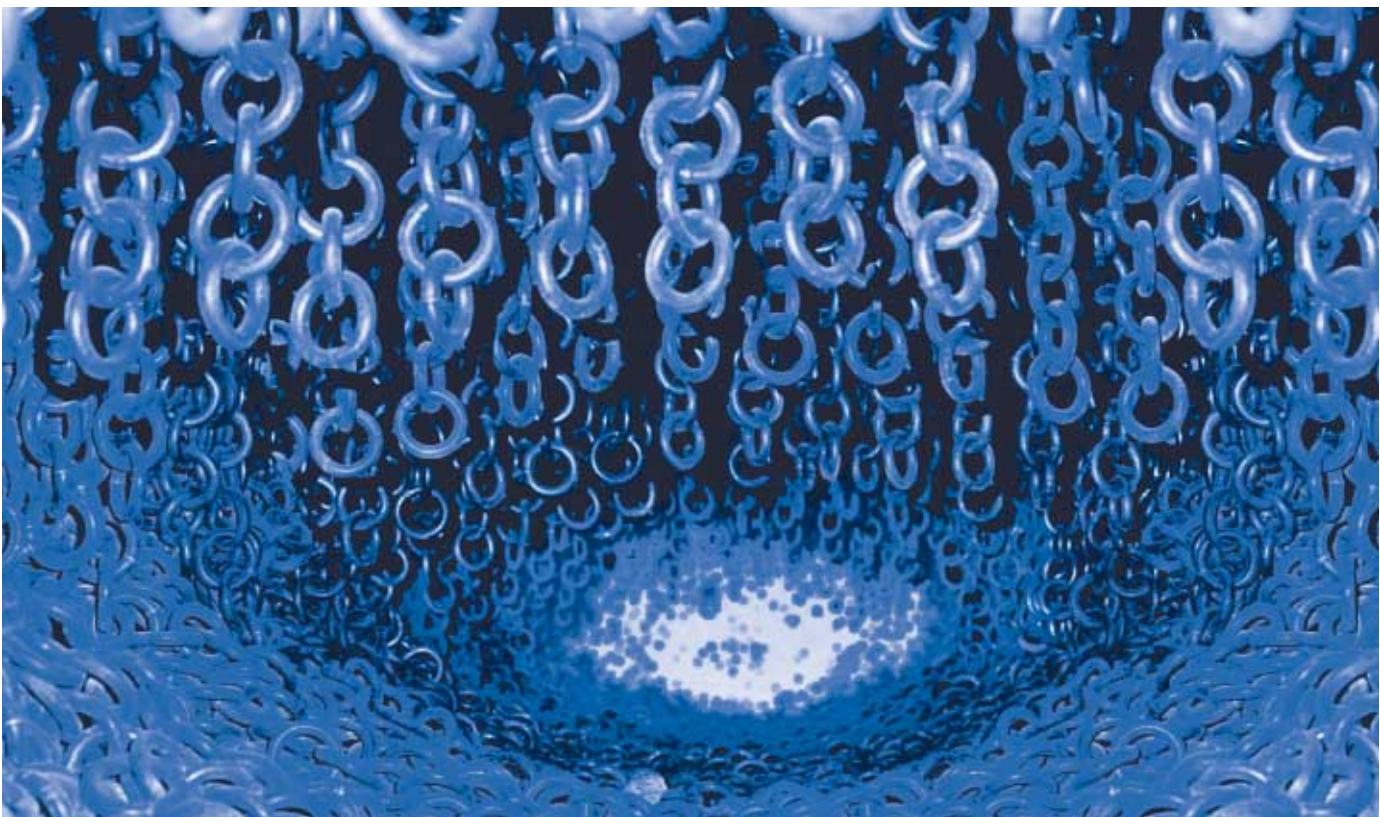


Kiln Chains



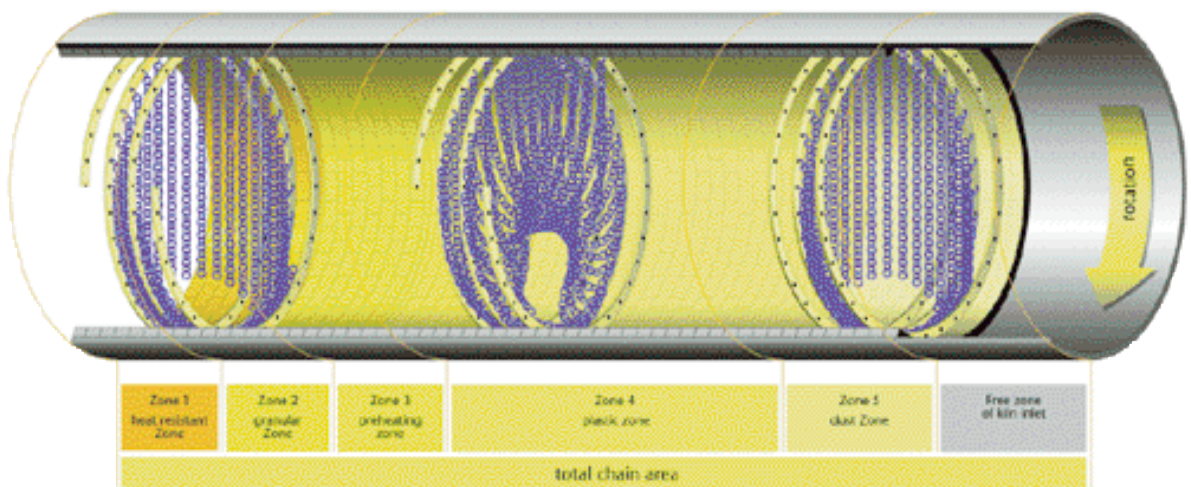
HEKO Ketten GmbH



Design of kiln chain systems



- Curtain chains
- Spiral curtain chains
- Z-curtain chains
- Garland chains
- Spiral garlands



Example of kiln chain system

Kiln chains in welded finish – for highest demands and cost effectiveness

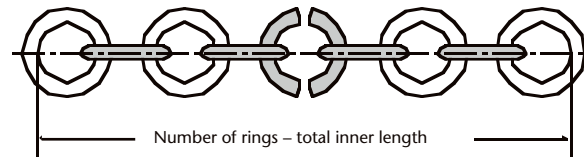
Kiln chains are mainly used in the cement, pulp and aluminium industry. A properly designed chain system aids:

- **Heat exchange**
- **Material transport**
- **Cleaning kiln shell**
- **Dust emission reduction**

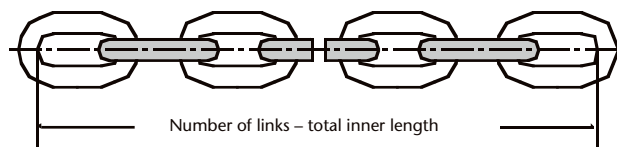
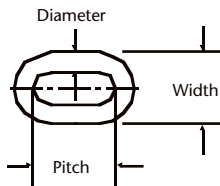
HEKO offer their expertise for the design of kiln chain systems to reduce energy costs and increase kiln outputs.

Optimum kiln performance can be achieved with a well designed kiln chain system. Please contact our specialists.

