



THIELE



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



Certified trading partner



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.



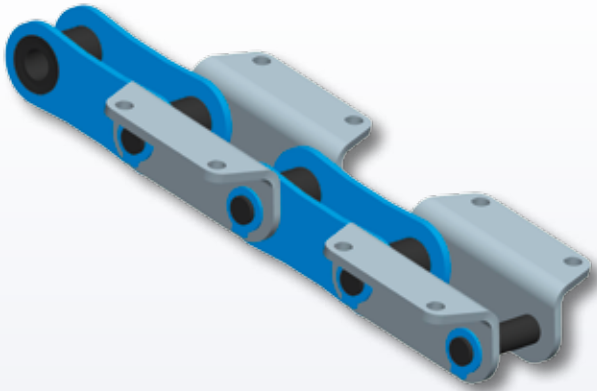
Production

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

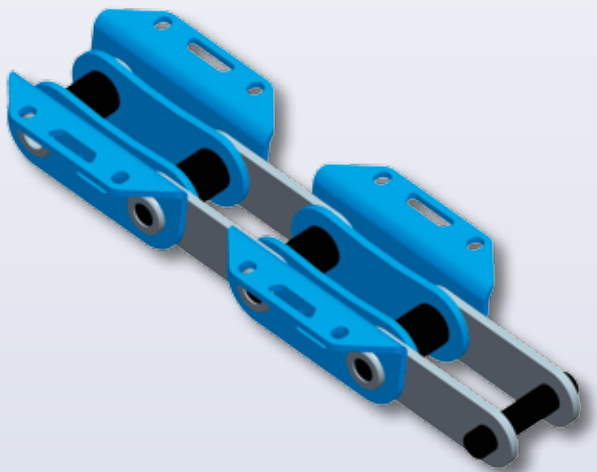
THIELE HLB



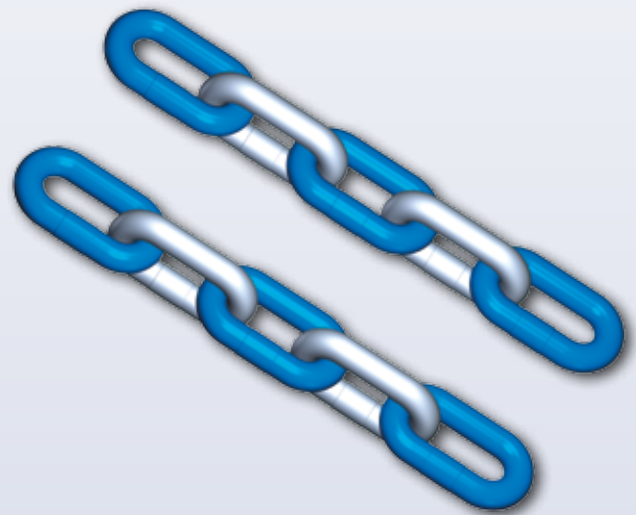
THIELE HLB-WG



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.

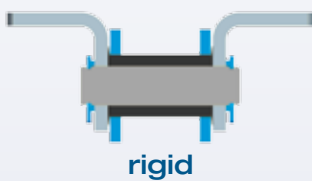
Selection factors

Overview of THIELE bucket elevator chains							
Bucket attachment	HLB	HLB-W (reversible)	HLB-WG (reversible/forged)	F _{Br} [kN]	p [mm]	d [mm]	
rigid	45			450	140,0	25	
	uncoupled	65	65		650	152,4	30
		80 (B)	80 (B)		800	152,4	35
		80 (A)	80 (A)		800	177,8	35
uncoupled		120	120	1200	177,8	40	
		150	150	1500	177,8	45	
		180	180	1800	177,8	50	
			200	2000	177,8	55	

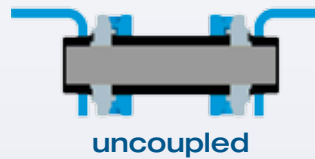
(A) = 177,8 mm pitch
(B) = 152,4 mm pitch

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

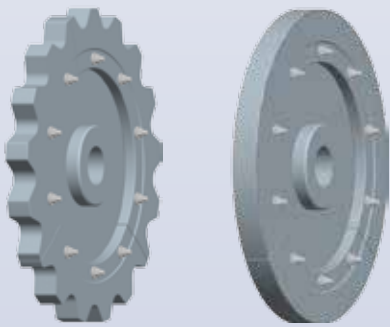
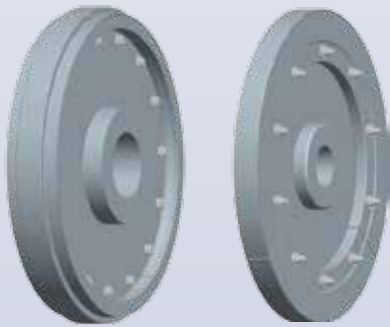
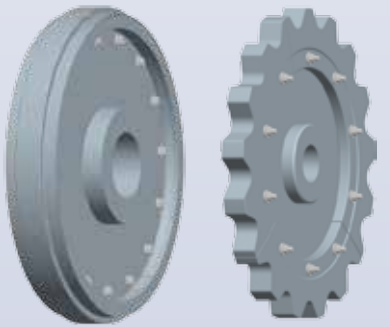
Gravity discharge: ≤ 1,1 m/s rigid
Centrifugal discharge: > 1,1 m/s uncoupled

