

***RENOLD***

# theme park chain



***RENOLD***

putting safety first

# Theme park industry

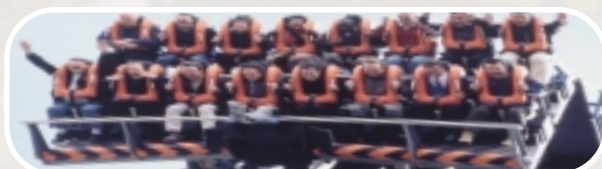
## RENOLD THEME PARK CHAIN

- Fully integrated design for added ride safety and longer life
- Specified by many of the world's leading ride designers and constructors
- Used, safely, on rides since 1928
- All produced in ISO 9000 and API approved factories

## APPLICATIONS

Renold chains are used on:

- Roller coasters
- Water rides
- Carousel drives
- Drag inclines for splash rides
- Drive motors



*When being dragged to the top of some of the highest white knuckle rides, or through the longest and deepest water rides in the world, Renold Chain provides added ride security and safety. Nemesis, Alton Towers.*



## STANDARD ROLLER COASTER CHAIN - KEY FEATURES

- Designed specifically to meet demands of increasingly higher and faster white knuckle rides
- Special crank link design allows full interchangeability with API 4 chain
- Over 30% improvement in load resistance over conventional chain with no increase in weight
- Substantially improved fatigue resistance leading to longer life
- Close tolerance control to optimise chain performance
- Customised plate holing and pin surface conditioning ensure optimum fit between pin and plate, thus overcoming need for pin welding and the consequential poorer life and safety performance
- Unique heat treatment and stress reduction techniques including shot peening of the bush, ensure maximum resistance to shock loading from dog tags

## STANDARD WATER RIDE CHAIN - KEY FEATURES

- Rugged, robust design to maximise durability
- Special heat treatment and stress reducing processes maximise resistance to shock loading
- Attachment fitting is varied to match load specification
- Optimum zinc coating thickness for corrosion protection
- Special water repelling grease to ensure smooth running
- Bespoke design service available as required
- Renold Theme Park installation, maintenance and safety manual is available - a must for all installers and maintainers of chain



### RENOLD INNOVATION

The loads required for Roller Coaster chain have increased dramatically in the last 15 years with higher payloads and greater drop heights needed to satisfy public demand for faster, more exciting rides.

The effect of increased loads has placed increasing demands upon the chain.

Renold has therefore developed special chains with substantially improved fatigue resistance to satisfy the increasing demands.



*Renold Chain has over 70 years of experience in supplying chain products to roller coaster rides.*

### RENOLD SMARTLINK®

To improve the understanding of the complex loading involved in modern roller coasters Renold have developed the Renold Smartlink® which charts stress across the full chain cycle to facilitate design and identify peak stress conditions.



### RENOLD SERVICE

- Renold have trained engineers in 16 countries worldwide and agents in over 70 countries available to assist
- Specialist application engineers are also available on request
- Renold Smartlink® can be used for assessing peak loading conditions
- Renold Theme Park installation, maintenance and safety guide is a must for all installers and maintenance engineers
- In addition to chain, Renold offer a full package of transmission goods including chain guides, tensioners, gears, couplings and sprag clutches

### LOCATIONS

Renold chain is used in theme parks around the world:

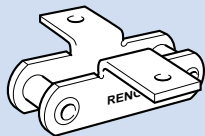
USA - Florida, California, Tennessee & the Midwest.

UK - Major Theme Parks throughout the U.K.

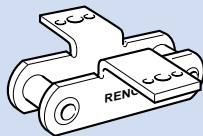
Europe - Belgium, France, Germany, Holland, Spain & Scandinavia.

Middle East, Argentina, Australia, Japan, Korea & South Africa.