Ring chains



Diameter		Pitch		Weight/Ring		Weight		Surface area per unit length	
mm	inch	mm	inch	kg	lbs	kg per m	lbs per 100 ft	cm²/m	ft²/ft
16	$\frac{5}{8}$	70	$2\frac{3}{4}$	0,43	0,95	6,14	413	1940	0,637
18	$\frac{5}{8}$	100	4	0,74	1,63	7,40	497	2096	0,688
19	$\frac{3}{4}$	65	$2\frac{9}{16}$	0,65	1,43	10,00	672	2423	0,795
19	$\frac{3}{4}$	70	$2\frac{3}{4}$	0,63	1,39	9,00	605	2384	0,782
19	$\frac{3}{4}$	76	3	0,67	1,48	8,82	592	2344	0,769
20	$\frac{3}{4}$	65	$2\frac{9}{16}$	0,67	1,48	10,31	693	2581	0,847
20	$\frac{3}{4}$	70	$2\frac{3}{4}$	0,70	1,54	10,00	672	2538	0,833
20	$\frac{3}{4}$	76	3	0,75	1,65	9,90	665	2493	0,818
20	$\frac{3}{4}$	78	$3\frac{5}{4}$	0,77	0,70	9,87	663	2480	0,814
20	$\frac{3}{4}$	80	$3\frac{1}{8}$	0,78	1,72	9,75	655	2467	0,810
20	$\frac{3}{4}$	100	4	0,93	2,05	9,30	625	2369	0,777
22	$\frac{7}{8}$	76	3	0,93	2,05	12,24	822	2800	0,919
22	$\frac{7}{8}$	80	$3\frac{1}{8}$	0,97	2,14	12,13	815	2768	0,908
22	$\frac{7}{8}$	100	4	1,14	2,51	11,40	766	2649	0,869
23	$\frac{7}{8}$	76	3	1,02	2,25	13,42	902	2957	0,970
23	$\frac{7}{8}$	80	$3\frac{1}{8}$	1,07	2,36	13,38	899	2923	0,959
23	$\frac{7}{8}$	100	4	1,14	2,51	11,40	766	2792	0,916
25	1	76	3	1,23	2,71	16,18	1088	3279	1,076
25	1	80	$3\frac{1}{8}$	1,30	2,87	16,25	1092	3238	1,062
25	1	89	$3\frac{1}{2}$	1,40	3,09	15,73	1057	3160	1,037
25	1	100	4	1,52	3,35	15,20	1021	3084	1,012
28	$1\frac{1}{8}$	89	$3\frac{1}{2}$	1,82	4,01	20,45	1374	3633	1,192
28	$1\frac{1}{8}$	100	4	1,95	4,30	19,50	1310	3537	1,161
30	$1\frac{3}{16}$	100	4	2,28	5,03	22,80	1532	3849	1,263
32	$1\frac{1}{4}$	100	4	2,65	5,84	26,50	1781	4169	1,368



Oval chains

Diameter		Pitch		outside width		Weight/link		Weight		Surface area per unit length	
mm	inch	mm	inch	mm	inch	kg	lbs	kg per m	lbs per 100 ft	cm²/m	ft²/ft
16	$\frac{5}{8}$	56	$2\frac{13}{64}$	54	$2\frac{1}{8}$	0,292	0,644	5,20	350	1682	0,522
18	$\frac{5}{8}$	63	$2\frac{15}{32}$	60	$2\frac{3}{8}$	0,410	0,914	6,50	440	1884	0,618
20	$\frac{3}{4}$	70	$2\frac{3}{4}$	67	$2\frac{5}{8}$	0,573	1,263	8,20	549	2097	0,688
22	$\frac{7}{8}$	86	$3\frac{25}{64}$	74	$2\frac{59}{64}$	0,840	1,850	9,80	659	2213	0,726
23	$\frac{7}{8}$	80	$3\frac{1}{8}$	77	$3\frac{1}{32}$	0,864	1,905	10,80	728	2417	0,793
25	1	91	$3\frac{19}{32}$	89	$3\frac{1}{2}$	1,170	2,580	12,87	866	2633	0,864
26	1	91	$3\frac{19}{32}$	89	$3\frac{1}{2}$	1,273	2,806	14,00	941	2725	0,894
28	$1\frac{1}{8}$	98	$3\frac{7}{8}$	101	4	1,617	3,565	16,50	1109	3010	0,988
30	$1\frac{3}{16}$	105	$4\frac{5}{32}$	106	$4\frac{5}{32}$	1,995	4,400	19,00	1277	3202	1,051

Tolerances: +/- 6 %

Options: Hardening

End rings and end links in various sizes on request

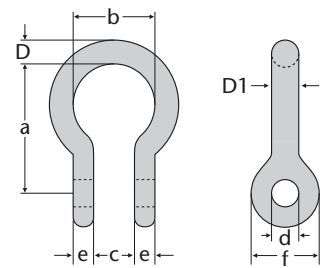
Kiln chain shackles



Shackle with bolt and nut



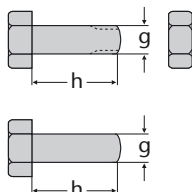
Shackle with weld plain pin with head



- forged and cast finish
- matching to chain material qualities

Shackles are available either in forged or cast finish in many different patterns.

