Leviat is a world leader in connecting, fixing, lifting and anchoring technology. From the build of new schools, hospitals, homes and infrastructure, to the repair and maintenance of heritage structures, our engineering skills are making a difference around the world.

We provide technical design assistance at every stage of a project, from initial planning to installation and beyond. Our technical support services range from simple product selection through to the development of a fully customised project-specific design solution.

Every promise we make locally, has the commitment and dedication of our global team behind it. We employ almost 3,000 people at 60 locations across North America, Europe and Asia-Pacific, providing an agile and responsive service worldwide.

Leviat, a CRH company, is part of the world’s leading building materials business.

We imagine, model and make engineered products and innovative construction solutions that help turn architectural visions into reality and enable our construction partners to build better, safer, stronger and faster.
Anchoring & Fixing
Systems for fixing secondary fixtures to concrete, including anchor channels, bolts and inserts; also tension rod systems for roofs and canopies.

Other areas of expertise:

Structural Connections
Systems to form robust, efficient connections, and continuity of concrete reinforcement as necessary, between walls, slabs, columns, beams and balconies, providing structural integrity as well as enhanced thermal and acoustic performance.

Lifting & Bracing
Systems for the safe and efficient transportation, lifting and temporary bracing of cast concrete elements and tilt-up panels before permanent structural connections are made.

Façade Support & Restraint
Systems for the safe and thermally-efficient fixing of the external building envelope, including brick and natural stone, insulated sandwich panels, curtain walling and suspended concrete façades, and also the repair and strengthening of existing masonry installations.

Formwork & Site Accessories
Non-structural accessories that complement our engineered solutions and help keep your construction environment operating safely and efficiently, including moulds for casting standard and special concrete elements and construction essentials such as reinforcing bar spacers.

Industrial Technology
Mounting channels, pipe clamps and other versatile framing systems that provide safe fixing in a wide range of industrial applications.

Leviat product ranges:
Ancon | Aschwanden | Connolly | Halfen | Helifix | Isedio | Meadow Burke | Modersohn | Moment | Plaka | Scaldex | Thermomass

>3,000 People
60+ Locations
~20 Countries
Modern architecture always strives to find a balance between practical, functional and aesthetically exceptional solutions. With our Rod Systems, we offer two product solutions that meet the highest aesthetic, safety and quality requirements. Our technically mature systems are easy to install and can be used for filigree supporting structures as well as for high load applications. Rod systems are increasingly being implemented as architectural and structural elements.

As a future-oriented, innovative company Leviat focuses on the ever-changing requirements of the industry. Our latest development aims to combine the portfolio of Ancon and Halfen Rod systems to ensure we meet the individual requirements of our customers and the industry. For the steel variant we provide “Halfen design” and for the stainless steel variant we provide the “Ancon design”. With both systems we are offering to our customers an optimum version from our product portfolio.

Both systems have a wide range of accessories and can be designed as tension and compression rod system. Likewise, both systems are regulated in a European Technical Assessment (ETA). Furthermore, they can be dimensioned and configured in our software, which is available free of charge.

Benefits and changes for planners of the previous Ancon system:
With the Halfen system Detan-S, we offer additional diameters (dₜ = 60 mm and dₜ = 76 mm), higher load-bearing capacities and the complete system in steel or hot-dip galvanised steel incl. brushed threads with sealing set.

Benefits or changes for planners of the previous Halfen system Detan-D:
For systems made of stainless steel, larger diameters (dₜ = 36 mm and dₜ = 42 mm) can be used. The diameters dₜ = 6 mm and dₜ = 27 mm are phased out. In addition to the electropolished variant, it is also possible to obtain satin or hand-polished systems.

Diameters for Halfen Detan-S in steel:
M10, M12, M16, M20, M24, M27, M30, M36, M42, M48, M52, M56, M60, M76

Diameters for Halfen Detan-D in stainless steel:
M8, M10, M12, M16, M20, M24, M30, M36, M42

The market launch of the new product portfolio took place under the following name:
- Halfen Detan-S Rod system carbon steel (previously Detan-S)
- Halfen Detan-D Rod system stainless steel (previously Ancon 500 Stainless steel)
Halfen Detan Rod systems
Tension and compression rod system

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Halfen Detan Rod systems

Applications

Application — examples

The Halfen Detan Tension and compression rod systems are a perfect match, both structurally and aesthetically. Halfen Detan is suitable for use in all types of bracing applications.

To complement range we offer a wide selection of services and accessories, for example, anchor discs and cross couplers and providing construction detailing and assistance for further possible applications.

Bracing under beams

The Halfen Detan Rod system allows smaller steel and wood-beam cross-sections. This makes larger spans possible. This is one example of a beam using two compression rod systems with three tension rods in the mid-section. Minimum material can be used to support glass structures, to allow maximum light into a building.

Stiffeners and Bracings

Statically required wind–bracing in roofs and walls can be aesthetically designed as a visual focus-point using the tension rod system. Cross bracing is possible either with a cross coupler or an anchor disc.

Suspensions

The design of aesthetically demanding structures, such as this pedestrian bridge, is made possible. The requirements of modern architecture complement the static requirements perfectly.
Halfen Detan Rod systems
Applications

Application — examples

Canopy suspensions

The Halfen Detan System allows bracings to be designed using a minimum of obtrusive structural elements, leaving them almost invisible. Statically required elements are simultaneously used as design elements. The visually, unobtrusive bracing elements give the whole structure an overall lightness. Applications are suspended canopies in all types of commercial and industrial projects. The Halfen Detan Rod system is suitable for tension and compression loads.

Back-braced glass-facades

The Halfen Detan Rod system allows filigree support structures for glass-facades to be realized.
The Sage, Gateshead/England

Cross bracings provide a futuristic, lightweight construction. For structural reasons, Halfen Detan Tension rods run diagonally across the glazed façade. The filigree Halfen Detan system is perfectly integrated, emphasizing the fascinating overall impression of the building.
L’Aquapolis Centre aquatique, Limoges/France
The aquatic sports centre is located in Limoges in France. Various fun pools are distributed over 2,400 m² as well as a 25 and a 50 metres competition size facility. Numerous fitness, water sport activities and relaxation zones are also available. Construction was completed after 3 years and the centre was opened in January 2015. In the Aquapolis project the impressive structure uses hot-dipped galvanized elements as tension chords for the roof beams with 12, 16, 24, 30, 36, 56 and 76 mm diameters.

Moody Pedestrian Bridge, Austin/USA
The Moody Pedestrian Bridge is a one of a kind inverted Fink Truss Bridge. The bridge is characterized by a series of slender steel towers that vary in height and scale. Tension rods in various lengths were engineered and designed to connect the towers to the bridge itself. Additional rods were used at the tops of the steel towers and also as a cross brace at the bottom of the main tower. Rods were provided in HDG material and then were painted to match the steel towers.
**Halfen Detan Rod systems**

**System Overview**

**Halfen Detan Tension rod system**

**Basic system**

Ordering procedure → page 11
Load capacity, system dimensions and materials:
Steel → pages 14–15
Stainless steel → pages 16–17

**System variants**

Ordering example → page 11
Load capacity, system dimensions and materials:
Steel → pages 14–15
Stainless steel → pages 16–17

**Cross bracing**

Ordering example → page 12
Load capacity, system dimensions and materials:
Steel → pages 14–15
Stainless steel → pages 16–17

**Halfen Detan Compression rod system**

Ordering example → page 13
Load capacity, system dimensions and materials:
Steel → pages 14–15
Stainless steel → pages 16–17

**Pretension unit**

Ordering example → page 19
Load capacity, system dimensions and materials → pages 16–17

More information → pages 25–26

The Halfen Detan Rod systems are only approved for predominantly static loads.