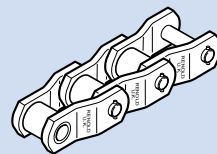
# Theme park industry



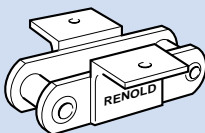
K1 - Integral



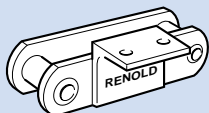
K3 - Integral



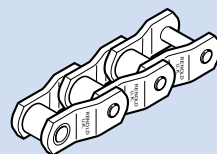
Cranked link - detachable



K1 - Welded



K2 - Welded



Cranked link - riveted

## AMUSEMENT PARK CHAIN - ROLLER COASTER CHAINS

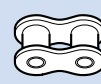
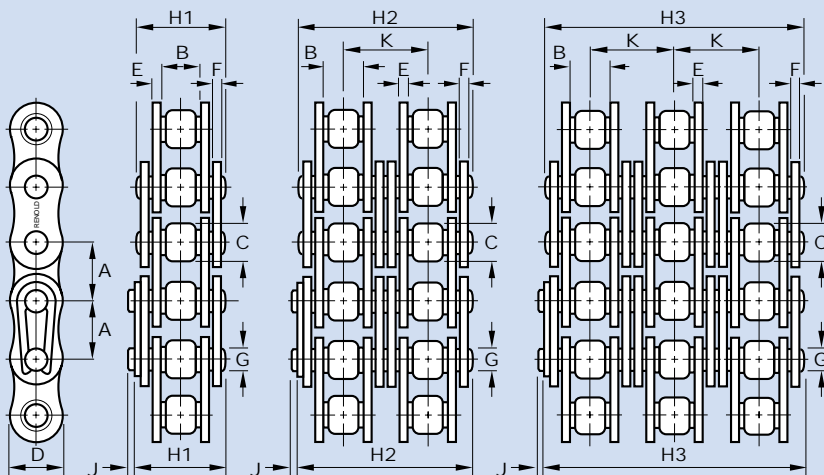
Chain Number	Breaking Load lbs	Breaking Load kN	Pitch	Gearing Dia.	Inside Width	Side Plate Depth (max)	Side Plate Thick Inner	Side Plate Thick Outer	Special Features
588506	150.000	667	103.2	44.45	49.58	58.3	12.95	12.95	Cranked Link - Cottered
588509	150.000	667	103.2	44.45	49.58	58.3	12.95	12.95	Cranked Link - Riveted
586946	157.366	700	103.2	44.45	49.58	58.3	14.0	12.0	Straight sideplate - Riveted and No58 links

## AMUSEMENT PARK CHAIN - WATER RIDE CHAINS

Chain Number	Breaking Load lbs	Breaking Load kN	Pitch	Bush Dia.	Inside Width	Side Plate Depth	Side Plate Thick Inner	Side Plate Thick Outer	Special Features
176499 / 03	15.000	67	101.6	23.6	19.0	38.1	5.1	3.8	Standard K3 attachments Zinc plated *
176600 / 03	15.000	67	101.6	23.6	19.0	38.1	5.1	3.8	Standard K3 attachments Zinc plated *
178388 / 03	30.000	134	101.6	33.2	25.4	51.0	7.1	5.1	Standard K3 attachments Zinc plated *
178403 / 03	30.000	134	101.6	33.2	25.4	51.0	7.1	5.1	Standard K2 attachments Zinc plated *
179385 / 03	45.000	200	152.4	38.1	38.1	61.0	8.9	7.6	Standard K2 attachments Zinc plated *
179362 / 03	45.000	200	152.4	38.1	38.1	61.0	8.9	7.6	Standard K2 attachments Zinc plated *
166245 / 03	60.000	267	152.4	33.2	25.4	51.0	7.1	5.1	Standard K3 attachments Zinc plated *
179639 / 03	60.000	267	127.0	38.1	38.1	61.0	8.9	7.6	Zinc plated *
179848 / 03	85.000	378	152.4	38.1	38.1	64.0	13.0	10.0	Standard K3 attachments Zinc plated *
166207 / 03	85.000	400	127.0	38.1	38.1	63.5	13.0	10.0	Zinc plated *
179840 / 03	85.000	400	152.4	38.1	38.1	63.5	13.0	10.0	Standard K2 attachments Zinc plated *
179850 / 03	90.000	400	152.4	44.4	76.2	64.0	13.0	10.0	Zinc plated *
171123 / 03	100.000	449	120.9	38.1	50.8	58.0	10.0	10.0	Zinc plated *
799947 / 315	202.300	900	315.0	60.0	78.0	120.0	16.0	16.0	Standard K2 attachments Zinc plated *

\* THESE CHAINS ARE TREATED WITH SPECIAL WATER RESISTANT LUBRICATION AS STANDARD.





