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LEAF CHAIN TECHNICAL BRIEFS

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UNIVERSAL Leaf Chain

For a number of years I-TRANS Engineering has stocked and distributed Universal leaf chain as a good value economy chain for the New Zealand forklift market. Universal is a chain that will give a reasonable life at an attractive price level compared to the more expensive and traditional European and Japanese chains such as HKK, Sugiyama, and Renold brands.

UNIVERSAL has been and remains a very successful chain for us in the BL422 through to BL846 Chain Series and will continue in its present form in this range. The reasons for this are:

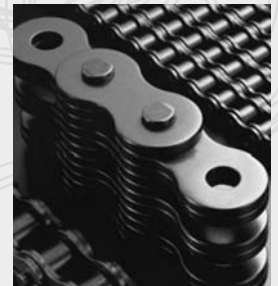
- The **UNIVERSAL BL400-800 Series** chains are not subjected to the larger loads, shocks and harsh working environments that larger chain sizes experience.
- These harsh environments include: Rough yards, large container loads, dirty and dusty conditions, marginal lubricating situations and high lifting usage conditions. Also in some cases infrequent maintenance schedules.
- Where these chains have run well are on the smaller forklifts carrying steadier and lighter loads. For example in warehouses and yards where the running surface conditions are smooth and often sealed plus the carrying loads are light and constant. Also maintenance is scheduled on a regular basis.

When it comes to the larger leaf chain sizes **UNIVERSAL BL866** through to **BL1688 Chain Series** there can be different working conditions including the situations discussed above in point two. As a result of this we have found that in some of these conditions our heavier chains are not giving a full service life compared to Japanese and European chains. Our research has recently found that in some cases one of the major causes for a shorter working life is the level of pressure fits between the rivet pins and the outer rivet plates.

- Because of the harsh working conditions the riveted pins and the inner clearance leaf plates seize together or 'cold weld' and then breakaway causing the pins surfaces to "pick-up".
- This extra force will eventually cause the riveted pins to break their pressure fit and rotate in the outer link plates.
- This condition is a classic symptom of an overloaded leaf chain, producing rotating pins and at worst elongated holes, galled pin surfaces, lateral pin movement and possible breakage.

All leaf chains can be affected by harsh conditions regardless of the quality and brand. However, usually the more expensive chains such as HKK, Sugiyama and Renold have a consistently strong tight pin to plate hole press fit and better formed punched holes. This means the chain has the ability to offer much longer working hours in harsh conditions before the rivet pins turn in the outer plates.

- **The Universal brand has been a successful economy chain for applications where overloading and shock loading are not prevalent, and where working surfaces are smooth and stable ie warehouse floors and concreted or tarmaced yards.**
- **Universal chain has been predominantly sold into the pitch sizes BL400, BL500, BL600 and BL800 Series up to and including BL846/BL866.**
- **In addition I-TRANS have sold Universal into the AL Series sizes AL566 through to AL1666.**
- **I-TRANS Engineering recommend for applications using BL866 and above that chain brands such as MCC and HKK are considered if greater loadings are involved.**



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MCC MAXTOP Leaf Chain

2

When it comes to the larger series chain BL866 through to BL1688 there are different working conditions encountered compared to the smaller BL400-800 Series chains. This includes the situations of the harsh working environment of rough yards, large container shock/loads, dirty/dusty conditions, marginal lubricating situations and high lifting usage. Also in some cases infrequent maintenance schedules. As a result of this we have found that in some of these conditions our heavier chains are not giving the required service life. Our research has recently found that in some cases one of the main causes for these failures is the strength of press fits and punched hole tolerances between the rivet pins and the outer rivet plates.

- Because of the harsh working conditions the riveted pins and the inner clearance leaf plates seize together or 'spot weld' and then breakaway causing the pins surfaces to "pick-up".
- This extra force will eventually cause the riveted pins to break their pressure fit and rotate in the outer link plates.
- This is a classic symptom of an overloaded leaf chain: rotating pins and at worse elongated holes, galled pin surfaces, lateral pin movement and possible breakage.