Halfen Detan Tension Rod with fork head

Suspensions consist of a system variant with coupler with a hanger and a basic system

Cross bracing consists of one system variant with cross coupler and a basic system

Cross bracing consists of one anchor disc and up to 8 basic systems

**Halfen Detan Compression Rod**

**Anchor disc for cross bracing**

**More information → pages 25–26**
Halfen Detan Rod systems
Product Range Overview: Halfen Detan Tension Rod System

Ordering procedure
Example order: Tension rod system, Halfen Detan-S, $d_s = 30\text{ mm}$, $L = 4500\text{ mm}$ FV, 1 coupler

Basic system

Ordering example (material steel HDG): Tension rod system, Halfen Detan-S, $d_s = 52\text{ mm}$, $L = 3620\text{ mm}$ FV

System variants
with coupler:

Ordering example (stainless steel): Tension rod system, Halfen Detan-D, $d_s = 24\text{ mm}$, $L = 11200\text{ mm}$, 2 couplers

Note: Maximum 5 couplers are possible.

Coupler with hanger

Ordering example (material steel HDG): Tension rod system, Halfen Detan-S, $d_s = 30\text{ mm}$, $L = 34000\text{ mm}$ FV, 3 couplers with hanger

System Detan-S, European Technical Assessment ETA-05/0207

<table>
<thead>
<tr>
<th>System $\phi d_s$ [mm]</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>27</th>
<th>30</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>52</th>
<th>56</th>
<th>60</th>
<th>76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available minimum system length $L$ [mm]</td>
<td>250</td>
<td>310</td>
<td>360</td>
<td>440</td>
<td>520</td>
<td>560</td>
<td>600</td>
<td>700</td>
<td>810</td>
<td>940</td>
<td>990</td>
<td>1050</td>
<td>1160</td>
<td>1480</td>
</tr>
<tr>
<td>Rod hot-dip galvanized</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available maximum system length $L$ with one rod [mm]</td>
<td>6060</td>
<td>6070</td>
<td>12080</td>
<td>12100</td>
<td>12120</td>
<td>12140</td>
<td>12140</td>
<td>12170</td>
<td>12220</td>
<td>12260</td>
<td>12290</td>
<td>12320</td>
<td>15430</td>
<td></td>
</tr>
<tr>
<td>Rod hot-dip galvanized</td>
<td>6060</td>
<td>6070</td>
<td>12080</td>
<td>12100</td>
<td>12120</td>
<td>12140</td>
<td>12140</td>
<td>12170</td>
<td>12220</td>
<td>12260</td>
<td>12290</td>
<td>12320</td>
<td>15430</td>
<td></td>
</tr>
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</table>

System Detan-D, European Technical Assessment ETA-23/0276

<table>
<thead>
<tr>
<th>System $\phi d_s$ [mm]</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available maximum system length $L$ with one rod [mm]</td>
<td>6035</td>
<td>6042</td>
<td>6050</td>
<td>6065</td>
<td>6076</td>
<td>6100</td>
<td>6113</td>
<td>6138</td>
<td>6162</td>
</tr>
<tr>
<td>Polished</td>
<td>6035</td>
<td>6042</td>
<td>6050</td>
<td>6065</td>
<td>6076</td>
<td>6100</td>
<td>6113</td>
<td>6138</td>
<td>6162</td>
</tr>
</tbody>
</table>

Abbreviations: WB = mill finish; FV = HDG = hot-dip galvanized

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Halfen Detan Rod systems
Product Range Overview: Halfen Detan Tension Rod System

System variants

Cross coupler for cross bracing:

Ordering example (material steel HDG): Tension rod system, Halfen Detan-S, \( d_s = 30\, \text{mm} \), \( L = 5600\, \text{mm} \) FV, 1 cross coupler

<table>
<thead>
<tr>
<th>System dimensions Detan-S [mm]</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>27</th>
<th>30</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>52</th>
<th>56</th>
<th>60</th>
<th>76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction for 2 x fork</td>
<td>60</td>
<td>73</td>
<td>85</td>
<td>107</td>
<td>128</td>
<td>140</td>
<td>148</td>
<td>179</td>
<td>220</td>
<td>264</td>
<td>277</td>
<td>290</td>
<td>324</td>
<td>432</td>
</tr>
<tr>
<td>( O_m )</td>
<td>15.0</td>
<td>18.5</td>
<td>22.5</td>
<td>27.0</td>
<td>34.0</td>
<td>37.5</td>
<td>42.5</td>
<td>51.0</td>
<td>55.0</td>
<td>62.5</td>
<td>70.5</td>
<td>77.5</td>
<td>85.0</td>
<td>115.0</td>
</tr>
<tr>
<td>( L_{km} )</td>
<td>100</td>
<td>120</td>
<td>142</td>
<td>166</td>
<td>200</td>
<td>222</td>
<td>242</td>
<td>284</td>
<td>310</td>
<td>348</td>
<td>400</td>
<td>440</td>
<td>478</td>
<td>631</td>
</tr>
<tr>
<td>min. system length</td>
<td>550</td>
<td>650</td>
<td>750</td>
<td>900</td>
<td>1050</td>
<td>1150</td>
<td>1200</td>
<td>1400</td>
<td>1600</td>
<td>1850</td>
<td>2000</td>
<td>2100</td>
<td>2300</td>
<td>2950</td>
</tr>
</tbody>
</table>

Minimal system length

Min. system length = 1 × cross coupler, 2 × tension rods, 2 × forks and 4 × locking-nuts

System variant with asymmetric distribution of couplers

Order with specification of system length \( L \):
We calculate the rod lengths and minimum and maximum system length. The couplers are distributed symmetrically. If an asymmetric distribution of the couplers is required, a drawing with all necessary measurements must be included.

We will detail complex rod systems as one configured system. A drawing with system dimensions is sufficient.

Ordering example:
① Tension Rod System, Halfen Detan-S, \( d_s = 24\, \text{mm} \), system length according to drawing, WB, couplers according to drawing
② Tension Rod System, Halfen Detan-S, \( d_s = 10\, \text{mm} \), system length \( L = 1050\, \text{mm} \), WB

Spanner flats are available with bars from ≥ 900 mm in length

Minimum system length

400–3650 mm
Halfen Detan Rod systems
Product Range Overview: Cross Bracings, Halfen Detan Compression Rod System

Cross bracings

Anchor disc

1. Ordering example: Anchor disc, Halfen Detan-S, \(d_s = 42\) mm, 4 holes drilled \(\alpha = 40^\circ\), \(\beta = 140^\circ\) (see drawing), FV
2. Ordering example (stainless steel): Anchor disc, Halfen Detan-D, \(d_s = 24\) mm, 8 holes drilled \(\alpha = 45^\circ\) (see drawing)

<table>
<thead>
<tr>
<th>System Detan-S, European Technical Assessment ETA-05/0207</th>
<th>System - (\Omega d_s) [mm]</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>27</th>
<th>30</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>52</th>
<th>56</th>
<th>60</th>
<th>76</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>System Detan-D, European Technical Assessment ETA-23/0276</th>
<th>System - (\Omega d_s) [mm]</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>42</th>
</tr>
</thead>
</table>

Set articles and individual components

- **Tension rod** (specify rod length separately)
- **Fork connection set**: Fork, locking-nuts, pins, circlips, sealing kit, left-hand thread
- **Fork connection set**: Fork, locking-nuts, pins, circlips, sealing kit, right-hand thread
- **Coupler set**: coupler + 2 locking-nuts, sealing kit
- **Coupler set with hanger**: coupler with hanger + 2 locking-nuts, sealing kit
- **Cross coupler set**: cross coupler + 2 locking-nuts, sealing kit
- **Spanner**
- **Snake-eye tool**
- **Locking nut, left-hand thread**
- **Locking nut, right-hand thread**
- **Flat seal**
- **Round seal**
- **Circlip for one fork**
- **Coupler, with hanger**
- **Coupler, without hanger**
- **Fork, left-hand thread**
- **Fork, right-hand thread**
- **Cross coupler**

① Stainless steel variant is without sealing kit/circlip.
European Technical Assessment is only valid when using components as a complete system.

