system shown.

1. Connection system, including 2x T-head bolt, nut and affected portion of MIQ-90 girder, per FEA simulation

<table>
<thead>
<tr>
<th>LRFD*</th>
<th>ASD*</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.40</td>
<td>3.40</td>
</tr>
<tr>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2.27</td>
<td>2.27</td>
</tr>
</tbody>
</table>

#### Interaction for LRFD

\[
\frac{P_{ax}}{F_x} + \frac{V_{ax}}{F_y} + \frac{V_{ay}}{F_z} + \frac{M_{ax}}{M_x} + \frac{M_{ay}}{M_y} + \frac{M_{az}}{M_z} \leq 1,00
\]

#### Interaction for ASD:

\[
\frac{P_{as}}{F_x} + \frac{V_{ax}}{F_y} + \frac{V_{ay}}{F_z} + \frac{M_{ax}}{M_x} + \frac{M_{ay}}{M_y} + \frac{M_{az}}{M_z} \leq 1,00
\]

*Values already include LRFD strength reduction (Φ) or ASD safety (Ω) factors in accordance with AISI, and are based on nominal geometry.*