INTERNATIONAL STANDARD

ISO 4347

Fourth edition
2004-02-15

Leaf chains, clevises and sheaves — Dimensions, measuring forces and tensile strengths

Chaînes de levage à mailles jointives, chapes et galets de renvoi — Dimensions, forces de mesurage et résistances à la traction

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 4347 was prepared by Technical Committee ISO/TC 100, *Chains and chain wheels for power transmission and conveyors*.

This fourth edition cancels and replaces the third edition (ISO 4347:1992), which has been technically revised.

Introduction

This International Standard includes two series of chains: one derived from the ISO 606 A/ASME B29.8 series, designated by the symbol “LH” or “BL”; the other derived from the ISO 606 B series, designated by the symbol “LL”.

All dimensions are given in millimetres, converted from the original dimensions given in inches.

Leaf chains, clevises and sheaves — Dimensions, measuring forces and tensile strengths

1 Scope

This International Standard specifies the characteristics of chains used for general lifting purposes, together with the rim profiles of sheaves and the chain attachment ends of clevises. It gives dimensions, limits for interchangeability, length measurement, preloading and minimum tensile strengths. It is not applicable to 8 × 8 lacing.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

ISO 606, *Short-pitch transmission precision roller and bush chains, attachments and associated chain sprockets*[1)]