1. Ordering example: Connection set, Detan-S, \(d_s = 20\) mm, left-hand thread, FV
2. Ordering example: Tension rod, Halfen Detan-S, \(d_s = 10\) mm, \(L = 500\) mm, thread length left = 120 mm, thread length right = 150 mm

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System components — materials and finish

<table>
<thead>
<tr>
<th>System - Ø ds [mm]</th>
<th>Tension rod</th>
<th>Fork</th>
<th>Couplers, locking-nuts</th>
<th>Anchor disc</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 - 12</td>
<td>10 - 12</td>
<td>16 - 76</td>
<td>10 - 76</td>
<td>10 - 76</td>
</tr>
<tr>
<td>Finish</td>
<td>FV</td>
<td>WB</td>
<td>hot-dip galvanized</td>
<td>hot-dip galvanized</td>
</tr>
<tr>
<td></td>
<td>mill finish</td>
<td></td>
<td>hot-dip galvanized</td>
<td>hot-dip galvanized</td>
</tr>
</tbody>
</table>

System load capacities; system- and available rod lengths; material specification, steel strength grade S355 (diameter ds 10-12) or S520

<table>
<thead>
<tr>
<th>System - Ø ds [mm]</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>27</th>
<th>30</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>52</th>
<th>56</th>
<th>60</th>
<th>76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load capacity Ft.R.d [kN]</td>
<td>21.3</td>
<td>30.94</td>
<td>81.22</td>
<td>126.9</td>
<td>182.7</td>
<td>238.1</td>
<td>290.6</td>
<td>423.4</td>
<td>581.1</td>
<td>763.7</td>
<td>911.3</td>
<td>1052.4</td>
<td>1224.5</td>
<td>2016.2</td>
</tr>
<tr>
<td>Available minimum system length L [mm]</td>
<td>250</td>
<td>310</td>
<td>360</td>
<td>440</td>
<td>520</td>
<td>600</td>
<td>700</td>
<td>810</td>
<td>940</td>
<td>990</td>
<td>1050</td>
<td>1160</td>
<td>1480</td>
<td></td>
</tr>
<tr>
<td>Available maximum system length with one rod [mm]</td>
<td>6060</td>
<td>6070</td>
<td>12080</td>
<td>12100</td>
<td>12120</td>
<td>12140</td>
<td>12140</td>
<td>12170</td>
<td>12220</td>
<td>12260</td>
<td>12270</td>
<td>12290</td>
<td>12320</td>
<td>15430</td>
</tr>
<tr>
<td>Available maximum rod length L [mm]</td>
<td>6000</td>
<td>12000</td>
<td>15000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

In accordance with ETA-05/0207 the partial safety value for the table above are assumed as $\gamma_{M0} = 1.0$ and $\gamma_{M2} = 1.25$

Design load $F_{t,R,d}$ according to annex B11 of ETA-05/0207. The load capacities in this table were determined on the basis of different available material strengths. The up to 15% higher design values can be achieved with strength class S520. The design values of all strength classes can be found in annex B11 of ETA-05/0207.

System dimensions [mm], materials — see table above

<table>
<thead>
<tr>
<th>System - Ø ds [mm]</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>27</th>
<th>30</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>52</th>
<th>56</th>
<th>60</th>
<th>76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fork length $L_{DT}$</td>
<td>60</td>
<td>73</td>
<td>89</td>
<td>110</td>
<td>133</td>
<td>147</td>
<td>160</td>
<td>192</td>
<td>225</td>
<td>265</td>
<td>285</td>
<td>305</td>
<td>335</td>
<td>460</td>
</tr>
<tr>
<td>Pin length $l_p$</td>
<td>28</td>
<td>32</td>
<td>44</td>
<td>52</td>
<td>60</td>
<td>65</td>
<td>72</td>
<td>84</td>
<td>97</td>
<td>111</td>
<td>119</td>
<td>130</td>
<td>139</td>
<td>180</td>
</tr>
<tr>
<td>Fork width $p$</td>
<td>20</td>
<td>24</td>
<td>33</td>
<td>40</td>
<td>46</td>
<td>51</td>
<td>57</td>
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<td>146</td>
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<tr>
<td>Fork height $q$</td>
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<td>196</td>
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<tr>
<td>Thread depth $a_m$</td>
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<td>18.5</td>
<td>22.5</td>
<td>27.0</td>
<td>34.0</td>
<td>37.5</td>
<td>42.5</td>
<td>51.0</td>
<td>55.0</td>
<td>62.5</td>
<td>70.5</td>
<td>77.5</td>
<td>85.0</td>
<td>115</td>
</tr>
<tr>
<td>Screw adjustment range $o_j$</td>
<td>5.0</td>
<td>6.5</td>
<td>7.5</td>
<td>8.0</td>
<td>11.0</td>
<td>12.5</td>
<td>12.5</td>
<td>14.0</td>
<td>15.0</td>
<td>17.5</td>
<td>20.0</td>
<td>22.5</td>
<td>25.0</td>
<td>39</td>
</tr>
<tr>
<td>Length locking nut $M$</td>
<td>24.5</td>
<td>37.0</td>
<td>41.0</td>
<td>50.0</td>
<td>58.0</td>
<td>63.0</td>
<td>64.0</td>
<td>72.0</td>
<td>83.0</td>
<td>91.0</td>
<td>98.0</td>
<td>105</td>
<td>112</td>
<td>148</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tension rod</th>
<th>Spanner width $t_s$</th>
<th>Hook spanner ②</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>Locking-nuts</td>
<td>Use soft touch pliers</td>
<td>With hook spanner</td>
</tr>
</tbody>
</table>

① Delivery time on request.
② When using a chain tensioner instead of a hook spanner we recommend protecting the rod surface against damage (also applies to the couplers).
Corrosion protection: rod thread hot-dip galvanized. Fork threads sealed with stoppers. Also see page 22 for sealing system.
Halfen Detan Rod systems
Tension Rod System Halfen Detan-S
European Technical Assessment ETA-05/0207

Connecting plates
The load transfer from the rod system into the plates is considered as verified if the dimensions in the table have been observed. Plates are not included in the scope of delivery.

Note: A can only be used when simultaneously using the circular anchor disc at 45°, see page 19.

Dimensions [mm]; Material — minimum qualities for Ø 10-12, steel strength grade S235JR; or for Ø 16-95, steel strength grade S355J2

<table>
<thead>
<tr>
<th>System - Ø</th>
<th>ds 10</th>
<th>ds 12</th>
<th>ds 16</th>
<th>ds 20</th>
<th>ds 24</th>
<th>ds 27</th>
<th>ds 30</th>
<th>ds 36</th>
<th>ds 42</th>
<th>ds 48</th>
<th>ds 52</th>
<th>ds 56</th>
<th>ds 60</th>
<th>ds 76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness conn. plate b</td>
<td>8</td>
<td>10</td>
<td>15</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
</tr>
<tr>
<td>Hole diameter for pin Ø j</td>
<td>9.5</td>
<td>11.5</td>
<td>15.5</td>
<td>19.5</td>
<td>23.5</td>
<td>26.5</td>
<td>29.5</td>
<td>33.5</td>
<td>41</td>
<td>47</td>
<td>49</td>
<td>53</td>
<td>57</td>
<td>76</td>
</tr>
<tr>
<td>Hole position r</td>
<td>15</td>
<td>18</td>
<td>24</td>
<td>29</td>
<td>35</td>
<td>39</td>
<td>43</td>
<td>51</td>
<td>60</td>
<td>70</td>
<td>76</td>
<td>83</td>
<td>88</td>
<td>129</td>
</tr>
<tr>
<td>Minimum width s</td>
<td>28</td>
<td>33</td>
<td>41</td>
<td>53</td>
<td>66</td>
<td>76</td>
<td>83</td>
<td>97</td>
<td>117</td>
<td>134</td>
<td>143</td>
<td>152</td>
<td>162</td>
<td>222</td>
</tr>
</tbody>
</table>

Cross bracing
Option 1:
Anchor disc standard K40 (smallest connecting angle α_min = 40°)
Example: Anchor disc with 4 tension rods (max. of 8 rod connections per disc)

Option 2:
Cross coupler (connecting angle α = 40° - 90°)

Note: Coupler with hanger only for system diameter 12 mm and higher.