2. Bucket width

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

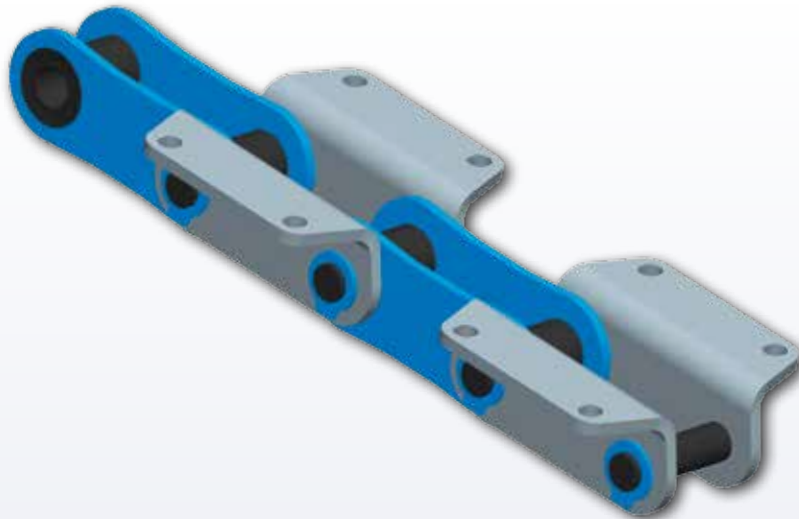
3. Chain wheels

Design recommendation

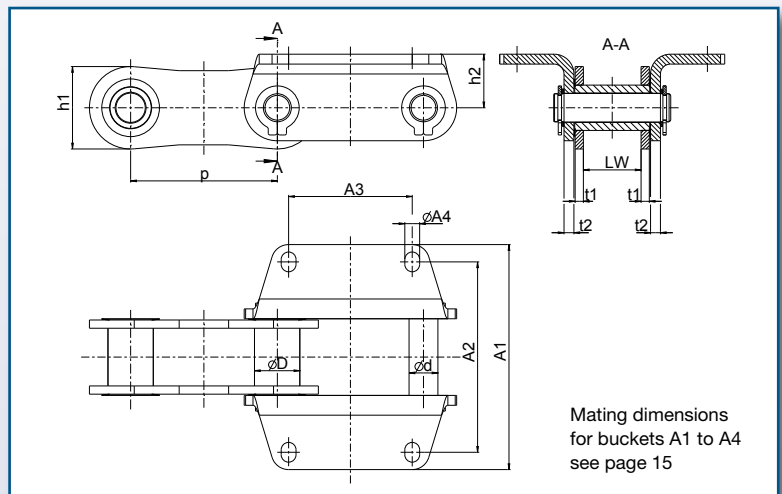
≤ 15 m: centre distance	> 15 m: centre distance	
Toothed drive wheel Smooth return wheel	Smooth drive wheel Smooth return wheel	Smooth drive wheel Toothed return wheel
		

THIELE HLB bucket elevator chain

THIELE HLB



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.



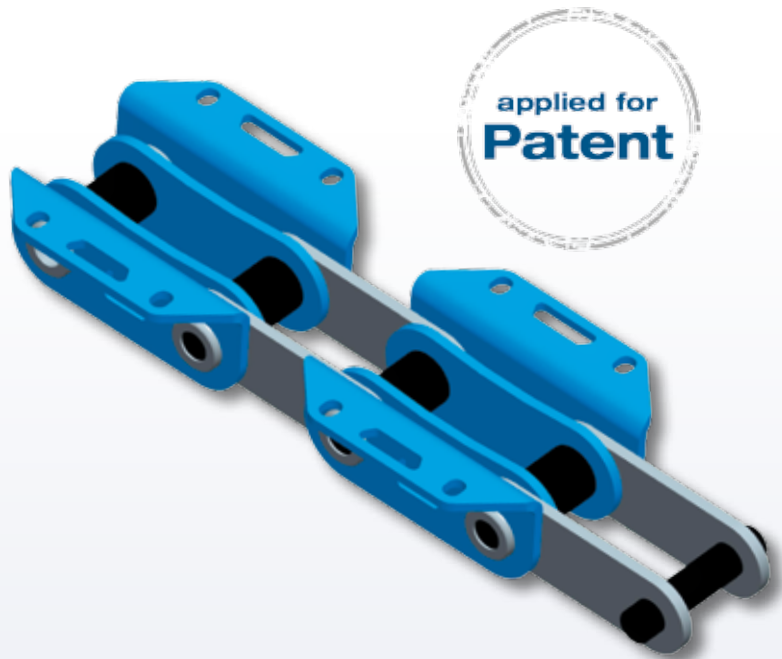
Chain	F_{Br} [kN]	p [mm]	LW [mm]	d [mm]	D [mm]	t_1 [mm]	t_2 [mm]	h_1 [mm]	min. h_2 [mm]	Weight [kg/m]
HLB 45	450	140,0	50	25	40	8	8	75	50	23
HLB 65	650	152,4	65	30	45	10	10	85	60	31
HLB 80B	800	152,4	70	35	55	10	12	100	65	50
HLB 80A	800	177,8	70	35	55	10	12	100	65	46

