Bucket Elevator Chains

CHANGE®
for Success
The THIELE quality philosophy

Our quality philosophy

- customer satisfaction
- our products are designed to the highest quality, environmental and safety standards
- continuous and sustainable process improvements
- QA system to ISO 9001 standard
- environmental management system to ISO 14001
- energy management system to ISO 50001
- our CIP (continuous improvement process) stands guarantee for the durability and high quality of our products

All information given is based on our current knowledge and expertise and is supplied without obligations or commitments. This also applies to the patent rights of third parties. There is in particular no implication of warranted characteristics in the legal sense. We expressly reserve the right to change our specifications in accordance with technical progress and company developments. This does not release the buyer from his obligation to inspect all incoming products. The quality of all our products is of course guaranteed in accordance with our general terms and conditions of sale.
THIELE company profile

The THIELE company
The THIELE company was founded more than 75 years ago and is now one of the world’s foremost chain manufacturers. THIELE’s product line includes round-link chains, bush conveyor chains, forged conveyor chains and a full range of fittings and accessories. THIELE’s know-how has been built up over many years of designing and producing complete chain systems and our highly skilled workforce and modern, high-performance production facilities stand guarantee for products of the finest quality.

Consulting and product development
THIELE specialises in chain systems for lifting and conveying. THIELE engineers provide an on-site consulting service and work alongside the client to analyse the technical requirements before planning and sizing up the moving chain assembly. Customised solutions are then worked out in detail in THIELE’s own design department.

Chain production
All our chains and components are manufactured in-house. Our production facilities include equipment for welding, laser-, plasma- and gas-cutting, solid forming, heat treatment and mechanical processing using the latest CNC lathes and multi-spindle milling machines.

Quality
High-integrity production methods are used to ensure that all products leaving the THIELE factory are of the finest quality, as confirmed by continuous monitoring in our laboratory and testing house. THIELE was one of the world’s first chain making companies to meet the DIN EN ISO 9001 quality management standard.

Design
THIELE can supply an extensive range of standard bucket elevator chains. Our in-house design department ensures that all interfaces are perfectly matched to meet the technical requirements. This also means that we can take a very flexible approach to individual customer needs.

Forging
Our own drop forging plant is the key to producing outstanding product characteristics and stands guarantee for real product quality with the ‘Made in Germany’ label.

Production
We are fully equipped with the latest CNC machines, laser and plasma cutting equipment and heat treatment plant - which means that all products leaving the THIELE factory are of the highest quality.
Bucket elevator chains

THIELE HLB

THIELE HLB-WG

THIELE HLB-W

THIELE round-link chains

The overview shows the wide range of modern, technically mature products designed to suit every type of application. Additions to the product range for all common chain dimensions can be found on page 10.
Selection factors

Overview of THIELE bucket elevator chains

<table>
<thead>
<tr>
<th>Bucket attachment</th>
<th>HLB (reversible)</th>
<th>HLB-W (reversible/forged)</th>
<th>HLB-WG (reversible/forged)</th>
<th>F_{br} [kN]</th>
<th>p [mm]</th>
<th>d [mm]</th>
</tr>
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<tbody>
<tr>
<td>rigid</td>
<td>45</td>
<td>45</td>
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<td>65</td>
<td>65</td>
<td>650</td>
<td>152.4</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>80 (B)</td>
<td>80 (B)</td>
<td>80 (B)</td>
<td>800</td>
<td>152.4</td>
<td>35</td>
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<tr>
<td>uncoupled</td>
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<td>80 (A)</td>
<td>80 (A)</td>
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<td>1200</td>
<td>177.8</td>
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</tr>
<tr>
<td></td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>1500</td>
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<td>45</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>1800</td>
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<td>50</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>200</td>
<td>177.8</td>
<td>55</td>
</tr>
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</table>

(A) = 177.8 mm pitch  
(B) = 152.4 mm pitch  
F_{br} = breaking strength  
p = pitch  
d = pin diameter

Subdivision of design types

A bucket plate is used as a rigid part of the design to create an outer link that is a press fit into the pin fixing.  
An additional bucket plate is used as a push-on fitting.

THIELE recommendation

1. Chain speed
   Gravity discharge: ≤ 1,1 m/s rigid  
   Centrifugal discharge: > 1,1 m/s uncoupled

2. Bucket width
   The chain on the chain wheel should be supported across at least 1/6 of the bucket width.

3. Chain wheels
   Design recommendation

<table>
<thead>
<tr>
<th>≤ 15 m: centre distance</th>
<th>&gt; 15 m: centre distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toothed drive wheel</td>
<td>Smooth drive wheel</td>
</tr>
<tr>
<td>Smooth return wheel</td>
<td>Smooth return wheel</td>
</tr>
<tr>
<td>Smooth drive wheel</td>
<td>Toothed return wheel</td>
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</table>
THIELE HLB high-performance bucket elevator chains are the result of years of specialist operating experience. State-of-the-art material developments and FEM analysis methods are used in the design of the various components.