Dimensions [mm]; Material — minimum qualities for Ø 10-12, steel strength grade S355J2, hot-dip galvanized

<table>
<thead>
<tr>
<th>System - Ø</th>
<th>ds 10</th>
<th>ds 12</th>
<th>ds 16</th>
<th>ds 20</th>
<th>ds 24</th>
<th>ds 27</th>
<th>ds 30</th>
<th>ds 36</th>
<th>ds 42</th>
<th>ds 48</th>
<th>ds 52</th>
<th>ds 56</th>
<th>ds 60</th>
<th>ds 76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness conn. plate b</td>
<td>8</td>
<td>10</td>
<td>15</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
</tr>
<tr>
<td>Hole diameter for pin Ø j</td>
<td>9.5</td>
<td>11.5</td>
<td>15.5</td>
<td>19.5</td>
<td>23.5</td>
<td>26.5</td>
<td>29.5</td>
<td>33.5</td>
<td>41</td>
<td>47</td>
<td>49</td>
<td>53</td>
<td>57</td>
<td>76</td>
</tr>
<tr>
<td>Hole position r</td>
<td>15</td>
<td>18</td>
<td>24</td>
<td>29</td>
<td>35</td>
<td>39</td>
<td>43</td>
<td>51</td>
<td>60</td>
<td>70</td>
<td>76</td>
<td>83</td>
<td>88</td>
<td>129</td>
</tr>
<tr>
<td>Minimum width s</td>
<td>28</td>
<td>33</td>
<td>41</td>
<td>53</td>
<td>66</td>
<td>76</td>
<td>83</td>
<td>97</td>
<td>117</td>
<td>134</td>
<td>143</td>
<td>152</td>
<td>162</td>
<td>222</td>
</tr>
</tbody>
</table>

Couplers
Note: Coupler with hanger only for system diameter 12 mm and higher.

Dimensions [mm]; Material — minimum qualities for Ø 10-12, steel strength grade S355J2, hot-dip galvanized

<table>
<thead>
<tr>
<th>System - Ø</th>
<th>ds 10</th>
<th>ds 12</th>
<th>ds 16</th>
<th>ds 20</th>
<th>ds 24</th>
<th>ds 27</th>
<th>ds 30</th>
<th>ds 36</th>
<th>ds 42</th>
<th>ds 48</th>
<th>ds 52</th>
<th>ds 56</th>
<th>ds 60</th>
<th>ds 76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupler length L_M</td>
<td>40</td>
<td>50</td>
<td>62</td>
<td>78</td>
<td>94</td>
<td>104</td>
<td>120</td>
<td>140</td>
<td>158</td>
<td>160</td>
<td>195</td>
<td>210</td>
<td>245</td>
<td>328</td>
</tr>
<tr>
<td>Coupler diameter d_M</td>
<td>20</td>
<td>22</td>
<td>28</td>
<td>35</td>
<td>42</td>
<td>47</td>
<td>53</td>
<td>64</td>
<td>75</td>
<td>87</td>
<td>93</td>
<td>98</td>
<td>104</td>
<td>155</td>
</tr>
<tr>
<td>Thread depth o_m</td>
<td>15.0</td>
<td>18.5</td>
<td>22.5</td>
<td>27.0</td>
<td>34.0</td>
<td>37.5</td>
<td>42.5</td>
<td>51.0</td>
<td>55.0</td>
<td>62.5</td>
<td>70.5</td>
<td>77.5</td>
<td>85.0</td>
<td>115</td>
</tr>
<tr>
<td>Screw adjustment range o_j</td>
<td>5.0</td>
<td>6.5</td>
<td>7.5</td>
<td>8.0</td>
<td>11.0</td>
<td>12.5</td>
<td>12.5</td>
<td>14.0</td>
<td>15.0</td>
<td>17.5</td>
<td>20.0</td>
<td>22.5</td>
<td>25.0</td>
<td>39</td>
</tr>
<tr>
<td>Suspension system diam. d_SA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>155/8</td>
</tr>
<tr>
<td>Offset of suspension hole k_m</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>155/8</td>
</tr>
</tbody>
</table>

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## System components — material and design

<table>
<thead>
<tr>
<th>Material</th>
<th>Tension rod</th>
<th>Fork</th>
<th>Couplers§, locking nuts</th>
<th>Pins§, circlips</th>
<th>Anchor disc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Finish</td>
<td>polished</td>
<td>polished</td>
<td>polished</td>
<td>polished</td>
<td>polished</td>
</tr>
</tbody>
</table>

§ circlips according to DIN 471, stainless steel 1.4568/1.4568
§ material stainless steel, strength grade S355
§ material stainless steel, strength grade S235

Stainless steel acc. to ETA-23/0276, annex 2 corresponds to corrosion resistance class III

**Note:** When using Halfen Detan-D the effects of corrosion for various ambient conditions must be verified by the design engineer for each separate case.

### Load capacities, system and available rod lengths, material: stainless steel

<table>
<thead>
<tr>
<th>System - Ø d_s [mm]</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Load capacity F_{T,R,d} [kN]</strong></td>
<td>17.1</td>
<td>27.1</td>
<td>39.4</td>
<td>73.3</td>
<td>114.6</td>
<td>165.0</td>
<td>262.4</td>
<td>382.2</td>
<td>524.6</td>
</tr>
<tr>
<td><strong>Available maximum system length with one rod [mm]</strong></td>
<td>3000</td>
<td>6000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In accordance with ETA-23/0276 the partial safety value for the table above are assumed as $\gamma_M = 1.0$ and $\gamma_{M2} = 1.25$

If other partial safety factors are to be applied the load capacities have to be calculated according to ETA-23/0276.

§ F_{T,R,d}: Design tension resistance according to ETA-23/0276 annex B11.
§ Longer system lengths L consisting of several rods with connecting couplers are possible!

### Fork

**System dimensions [mm]: materials, see table above**

<table>
<thead>
<tr>
<th>System - Ø</th>
<th>d_s</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fork length</td>
<td>L_{DT}</td>
<td>40</td>
<td>49</td>
<td>60</td>
<td>78</td>
<td>94</td>
<td>115</td>
<td>140</td>
<td>169</td>
<td>196</td>
</tr>
<tr>
<td>Pin length</td>
<td>l_B</td>
<td>23</td>
<td>28.5</td>
<td>34</td>
<td>46</td>
<td>58</td>
<td>68</td>
<td>86</td>
<td>103</td>
<td>118</td>
</tr>
<tr>
<td>Fork width</td>
<td>p</td>
<td>23.5</td>
<td>29</td>
<td>35</td>
<td>48</td>
<td>60</td>
<td>70</td>
<td>89</td>
<td>106</td>
<td>123</td>
</tr>
<tr>
<td>Fork height</td>
<td>q</td>
<td>23.5</td>
<td>29</td>
<td>35</td>
<td>48</td>
<td>60</td>
<td>70</td>
<td>89</td>
<td>106</td>
<td>123</td>
</tr>
<tr>
<td>Thread depth</td>
<td>o_{m}</td>
<td>12.5</td>
<td>15</td>
<td>18.5</td>
<td>23.5</td>
<td>28</td>
<td>35</td>
<td>42.5</td>
<td>50</td>
<td>57</td>
</tr>
<tr>
<td>Screw adjustment range</td>
<td>o_j</td>
<td>4.5</td>
<td>5</td>
<td>6.5</td>
<td>7.5</td>
<td>8</td>
<td>11</td>
<td>12.5</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Length locking nut</td>
<td>M</td>
<td>18</td>
<td>22</td>
<td>27</td>
<td>33</td>
<td>38</td>
<td>49</td>
<td>60</td>
<td>71</td>
<td>84</td>
</tr>
<tr>
<td>Tension rod assembly: Spanner width</td>
<td>t_s</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>14</td>
<td>18</td>
<td>21</td>
<td>27</td>
<td>32</td>
<td>36</td>
</tr>
<tr>
<td>Edge distance</td>
<td>r</td>
<td>j</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin hole diameter</td>
<td>j</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thickness of connection plate</td>
<td>b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

→ see table on page 17 for dimensions of connecting plates
Halfen Detan Rod systems
Tension Rod System Halfen Detan-D
European Technical Assessment ETA-23/0276

Connecting plates
The load transfer from the rod system into the connection plates is considered as verified if the dimensions in the table have been observed. Connection plates are not included in the scope of delivery.