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

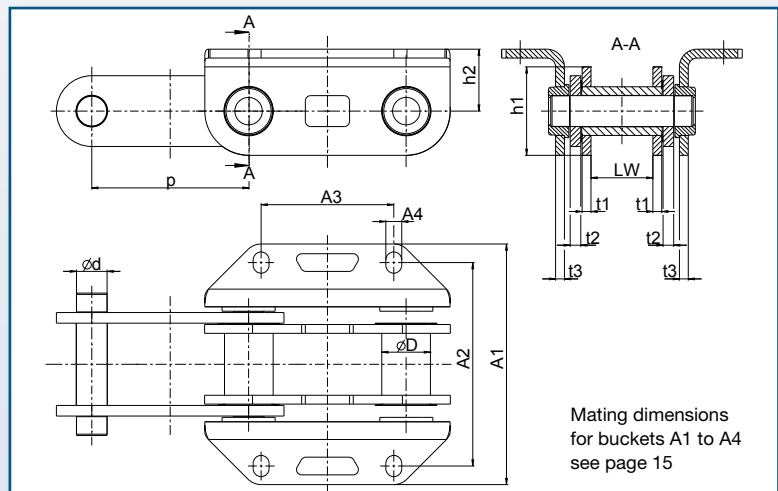
THIELE HLB-W bucket elevator chain

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.



THIELE HLB-W



Chain	F_{Br} [kN]	p [mm]	LW [mm]	d [mm]	D [mm]	t_1 [mm]	t_2 [mm]	t_3 [mm]	h_1 [mm]	min. h_2 [mm]	Weight [kg/m]
HLB-W 65	650	152,4	65	30	45	10	10	8	85	60	45
HLB-W 80B	800	152,4	70	35	55	10	12	10	100	70	62
HLB-W 80A	800	177,8	70	35	55	10	12	10	100	70	57
HLB-W 120	1200	177,8	70	40	65	14	16	10	115	80	80
HLB-W 150	1500	177,8	85	45	70	16	18	12	120	85	104
HLB-W 180	1800	177,8	95	50	75	18	20	12	130	90	121

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
 t_3 = thickness of bucket plate

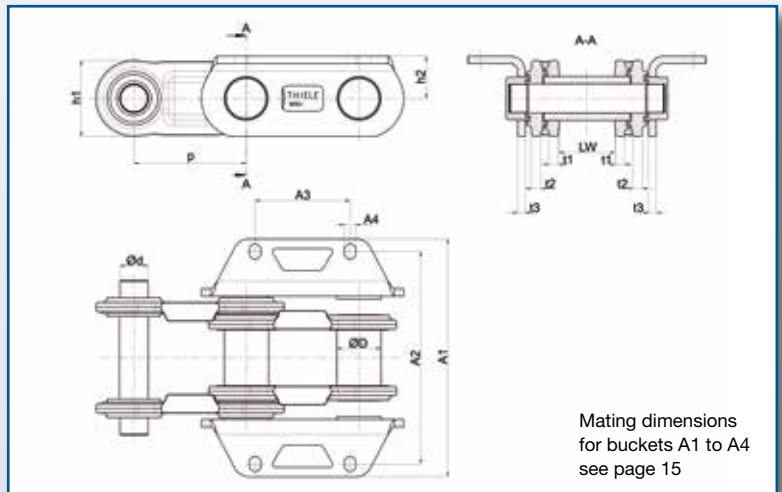
h_1 = height of inner link
min. h_2 = bucket connector height

THIELE HLB-WG bucket elevator chain

THIELE HLB-WG



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.



Chain	F_{Br} [kN]	p [mm]	LW [mm]	d [mm]	D [mm]	t_1 [mm]	t_2 [mm]	t_3 [mm]	h_1 [mm]	min. h_2 [mm]	Weight [kg/m]
HLB-WG 120	1200	177,8	70	40	65	12	12	10	115	80	80
HLB-WG 150	1500	177,8	85	45	70	15	15	12	120	85	100
HLB-WG 180	1800	177,8	95	50	75	17	17	12	130	90	110
HLB-WG 200	2000	177,8	105	55	80	18	18	15	135	100	120

