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.
**MIQM-1/2” wing nut**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Item number</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIQM-1/2”</td>
<td>2183585</td>
</tr>
</tbody>
</table>

**Corrosion protection:**
Hot dipped galvanized per ASTM A153/A 153M-09
Wing nut: 2.1 mils (53 μm)

**Weight:**
0.09lb (39g) incl. all components

**Description:**
The Hilti Wing nut is a simple part to connect the MIQ girder with construction elements. The wingnut can be inserted at any point along the MIQ girder and allows for a flush connection. The flexible wings makes it easy to hold the part in place during installation.

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**Material properties**

<table>
<thead>
<tr>
<th>Material</th>
<th>Nut: C4C DIN EN 10263-2</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Ultimate strength</th>
<th>E-modulus</th>
<th>Shear modulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f_u = 43.5$ ksi (300 $\frac{N}{mm^2}$)</td>
<td>29000 ksi (200000 $\frac{N}{mm^2}$)</td>
<td>11000 ksi (75845 $\frac{N}{mm^2}$)</td>
</tr>
</tbody>
</table>
MIQM-1/2” wing nut

Approved loading cases

<table>
<thead>
<tr>
<th></th>
<th>Single</th>
<th>Double</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
</tbody>
</table>

Governing Conditions

Methodology:
Connection strength values are determined by a combination of simulation (ANSYS), calculation (Microsoft Excel and Mathcad) and lab 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.
### MIQM-1/2” wing nut

#### Approved loading cases

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</table>

#### Loading case: Standard

- **Bill of Material for this loading case:**
  - For connection on MIQ-90 girder
  - 1x MIQM-1/2” wing nut  2183585

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

- **Combinations covered by loading case**
  - Wing nut ½” 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. \( \Omega = \frac{1}{\phi} \) (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 wing nut and affected portion of MIQ-90 girder, per FEA simulation
MIQM-1/2” wing nut

### Approved loading cases

<table>
<thead>
<tr>
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<th>Double</th>
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<tbody>
<tr>
<td><img src="image1.jpg" alt="Diagram of single connection system" /></td>
<td><img src="image2.jpg" alt="Diagram of double connection system" /></td>
</tr>
</tbody>
</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 wing nut and affected portion of MIQ-90 girder, per FEA simulation

![Diagram of connection system](image3.jpg)

| LRFD* | | | | | |
| 1.06 | 1.06 | 0.00 | 0.00 | 2.58 | 2.58 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| ASD* | | | | | |
| 0.71 | 0.71 | 0.00 | 0.00 | 1.72 | 1.72 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Interaction for LRFD:

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

Interaction for ASD:

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

*Values already include LRFD strength reduction (Φ) or ASD safety (Ω) factors in accordance with AISI, and are based on nominal geometry.*
MIQM-1/2” wing nut

Approved loading cases

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</table>

Loading case: Standard

Bill of Material for this loading case:
For connection on MIQ-90 girder
2x MIQM-1/2” wing nut  2183585

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

Combinations covered by loading case

Wing nut ½” 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. \( \Omega = \frac{11}{9} \) (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 wing nut, nut and affected portion of MIQ-90 girder, per FEA simulation
### MIQM-1/2” wing nut

#### Approved loading cases

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<td><img src="image2.png" alt="Double Connection System" /></td>
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</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 wing nut, nut and affected portion of MIQ-90 girder, per FEA simulation

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</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.*
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