Note: A only possible when simultaneously using the circular anchor disc at 45°, see page 21.

| Dimensions [mm]; material — minimum qualities: Stainless steel, strength grade S235 |
|-----------------------------------|---|---|---|---|---|---|---|---|
| System - Ø | dₙ | 8 | 10 | 12 | 16 | 20 | 24 | 30 | 36 | 42 |
| Thickness conn. plate b | | 8 | 10 | 12 | 15 | 20 | 20 | 30 | 30 | 35 |
| Hole diameter for pin Ø j | | 7.5 | 9.5 | 11.5 | 14.5 | 18.5 | 21.5 | 26.5 | 30.5 | 35.5 |
| Hole position r | | 12 | 15 | 18 | 23 | 29 | 35 | 43 | 54 | 63 |

Cross bracing
Option 1: Anchor disc standard K40 (smallest connecting angle α min = 40°) Example: Anchor disc with 4 tension rods (maximum 8 tension rod connections per disc)

Option 2: Cross coupler (connecting angle α = 40°-90°)

Anchor disc: Measurements [mm]; Material: Stainless steel, strength grade S460

<table>
<thead>
<tr>
<th>System - Ø</th>
<th>dₙ</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer hole diameter f</td>
<td></td>
<td>76</td>
<td>93</td>
<td>112</td>
<td>150</td>
<td>184</td>
<td>212</td>
<td>269</td>
<td>318</td>
<td>367</td>
</tr>
<tr>
<td>Outer anchor disc diameter g</td>
<td></td>
<td>100</td>
<td>123</td>
<td>148</td>
<td>196</td>
<td>242</td>
<td>282</td>
<td>355</td>
<td>425.5</td>
<td>493.5</td>
</tr>
</tbody>
</table>

Cross coupler: Measurements [mm]; Material: Stainless steel, strength grade S355/S235

<table>
<thead>
<tr>
<th>System Ø</th>
<th>dₙ</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupler length L KM</td>
<td></td>
<td>90</td>
<td>110</td>
<td>126</td>
<td>155</td>
<td>180</td>
<td>210</td>
<td>262</td>
<td>320</td>
<td>380</td>
</tr>
<tr>
<td>Coupler diameter dₙ KM</td>
<td></td>
<td>20</td>
<td>25</td>
<td>28</td>
<td>38</td>
<td>48</td>
<td>58</td>
<td>70</td>
<td>82</td>
<td>96</td>
</tr>
</tbody>
</table>

Couplers

Dimensions [mm]; Material, stainless steel, strength grade S355/S235

<table>
<thead>
<tr>
<th>System - Ø</th>
<th>dₙ</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupler length L KM</td>
<td></td>
<td>38</td>
<td>45</td>
<td>56</td>
<td>83</td>
<td>82</td>
<td>104</td>
<td>125</td>
<td>144.5</td>
<td>166.5</td>
</tr>
<tr>
<td>Coupler diameter dₙ KM</td>
<td></td>
<td>17</td>
<td>21</td>
<td>25</td>
<td>35</td>
<td>43</td>
<td>52</td>
<td>65</td>
<td>78</td>
<td>90</td>
</tr>
<tr>
<td>Thread depth oₙ</td>
<td></td>
<td>12.5</td>
<td>15</td>
<td>18.5</td>
<td>23.5</td>
<td>28</td>
<td>35</td>
<td>42.5</td>
<td>50</td>
<td>57</td>
</tr>
<tr>
<td>Suspension system diam. dₙ sa</td>
<td></td>
<td>-</td>
<td>-</td>
<td>33</td>
<td>37</td>
<td>49</td>
<td>59.1</td>
<td>74.5</td>
<td>93.1</td>
<td></td>
</tr>
<tr>
<td>Offset, suspension hole kₚ</td>
<td></td>
<td>-</td>
<td>-</td>
<td>28</td>
<td>33</td>
<td>37</td>
<td>49</td>
<td>59.1</td>
<td>74.5</td>
<td>93.1</td>
</tr>
</tbody>
</table>

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**Halfen Detan Rod systems**

**Couplers and Compression Rods**

### Cross couplers

The Halfen Detan Cross coupler is an alternative to the anchor disc cross coupler. The new cross coupler can be used for minimum crossing angles. The cross coupler can be used instead of the anchor disc and 4 fork heads. In both cases the same load capacity is guaranteed.

Cross coupler with a minimal cross angle of 40°

The cross couplers are elegant solutions and allow contactless crossing of tension rods in the same plane. Other advantages are the moderate costs compared to an anchor disc solution and the easy installation.

Cross-bracing with a cross coupler

### Compression rods

The Halfen Detan Rod system is an intelligent system combining tension and compression rods. To complement the Halfen Detan Rod system we also supply compression rods that integrate perfect both visually and technically into the system. To blend in and to match the tension rods the compression rods taper towards the rod-ends. This allows use of the same design of fork and locking-nuts to give a uniform design. The concept is especially convincing as the forks are suitable for compression as well as for tension loads. This combination of tension and compression rods is therefore technically very beneficial.

In addition to standard pipe profiles we also provide other pipe cross-sections and special solutions.

The compression rod systems are pre-assembled with our standard forks and locking-nuts.

Bracing between an exterior steel column and an interior steel beam

Compression system connected to a welded plate
Compression rod

To complement the tension rod system, we also offer compression rods, which can be incorporated technically and aesthetically perfect into a system. Compression rods consist of larger diameter tubes, which are tapered at each end allowing standard Halfen Detan Fork heads to be used.

<table>
<thead>
<tr>
<th>Rod cross-sections — examples / recommended configurations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System - Ø Dₚ [mm]</strong></td>
</tr>
<tr>
<td><strong>Wall thickness [mm]</strong></td>
</tr>
</tbody>
</table>

Other rod dimensions are also available. Please contact us for further information.

Ordering example: Compression rod system, Halfen Detan-S, Dₚ = 42 mm, L = 2000 mm, fork connector dₛ = 16 mm

Ordering example (stainless steel): Compression rod system, Halfen Detan-D, Dₚ = 60 mm, L = 3200 mm, fork connector dₛ = 24 mm

Static calculation of compression rods is required for individual projects. A free Halfen Detan Calculation program is available. Contact us if you require assistance. An enquiry with drawings, system dimensions and static verification is also possible.