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

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

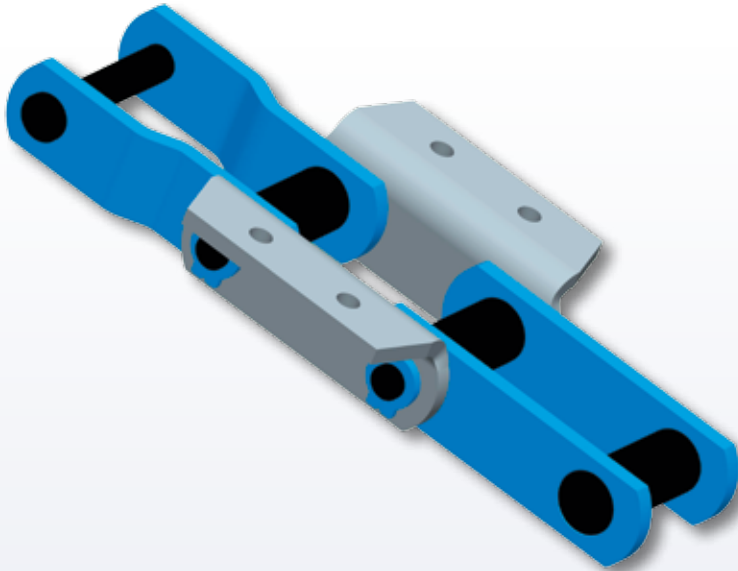
Breaking strength

- Suitable for chain breaking forces of 1200 kN to 2000 kN



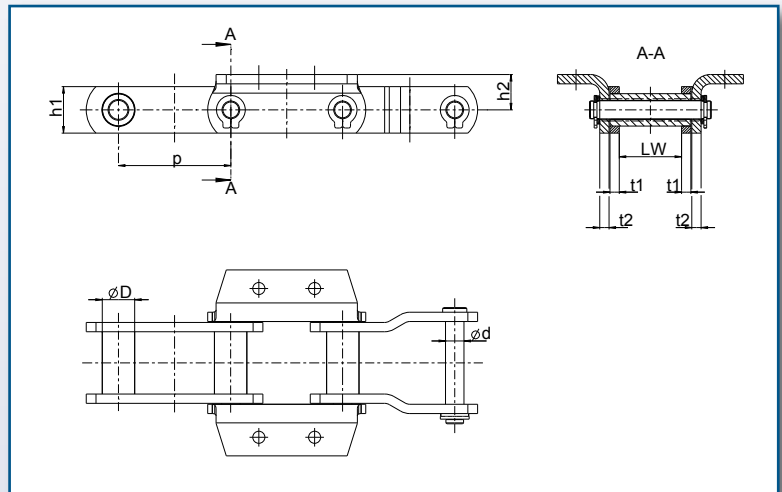
THIELE BR bucket elevator chain

Standard designs



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.



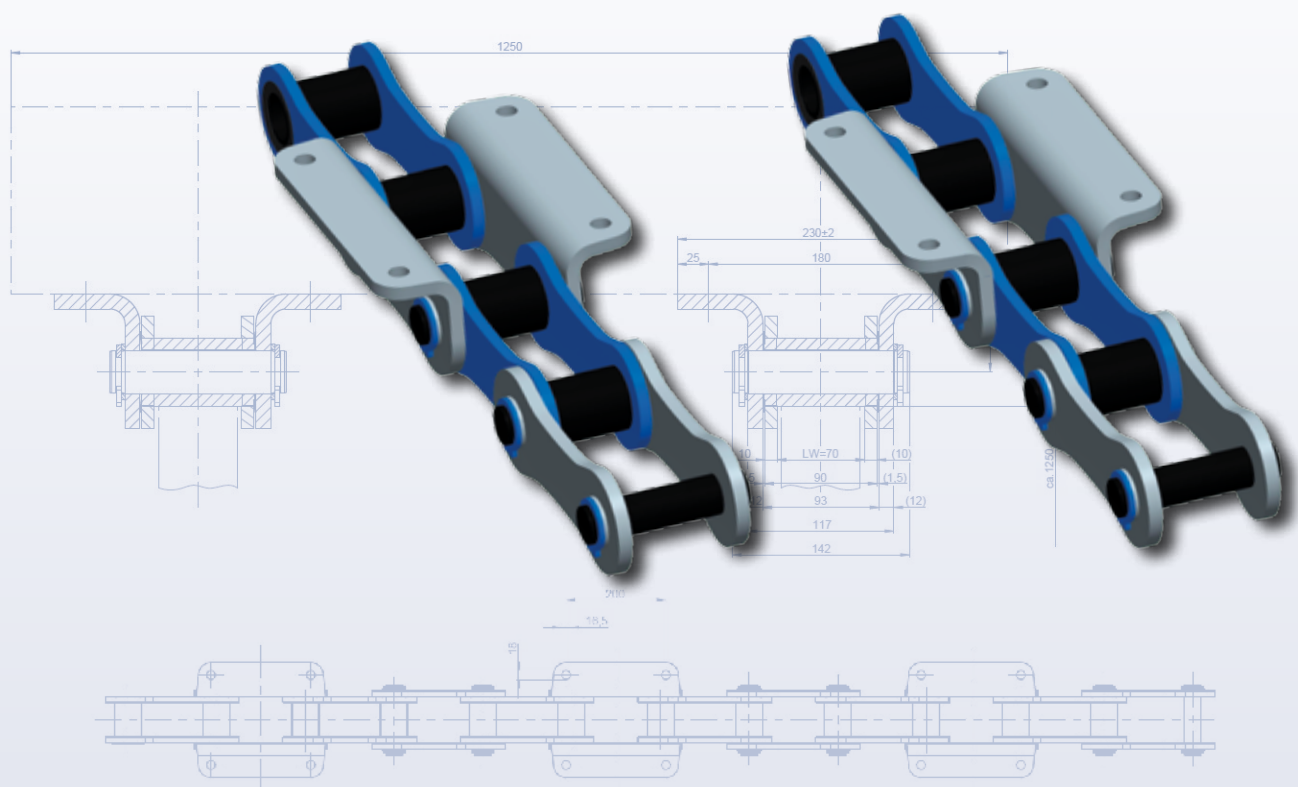
Chain	F_{Br} [kN]	p [mm]	LW [mm]	d [mm]	D [mm]	t_1 [mm]	t_2 [mm]	h_1 [mm]	min. h_2 [mm]	Weight [kg/m]
BR 1-02	160	101,6	54	15	25	10	10	38	28	10
BR 1-11	300	120,9	67	20	36	10	10	50	37,5	15
BR 8-57	540	152,4	76	26	44,5	12	12	82	63,5	32
BR 8-59	740	152,4	95	31	60,5	16	16	102	76	50
BR 8-64B	740	152,4	95	31	60,5	16	16	102	76	51
BR 8-64A	740	177,8	95	31	60,5	16	16	102	76	50
BR 9-84B	960	152,4	95	35	63,5	16	16	102	76	54
BR 9-84A	960	177,8	95	35	63,5	16	16	102	76	53