<table>
<thead>
<tr>
<th>Chain</th>
<th>( F_{br} ) [kN]</th>
<th>p [mm]</th>
<th>LW [mm]</th>
<th>d [mm]</th>
<th>D [mm]</th>
<th>( t_1 ) [mm]</th>
<th>( t_2 ) [mm]</th>
<th>( h_1 ) [mm]</th>
<th>min. ( h_2 ) [mm]</th>
<th>Weight [kg/m]</th>
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</thead>
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<tr>
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<td>8</td>
<td>75</td>
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<td>10</td>
<td>12</td>
<td>100</td>
<td>65</td>
<td>50</td>
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<td>35</td>
<td>55</td>
<td>10</td>
<td>12</td>
<td>100</td>
<td>65</td>
<td>46</td>
</tr>
</tbody>
</table>

\( F_{br} \) = breaking strength  
\( p \) = pitch  
\( LW \) = clearance  
\( d \) = pin diameter  
\( D \) = bush outer diameter  
\( t_1 \) = thickness of inner link  
\( t_2 \) = thickness of outer link  
\( h_1 \) = height of inner link  
\( h_2 \) = bucket connector height
Using the reversible versions of THIELE’s high-performance HLB-W bucket elevator chain system helps extend the lifespan of the product.

The geometrically optimised design of the chain links makes for reduced wear at the bushes and chain wheels. The load-bearing, push-on bucket holders also help reduce the joint surface pressure and greatly facilitate the chain reversing process.

<table>
<thead>
<tr>
<th>Chain</th>
<th>F_{Br} [kN]</th>
<th>p [mm]</th>
<th>LW [mm]</th>
<th>d [mm]</th>
<th>D [mm]</th>
<th>t₁ [mm]</th>
<th>t₂ [mm]</th>
<th>t₃ [mm]</th>
<th>h₁ [mm]</th>
<th>min. h₂ [mm]</th>
<th>Weight [kg/m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLB-W 65</td>
<td>650</td>
<td>152.4</td>
<td>65</td>
<td>30</td>
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<td>10</td>
<td>10</td>
<td>8</td>
<td>85</td>
<td>60</td>
<td>45</td>
</tr>
<tr>
<td>HLB-W 80B</td>
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<td>100</td>
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<td>104</td>
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<td>130</td>
<td>90</td>
<td>121</td>
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</tbody>
</table>

F_{Br} = breaking strength    p = pitch    D = bush outer diameter
LW = clearance    d = pin diameter    t₁ = thickness of inner link
h₁ = height of inner link    t₂ = thickness of outer link
min. h₂ = bucket connector height    t₃ = thickness of bucket plate
THIELE HLB-WG bucket elevator chain

The THIELE HLB-WG high-performance bucket elevator chain builds on THIELE’s existing product range and ties in with the high demands and expectations of our customers. This has resulted in the development of a forged chain based on patented technology. THIELE’s own drop forging plant stands guarantee for constant product quality with the „Made in Germany“ label.

<table>
<thead>
<tr>
<th>Chain</th>
<th>$F_{Br}$ [kN]</th>
<th>$p$ [mm]</th>
<th>LW [mm]</th>
<th>$d$ [mm]</th>
<th>D [mm]</th>
<th>$t_1$ [mm]</th>
<th>$t_2$ [mm]</th>
<th>$t_3$ [mm]</th>
<th>$h_1$ [mm]</th>
<th>min. $h_2$ [mm]</th>
<th>Weight [kg/m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLB-WG 120</td>
<td>1200</td>
<td>177,8</td>
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<td>40</td>
<td>65</td>
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<td>80</td>
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<tr>
<td>HLB-WG 150</td>
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<td>85</td>
<td>45</td>
<td>70</td>
<td>15</td>
<td>15</td>
<td>12</td>
<td>120</td>
<td>85</td>
<td>100</td>
</tr>
<tr>
<td>HLB-WG 180</td>
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<td>12</td>
<td>130</td>
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<td>110</td>
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<td>HLB-WG 200</td>
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<td>18</td>
<td>15</td>
<td>135</td>
<td>100</td>
<td>120</td>
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</tbody>
</table>