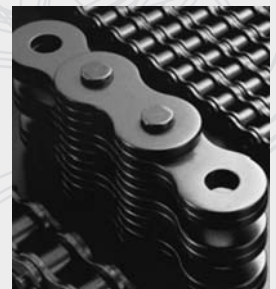
MCC's MAX TOP LEAF CHAIN is a top line chain manufactured in Taiwan which we have added to our leaf chain range to help overcome the problems raised in tougher working conditions. MCC chain incorporates some of the features that the more expensive chains such as HKK, Sugiyama and Renold have to make it more successful and last longer in the harsh working conditions and these include:

- Higher formed side and leaf plates for improved fatigue resistance.
- Better formed rivet heads and pin to outer plate hole fits which gives more secure riveting.
- Improved hole punching to ensure better pin to hole contact occurs. This Further ensures a good solid fitting rivet pin.
- All components are manufactured from quality heat treated steel.

MCC have been successfully manufacturing chain in Taiwan for the past 30 years and in this time have gained a lot of experience in perfecting quality chain at prices below their European counterparts. Their experience includes motor cycle and automotive timing chain. They also manufacture standard roller chains, special attachment chain along with other special purpose industrial chains. MCC offer a competitively priced range of BL, AL and LL Leaf Chain sizes. The latter LL sizes MCC offer as shorter run specials. MCC leaf chain is a recent addition to the New Zealand leaf chain market but it has been used very successfully in Australia for a number of years. It is a quality chain that is positioned in the middle between the Chinese value chains, and the Japanese and European higher end products. It can be used in moderate to medium working conditions where industrial users want a compromise between price and chain longevity.

I-TRANS ENGINEERING is presently stocking MCC leaf chain in key sizes: BL1046, BL1066, and BL1266 (additional sizes will be added as needs dictate). MAX TOP will offer quality chain out of Taiwan representing good value for money, quality and advanced technology.

For harsh conditions where chain is subject to overloading, shock loading, loose metal yards with broken surfaces we recommend the use of Japanese or European quality leaf chains.



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HKK Chain

Introducing HKK Chain

HKK Japan is a part of the Sugiyama (SY) Chain Group. They manufacture a wide range of high quality industrial roller chain, lift/leaf chains, and a wide range of specialty chains. In recent years Sugiyama have focused substantial marketing activities in Asia and Pacific regions. Strong marketing and sales efforts are exercised in North America where they sell not only HKK but SY and Hitachi branded product.

In 1987 HKK introduced SBR Technology into all standard transmission roller chain products. Solid Bush Solid Roller technology using cold forging techniques benefits chain life and overall performance, and on its introduction it outperforms all other Japanese drive chains using conventional split bushings and rollers that suffer "curling" under stress.

In 2002 HKK introduce SILVER SBR (an anti corrosion treatment) technology that uses a special surface finish which lifts fatigue strength of their standard chains by 25%.

HKK progress their research and development and focus their marketing at the heavy end of the value added application range such as the oil field, port and logistics markets, anti-corrosion and maintenance free chain markets.

HKK and Sugiyama is a market leader in value added chain product. They have positioned themselves in excelling in chain applications where performance is required under environmental stress. They have developed pin surface treatments, heat treatments, cold forging processes and design and engineering advances that have elevated their brand to the forefront of industrial roller and lift chain technology

Introducing HKK's LEAF CHAIN Programme

As a lot of problems regarding chain failures are due to corrosion, lack of lubrication and potential overloading. All of these factors can cause the riveted pins and inner clearance leaf plates to seize together or 'cold weld' and then breakaway causing the pins surfaces to "pick-up". This extra force will eventually cause the riveted pins to break their pressure fit and rotate in the outer link plates. A classic symptom of an overloaded leaf chain failure: rotating pins and at worse elongated holes and pin lateral movement.

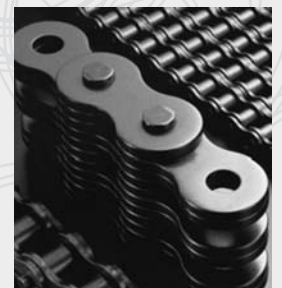
HKK Leaf Chain still needs the same maintenance considerations as your standard leaf chain as it is not designed as a replacement for 'low maintenance chain.' and it deserves the attention of being well maintained to achieve its potential life.

HKK CHAIN OFFERS THE FOLLOWING BENEFITS:

- The best quality steel materials and heat treatment.
- A very high level of engineering design and tolerances.
- A good tight interference fit between the pin and the outer links. This ensures pin rigidity under the toughest of working conditions.
- Japanese quality management and high manufacturing standards

Where HKK can be used:

- In harsh, hard working environments such as the ports, container terminals and in hard working open yards with broken surfaces.
- And where high cycle lifting requirements are required such as in the timber processing plants (e.g moulded fibre plants) which experience long and heavy operating working hours.