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

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.

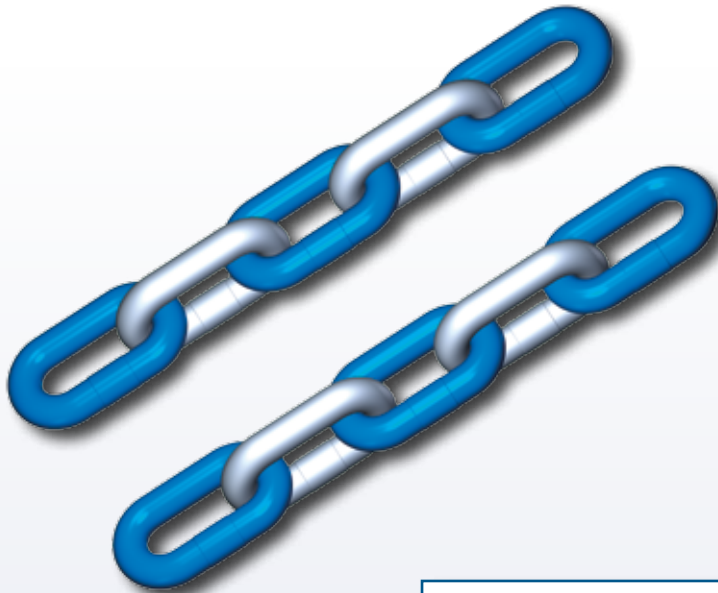


Double-strand



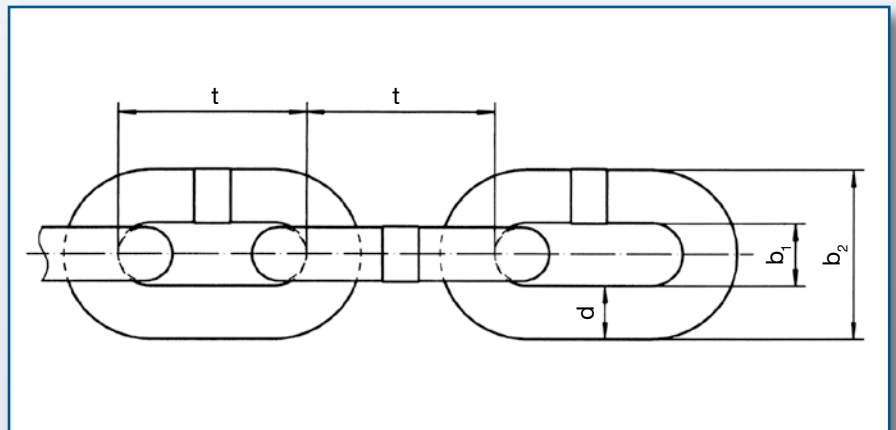
THIELE E-PRO round-link chains for bucket elevators