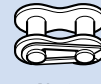
No 4



No 107



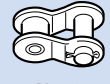
No 11



No 26



No 58



No 12



No 30

## AMUSEMENT PARK CHAIN - DRIVE CHAIN

### Chain Technical Details

### Connecting Links

ISO No	Renold Chain No	Pitch Inch	Pitch mm	Inside Width	Roller Dia	Plate Height	Plate Width Inner	Plate Width Outer	Pin Dia	Pin Len	Con Link Extra	Trans Pitch	F <sub>B</sub> Newtons Min	Weight kg/m	No 4	No 107	No 11	No 26	No 58	No 12	No 30
		A	A	B	C	D	E	F	G	H	J	K									
<b>BS SIMPLE</b>																					
08B-1	110046#	0.50	12.7	7.75	8.51	11.81	1.55	1.55	4.45	17.0	3.9	-	19000	0.70	✓	✓	-	✓	-	-	✓
10B-1	110056#	0.625	15.875	9.65	10.16	14.7	1.55	1.55	5.08	18.8	4.1	-	23000	0.92	✓	✓	-	✓	-	-	✓
12B-1	110066#	0.75	19.05	11.68	12.07	15.93	1.8	1.8	5.72	22.7	4.6	-	30500	1.20	✓	✓	-	✓	-	-	✓
16B-1	110088	1.00	25.4	17.02	15.88	20.57	4.12	3.1	8.28	36.1	5.4	-	67000	2.80	✓	✓	-	✓	-	✓	-
20B-1	110106	1.25	31.75	19.56	19.05	26.04	4.62	3.61	10.19	43.2	6.1	-	98070	3.85	✓	✓	-	✓	-	✓	-
32B-1	110166	2.00	50.8	30.99	29.21	41.22	7.11	6.35	17.81	67.4	7.9	-	255000	10.10	✓	✓	✓	-	-	✓	-
<b>BS DUPLEX</b>																					
08B-2	114046	0.50	12.7	7.75	8.51	11.81	1.55	1.55	4.45	31.0	3.9	13.92	36500	1.38	✓	✓	-	✓	-	-	✓
10B-2	114056	0.625	15.875	9.65	10.16	14.7	1.55	1.55	5.08	35.4	4.1	16.59	44500	1.80	✓	✓	-	✓	-	-	✓
12B-2	114066	0.75	19.05	11.68	12.07	15.93	1.8	1.8	5.72	42.2	4.6	19.46	61000	2.40	✓	✓	-	✓	-	-	✓
16B-2	114088	1.00	25.4	17.02	15.88	20.57	4.12	3.1	8.28	68.0	5.4	31.88	127500	5.50	✓	✓	-	✓	-	-	-
20B-2	114106	1.25	31.75	19.56	19.05	26.04	4.62	3.61	10.19	79.7	6.1	36.45	196100	7.80	✓	✓	-	✓	-	✓	-
32B-2	114166	2.00	50.8	30.99	29.21	41.22	7.11	6.35	17.81	126.0	7.9	58.55	485450	20.10	✓	✓	✓	-	-	✓	-
<b>BS TRIPLEX</b>																					
08B-3	116046	0.50	12.7	7.75	8.51	11.81	1.55	1.55	4.45	44.9	3.9	13.92	56000	2.06	✓	✓	-	✓	-	-	✓
10B-3	116056	0.625	15.875	9.65	10.16	14.7	1.55	1.55	5.08	52.8	4.1	16.59	66700	2.54	✓	✓	-	✓	-	-	✓
12B-3	116066	0.75	19.05	11.68	12.07	15.93	1.8	1.8	5.72	61.7	4.6	19.46	92000	3.60	✓	✓	-	✓	-	-	✓
16B-3	116088	1.00	25.4	17.02	15.88	20.57	4.12	3.1	8.28	99.9	5.4	31.88	191250	8.15	✓	✓	-	✓	-	✓	-
20B-3	116106	1.25	31.75	19.56	19.05	26.04	4.62	3.61	10.19	116.1	6.1	36.45	294200	11.65	✓	✓	-	✓	-	✓	-
32B-3	116166	2.00	50.8	30.99	29.21	41.22	7.11	6.35	17.81	184.5	7.9	58.55	728700	30.00	✓	✓	✓	-	-	✓	-
<b>ANSI SIMPLE</b>																					
40	119043	0.50	12.7	7.85	7.92	11.15	1.55	1.55	3.98	17.8	3.9	-	16900	0.63	✓	✓	✓	✓	-	✓	✓
50	119053	0.625	15.875	9.4	10.16	14.55	2.03	2.03	5.07	21.8	4.1	-	27800	1.05	✓	✓	✓	✓	-	✓	✓
60	119063	0.75	19.05	12.58	11.91	17.45	2.39	2.39	5.96	26.9	4.6	-	37800	1.55	✓	✓	✓	✓	-	✓	✓
80	119083	1.00	25.4	15.75	15.88	24.05	3.25	3.25	7.93	33.5	5.4	-	64500	2.80	✓	✓	✓	-	✓	✓	-
100	119103	1.25	31.75	18.9	19.05	29.97	4.06	4.06	9.54	41.1	6.1	-	104500	4.20	✓	✓	✓	-	✓	✓	-
160	119163	2.00	50.8	31.55	28.58	47.73	6.35	6.35	14.29	65.5	7.9	-	244500	10.40	✓	✓	✓	-	✓	✓	-
<b>ANSI DUPLEX</b>																					
40-2	115043	0.50	12.7	7.85	7.92	11.15	1.55	1.55	3.98	32.2	3.9	14.38	33800	1.20	✓	✓	✓	✓	-	✓	✓
50-2	115053	0.625	15.875	9.4	10.16	14.55	2.03	2.03	5.07	39.9	4.1	18.11	55600	2.10	✓	✓	✓	✓	-	✓	✓
60-2	115063	0.75	19.05	12.58	11.91	17.45	2.39	2.39	5.96	49.8	4.6	22.78	75600	3.05	✓	✓	✓	✓	-	✓	✓
80-2	115083	1.00	25.4	15.75	15.88	24.05	3.25	3.25	7.93	62.7	5.4	29.29	129000	5.50	✓	✓	✓	-	✓	✓	-
100-2	115103	1.25	31.75	18.9	19.05	29.97	4.06	4.06	9.54	77.0	6.1	35.76	209000	8.40	✓	✓	✓	-	✓	✓	-
160-2	115163	2.00	50.8	31.55	28.58	47.73	6.35	6.35	14.29	124.2	7.9	58.55	489000	20.60	✓	✓	✓	-	✓	✓	-
<b>ANSI TRIPLEX</b>																					
40-3	117043	0.50	12.7	7.85	7.92	11.15	1.55	1.55	3.98	46.17	3.9	14.38	50700	1.85	✓	✓	✓	✓	-	✓	✓
50-3	117053	0.625	15.875	9.4	10.16	14.55	2.03	2.03	5.07	57.9	4.1	18.11	83400	3.15	✓	✓	✓	✓	-	✓	✓
60-3	117063	0.75	19.05	12.58	11.91	17.45	2.39	2.39	5.96	72.6	4.6	22.78	113400	4.55	✓	✓	✓	✓	-	✓	✓
80-3	117083	1.00	25.4	15.75	15.88	24.05	3.25	3.25	7.93	91.9	5.4	29.29	193500	8.30	✓	✓	✓	-	-	✓	-
100-3	117103	1.25	31.75	18.9	19.05	29.97	4.06	4.06	9.54	113.0	6.1	35.76	313500	12.60	✓	✓	✓	-	-	✓	-
160-3	117163	2.00	50.8	31.55	28.58	47.73	6.35	6.35	14.29	182.9	7.9	58.55	733950	31.00	✓	✓	✓	-	-	✓	-