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Wippermann Leaf Chain - LL Series



Introduction to Wippermann

- Wippermann of Germany have been manufacturing roller, leaf chain and a range of very successful specialist chains worldwide for 120 years.
- Leaf Chains are standardised according to ISO4347 and DIN 8152. They are used as load chains, hoisting gear and lifting equipment as well as for counterweights and for the transmission of back-and-forth movements under load.
- **Wippermann's LL leaf chains are manufactured to ISO606 type B**, as opposed to ISO606 Type A Leaf Chain which is commonly called BL Series Chain.
- Wippermann have developed a formidable engineering knowledge in chain manufacturing, drive and conveyor design, heat treatment and are considered world leaders in their field of chain and sprocket drive-design-manufacturing for a worldwide client base.
- Wippermann manufacture their **STANDARD LL Series from LL822 through to LL4088**.
- For chain being applied to very harsh working conditions Wippermann recommend their **HEAVY DUTY DESIGN U TO WORKS-STANDARD** chains in pitch sizes 15.875mm through to 63.5mm.

Heat treatment

- Heat treatment is one of the most important process steps in chain production. Here to Wippermann have the most sophisticated equipment as well as specially developed technologies. Furthermore, they support all steel hardening processes by means of a central computer system which checks all heat treatment parameters during the entire procedure and is thus able to guarantee continuously high product quality.

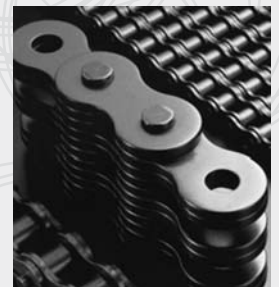
Contract heat treatment

- For heat treatment in throughput and charge operation we use conveyor furnace equipment for treatment under inert protective gas. Furthermore, we have multi-purpose chamber kilns, pusher type furnaces and swing retorts. We will treat bulk goods up to a partial weight of 1.5 kg as well as products with a length of up to 1,000 mm and weights up to 400 kg; this step is then followed by degreasing or vibratory finishing processes.

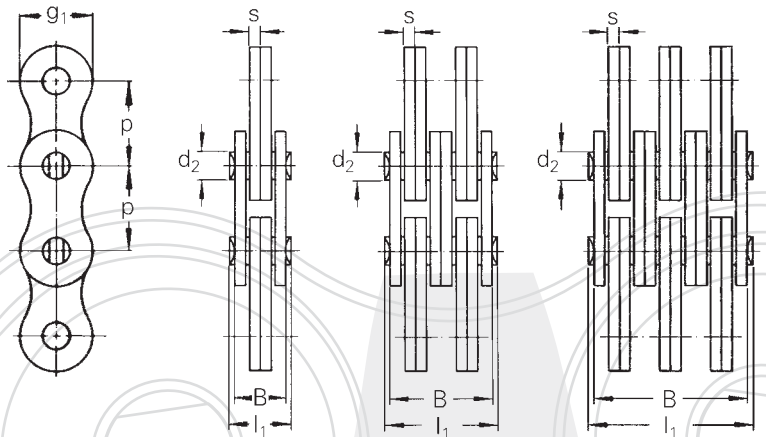
The finishing process is subsequently completed by means of a shot peening procedure.

Sourcing and Delivery

- I-TRANS Engineering have been importing Wippermann leaf chain for larger end clients in New Zealand on an indent/POA basis up to and including leaf chain weights of LL4088. Delivery is confirmed at the time of quoting however ex Factory 60-80 days is a common delivery schedule.