round-link chains



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

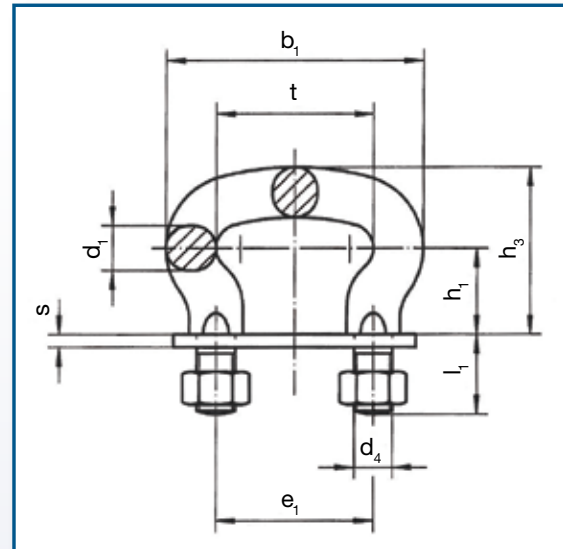


Chain ends to DIN 764

chain d x t [mm]	min. b_1 [mm]	max. b_2 [mm]	Weight [kg/m]	E-PRO 805 break. strength [kN]	E-PRO 805 quality grade	
16 x 56	22	58	5,2	140	Breaking stress [N/mm ²]	400
18 x 63	24	65	6,5	178	Test stress [N/mm ²]	240
20 x 70	27	72	8,2	220	Ultimate elongation approx. [%]	2
23 x 80	31	83	11,0	290	Surface hardness HV 10	750
26 x 91	35	94	14,0	371	Carburising depth HTÄ...d ± 0,01d	0,10
30 x 105	39	108	19,0	494	Case hardening depth EHT 550 ... d min.	0,06
36 x 126	47	130	26,5	712	Material	Cr-Ni-Mo

d x t = diameter x pitch
 b_1 = internal chain width
 b_2 = external chain width

Chain shackle connectors to DIN 5699

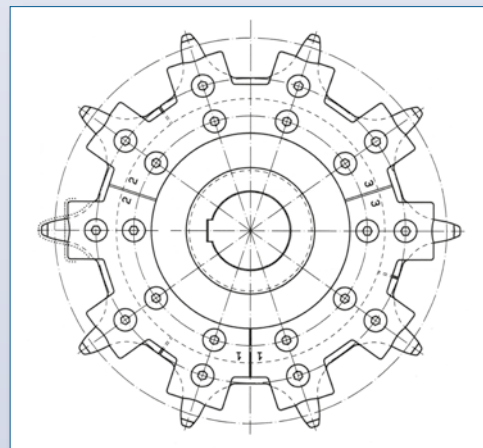


Chain shackle connectors to DIN 5699

t [mm]	b ₁ [mm]	d ₁ [mm]	d ₄ [mm]	e ₁ [mm]	h ₁ [mm]	h ₃ [mm]	l ₁ [mm]	s [mm]	approx. weight [kg/unit]
56	92	16	M14	56	34	64	35	6	0,55
63	105	18	M16	63	37	71	40	6	0,74
70	116	20	M20	70	42	80	45	6	1,09
80	132	23	M20	80	47	89	45	6	1,40
91	149	26	M24	91	52	99	55	8	2,15
105	173	30	M24	105	60	114	55	8	2,86
126	206	36	M30	126	71	134	65	10	4,79

Note:

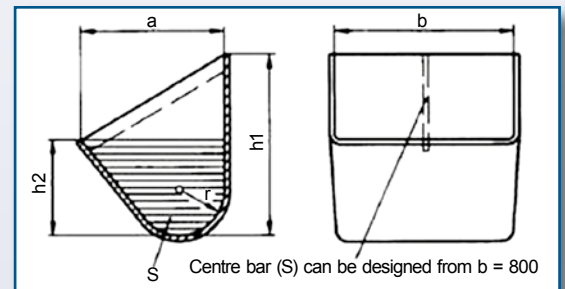
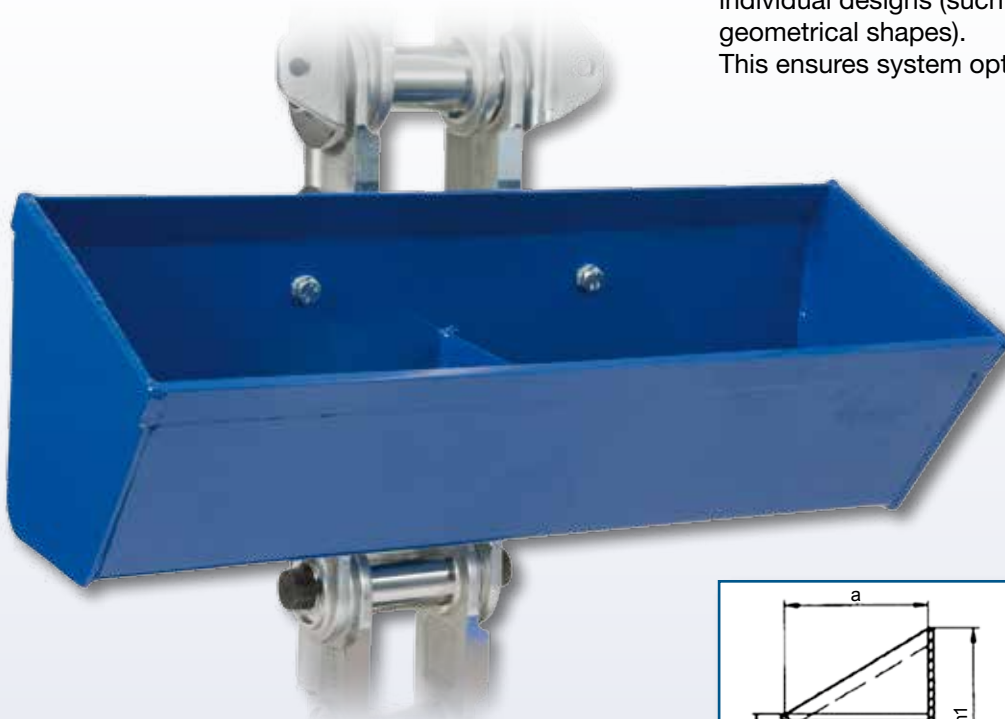
On toothed chain wheels the nominal size of the shackle corresponds to the nominal size of the chain. With smooth chain wheels the shackle connector can be one size larger than the corresponding chain.