All fork and connecting plate system dimensions; see page 14–15 (steel) → page 16-17 (stainless steel)

Compression rod in steel

<table>
<thead>
<tr>
<th>System - Ø Dₚ [mm]</th>
<th>Compression rod</th>
<th>Fork</th>
<th>Locking nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>42-139/according to statics calculations</td>
<td>according to statics calculations</td>
<td>see fork</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>S355J2</td>
<td>G20 Mn5+QT</td>
<td>S235JR</td>
</tr>
<tr>
<td>Finish</td>
<td>FV</td>
<td>hot-dip galvanized</td>
<td>hot-dip galvanized</td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>mill finish</td>
<td>hot-dip galvanized</td>
</tr>
</tbody>
</table>

Compression rod in stainless steel

<table>
<thead>
<tr>
<th>System - Ø Dₚ [mm]</th>
<th>Compression rod</th>
<th>Fork</th>
<th>Locking nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>42-139/according to statics calculations</td>
<td>according to statics calculations</td>
<td>see fork</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>S235</td>
<td>S460</td>
<td>S235</td>
</tr>
<tr>
<td>Finish</td>
<td>stainless steel①</td>
<td>stainless steel①</td>
<td>stainless steel①</td>
</tr>
</tbody>
</table>

① Stainless steel corresponds to corrosion protection class III as in DIN EN 1993-1-4

Note: The design engineer is responsible for verifying the corrosion resistance is suitable for the various ambient conditions for each individual case when using Halfen Detan-D.

System assembly

Length adjustment at the forks.

The cone (with thread) is inserted in the rod and secured with a continuous weld.

Available as a custom piece with at least one fork.

The cone cannot be ordered as a single component, delivery only as a complete pressure rod.

For sales and technical enquiries please contact: info.au@leviat.com
Halfen Detan-D surface finishes

Surface finish is usually an important factor in applications using stainless steel. Stainless steel rods are bright drawn as standard but can be satin or hand polished if required. The photographs provide a good indication of the available finishes; actual finishes may differ slightly. Couplers and anchor discs are supplied with a smooth machined finish as standard, and can be satin-polished or hand polished when required.

<table>
<thead>
<tr>
<th>Material</th>
<th>Bar</th>
<th>Fork, nut</th>
<th>Coupler</th>
<th>Cross Coupler</th>
<th>Disc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electro-polished (EP)</td>
<td>Bright drawn</td>
<td>Electro-polished</td>
<td>Machined</td>
<td>Electro-polished</td>
<td>Machined</td>
</tr>
<tr>
<td>Satin-polished (SP)</td>
<td>Bright drawn</td>
<td>Satin-polished</td>
<td>Satin-polished</td>
<td>Satin-polished</td>
<td>Satin-polished</td>
</tr>
<tr>
<td>Hand polished (HP)</td>
<td>Hand polished</td>
<td>Hand polished</td>
<td>Hand polished</td>
<td>Hand polished</td>
<td>Hand polished</td>
</tr>
</tbody>
</table>

Duplex–coatings

Custom colour design: Powder coating

Two criteria can be met with a protective powder coating: Free architectural design using colour with simultaneous improvement of the corrosion protection. The coatings can be applied by a certified coating specialist.

Duplex-coating (Hot-dip galvanized + paint coating or powder coating) according to EN ISO 12944-6.

Fire protection

There are reactive fire protection systems for steel elements with round profiles approved by the German Institute of Construction Engineering (DIBt, Deutsches Institut für Bautechnik) on the market. We can gladly put you in touch with the supplier of such systems.

Downloads and information about the fire protection system HENSOTHERM® 421 KS by Rudolf Hensel GmbH, are available on the website at www.rudolf-hensel.de/421KS.
Halfen Detan Rod systems
Connection plates and Installation

Examples — Connection plates and anchor discs

The connecting elements shown here are only examples of our custom solutions illustrating possible shapes of connecting plates. These steel plates are not standard products. Drawings are always required for enquiries and estimates.

Installation and safety notes

Forks must be correctly aligned and positioned in the same plane (Figure 1 and 2a) to ensure that the tension system is not subjected to bending. To ensure the rod can be installed, one fork end of the rod must be able to swing into place; this may not always be possible (see figure 3b). An anchor disk must be used in this case, to allow correct installation (see figure 3a).

Prior to installation all Halfen Detan Rod system components must be checked for damage. Damaged components must not be used.

More information can be found in the installation instruction INST_DT www.halfen.com/products/tension rod systems/detan rod system/product information

For an installation video go to, www.halfen.com/service/videos/tension rod systems

For sales and technical enquiries please contact: info.au@leviat.com

Leviat
Halfen Detan Rod systems
Corrosion protection

Corrosion protection Halfen Detan-S

The Halfen Detan Rod systems offer high protection against corrosion, especially for vulnerable parts of the system, e.g. the threads. The forks and locking-nuts are hot-dip galvanized to ensure durable top-quality protection against corrosion as well as to ensure good mechanical resistance.

Reliable and durable
- tension rods are completely hot-dip galvanized after production
- no danger of hydrogen embrittlement
- no flaking zinc
- large spanner flats ensure that rod can be properly tightened
- forks and locking-nuts are hot-dip galvanized
- threads are corrosion protected
- threads are additionally protected against humidity and contamination

Sealing systems for system-component (for tension and compressure rods) = effective protection against humidity and contamination

All forks are delivered with a threaded cap inserted to protect the thread as standard. The caps are colour-coded to help identify the thread direction:
Yellow = right-hand thread,
Blue = left-hand thread.

A special sealing system is provided as standard for additional protection for all rod diameters larger 16mm. We recommend sealing the outer joint of the locking-nuts on-site with a durable elastic silicone suitable for outdoor application. In general, all connecting couplers smaller than M16 should always be sealed using suitable silicone sealant.

Corrosion protection Halfen Detan-D

Each stainless steel fork is supplied with two clear, self-adhesive, PET (polyester) washers to isolate the system from a connecting plate of a dissimilar metal. Stainless steel pins are supplied with a PTFE coating around the barrel, as illustrated, to isolate the system from a connecting plate of a dissimilar metal.
Halfen Detan Rod systems
On-site logistics/Pre-assembly/Design Software

Optimal on-site logistics

Avoid mix-ups on-site with system specific rod marking
- all rods are clearly marked with contract and customer specific data (order and rod position number, rod length, system size)
- standard for systems diameter 16 – 60mm (Halfen Detan-D)

Easy and customer-friendly labels with specific information
- includes product-specific information, e.g. system length, system diameter
- exact identification and sorting with item position numbers
- optimized and efficient on-site logistics
- customer specified information possible: Project-data, e.g. floor numbers or node position

Certified quality

Pre-assembled delivery
The rod systems up to and including 60mm diameter will be delivered pre-assembled. (76mm diameter rods and larger are delivered in separate components). Larger system elements will be separated at the couplers as required to enable delivery.

Economic and time saving
- no further on-site assembly required
- no danger of mix-ups
- pre-assembled to system length L + \Omega \rightarrow see pages 14 and 16
- free movement of threads ensured
- easy online forms available for tender request, or use the order forms attached \rightarrow see pages 28–32

Halfen Detan Design software

The Halfen Detan design software
Structural calculation and planning tool in one programme.
- structural calculation: tension rod system design according to ETA Assessment, compression rod system design according to EC3 and ETA Assessment
- various material options and finishes
- dimension results are used to generate item lists with individual positions listed in a print-out


For sales and technical enquiries please contact: info.au@leviat.com
Halfen Detan Rod systems
European Technical Assessment

ETA-European Technical Assessment – a secure basis for structural design

Assessment for Halfen Detan-S
- tension rod system Halfen Detan-S with European Technical Assessment ETA-05/0207
- up to 15% higher load capacities with the additional S470 and S520 strength classes which are included in the new ETA; compared with strength class S460
- CE marking recognized in all European Union countries
- design of allowable loads considering country-specific coefficients $\gamma_M$ and $\gamma_D$ (NA) using the Halfen Detan software
- EU wide standardised design concept
- no national approvals or certificates required
- cross couplers are a cost effective alternative to anchor discs for cross bracings

Design of compression rods
- compression rods are regulated in the ETA
- dimensioning of Halfen Detan-S compression rods from tube material, strength class S355 according to Eurocode 3 (EN1993-1-1)

Assessment for Halfen Detan-D
- tension rod system Halfen Detan-D in stainless steel with European Technical Assessment ETA-23/0276
- 25% higher loads compared to strength class S355 due to the higher tensile strength of the tension rods
- permanent quality and production monitoring by a supervisory institution
- CE marking recognized in all European Union countries
- design of allowable loads considering country-specific coefficients $\gamma_M$ and $\gamma_D$ (NA) using the Halfen Detan software
- EU wide, standardised design concept
- no national approvals or certificates required
- cross couplers are a cost effective alternative to anchor discs for cross bracings

Design of compression rods
- compression rods are regulated in the ETA
- dimensioning of Halfen Detan-D compression rods in stainless steel strength class 235, according to Eurocode 3 (EN1993-1-4)
Halfen Detan Rod systems
Halfen Detan Pretension Unit

Halfen Detan Pretension unit — Advantages and basics

The exact application of pretension for system diameters 30 and larger can be difficult, therefore additional tools such as hydraulic jacks become necessary. The Pretension unit for use with Halfen Detan Rod systems from M30 to M60 provides an effective solution with load transfer using a threaded-plate preventing damages to the rod surface.