Wippermann Leaf Chain - LL Series



LEAF CHAINS TYPE SERIES LL ACCORDING TO DIN ISO 4347 according to DIN 8152

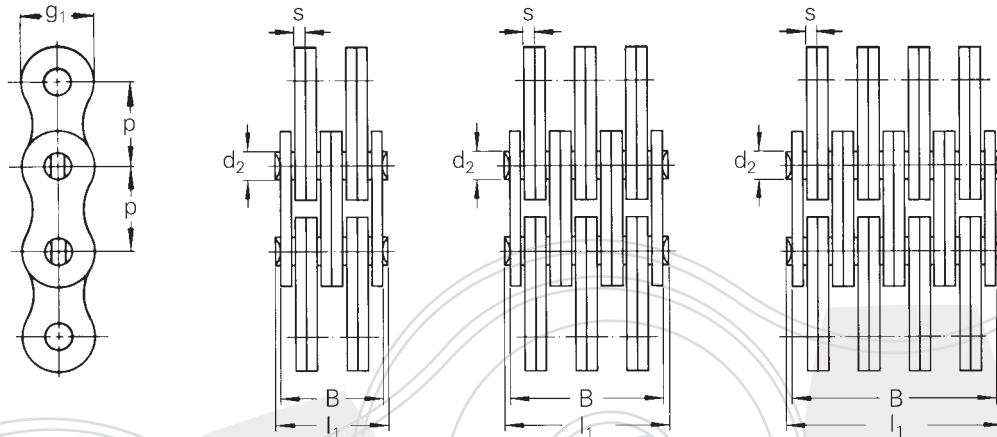
Abstract from DIN 8152

Chains may be assembled with chain parts according to DIN 8187. Therefore the actual pitch may deviate from the nominal pitch. The permissible length deviation refers to the length specification of the manufacturer and is $\pm 0,25\%$ under the measuring force.

Chain		DIN	Nominal pitch		Lacing	Width over		Pin \varnothing	Plate		Effective length over 100 x pitch*	Bearing area	Minimum tensile strength DIN F_B min.	Weight
No.	Ind.		p			Pins	Plates		thickness	height				
No.	Ind.	No.	mm	inch		l_1 max.	B max.	d_2 max.	s	g_1 max.	mm	cm ²	kN	kg/m
F 122		LL 0822	12,7	1/2	2 x 2	9,0	6,4	4,45	1,55	10,7	1260	0,138	18,0	0,39
F 124		LL 0844	12,7	1/2	4 x 4	15,2	12,8	4,45	1,55	10,7	1260	0,276	36,0	0,74
F 126		LL 0866	12,7	1/2	6 x 6	21,4	19,0	4,45	1,55	10,7	1260	0,414	54,0	1,10
F 152		LL 1022	15,875	5/8	2 x 2	10,0	7,2	5,08	1,65	12,6	1580	0,175	26,0	0,50
F 154		LL 1044	15,875	5/8	4 x 4	17,1	14,5	5,08	1,65	12,6	1580	0,349	50,0	0,96
F 156		LL 1066	15,875	5/8	6 x 6	24,1	21,5	5,08	1,65	12,6	1580	0,524	78,0	1,39
F 192		LL 1222	19,05	3/4	2 x 2	10,7	7,8	5,72	1,83	14,7	1892	0,209	33,0	0,59
F 194		LL 1244	19,05	3/4	4 x 4	18,1	15,2	5,72	1,83	14,7	1892	0,419	66,0	1,15
F 196		LL 1266	19,05	3/4	6 x 6	25,4	22,6	5,72	1,83	14,7	1892	0,628	99,0	1,70
F 194 S		-	19,05	3/4	4 x 4	21,0	18,6	5,98	2,25	14,7	1905	0,515	76,5	1,40
F 196 S		-	19,05	3/4	6 x 6	31,5	27,8	5,98	2,25	14,7	1905	0,772	115,0	2,10
F 252		LL 1622	25,4	1	2 x 2	17,2	12,8	8,28	3,00	21,1	2532	0,500	70,0	1,56
F 254		LL 1644	25,4	1	4 x 4	29,3	25,6	8,28	3,00	21,1	2532	0,994	140,0	3,04
F 256		LL 1666	25,4	1	6 x 6	41,3	37,5	8,28	3,00	21,1	2532	1,490	210,0	4,53
F 312		LL 2022	31,75	1 1/4	2 x 2	20,3	16,0	10,19	3,75	25,4	3170	0,750	105,0	2,01
F 314		LL 2044	31,75	1 1/4	4 x 4	36,5	32,0	10,19	3,75	25,4	3170	1,500	210,0	3,93
F 316		LL 2066	31,75	1 1/4	6 x 6	51,5	48,0	10,19	3,75	25,4	3170	2,250	315,0	5,86
F 382		LL 2422	38,1	1 1/2	2 x 2	26,5	21,0	14,63	5,00	33,4	3797	1,460	175,0	4,18
F 384		LL 2444	38,1	1 1/2	4 x 4	46,5	42,0	14,63	5,00	33,4	3797	2,930	350,0	8,48
F 386		LL 2466	38,1	1 1/2	6 x 6	67,5	62,0	14,63	5,00	33,4	3797	4,390	525,0	12,20
F 502		LL 3222	50,8	2	2 x 2	30,5	25,0	17,81	6,00	43,0	5070	2,140	265,0	6,73
F 504		LL 3244	50,8	2	4 x 4	54,5	50,0	17,81	6,00	43,0	5070	4,280	530,0	13,10
F 506		LL 3266	50,8	2	6 x 6	80,5	74,0	17,81	6,00	43,0	5070	6,420	800,0	19,50
F 508		LL 3288	50,8	2	8 x 8	105,5	99,0	17,81	6,00	43,0	5070	8,560	1050,0	25,80
F 501		LL 3110	50,8	2	10 x 10	130,0	123,0	17,81	6,00	43,0	5070	10,850	1330,0	31,56
F 632		LL 4022	63,5	2 1/2	2 x 2	44,7	33,2	22,89	8,00	52,0	6335	3,525	422,0	10,51
F 634		LL 4044	63,5	2 1/2	4 x 4	77,9	65,6	22,89	8,00	52,0	6335	7,050	845,0	20,29
F 636		LL 4066	63,5	2 1/2	6 x 6	111,1	98,0	22,89	8,00	52,0	6335	10,575	1270,0	29,74
F 638		LL 4088	63,5	2 1/2	8 x 8	136,0	130,4	22,89	8,00	52,0	6335	14,100	1690,0	39,30