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.

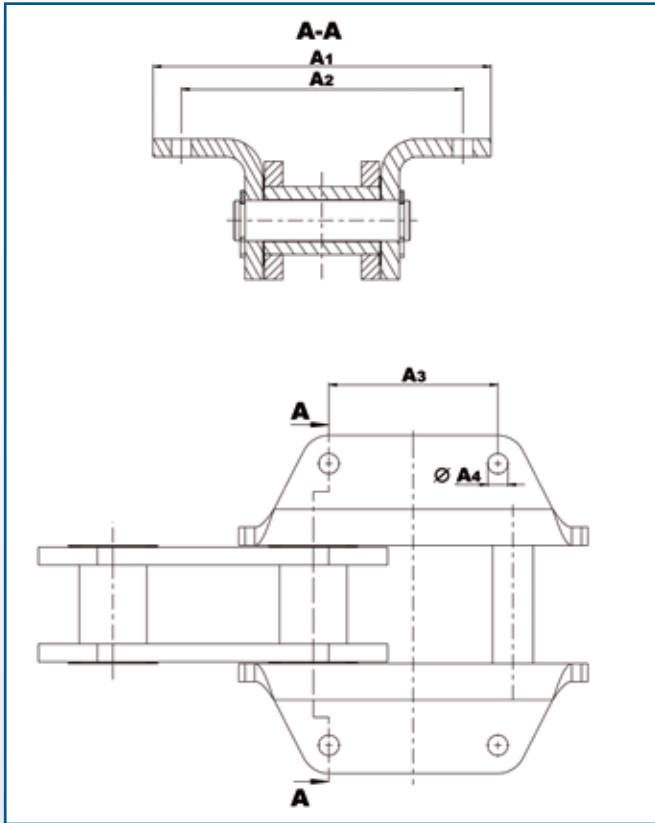


Deep bucket with flat rear face to DIN 15234

b [mm]	a [mm]	h ₁ [mm]	h ₂ [mm]	r [mm]	weight [kg] at wall thickness			volume [dm ³]
					4 mm	5 mm	6 mm	
160	160	200	106	50	3,18			1,90
200	160	200	106	50	3,76			2,40
250	200	250	132	63	5,82	7,27		4,60
315	200	250	132	63	6,82	8,59		5,80
400	224	280	150	71	9,40	11,80		9,40
500	250	315	170	80	12,80	16,10	19,40	14,90
630	280	355	190	90	17,60	22,10	26,60	23,50
800	315	400	212	100		30,60	36,90	37,30
1000	355	450	236	112		42,00	50,30	58,30
1250	400	500	265	125			68,50	92,00

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

Bucket - Attachments

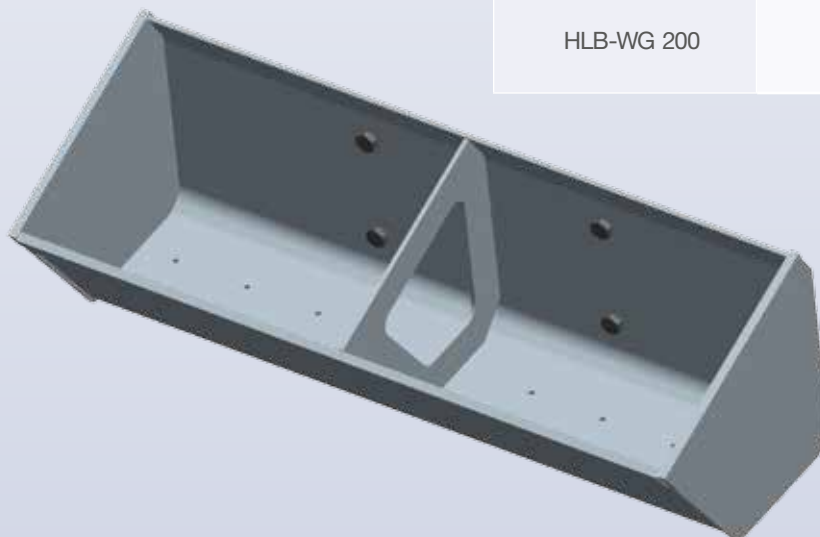


We can design the bucket interface to match your system! Our flexible manufacturing process means that we can produce all bucket connection sizes from A1 to A4 to suit our customers' needs. The table on the right shows typical values for some of the most common hole patterns.