Additional advantages
- the system is optimised for Halfen Detan Rods
- extra lightweight aluminium design for simple assembly
- targeted hydraulic application for tension up to 425 kN
- no power-source needed
- the high-quality galvanized surface is protected by special load transfer plates
- simple control of load application with a calibrated manometer
- additional control using optional extensometer, even after load application (if previously gauge-marked)
- functional, simple & robust

Applying pretension

If pretensioning a system is intended then special couplers, special thread lengths and locking-nuts are required. These cannot be retrofitted and must therefore be taken into consideration at the planning stage.

Our technical support team is available to assist in any enquiries. Contact information can be found at the back of this catalogue.

To apply pretension, special pretension units are available from our technical support team. The necessary rod force is converted into the required hydraulic pressure and then applied using the Halfen Detan Pretension unit.

Pretension check

If the rod was previously gauge-marked, the pretension force can be controlled using an extensometer.

This system can be used during, as well as after load application. This allows load control using hydraulic pressure as well as monitoring direct rod strain.

Similar to the Halfen Detan Pretension unit this device is easy to use, is robust and also requires no power-source.
Assembly of the pretension unit

Easy to attach and to operate

To avoid possible damage to the rod surface load transfer is via threaded plates. The hydraulic-system is attached in front and behind the coupler. The hydraulic jacks temporarily relieve the strain on the coupler, allowing the coupler to be easily turned by hand. When reaching the desired pressure, the hydraulic unit is released and removed. After release the coupler takes the load.

To ensure that the maximum recommended load has been reached the required hydraulic pressure is needed. Please refer to the table below.

Alternatively the load can be checked using an extensometer.

A detailed assembly instruction is available on the internet: www.halfen.com/Service/Brochures/Installation instructions/Detan

System variations

with pretension coupler:

Ordering example (material steel): Tension rod system, Halfen Detan-S, \(d_s = 30\, \text{mm}, L = 5600\, \text{mm} \), FV, 1 pretension coupler

### System load capacities, system lengths and available rod lengths

<table>
<thead>
<tr>
<th>System - (\varnothing) ds [mm]</th>
<th>30</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>52</th>
<th>56</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section A [(\text{mm}^2)]</td>
<td>707</td>
<td>1018</td>
<td>1385</td>
<td>1810</td>
<td>2124</td>
<td>2463</td>
<td>2827</td>
</tr>
<tr>
<td>Thread length o [(\text{mm})]</td>
<td>105</td>
<td>118</td>
<td>126</td>
<td>139</td>
<td>176</td>
<td>188</td>
<td>195</td>
</tr>
<tr>
<td>Available min. system length with coupler L [(\text{mm})]</td>
<td>1076</td>
<td>1244</td>
<td>1440</td>
<td>1652</td>
<td>1758</td>
<td>1866</td>
<td>2056</td>
</tr>
<tr>
<td>Load capacity (N_{RD}) [kN]</td>
<td>290.6</td>
<td>423.4</td>
<td>581.1</td>
<td>763.7</td>
<td>911.3</td>
<td>1052.4</td>
<td>1224.5</td>
</tr>
</tbody>
</table>

### Pretension table for Detan Rod system S (some values are rounded)

<table>
<thead>
<tr>
<th>Max. recommended pretension [kN]</th>
<th>(N_{\text{rec}})</th>
<th>116</th>
<th>169</th>
<th>232</th>
<th>305</th>
<th>365</th>
<th>421</th>
<th>425</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic pressure [bar] p</td>
<td>190</td>
<td>277</td>
<td>380</td>
<td>500</td>
<td>596</td>
<td>688</td>
<td>695</td>
<td></td>
</tr>
<tr>
<td>Strain [%] (\varepsilon)</td>
<td>0.78</td>
<td>0.79</td>
<td>0.80</td>
<td>0.80</td>
<td>0.82</td>
<td>0.81</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Stress ([\text{N/mm}^2]) (\sigma)</td>
<td>164</td>
<td>166</td>
<td>168</td>
<td>169</td>
<td>172</td>
<td>171</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Elongation ([\mu\text{m}/10,\text{cm}]) (\Delta\lambda)</td>
<td>78</td>
<td>79</td>
<td>80</td>
<td>80</td>
<td>82</td>
<td>81</td>
<td>72</td>
<td></td>
</tr>
</tbody>
</table>

\(\oplus\) Maximum recommended pretension without precise verification \(\% 40\%\) of \(N_{RD}\). \(\odot\) Maximum hydraulic pressure at approx. 700 bar

### Pretension coupler (all dimensions in [mm])

<table>
<thead>
<tr>
<th>System - (\varnothing) (d_s)</th>
<th>30</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>52</th>
<th>56</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupler length (L_M)</td>
<td>120</td>
<td>140</td>
<td>158</td>
<td>180</td>
<td>195</td>
<td>210</td>
<td>245</td>
</tr>
<tr>
<td>Coupler - (\varnothing) (d_M)</td>
<td>53</td>
<td>64</td>
<td>75</td>
<td>87</td>
<td>93</td>
<td>98</td>
<td>104</td>
</tr>
<tr>
<td>Locking nut length (M_v)</td>
<td>99</td>
<td>107</td>
<td>118</td>
<td>126</td>
<td>158</td>
<td>165</td>
<td>172</td>
</tr>
<tr>
<td>Coupler assembly (SW)</td>
<td>46</td>
<td>55</td>
<td>65</td>
<td>75</td>
<td>80</td>
<td>85</td>
<td>90</td>
</tr>
<tr>
<td>Tension rod assembly Spanner width (t_s)</td>
<td>27</td>
<td>32</td>
<td>36</td>
<td>41</td>
<td>46</td>
<td>50</td>
<td>55</td>
</tr>
</tbody>
</table>
Tender specification

Tension rod system Halfen Detan-S...

Tension rod system type Halfen Detan-S, consisting of 1 right-hand threaded fork, 1 left-hand threaded fork, plus 1 tension rod including 2 pins, 4 circlips and 2 DT-S nuts, with European Technical Assessment ETA 05/0207, pre-assembled and product-specific-labelled tension rod system, type Halfen Detan-S $d_s = 30$, $L$, $F$

with

- $d_s = \text{system-diameter [mm]} \ldots (10 / 12 / 16 / 20 / 24 / 27 / 30 / 36 / 42 / 48 / 52 / 56 / 60 / 76)$
- $L = \text{system-length [mm] (from bolt-axis/to bolt-axis)}$
- $F = \ldots \text{ (material FV /WB) for hot-dip galvanized or mill finished surface}$

completely hot-dip galvanized finish (alternative; mill finished tension rod), or equivalent; deliver and install according to the manufacturer’s installation instructions. Includes welding the connector plates according to the specifications provided by the planner.

Tension rod system Halfen Detan-D...