* Chain length tolerance $\pm 0,25\%$ of uncoiled chain under measuring force.

Wippermann Leaf Chain - LL Series



LEAF CHAINS ACCORDING TO WORKS-STANDARD

Chain		Nominal pitch		Lacing	Width over		Pin \varnothing	Plate		Effective length over 100 x pitch*	Bearing area	Minimum tensile strength	Weight
No.	Ind.	mm	inch		Pins	Plates		thickness	height				
		p			l_1 max.	B max.	d_2 max.	s	g_1 max.		f	F_B min.	q
		mm	inch		mm	mm	mm	mm	mm	mm	cm ²	kN	kg/m
FU 154		15,875	5/8	4 x 4	17,1	14,5	5,08	1,65	14,4	1596	0,350	52,0	1,2
FU 156		15,875	5/8	6 x 6	24,1	21,5	5,08	1,65	14,4	1596	0,524	78,0	1,8
FU 158		15,875	5/8	8 x 8	30,9	28,0	5,08	1,65	14,4	1596	0,699	102,0	2,3
FU 156 S		15,875	5/8	6 x 6	27,5	25,0	5,08	2,05	14,7	1596	0,625	83,5	2,1
FU 194		19,05	3/4	4 x 4	18,1	15,2	5,72	1,83	16,1	1907	0,419	66,0	1,4
FU 196		19,05	3/4	6 x 6	25,4	22,6	5,72	1,83	16,1	1907	0,628	99,0	2,3
FU 196 S		19,05	3/4	6 x 6	31,7	28,8	6,50	2,35	18,1	1907	0,917	130,0	2,9
FU 254		25,4	1 3/4	4 x 4	29,3	25,6	8,28	3,00	23,0	2550	0,994	140,0	3,5
FU 256		25,4	1	6 x 6	41,3	37,5	8,28	3,00	23,0	2550	1,490	210,0	5,0
FU 258		25,4	1	8 x 8	53,1	49,0	8,28	3,00	23,0	2550	1,987	280,0	6,8

* Chain length tolerance $\pm 0,25$ % of uncoiled chain under measuring force.

LEAF CHAINS HEAVY DUTY DESIGN U TO WORKS-STANDARD

With chains of this type all plates are mounted with a sliding fit and are also secured with laterally attached riveted washers. This design guarantees an even load distribution and reduces the bending load of the pin. These chains have been designed to transport heavy loads under harsh conditions. They are particularly suitable for such applications due to their high fatigue strength.