$F_{Br}$ = breaking strength  
$p$ = pitch  
LW = clearance  
$d$ = pin diameter  
D = bush outer diameter  
$t_1$ = thickness of inner link  
$t_2$ = thickness of outer link  
$h_1$ = height of inner link  
min. $h_2$ = bucket connector height  
$t_3$ = thickness of bucket plate

Mating dimensions for buckets A1 to A4 see page 15
Benefits of forged bucket elevator chains

- Chain joint is protected by labyrinth seals
- Labyrinth seals are also used on the push-fit bucket plates
- Each labyrinth is filled with high-performance lubricant
- Overall support width is increased by load-bearing, forged inner and outer links
- Accurately machined contact faces with the chain wheel ensure a uniform contact/wear pattern
- The bucket plate sits within the profile of the inner link
- Link-joint surface pressure is reduced by increasing the contact ratio of the pin in the bucket link
- Push-on bucket plates makes the system reversible

**Breaking strength**
- Suitable for chain breaking forces of 1200 kN to 2000 kN
Market analysis has identified a number of bucket elevator chains whose construction and design are particularly sought after by customers. We have now adopted the most popular of these systems in our standard product range.

Our flexible approach to the production process means that the design dimensions can be tailored to customer requirements at any time.
Double-strand bucket elevator chain

Certain technical situations call for bucket elevator chains with a double-strand layout. Guided by the customer’s instructions and the technical requirements of the project we can build suitable systems using products from the THIELE range of bucket elevator chains.
THIELE E-PRO round-link chains for bucket elevators

High wear resistant round-link chains are used in conveyor systems and bucket elevators.

THIELE conveyor chains are produced from special steels of high basic strength. A special case hardening process is used to achieve a high level of wear resistance.

### Chain ends to DIN 764

<table>
<thead>
<tr>
<th>Chain (d \times t) ([\text{mm}])</th>
<th>(\text{min. } b_1) ([\text{mm}])</th>
<th>(\text{max. } b_2) ([\text{mm}])</th>
<th>Weight ([\text{kg/m}])</th>
<th>(\text{E-PRO 805 break strength}) ([\text{kN}])</th>
<th>(\text{E-PRO 805 quality grade})</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 (x) 56</td>
<td>22</td>
<td>58</td>
<td>5,2</td>
<td>140</td>
<td>400</td>
</tr>
<tr>
<td>18 (x) 63</td>
<td>24</td>
<td>65</td>
<td>6,5</td>
<td>178</td>
<td>240</td>
</tr>
<tr>
<td>20 (x) 70</td>
<td>27</td>
<td>72</td>
<td>8,2</td>
<td>220</td>
<td>2</td>
</tr>
<tr>
<td>23 (x) 80</td>
<td>31</td>
<td>83</td>
<td>11,0</td>
<td>290</td>
<td>750</td>
</tr>
<tr>
<td>26 (x) 91</td>
<td>35</td>
<td>94</td>
<td>14,0</td>
<td>371</td>
<td>0,10</td>
</tr>
<tr>
<td>30 (x) 105</td>
<td>39</td>
<td>108</td>
<td>19,0</td>
<td>494</td>
<td>0,06</td>
</tr>
<tr>
<td>36 (x) 126</td>
<td>47</td>
<td>130</td>
<td>26,5</td>
<td>712</td>
<td></td>
</tr>
</tbody>
</table>

\(d \times t\) = diameter x pitch  
\(b_1\) = internal chain width  
\(b_2\) = external chain width
Chain shackle connectors to DIN 5699

<table>
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<tr>
<th>t  [mm]</th>
<th>b₁ [mm]</th>
<th>d₁ [mm]</th>
<th>d₄ [mm]</th>
<th>e₁ [mm]</th>
<th>h₁ [mm]</th>
<th>h₃ [mm]</th>
<th>l₁ [mm]</th>
<th>s  [mm]</th>
<th>approx. weight [kg/unit]</th>
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<td>92</td>
<td>16</td>
<td>M14</td>
<td>56</td>
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<td>35</td>
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<td>0.55</td>
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<td>63</td>
<td>105</td>
<td>18</td>
<td>M16</td>
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<td>37</td>
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<td>80</td>
<td>45</td>
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<td>80</td>
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<td>M20</td>
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<td>91</td>
<td>149</td>
<td>26</td>
<td>M24</td>
<td>91</td>
<td>52</td>
<td>99</td>
<td>55</td>
<td>8</td>
<td>2.15</td>
</tr>
<tr>
<td>105</td>
<td>173</td>
<td>30</td>
<td>M24</td>
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<td>60</td>
<td>114</td>
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<td>126</td>
<td>206</td>
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<td>M30</td>
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<td>71</td>
<td>134</td>
<td>65</td>
<td>10</td>
<td>4.79</td>
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**Note:**
On toothed chain wheels the nominal size of the shackle corresponds to the nominal size of the chain. With smooth chain wheels the shackle connector can be one size larger than the corresponding chain.