Diameter													weight	drawing			
D		D1		a		b		c		d		e		f			
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	
19	3/4	19	3/4	95	3 3/4	50	2	34		22	7/8	14	9/16	45	1 3/4		1216
19	3/4	19	3/4	95	3 3/4	50	2	34	1 11/32	22	7/8	14	9/16	45	1 3/4		1782
22	7/8	22	7/8	100	4	55	2 5/32	36,5	1 7/16	26	1	16	5/8	52	2 1/16		9471120
22	7/8	22	7/8	95	3 3/4	50	2	34	1 11/32	24	7/8	14	9/16	45	1 3/4		977556
24	15/16	20	7/4	93	3 5/32	48	1 57/64	27	1 1/16	26	1 1/64	20	3/4	48	1 57/64		975676
24	15/16	20	7/4	95	3 5/64	46	1 19/16	27	1 1/16	26	1 1/64	20	3/4	48	1 57/64		3087116
25	1	25	1	100	4	58	2 5/16	38	1 1/2	29	1 5/32	18	23/32	59	2 15/16		950
25	1	25	1	100	4	58	2 5/16	38	1 1/2	26	1 5/32	18	23/32	59	2 15/16		950-M 24
25	1	25	1	100	4	58	2 5/16	38	1 1/2	24	1 5/32	18	23/32	59	2 15/16		950-M 22
25	1	25	1	100	4	58	2 5/16	43	1 1/2	26	1 5/32	18	23/32	59	2 15/16		950-43-M 24
25	1	20	3/4	100	4	60	3	26	1	26	1	20	3/4	50	2		3123
25	1	25	1			58	2 5/16	45	1 25/32	27,5	1 5/64	22,5	7/8	57	2 1/4		M 5
25	1	25	1			58	2 5/16	45	1 25/32	26		22,5	7/8	57	2 1/4		M 5-Pi 25
25	1	33	1 3/64			58	2 5/16	41	1 39/64			23	7/8	56	2 13/64		B 25
28	1 1/8	28	1 1/8	190	7 1/2	70	2 3/4	34	1 3/34	31	1 7/32	27	1 1/16	68	2 49/64		B 28

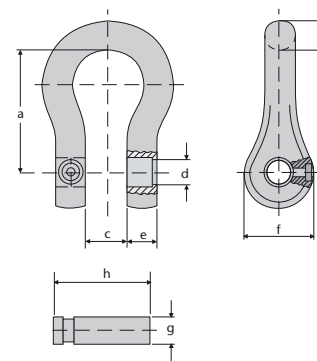


bolt with nut	length of thread	weight	drawing
g x h(mm)	mm	kg	
M 20 x 90	30	0,35	1782
M 24 x 100	35	0,55	947
M 27 x 105	35	0,75	950
M 24 x 105	35	0,55	950-43-M 24
M 22 x 110	40	0,45	950-M 22
M 24 x 100	35	0,75	3123

Weld plain pin	weight	drawing
g x h(mm)	kg	
20 x 80	0,3	1782
24 x 90	0,5	947
27 x 95	0,65	950
22 x 95	0,4	950-Pi 22
24 x 95	0,5	950-Pi 24
24 x 90	0,5	3123

Other dimensions on request.

Forged Easyloc Shackle



Advantages

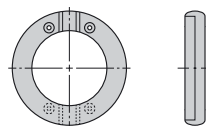
- Secure chain attachment
- Reduced installation time
- Excellent wear resistance
- Available to match to all chain materials

Diameter														weight	drawing		
D		a		c		d		e		f		g		h			
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	
25	1	103	4 1/6	35	1 3/8	21	53/64	25	1	59	2 5/16	24	1 5/16	81	3 1/8	2,0	Easy 25
25	1	103	4 1/6	35	1 3/8	21	53/64	25	1	59	2 5/16	24	1 5/16	81	3 1/8	2,0	Easy 25-PI 22

Other dimensions on request.



