

Strong. Powerful. Performance.



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Renold Synergy

Renold Synergy has achieved an unsurpassed reputation as the only true high performance roller chain on the market. This is based not only on the years of research and testing that went into its design, but also the response of engineers around the world who have endorsed the wear resistance, fatigue resistance and exceptional working life they have achieved by specifying Renold Synergy.

Renold has a long reputation for manufacturing the best roller chain and yet our engineers set out to improve on those already high standards when they developed the Synergy concept.

Since then, there has been a further series of modifications to improve the wear performance and corrosion resistance and this has been combined with a unique 'virtually dry-to-the-touch' feature to provide a truly user-friendly, durable chain which has outlasted the nearest competitor in countless applications.

Renold Synergy should be lubricated as normal when in operation. The low level of lubrication on the chain when it is supplied is simply to make handling easier.

RENOLD

Aim of the Synergy concept - Key objectives

- Produce a roller chain to meet requirements for endurance under high shock load and demanding wear applications in normal lubrication conditions
- To meet and exceed the minimum ISO606 standard requirements for fatigue by at least 60%
- To achieve a wear performance significantly better than the best competition
- To have a high degree of user friendliness, be easy to handle, assemble and use

SMERT

Areas of improvement

- Plate shape high waist profile for improved stress distribution
- Plate thickness maximised within the constraints of the standard
- Bush geometry solid bush, much improved roundness and strength over curled bush.
- Extrusion technology combined with the traditional Renold profiled or coned ends
- Hole quality extensive development on optimising hole finish
- Fits Optimised interference fits to achieve maximum fatigue life
- Fatigue resistance Pre-stressed surfaces
- Wear Profiled components and special coating on the pin surface

Operational features and benefits - user friendly

- Renold Synergy is virtually dry to the touch therefore the lubricant stays in the chain, not on your hands.
- Renold Synergy's special platinum coloured connecting link contrasts with the black surface of the other plates, making for easy identification, ensuring rapid disconnection of the chain.
- Renold Synergy's unique soft pin ends allow quick and easy cutting to length without damaging the rest of the chain.
- Because Renold Synergy lasts longer and is more resistant to shock loading, it is the most reliable product of its kind; just fit it and forget it.

Operational features and benefits - environmentally friendly

- Precious initial lubricant is primarily in the chain not on the outside where it's not needed
- All packaging is 100% recyclable
- All chain is 100% recyclable
- Renold Synergy is made in factories that fully conform with ISO 14001
- All material waste in production is recycled

Product feature and benefits - plates

- Precision blanked profile optimises stress distribution.
- Strict control of steel specification (including trace elements) to ensure very consistent heat treatment results.
- Triple punch holing techniques maximises resistance to crack propagation and ensures controlled positional location of pin and bush for even wear.
- Special coating gives improved corrosion and light acid resistance.
- Connecting link plates are specially treated to ensure the same fatigue performance as the overall chain.

Product feature and benefits pin and bushing

- Optimised hardening to minimise wear but also prevent brittleness.
- Unique bush bore profile to ensure full contact between pin and bush bore surfaces.
- Three-stage pin surface treatment giving a unique combination of lubrication retention and extended wear life.
- Exclusive 6-stage cold extrusion process giving concentricity and material grain flow, optimising shock load resistance.

Fatigue performance

Under conditions of continual heavy load or repeated shock loading, chain may need to be replaced due to breakage or fatigue.

Tests have shown that Renold Synergy was, on average, 30% better than leading competitive brands. This is especially true as the loose fit connecting link plates are specially treated to achieve the same fatigue performance as the chain.

Comparative tests - Synergy v Rest

Renold Synergy has been tested against a number of leading World manufacturers for both wear and fatigue.

These results are summarised below and show that Renold Synergy far surpasses the nearest competition and is even better than the previous Renold chain.

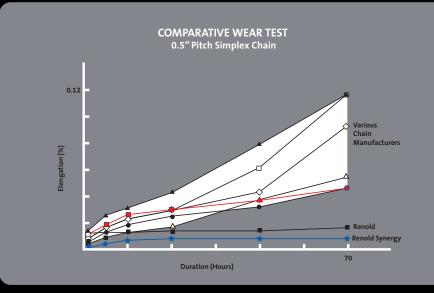
Chain test and validation

Renold Synergy has been subjected to wear, fatigue and other tests in the laboratory, on customers test rigs and in many applications.