Other accessory fittings can also be supplied.
Buckets

Our conveyor buckets are designed to suit the needs of our customers. As well as supplying a wide range of standard DIN buckets we are always willing to accept proposals for individual designs (such as different geometrical shapes). This ensures system optimisation.

Buckets

<table>
<thead>
<tr>
<th>b  [mm]</th>
<th>a  [mm]</th>
<th>h₁ [mm]</th>
<th>h₂ [mm]</th>
<th>r  [mm]</th>
<th>4 mm [kg]</th>
<th>5 mm [kg]</th>
<th>6 mm [kg]</th>
<th>volume [dm³]</th>
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<tr>
<td>160</td>
<td>160</td>
<td>200</td>
<td>106</td>
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<td>2,40</td>
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<td>250</td>
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<td>250</td>
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<td>63</td>
<td>5,82</td>
<td>7,27</td>
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<td>4,60</td>
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<tr>
<td>315</td>
<td>200</td>
<td>250</td>
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<td>63</td>
<td>6,82</td>
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<td>5,80</td>
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<td>11,80</td>
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<td>9,40</td>
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<td>500</td>
<td>250</td>
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<td>80</td>
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<td>16,10</td>
<td>19,40</td>
<td>14,90</td>
</tr>
<tr>
<td>630</td>
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<td>1000</td>
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<td>265</td>
<td>125</td>
<td>68,50</td>
<td></td>
<td></td>
<td>92,00</td>
</tr>
</tbody>
</table>

b = bucket width
a = outreach
h₁ = height of rear face
h₂ = height of scoop edge

Deep bucket with flat rear face to DIN 15234

Centre bar (S) can be designed from b = 800
Bucket - Attachments

We can design the bucket interface to match your system! Our flexible manufacturing process means that we can produce all bucket connection sizes from A1 to A4 to suit our customers’ needs. The table on the right shows typical values for some of the most common hole patterns.
Chain wheels, return wheels, shafts and axles

To obtain optimum life expectancy from a THIELE bucket-conveyor chain we strongly recommend fitting new chain wheels as part of the chain replacement process.

In many cases this merely involves replacing the worn wheel segments. The product line-up includes both smooth and toothed wheel profiles.

THIELE can also supply wheel assemblies complete with shafts and axles, if required.
Bucket elevators are used by a wide range of industries for the vertical conveying of all kinds of bulk materials.

Given the often highly abrasive nature of the conveyed product, which may be coarse or fine-grained in size and in some cases even hot in temperature, it is vital to have a conveyor system that has been specifically designed for the job in hand.

The THIELE range of high-performance bucket elevator chains are specially designed for applications of this kind. These assemblies can be used as single-strand/centre chain systems or as double-strand systems.

**Benefits**
- long chain operating life
- high chain tensile forces to 2000 kN
- sealed chain joint
- optimised joint surface pressure
- suitable for temperatures of up to 400 °C
- designed to match existing bucket conveyor systems
- extended maintenance intervals

**Applications**
- cement
- steel
- fertilisers
- biomass
- chemicals
- recycling
- building materials
- foodstuffs
- natural resources
- environment engineering
Client-specific solutions

THIELE can draw on years of experience in manufacturing and upgrading bucket-elevator chains for a wide range of applications. Constantly changing operating conditions call for high-tech solutions. THIELE can provide a complete service package: from project planning through to after-sales service.

- THIELE upgrade on an existing installation – optimum interaction between chain and chain wheel extends the operating life of the elevator.
- THIELE E-PRO 805 round-link chain makes for a significant improvement in system lifespan.
- THIELE upgrade on a bucket-conveyor chain – the use of higher-grade materials, heat-treated components and machine parts makes for extended maintenance intervals.

Product know-how and references

Through years of close collaboration with acknowledged plant engineers and operators of bucket elevator systems we have acquired extensive expertise in this field and have produced a range of new design developments. Our innovative strength is borne out by the many patents taken out in our name.

The continuous development and refinement of our existing products, the ongoing improvements made to current projects and the long list of references received from all over the world are evidence of THIELE’s high quality and performance standards.
Our services:
upgrades, repairs and inspections

As well as producing chains and components THIELE also offers a complete support service for system operators. This includes:

- wear measurements and inspections
- maintenance and repair work
- technical support during assembly
- complete installation and assembly
- plant commissioning
- technical consultation
- personnel training