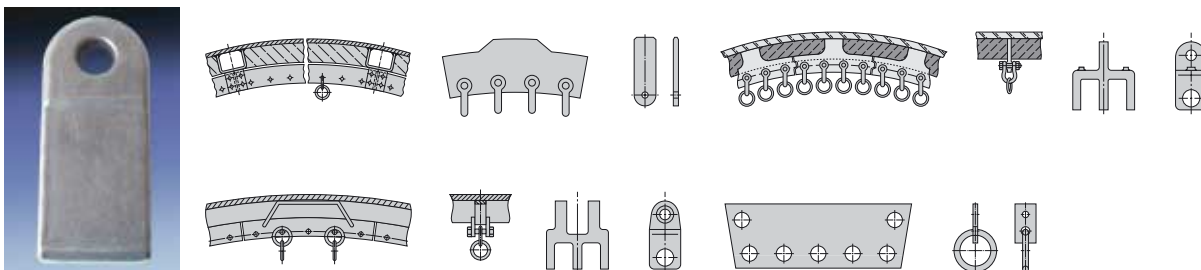
weld connecting ring - forged finish



Diameter		weight
D	pitch	kg
22/25	76	1,0

- To combine shortened chain strands
- Available to match to all chain qualities

Examples for different kiln shell attachments



Different patterns, fabricated or cast, on request.

Dimensions to suit to your requirements.

Chain steel grades

DIN Standard - Material number	DIN Standard	US Standard AISI	Chemical composition							
			C	Si	Mn	P	S	Cr	Ni	Al
Carbon steels										
1.0035	St. 33	C 1008	≤0,30	≤0,30	0,20- 0,50	0,060	0,050	-	-	-
1.0207	St. 35-2	C 1010	0,06- 0,14	traces	0,40- 0,60	0,035	0,035	-	-	-
1.0402	C 22	C 1020	0,17- 0,24	≤0,40	0,40- 0,70	0,045	0,045	≤ 0,40		
1.0470	21 Mn 4 Al	C 1022	0,18- 0,24	≤0,25	0,80- 1,10	0,035	0,035	-	-	0,02-0,05
1.0495	21 Mn 5	C 1022	0,18- 0,24	≤0,25	1,10- 1,60	0,035	0,035	-	-	0,02-0,05
1.0570	St. 52.3	C 1024	≤0,20	≤0,55	≤ 1,60	0,035	0,035	-	-	-
1.0501	C 35	C 1035	0,32- 0,39	≤0,40	0,50- 0,80	0,045	0,045	≤ 0,04	-	-
Alloy steels										
1.7225	42 Cr Mo 4	SAE 4140	0,38- 0,45	≤0,40	0,60- 0,90	0,035	0,035	0,90- 1,20	-	-
1.6523	21 Ni Cr Mo2	SAE 8620	0,17- 0,23	≤0,25	0,60- 0,90	0,020	0,020	0,35- 0,65	0,40- 0,70	-
Ferritic steels										
1.4713	X 10Cr Al7 (8F)	8 F	≤0,12	0,50- 1,00	≤ 1,00	0,040	0,030	6,00- 8,00	-	0,50-1,00
1.4724	X 10Cr Al13 (9F)	9 F	≤0,12	0,70- 1,40	≤ 1,00	0,040	0,030	12,00-14,00	-	0,70-1,20
1.4742	X 10Cr Al18 (10F)	10 F	≤0,12	0,70- 1,40	≤ 1,00	0,040	0,030	17,00-19,00	-	0,70-1,20
Austenitic steels										
1.4301	X 5 Cr Ni 18 10	304	≤0,07	≤1,00	≤ 2,00	0,045	0,030	17,00-19,50	8,50-10,50	-
1.4821	X 20 Cr Ni Si 254	329	0,10- 0,20	≤0,80- 1,50	≤ 2,00	0,040	0,030	24,00-27,00	3,50- 5,50	-
1.4828	X 15 Cr Ni Si 20 12	309	≤0,20	≤1,50- 2,50	≤ 2,00	0,045	0,030	19,00-21,00	11,00-13,00	-
1.4841	X 15 Cr Ni Si 25 20	310	≤0,20	≤1,50- 2,50	≤ 2,00	0,045	0,030	24,00-26,00	19,00-22,00	-
1.4541	X 6 Cr Ni Ti 18 10	321	≤0,08	≤1,00	≤ 2,00	0,045	0,030	17,00-19,00	9,00-12,00	-
Austenitic manganese steels										
1.4892-85 MA	Novotherm 85 MA (14872-92)		0,20- 0,30	≤1,00	7,00- 9,00	0,045	0,030	16,00-18,00	3,50- 4,50	-
1.4892-105 MA	Novotherm 105 MA (14872-93)		0,20- 0,30	≤1,00	8,00-10,00	0,045	0,030	19,00-21,00	3,50- 4,50	-
1.4892-100 MA	Novotherm 100 MA (14872)		0,20- 0,30	≤1,00	8,00-10,00	0,045	0,030	23,00-24,00	4,00- 5,00	-
1.4892-115 MA	Novotherm 115 MA (14872-91)		0,20- 0,30	≤1,00	8,00-10,00	0,045	0,030	24,00-26,00	5,00- 7,00	-