Chain		Nominal pitch		Lacing	Width over		Pin \varnothing	Plate		Effective length over 100 x pitch*	Bearing area	Minimum tensile strength	Weight
No.	Ind.	mm	inch		Pins	Plates		thickness	height				
		p			l_1 max.	B max.	d_2 max.	s	g_1 max.		f	F_B min.	q
		mm	inch		mm	mm	mm	mm	mm	mm	cm ²	kN	kg/m
F 384 U		38,1	1 1/2	4 x 4	53,2	42,0	14,63	5,00	33,4	3802	2,926	354,0	9,1
F 386 U		38,1	1 1/2	6 x 6	75,2	62,0	14,63	5,00	33,4	3802	4,389	540,0	12,5
F 388 U		38,1	1 1/2	8 x 8	94,2	83,0	14,63	5,00	33,4	3802	5,852	700,0	16,5
F 504 U		50,8	2 1/2	4 x 4	60,2	50,0	17,81	6,00	43,0	5073	4,274	530,0	13,5
F 506 U		50,8	2	6 x 6	87,2	74,0	17,81	6,00	43,0	5073	6,412	800,0	20,0
F 508 U		50,8	2	8 x 8	111,2	99,0	17,81	6,00	43,0	5073	8,549	1050,0	26,5
F 501 U		50,8	2	10 x 10	135,0	123,0	17,81	6,00	43,0	5073	10,686	1330,0	33,1
F 634 U		63,5	2 1/2	4 x 4	81,2	70,0	22,89	8,00	52,0	6340	5,494	845,0	19,4
F 636 U		63,5	2 1/2	6 x 6	112,2	101,0	22,89	8,00	52,0	6340	10,990	1270,0	29,1
F 638 U		63,5	2 1/2	8 x 8	146,0	135,0	22,89	8,00	52,0	6340	14,650	1690,0	38,8

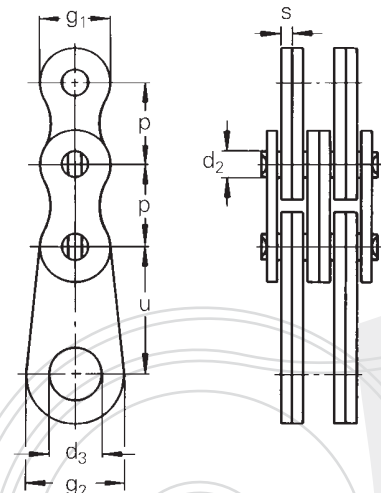
* Chain length tolerance $\pm 0,25$ % of uncoiled chain under measuring force.

Wippermann Leaf Chain - LL Series

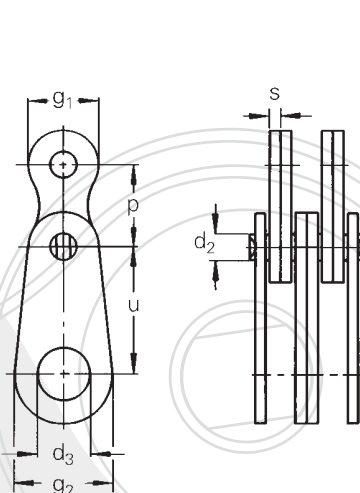


PLATE END LINKS AND CONNECTING PINS FOR LEAF CHAINS

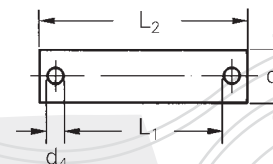
Inner end link
4 x 4



Outer end link
4 x 4



Connecting pin



Leaf chains are only supplied with end links on customers' request. The design with either outer or inner end link must be stated in the order.

DESIGN OF CHAIN ENDS:

Only the normal links are counted

- A Both sides with inner end links (uneven number of links)
- B Both sides with outer end links (uneven number of links)
- C One side with inner end link, other side with outer end link (even number of links)
- D One side with inner end link, other side with inner link (even number of links)
- E One side with outer end link, other side with outer link (even number of links)
- F One side with inner end link, other side with outer link (uneven number of links)
- G One side with outer end link, other side with inner link (uneven number of links)
- H Both sides with inner links (uneven number of links)
- I Both sides with outer links (uneven number of links)
- K One side with inner link, other side with outer link (even number of links)

Designation of a leaf chain design A with 25,4 mm pitch, combination 4 x 4, 45 normal links and end links on both sides: F 254 A x 45