F<sub>B</sub> = AXIAL BREAKING FORCE

# THESE CHAINS CAN BE SUPPLIED NICKEL PLATED

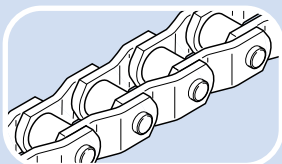
See warning on page 6

# Theme park industry

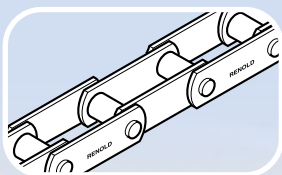
## RENOLD CHAIN TYPES



Drive chain  
**ISO606 / 606A**  
**DIN8187 / Ansi B29.1**



Crank Link



Conveyor chain

## SUPPLEMENTARY LITERATURE

- Renold Theme Park Installation Maintenance and Safety Guide
- Renold Popular Chain Products
- Amusement Park Ride Questionnaire
- Renold Chain Care and Handling Guide

## ALSO AVAILABLE FROM RENOLD

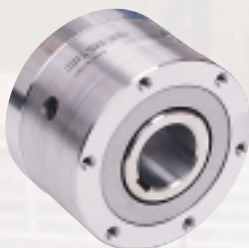
### SPROCKETS



Renold sprockets are the ideal solution for smooth chain operation. A range of standard and bespoke sprockets can be supplied on request.

### SPRAG CLUTCH

Sprag clutches are the solution for back stopping, indexing and over running applications. The no backlash design gives positive connection between driver and driven components. Torque capacities of over 800,000Nm are available, with bore sizes of 500mm.