Typical tests were:

- In the Laboratory
- Fatigue endurance tests 8.5 million cycles
- Wear tests under accelerated conditions
- Benchmark tests on key competitors chain for 3 million cycles
- Service trials
 - In many applications since its launch with excellent results

Renold Synergy performance has proved to be a significant breakthrough in chain technology. With a wear life up to 6 times longer than its nearest competitor and an equally impressive improvement in fatigue ratings its potential is beyond doubt.



To illustrate the extent to which Renold Synergy outperforms the competition, we have shown the example of results against a leading Japanese Chain.

Summary of Test Results

Chain tested - 16B (1" BS Chain)

Fatigue tests

Conformity tests carried out at 3 million cycles and 20kN on 16B chain.

Renold Synergy: 3 survivals Japanese chain: 1 survival

1 failure at 2m cycles 1 failure at 1m cycles

Many other comparative tests and measures were carried out, one of which is a roundness and concentricity test on the bush. This test shows how extrusion technology employed on Renold Synergy creates perfectly round and concentric parts, every time. (See diagram opposite)

In addition, Renold Synergy inner and outer link securities were found to be higher than the Japanese chain.

Combined with the data accumulating from applications worldwide a picture is beginning to emerge of a product which will meet our customers' greatest expectations for long life and low downtime.

Performance in every detail

Here we illustrate how every component in Renold Synergy has been engineered to perfection.

- Introduction of techniques to better manage the interface between components
- Refinement of fits (achieved optimum fits by using FEA)
- Improved resistance to outer plate movement, push and torsional plate/pin securities up to 20% higher
- Re-profiling of bush bore (to obtain perfect fit and greater virtual bearing area)
- No stress raisers in bush bore
- Reduced coefficient of friction between pin and bush by optimising surface finishes
- Fatigue performance consistency

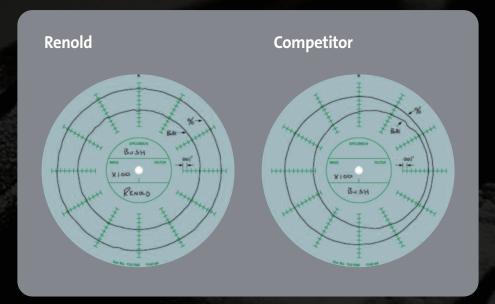
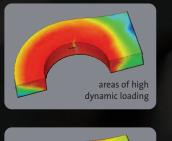


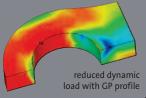
Plate Design

Every aspect of Renold Synergy has been designed using cutting edge design tools. One example of this is the use of Finite Element Analysis to achieve optimised plate profiles and interference fits. Shown below is the stress pattern of a conventional plate profile with the high stress 'hot spots' shown in red.

After many iterations of the FEA models an optimum design is achieved. The stress distribution in the Renold Synergy plate shown below is smoother and lower than the conventional chain plate.

Renold call this a Grand Prix (GP) plate form. Especially under dynamic load the lower stress peaks lead to a higher fatigue performance of the chain.





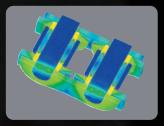
Connecting Link Design

Chain will always fail at the weakest component. For standard chains this is normally the connecting link.

Renold Synergy is equipped with a unique connecting link. This link features a special plate, which is cold worked after heat treatment to enable high performance even though the plate is an easy-to-use slip fit on the pins.

The whole chain is now optimised as a system with no component weaker than any other. Shown below is the optimised connecting link plate in an FEA study.

This connecting link clearly shows an even stress distribution throughout.



Renold Synergy Successes

Don't just take our word for it. See how Renold Synergy is improving the performance of businesses of every kind round the world.

Food

An Australian bakery has installed Renold Synergy on all their chain drives. Their maintenance supervisor said, 'Our experience to date has been that Renold Synergy gives a high degree of reliability, which means less breakdowns and maintenance time ...our cost of ownership is greatly reduced.'

Cadbury use Renold Synergy for drive chain and moulding chain applications, based on the improved efficiency and optimised uptime.

In the United States, one of the world's largest food manufacturers described the performance of Renold Synergy, in one of their most demanding dough mixer applications as, 'exceptional, and the wear life astonishing!'