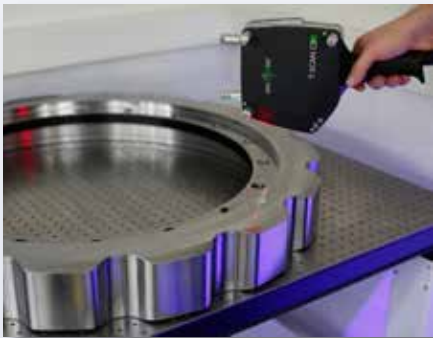
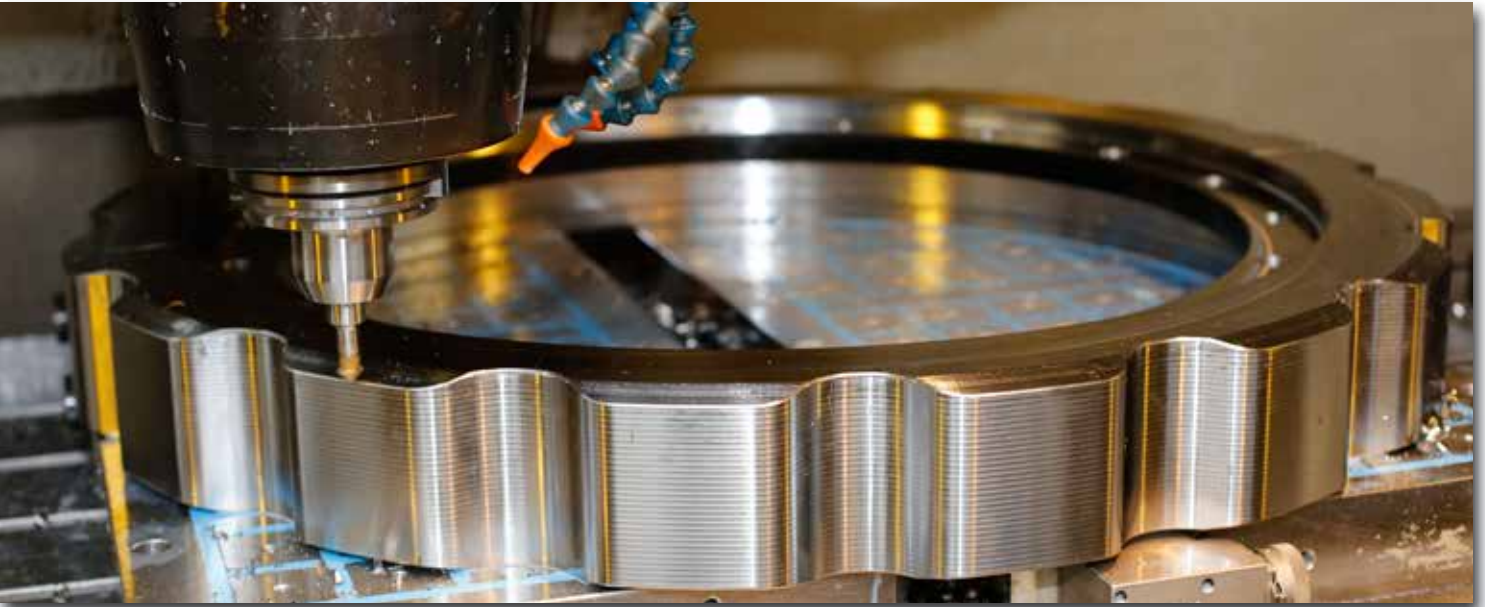
THIELE chain size	A1	A2	A3	A4
HLB 45 HLB-W 45		140	100	14
		158	58,7	12,7
HLB 65 HLB-W 65		184,6	63,5	17,5
		190	100	17,5
		200	130	18
HLB 80 HLB-W 80		250	150	18
		283	200	17
		330	139,7	17,5
		330	200	17
HLB 120 HLB-W 120 HLB-WG 120		184,4	63,5	16
		250	150	18
		330	200	17
HLB 150 HLB-W 150 HLB-WG 150		177,8	88,9	16
		300	150	18
		330	200	17
		330,2	166,6	16
HLB 180 HLB-W 180 HLB-WG 180		228,6	92,3	16
		300	150	18
		330,2	139,7	16
		350	200	17
		370	200	18
HLB-WG 200		360	200	17
		380	200	21

Depending on bucket contact surface

bucket connections



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.



Applications



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.



HLB bucket elevator chain



HLB-WG bucket elevator chain



HLB-W bucket elevator chain

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





THIELE



THIELE GmbH & Co. KG

Werkstr. 3
58640 Iserlohn - Kalthof
Germany

Phone +49 (0) 23 71 9 47 - 0
Fax +49 (0) 23 71 9 47 - 295
Internet www.thiele.de
e-mail bulkmaterial@thiele.de

CHANGE[®]
for Success