Tension rod system type Halfen Detan-D made of stainless steel, corrosion resistance class (CRC) III according to EN 1993-1-4: 2006, consisting of 1 right-hand threaded fork, 1 left-hand thread fork, plus 1 tension rod including 2 pins, 4 circlips and 2 DT-D nuts, with European Technical Assessment ETA-23/0276, pre-assembled and product-specific-labelled tension rod system, type Halfen Detan-D, $d_s$, $L$

with

- $d_s = \text{system-diameter [mm]} \ldots (8 / 10 / 12 / 16 / 20 / 24 / 27 / 30)$
- $L = \text{system-length [mm] (from bolt-axis/to bolt-axis)}$

or equivalent; deliver and install according to the manufacturer’s installation instructions. Includes welding the connector plates according to the specifications provided by the planner.

For sales and technical enquiries please contact: info.au@leviat.com
Halfen Detan Tension rod system

Basic system without couplers

Customer: ____________________________ Contact name: ____________________________
Customer address: ________________________________________________________________
Tel.: ____________________________ Fax: ____________________________ Email: ____________________________
Project: ____________________________ Project address: ____________________________
Date: ____________________________ Customer no.: ____________________________

Tension rod system Halfen Detan-S (steel):

System-∅ \( d_s \)

Tension rod system Halfen Detan-D (stainless):

System-∅ \( d_s \)

System length \( L \)

Choice of material:

- Halfen Detan-S (steel) – FV (hot-dip galvanized) ETA-05/0207; EN1993
- Halfen Detan-S (steel) – WB (mill finish) ETA-05/0207; EN1993
- Halfen Detan-D (stainless) ETA-23/0276

<table>
<thead>
<tr>
<th>Item.</th>
<th>Qty</th>
<th>( d_s ) [mm]</th>
<th>( Z_{Ed,\text{max}} ) ( \circledast ) [kN]</th>
<th>System length ( L ) [mm]</th>
<th>Material choice</th>
<th>Hot-dip galvanized</th>
<th>Stainless</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>3</td>
<td>30</td>
<td></td>
<td>5600</td>
<td>mill finish</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

\( \circledast \) maximum tension load required if diameter is unknown

Please contact us for an estimate. Send this completed PDF form sheet via email to your local Leviat contact, see page 35.
Halfen Detan Tension rod system

Basic system with couplers

Please contact us for an estimate. Send this completed PDF form sheet via email to your local Leviat contact, see page 35.
Halfen Detan Cross bracings

Double-symmetric fields (rectangular or square)

Customer: ___________________________ Contact name: ___________________________
Customer address: ___________________________ Tel.: ___________________________ Fax: ___________________________ Email: ___________________________
Project: ___________________________ Project address: ___________________________
Date: ___________________________ Customer no.: ___________________________ Enquiry ☐ Estimate ☐ Order ☐

Cross bracing

Choice of material:
- Halfen Detan-S (steel) – FV (hot-dip galvanized)
  ETA-05/0207; EN1993
- Halfen Detan-S (steel) – WB (mill finish)
  ETA-05/0207; EN1993
- Halfen Detan-D (stainless)
  ETA-23/0276

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>dₜ [mm]</th>
<th>Zₑₐₐₘₐₙ [kN]</th>
<th>B [mm]</th>
<th>H [mm]</th>
<th>Material choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mill finish</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>hot-dip galvanized</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>stainless</td>
</tr>
</tbody>
</table>

© maximum tension load required if diameter is unknown
© smallest installation angle α = 40°

Please contact us for an estimate. Send this completed PDF form sheet via email to your local Leviat contact, see page 35.
## Halfen Detan Cross bracings

Asymmetric fields (e.g. trapezoidal or diamond-shaped)

### Cross bracing

![Diagram of cross bracing with dimensions and labels]

### Choice of material:

- **Halfen Detan-S (steel)** – FV (hot-dip galvanized)  
  ETA-05/0207; EN1993
- **Halfen Detan-S (steel)** – WB (mill finish)  
  ETA-05/0207; EN1993
- **Halfen Detan-D (stainless)**  
  ETA-23/0276

### Table: System dimensions

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>( d_s ) [mm]</th>
<th>( Z_{Ed,\max} ) ( \circ ) [kN]</th>
<th>System length ( L_1 ) [mm]</th>
<th>System length ( L_2 ) [mm]</th>
<th>Length ( a ) [mm]</th>
<th>Length ( b ) [mm]</th>
<th>Length ( c ) [mm]</th>
<th>Length ( d ) [mm]</th>
<th>Opening angle ( \circ ) [°]</th>
<th>Material choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mill finish</td>
</tr>
<tr>
<td>Example 3</td>
<td>30</td>
<td>9800</td>
<td>4200</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>hot-dip galvanized</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>stainless</td>
</tr>
</tbody>
</table>

**Plausibility check:** \( L_1 = a + b \) and \( L_2 = c + d \)

\( \circ \): maximum tension load required if diameter is unknown

\( \circ \): smallest installation angle \( \alpha = 40^\circ \)

---

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Halfen Detan Compression rod system

Customer: ____________________________  Contact name: ____________________________
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Fax: ____________________________  Email: ____________________________
Project: ____________________________  Project address: ____________________________
Date: ____________________________  Customer no.: ____________________________
Enquiry □  Estimate □  Order □

Competition rod system Halfen Detan-S (steel):

Choice of material: Halfen Detan-S (steel) – FV (hot-dip galvanized) ETA-05/0207; EN1993
Halfen Detan-S (steel) – WB (mill finish) ETA-05/0207; EN1993
Halfen Detan-D (stainless) ETA-23/0278

| Item       | Qty | dₜ [mm] | Dₜ [mm] | t [mm] | Nₑₑₐₐₘₘₐₓ [kN] | Zₑₑₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐₐ$_{10}^{10}$ [kN] | System length L [mm] | Material choice
<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>Example</td>
<td>5</td>
<td>16</td>
<td>54</td>
<td>2.6</td>
<td>89</td>
<td>114</td>
<td>139</td>
<td>mill finish</td>
<td>hot-dip galvanized</td>
<td>stainless</td>
</tr>
<tr>
<td>System-Ø Dₜ</td>
<td>42</td>
<td>54</td>
<td>60</td>
<td>76</td>
<td>3.2</td>
<td>3.6</td>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

© for unknown geometry maximum compression stress is required
© for unknown geometry maximum tension stress is required (only if present)
© shorter delivery periods if standard lengths from table below will be selected (see © note):

<table>
<thead>
<tr>
<th>Standard cross sections [mm]; only for steel S355</th>
</tr>
</thead>
<tbody>
<tr>
<td>System-Ø Dₜ</td>
</tr>
<tr>
<td>Wall thickness</td>
</tr>
</tbody>
</table>

Note: Halfen Detan Compression rods are also available with other diameters as shown in the table.

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Halfen Detan Tension rod special design

Customer: _______________________________ Contact name: _______________________________
Customer address: __________________________ Fax: __________________________ Email: __________________________
Tel.: __________________________ Project: __________________________ Project address: __________________________
Date: __________________________ Customer no.: __________________________ Enquiry ☐ Estimate ☐ Order ☐

**Special design rod**

![Diagram of special design rod](image)

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>( d_\phi ) [mm]</th>
<th>System length L [mm]</th>
<th>Thread design incl. indication of thread-length [mm]</th>
<th>Fork connection single ended with thread direction</th>
<th>Material choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>( r/r )</td>
<td>( l/l )</td>
<td>( r/l )</td>
</tr>
<tr>
<td>Example</td>
<td>3</td>
<td>30</td>
<td>2500</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- \( r/r \) = right-hand/right-hand - thread; \( l/l \) = left-hand/left-hand - thread; \( r/l \) = right-hand/left-hand - thread
- Thread lengths up to 195 mm possible
- Not part of European Technical Assessment

Choice of material:
- **Halfen Detan-S (steel)** – FV (hot-dip galvanized) ETA-05/0207; EN1993
- **Halfen Detan-S (steel)** – WB (mill finish) ETA-05/0207; EN1993
- **Halfen Detan-D (stainless)** ETA-23/0276

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