Packaging

An American packaging company producing corrugated cardboard boxes and unable to lubricate their chain has seen significantly increased working life by specifying Renold Synergy. Plymouth Packaging could not find a chain that could last more than 2-3 months. Renold Synergy is giving them 7-8 months, eliminating as many as 3 downtimes and ensuring `great cost savings`.

Steel

In New Zealand, a steel producer managed to more than double the working life of their chain drives by specifying Renold Synergy. Three 55 metre lengths installed in the summer of 2001 are still in operation compared with the previous chain which failed rapidly due to excessive wear.

A German company making castings has proved that Synergy can last up to 6 times longer by replacing the chain in an automated tooling machine.

Sawmill

In the United States VKN Hardwoods uses chain in its processing of hardwood timber. The corporate maintenance manager stated, 'The amazing thing is that we have increased production on this piece of equipment by 25%.'

A company in New Zealand that uses chain to draw logs forwards and backwards through a band saw was experiencing chain breakages on an almost daily basis due to impulsive and fluctuating shock loads on the drive. Renold Synergy has lasted 2 years without being touched.

Wool processing

In Australia, Goulburn Wool use Renold Synergy to operate drives in conditions they describe as 'harsh', drawing coarse wool through washing processes. Their maintenance supervisor said, 'I have found Synergy chain to far outlast any other chain. Its reliability is second to none. I would thoroughly recommend this product as breakdown, due to chain failing, is almost non-existent in our applications.'

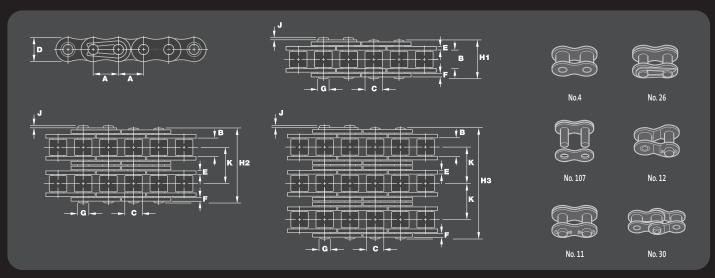
Tyre manufacture

Michelin found that Renold Synergy lasted up to 6 times longer than the previous chain for a series of drives that rotate two 800kg reels responsible for winding strips of rubber sandwiched around steel wire for despatch to other factories.