## WARNING

The information given in this brochure is for general guidance only. In replacing chain on amusement park rides Renold strongly recommend that all practices given in the following literature are followed in full:

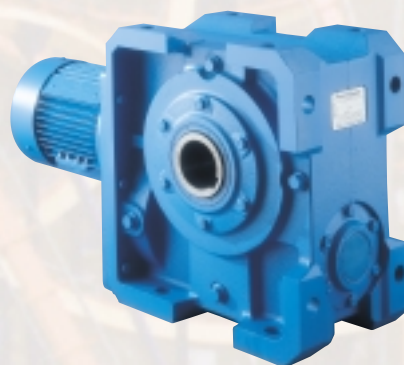
- Renold Chain Care and Handling Guide
- Renold Theme Park Chain Installation, Maintenance and Safety Guide

All replacement chain should comply with the original equipment manufacturer's exact specification and Renold would advise strongly against using welded chains in these safety critical applications.

If you are unsure about the original specification Renold will be pleased to help you select an appropriate chain on completion of a Renold Chain Amusement Park Ride Questionnaire. Please fill this in fully and carefully, as Renold cannot be held responsible for the suitability of the chain for the purpose if incorrect or incomplete information is given.

## POWERMASTER

Powermaster is a helical/worm geared motor unit available in six unit sizes up to 90kW capacity. A wide range of mounting and shaft options are available. The standard unit has ratios from 8:1 to 307:1 and when combined with Ritespeed Helical gear, offers ratios of up to 20,000:1.



- Renold also supply a range of chain tensioners, including the unique, innovative, Roll-Ring® self adjusting chain tensioner. Roll-Ring® is used extensively in smaller pitch chain drives, and is available for both BS and ANSI standards.



# Unique quality and safety

# RENOLD

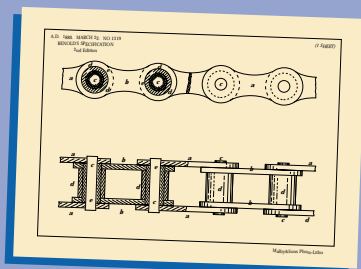
## 'IN A CLASS OF ITS OWN'

Renold, the inventor of Bush Roller Chain has led the world in chain technology for more than a century.



Only products designed and supplied to our specification carry the MARK OF EXCELLENCE, 'RENOLD'. You can be sure that when you choose such a product, Renold Service, Quality, Value for Money and LONG LIFE PERFORMANCE are guaranteed.

Original patent drawing 1880



## A UNIQUE SERVICE



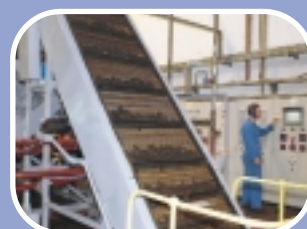
Renold, the premier chain company is dedicated to providing national and global customers with products to the ultimate of specification and design, manufactured to exceed the highest international standards.

Investment in manufacturing and process technology, combined with an international sales and distribution network, places Renold's commitment to the development of chain products and customer service at the forefront of the industry. Renold's 16 national sales companies and over 70 country distributors around the world have direct access to extensive Renold design, test and manufacturing facilities, enabling the chain required to be promptly specified and produced. Renold, the power transmission specialists, provide a worldwide customer orientated product service.

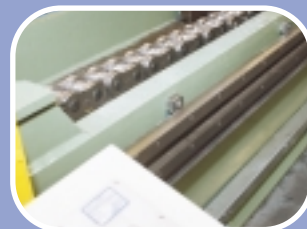
## CONSISTENCY

Only materials that meet the Renold exacting specifications are used for the manufacture of our chain components.

*Stringent process control at every stage of production including component manufacture, heat treatment, and assembly, ensure the consistent quality of all Renold Chain.*



*Every chain is proof loaded, resulting in minimum initial wear, greater fatigue resistance and improved wear performance.*



*Corrosion protection and long life are achieved by automatically coating every chain with a specially formulated lubricant. Chain lubrication is one of the most important factors in achieving a long and trouble free service life. Renold can advise the correct method to suit your needs.*



## QUALITY

Our commitment to quality ensures that Renold Transmission and Conveyor Chain conforms to and surpasses the highest international standards of manufacture and design, including approval by the American Petroleum Institute.

All of our manufacturing systems conform to API and ISO9001.



Renold employees are fully trained to ensure all products meet the unique Renold specification.



*We also manufacture to the specifications required by API, BAe, CAA, LONDON UNDERGROUND, ROLLS-ROYCE and JAGUAR.*

# RENOLD INVEST IN OUR STRENGTH



RENOLD WORLDWIDE

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