Chain	Nominal pitch	End plates									Connecting pins								
		p	u	d ₂	d ₃	g ₁	g ₂	s	d ₂	d ₄	2 x 2		4 x 4		6 x 6		8 x 8		
											L ₁	L ₂	L ₁	L ₂	L ₁	L ₂	L ₁	L ₂	
No.	Ind.	mm	inch	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
F 12		12,7	½	30	4,45	10,0	10,5	20	1,55	4,45	1,6	6,8	13,0	13,6	19,8	20,4	26,6	-	-
F 15		15,875	⅝	30	5,08	10,0	12,5	20	1,70	5,08	1,6	7,4	13,6	14,8	21,0	21,8	28,0	-	-
F 19		19,05	¾	30	5,72	10,0	14,5	20	1,80	5,72	1,6	8,0	14,2	15,4	21,6	22,9	29,1	-	-
F 25		25,4	1	45	8,28	16,0	21,0	35	3,00	8,28	3,4	13,0	23,8	25,9	36,7	38,0	48,8	51,0	61,8
F 31		31,75	1¼	45	10,19	16,0	24,5	35	3,80	10,19	3,4	16,4	27,2	32,4	43,2	48,5	59,3	64,8	75,6
F 38		38,1	1½	60	14,63	26,0	33,0	50	5,00	14,63	4,2	21,3	33,7	42,4	54,8	63,5	75,9	84,8	97,2
F 50		50,8	2	70	17,81	36,0	43,0	70	6,00	17,81	4,2	25,5	37,9	50,5	62,9	75,5	87,9	100,7	113,0
F 63		63,5	2½	90	22,89	45,0	52,0	80	8,00	22,89	5,2	-	-	66,4	86,8	99,6	120,0	132,8	153,2
FU 12		12,7	½	30	4,45	10,0	11,5	20	1,55	4,45	1,6	-	-	13,6	19,8	20,4	26,6	-	-
FU 15		15,875	⅝	30	5,08	10,0	14,5	20	1,70	5,08	1,6	-	-	14,8	21,0	21,8	28,0	28,3	34,5
FU 15 S		15,875	⅝	20	5,08	8,3	14,7	18	2,00	5,08	1,6	-	-	-	-	30,9	37,5	-	-
FU 19		19,05	¾	30	5,72	10,0	15,4	20	1,80	5,72	1,6	-	-	15,4	21,6	22,9	29,1	-	-
FU 19 S		19,05	¾	25	6,50	10,3	18,0	20	2,30	6,50	1,6	-	-	19,6	25,8	29,3	35,5	-	-
FU 25		25,4	1	45	8,28	16,0	21,0	35	3,00	8,28	3,4	-	-	25,9	36,7	38,0	48,8	51	61,8
F 38 U		38,1	1½	60	14,63	26,0	33,0	50	5,00	14,63	4,2	-	-	48,4	61,0	70,0	82,4	90,8	103,2
F 50 U		50,8	2	70	17,81	36,0	43,0	70	6,00	17,81	4,2	-	-	56,5	68,9	81,5	93,9	106,8	119,2
F 63 U		63,5	2½	90	22,89	45,0	52,0	80	8,00	22,89	5,2	-	-	72,4	92,8	105,6	126,0	138,8	159,2

Other dimensions on request.

800 Series+Rating Chart & Leaf Chain Selection



Chain brand	Hours rated	Daily service hours	Service Conditions
HKK Chain (Sugiyama, Japan)	6000	16 to 24	Continuous high cycle lifting, high lifting loads/shock conditions. Uneven and pot holed working surfaces, harsh environment (salt air), marginal lubrication boundaries where dust,dirt & grit could also be an issue.

A top quality chain ideal for Port applications, container yards & heavy industrial applications (timber moulded fiber plants). The chain has an anti-corrosive pin to reduce the effects of possible fretting. An ideal chain for uneven surface working conditions including pot-holes.

MCC Max Top (Taiwan)	4500	8 to 16	A well manufactured chain designed for normal to moderate working conditions (#) and lifting cycles. In comparison with the HKK chain it has a more limited life expectancy in harsh working conditions but is still value for money if a less expensive chain is desired.
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Timber yards, mills and similar industrial applications where working conditions are normal (#) to reasonably well maintained. It also has a useful life expectancy in rougher, harsher and more abrasive working conditions found in open timber yards where a higher more expensive rated chain as HKK may not be desired to be installed.

Universal (China)	3000-4500	3 to 16	An economical chain built for normal forklift applications (#) but in some situations challenge the harsher working environments of MCC.
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A good economical general purpose chain for more normal (#) applications and working conditions but could also challenge MCC chain in certain applications. It is also designed as a dollar saving chain for applications where the machinery it is being fitted to has a limited life or does not require high cost chain.