Find out more at: www.renold.com/synergy

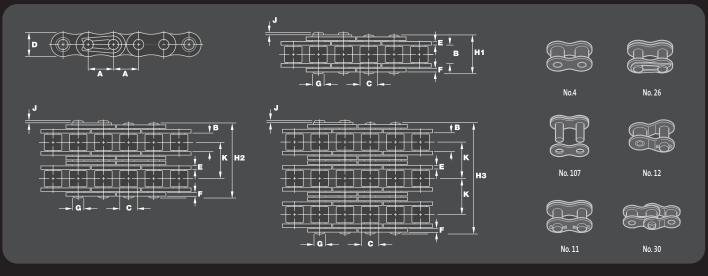


Renold Synergy[®] Roller Chain European (BS) Standard / ISO 606



Chain Ref.		Technical Details (mm)													Connecting Links					
Renold Chain No.	ISO Ref.	Pitch (inch)	Pitch (mm)	Inside Width	Roller Diam.	Plate Height	Plate Width Inner	Plate Width Outer	Pin Diam.	Pin Length	Conn. Link Extension	Transverse Pitch	ISO606 Tensile Strength (Newtons)	Weight kg/m	No. 4	No. 107	No. 11	No. 26	No. 12	No. 30
				MIN	MAX	MAX	MAX	MAX	MAX	MAX	MAX	NOM	MIN	кд/т						
European	European (BS) Standard - Simplex																			
		A	A	В	C	D	E	F	G	H1	J	K								
GY06B1* GY08B1 111044 111046 110044 GY10B1 110054 GY12B1 GY16B1 GY20B1 GY20B1	06B-1 08B-1 - - 10B-1 - 12B-1 16B-1 20B-1 24B-1	0.375 0.500 0.500 0.500 0.625 0.625 0.750 1.000 1.250 1.500	9.525 12.700 12.700 12.700 15.875 15.875 19.050 25.400 31.750 38.100	5.72 7.75 3.30 4.88 5.21 9.65 6.48 11.68 17.02 19.56 25.40	6.35 8.51 7.75 8.51 10.16 10.16 12.07 15.88 19.05 25.40	8.20 11.70 9.60 11.70 14.60 16.00 21.08 26.42 33.40	1.29 1.55 1.13 1.55 1.55 1.55 1.81 4.12 4.62 6.10	1.04 1.55 0.98 1.55 1.55 1.55 1.81 3.10 3.61 5.08	3.28 4.45 4.09 4.45 5.08 5.08 5.72 8.28 10.19 14.63	12.5 16.5 9.8 11.4 14.5 18.8 16.0 21.9 34.9 39.8 52.6	1.3 2.0 2.0 2.5 2.5 2.5 2.6 2.2 2.7 6.8	· · · ·	8900 17800 8900 17800 22200 22200 28900 60000 95000 160000	0.39 0.70 0.30 0.35 0.70 0.96 0.81 1.22 2.80 3.85 7.45		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~			•••••••	
				25.40	25.40	55.40	6.10	5.08	14.05	52.0	0.8	•	100000	7.45	v	✓	~	•	V	-
European	(BS) Sta																			
		A	A	В	C	D	E	F	G	H2	J	К								
GY06B2* GY08B2 GY10B2 GY12B2 GY16B2 GY20B2 GY24B2	06B-2 08B-2 10B-2 12B-2 16B-2 20B-2 24B-2	0.375 0.500 0.625 0.750 1.000 1.250 1.500	9.525 12.700 15.875 19.050 25.400 31.750 38.100	5.72 7.75 9.65 11.68 17.02 19.56 25.40	6.35 8.51 10.16 12.07 15.88 19.05 25.40	8.20 11.70 14.60 16.00 21.08 26.42 33.40	1.29 1.55 1.55 1.81 4.12 4.62 6.10	1.04 1.55 1.55 1.81 3.10 3.61 5.08	3.28 4.45 5.08 5.72 8.28 10.19 14.63	23.0 30.4 35.4 41.4 66.8 76.7 101.3	1.3 2.0 2.5 2.6 2.2 2.7 6.8	10.24 13.92 16.59 19.46 31.88 36.45 48.36	16900 31100 44500 57800 106000 170000 280000	0.78 1.38 1.69 2.42 5.50 7.80 14.80	~ ~ ~ ~ ~ ~ ~	~ ~ ~ ~ ~ ~ ~	• • • • • • • >	~~~~~	· · · · · · · · · · · · · · · · · · ·	✓ ✓ ✓ · · ·
European (BS) Standard - Triplex																				
		A	A	В	C	D	E	F	G	H3	J	К								
GY06B3* GY08B3 GY10B3 GY12B3 GY16B3 GY20B3 GY24B3	06B-3 08B-3 10B-3 12B-3 16B-3 20B-3 24B-3	0.375 0.500 0.625 0.750 1.000 1.250 1.500	9.525 12.700 15.875 19.050 25.400 31.750 38.100	5.72 7.75 9.65 11.68 17.02 19.56 25.40	6.35 8.51 10.16 12.07 15.88 19.05 25.40	8.20 11.70 14.60 16.00 21.08 26.42 33.40	1.29 1.55 1.55 1.81 4.12 4.62 6.10	1.04 1.55 1.55 1.81 3.10 3.61 5.08	3.28 4.45 5.08 5.72 8.28 10.19 14.63	33.3 44.3 52.0 60.9 98.6 113.2 149.7	1.3 2.0 2.5 2.6 2.2 2.7 6.8	10.24 13.92 16.59 19.46 31.88 36.45 48.36	24900 44500 66700 86700 160000 250000 425000	1.11 2.06 2.54 3.59 8.15 11.65 22.25	~ ~ ~ ~ ~ ~ ~	~~~~~~	• • • • • • >	~ ~ ~ ~ ~ ~ ~ ~		