The correct selection of the material quality is essential for a good service life and, therefore, for the cost effectiveness of a chain system.
Kiln temperature, kiln gases and type of firing are the primary components in the selection of material qualities.
Please contact us for further information.

Carbon and alloy steels:

In the first kiln sections, where the gas temperature is usually below 500°C, carbon steels can be installed. If mechanical wear is higher, low alloy steels are recommended which may also be heat treated for lower wear.

Scale resisting up to (gas temperature)		Recommended temperature range (gas temperature)		Firing oil gas coal			Structure	Sigma phase brittleness conditions	Suitable for carburizing gases	Suitable for sulphur containing	Surface hardness HV without heat treatment with	
°C	°F	°C	°F									
500	932	≤ 500	≤ 932	•	•	•	ferite/perlite	no	•	•	180	250
500	932	≤ 500	≤ 932	•	•	•	ferite/perlite	no	•	•	180	250
500	932	≤ 500	≤ 932	•	•	•	ferite/perlite	no	•	•	200	250
500	932	≤ 500	≤ 932	•	•	•	ferite/perlite	no	•	•	230	400
500	932	≤ 500	≤ 932	•	•	•	ferite/perlite	no	•	•	230	400
500	932	≤ 500	≤ 932	•	•	•	ferite/perlite	no	•	•	230	400
500	932	≤ 500	≤ 932	•	•	•	ferite/perlite	no	•	•	230	600
550	1022	≤ 550	≤ 1022	•	•	•	ferite/perlite	no	•	•	250	450
550	1022	≤ 550	≤ 1022	•	•	•	ferite/perlite	no	•	•	250	450
850	1562	500- 800	932-1472	•	•		ferrite	no		•		
950	1742	500- 900	932-1652	•	•		ferrite	no		•		
1100	2012	800-1050	1472-1922	•	•		ferrite	≤ 800°C		•		
850	1562	500- 850	932-1562		•	•	austenite	no	•			
1100	2012	800-1100	1472-2012		•	•	austenite	no	•			
1050	1922	800-1050	1472-1922		•	•	austenite	no	•			
1200	2192	850-1200	1562-2192		•	•	austenite	no	•			
850	1562	500- 850	932-1562		•	•	austenite	no	•			
850	1562	500- 850	932-1562	•	•	•	austenite/ manganese	no	•	•		
1000	1837	750- 950	1380-1748	•	•	•	austenite/ manganese	≤ 650°C	•	•		
1100	2012	800-1050	1472-1922	•	•	•	austenite/ manganese	≤ 700°C	•	•		
1200	2192	850-1200	1562-2192	•	•	•	austenite/ manganese	≤ 750°C	•	•		

Ferritic steels:

Ferritic steels are very resistant to sulphurous gases, but less suitable for nitriding and/or carburizing atmospheres.

Austenitic Cr-Ni-steels:

Austenitic Cr-Ni steels are more resistant to carburizing atmospheres, but unsuitable for sulphurous gases.

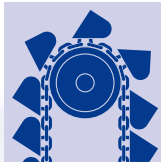
Austenitic-manganese steels:

Cr-Ni-Mn steels combine the advantages of ferritic and austenitic alloys and are especially suitable in kilns with sulphur containing gases with carburizing conditions.

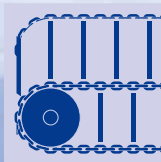
Further chain material qualities like 1.4571, 1.4833, etc. are available on request.

Hangers, shackles and other accessories, cast, forged or fabricated, can be supplied to the same or equivalent material quality as the chains.

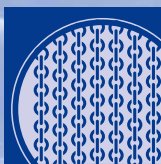
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products
and services



- Elements
for bucket
elevators



- Elements
for chain
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- Chains and
accessories
for rotary kilns



- Calculations,
advice and servicing
of conveyors and kiln chain
systems



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