NOTE (#) normal = sealed or smooth gravel working surfaces with smooth lifting

NOTES ON RATED AND SERVICE HOURS

The above maximum rated hours for HKK Chain is based on the life expectancy theories used by the NZ Health And Safety Regulations. The rated hours for the other two chains have been calculated on a cost % using the HKK as the bench mark standard for price and quality.

The rated hours are reliant on good standards of maintenance and lubrication represented on pages 12-14 of our ' Leaf Chain and Lifting Catalogue.' It is also important the chain has been selected correctly for its lifting application.

The actual working life hours of a chain could be higher or lower than the chains rated hours. This will be determined by suitably selected chain, its care and the working environment. With this in mind it would be quite feasible to have a 6000 hour rated chain lasting a considerably shorter time in a harsh working environment with good care and selection. However it could also last longer than 6000 hours in a better working environment receiving the same care and attention.

CHAIN LUBRICATION

One of the essential ingredients in maintaining the correct rated life for a lifting chain is to ensure that adequate lubrication reaches the bearing surfaces of the chain which incorporates the pin to bearing hole surfaces and the sides of the individual leaves. This is best achieved by removing and cleaning the chain and soaking it in SAE20/50 multi grade oil on a regular basis.

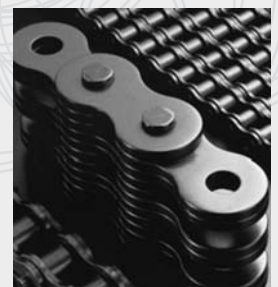
However, the method above is not always a practical solution in todays working environment and there are available a number of spray-on lubricants which can penetrate into the chain bearing areas. An oil spray with a molybdenum base is best suited for leaf chain applications as this leaves a film or a boundary lubrication barrier between the bearing surfaces. Another important part of this process is to ensure that the areas are clean where the oil is required to penetrate so that it has a maximum penetrating lubricating effect.

LIFTING CHAIN SELECTION GUIDE.

To ensure a satisfactory working life for a lifting chain correct maintenance and sizing work hand in hand. When selecting a chain size a working safety factor must be considered for each application. The guidelines are as follows.

Safety Factor	Chain Working Conditions
5 to 1	Low cycle, clean /lubricated conditions
7 to 1	High cycle, steady duty/well maintained
9 to 1	High shock load conditions cycle
11 to 1	High shock load,harsh conditions

$$\frac{\text{Average Tensile Strength}}{\text{Safety Factor}} = \text{KN or lbs (maximum allowable load) per Chain}$$



Harsh conditions are interpreted as dirty, abrasive conditions where a chain is hard to maintain and could be subjected to impulsive loads, temperature fluctuations & corrosive conditions.

Leaf Chain Stock Identification Chart (BL+AL)



BL LEAF CHAIN				
Leaf Chain Number	UN (ST)*		MCC	HKK STD
BL466	Y		N	N
BL523	Y		N	N
BL534	Y		N	N
BL544	Y		N	N
BL546	Y		N	N
BL566	Y		N	N
BL623	Y		N	N
BL634	Y		N	N
BL644	Y		N	N
BL646	Y		N	N
BL666	Y		N	N
BL822	Y		N	N
BL823	Y		N	N
BL834	Y		N	N
BL844	Y		N	N
BL846	Y		N	N
BL866	Y		N	N
BL1023	Y		N	N
BL1034	Y		N	Y
BL1046	Y		Y	Y
BL1066	Y		Y	Y
BL1088	Y		N	N
BL1234	Y		Y	N
BL1246	Y		N	N
BL1266	Y		Y	Y
BL1434	Y		N	N
BL1444	N		Y	N
BL1446	Y		N	N
BL1466	Y		N	N
BL1644	Y		N	Y
BL1666	Y		N	Y
BL1688	Y		N	Y

Y (STD) = standard pin

AL LEAF CHAIN				
AL566	Y	N	N	N
AL644	Y	N	N	N
AL666	Y	N	N	N
AL844	Y	N	N	N
AL866	Y	N	N	N
AL1066	Y	N	N	N
AL1666	Y	N	N	N

* LL series leaf chains are currently not available ex stock but can be sourced on an indent/ P.O.A. basis