Renold Synergy[®] Roller Chain ANSI Standard / ISO 606



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				MIN	MAX	MAX	MAX	MAX	MAX	MAX	MAX	NOM	(Newtons) MIN	kg/m							
ANSI Standard - Simplex																					
		A	A	В	C	D	E	F	G	H1	J	K									
GY35A1° GY40A1 GY50A1 GY60A1 GY80A1 GY100A1 GY120A1 GY140A1 GY160A1	35-1 40-1 50-1 80-1 100-1 120-1 140-1 160-1	0.375 0.500 0.625 0.750 1.000 1.250 1.500 1.750 2.000	9.525 12.700 15.875 19.050 25.400 31.750 38.100 44.450 50.800	4.68 7.85 9.40 12.57 15.75 18.90 25.23 25.23 31.55	5.08 7.92 10.16 11.91 15.88 19.05 22.23 25.40 28.58	8.60 11.20 14.60 17.50 24.13 30.17 36.20 42.23 48.26	1.29 1.55 2.04 2.45 3.25 4.06 4.80 5.61 6.35	1.29 1.55 2.04 2.45 3.25 4.06 4.80 5.61 6.35	3.59 3.97 5.08 5.94 7.94 9.54 11.11 12.71 14.29	12.0 16.4 20.4 25.3 32.7 39.7 49.3 52.9 63.1	1.7 2.1 2.7 2.6 3.0 4.2 5.3 5.2 6.5		7900 13900 21800 31300 55600 87000 125000 170000 223000	0.35 0.60 1.00 1.47 2.80 4.20 5.70 7.80 10.40	~~~~~~~~~	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	->>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	✓ ✓ ✓ · · · · · · · · · · · · · · · · ·		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	√ √ √
ANSI Standard - Duplex																					
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GY35A2° GY40A2 GY50A2 GY60A2 GY80A2 GY100A2 GY120A2 GY120A2 GY140A2 GY160A2	35-2 40-2 50-2 60-2 80-2 100-2 120-2 140-2 160-2	0.375 0.500 0.625 0.750 1.000 1.250 1.500 1.750 2.000	9.525 12.700 15.875 19.050 25.400 31.750 38.100 44.450 50.800	4.68 7.85 9.40 12.57 15.75 18.90 25.23 25.23 31.55	5.08 7.92 10.16 11.91 15.88 19.05 22.23 25.40 28.58	8.60 11.20 14.60 17.50 24.13 30.17 36.20 42.23 48.26	1.29 1.55 2.04 2.45 3.25 4.06 4.80 5.61 6.35	1.29 1.55 2.04 2.45 3.25 4.06 4.80 5.61 6.35	3.59 3.97 5.08 5.94 7.94 9.54 11.11 12.71 14.29	22.2 30.8 38.4 48.1 61.9 75.4 94.7 101.8 121.6	1.7 2.1 2.7 2.6 3.0 4.2 5.3 5.2 6.5	10.13 14.38 18.11 22.78 29.29 35.76 45.44 48.87 58.55	15800 27800 43600 62600 111200 174000 250000 340000 446000	0.62 1.20 1.98 2.91 5.50 8.40 11.00 15.50 20.60	~~~~~~~~~	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	- > > > > > > > > >	 ✓ ✓		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	✓ ✓ ✓ ✓ ✓ · · ·
ANSI Stan	ANSI Standard - Triplex																				
		A	A	В	C	D	E	F	G	H3	J	K									
GY35A3° GY40A3 GY50A3 GY60A3 GY80A3 GY100A3 GY120A3 GY140A3 GY160A3	35-3 40-3 50-3 80-3 100-3 120-3 140-3 160-3	0.375 0.500 0.625 0.750 1.000 1.250 1.500 1.750 2.000	9.525 12.700 15.875 19.050 25.400 31.750 38.100 44.450 50.800	4.68 7.85 9.40 12.57 15.75 18.90 25.23 25.23 31.55	5.08 7.92 10.16 11.91 15.88 19.05 22.23 25.40 28.58	8.60 11.20 14.60 17.50 24.13 30.17 36.20 42.23 48.26	1.29 1.55 2.04 2.45 3.25 4.06 4.80 5.61 6.35	1.29 1.55 2.04 2.45 3.25 4.06 4.80 5.61 6.35	3.59 3.97 5.08 5.94 7.94 9.54 11.11 12.71 14.29	32.2 45.1 56.5 70.9 91.2 111.2 140.2 150.7 180.2	1.7 2.1 2.7 2.6 3.0 4.2 5.3 5.2 6.5	10.13 14.38 18.11 22.78 29.29 35.76 45.44 48.87 58.55	23700 41700 65400 93900 166800 261000 375000 510000 669000	0.93 1.80 2.96 4.38 8.30 12.60 16.70 23.10 31.00	~~~~~~~~	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	- > > > > > > > > >	~ ~ ~ ~		~~~~~~~~	✓ ✓ ✓ ✓ · · · · ·

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