ASME[2)] B29.8, *Leaf chains, clevises and sheaves*

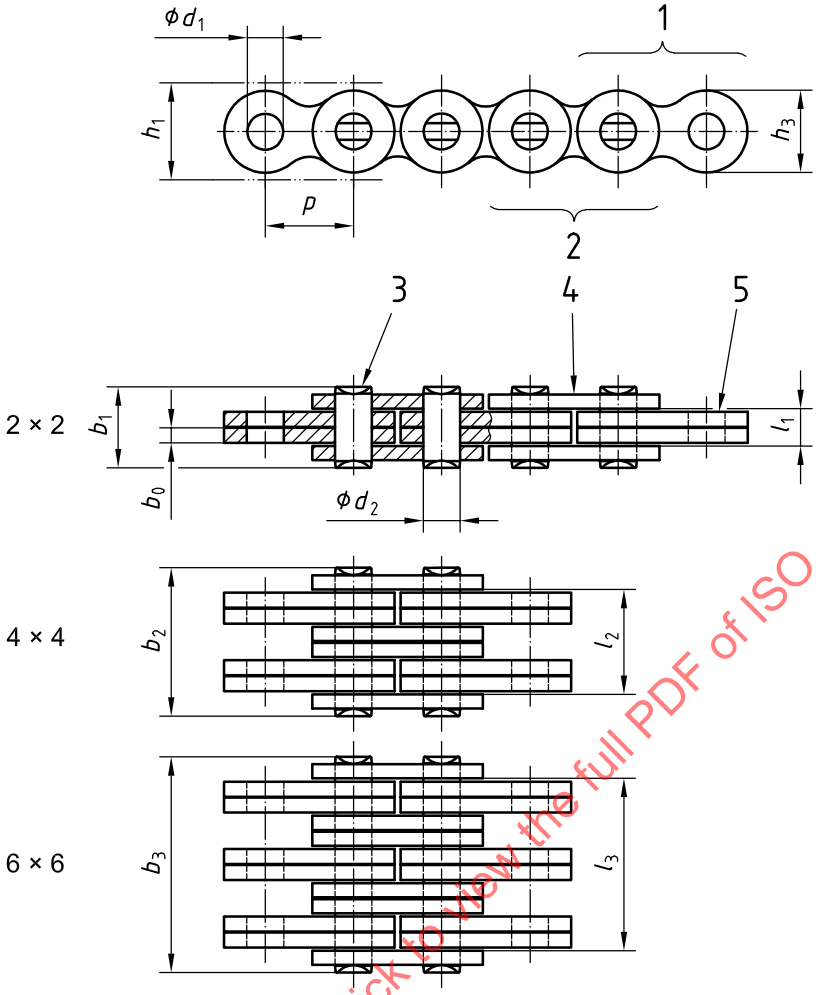
3 Chains

3.1 Nomenclature

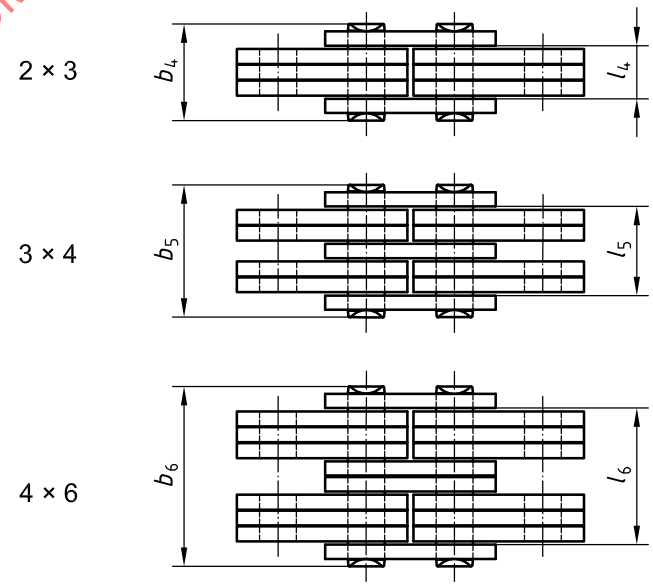
The nomenclature of chains is shown in Figure 1 (which does not necessarily define the actual form of the chain plates) and as given in Tables 1 and 2.

1) To be published. (Revision of ISO 606:1994)

2) American Society of Mechanical Engineers



a) **Even lacing**



b) **Uneven lacing**

Key

1 inner link
2 outer link
3 pin
4 outer plate
5 inner plate

Figure 1 — Symbols related to Tables 1 and 2

3.2 Chain designation

Leaf chain shall be designated by the prefix “LH” [“BL”] for chains derived from the ISO 606 A [ASME B29.8] series, or by the prefix “LL” for chains derived from ISO 606 B series, followed by a number of which the first two digits indicate the pitch expressed in sixteenths of an inch and the last two digits indicate the lacing (number of plates in the outer plate pitch and inner plate pitch).

To obtain the ASME “BL” reference, the same principle is used, except that the pitch is expressed in eighths of an inch using only one or two digits, dependent on pitch.

EXAMPLE 1 A chain with nominal pitch of 12,7 mm derived from chain ISO 08B, consisting of outer plates and inner plates each comprising two plates would be designated by

LL 0822

EXAMPLE 2 A chain with nominal pitch of 19,05 mm derived from ISO 12A [ASME chain No: 60], consisting of outer plates comprising three plates and inner plates comprising four plates would be designated by

LH 1234 [BL 634]

3.3 Dimensions

The dimensions given in Tables 1 and 2 provide minimum and maximum limits, ensuring interchangeability and connection to standard design clevises.

Manufacturers are responsible for the actual dimensional features of their products.

Chains from different manufacturers shall never be placed together within the same application.

Table 1 — Principal chain dimensions, measuring forces and tensile strengths, LH series

ISO chain number	ASME chain number	Pitch p nom.	Lacing	Thickness of plates b_0 max.	Hole diameter of inner plates d_1 min.	Pin diameter d_2 max.	Chain path depth h_1[a] min.	Plate depth h_3 max.	Width over riveted pin b_1 to b_6 max.	Width between outer plates l_1 to l_6 min.	Measuring force	Minimum tensile strength
		mm		mm							N	kN
LH 0822 [b]	BL 422	12,7	2 × 2	2,08	5,11	5,09	12,32	12,07	11,1	4,2	222	22,2
LH 0823	BL 423	12,7	2 × 3	2,08	5,11	5,09	12,32	12,07	13,2	6,3	222	22,2
LH 0834	BL 434	12,7	3 × 4	2,08	5,11	5,09	12,32	12,07	17,4	10,4	334	33,4
LH 0844 [b]	BL 444	12,7	4 × 4	2,08	5,11	5,09	12,32	12,07	19,6	12,4	445	44,5
LH 0846	BL 446	12,7	4 × 6	2,08	5,11	5,09	12,32	12,07	23,8	16,6	445	44,5
LH 0866	BL 466	12,7	6 × 6	2,08	5,11	5,09	12,32	12,07	28	21	667	66,7
LH 1022 [b]	BL 522	15,875	2 × 2	2,48	5,98	5,96	15,34	15,09	12,9	4,9	334	33,4
LH 1023	BL 523	15,875	2 × 3	2,48	5,98	5,96	15,34	15,09	15,4	7,4	334	33,4
LH 1034	BL 534	15,875	3 × 4	2,48	5,98	5,96	15,34	15,09	20,4	12,3	489	48,9
LH 1044 [b]	BL 544	15,875	4×4	2,48	5,98	5,96	15,34	15,09	22,8	14,7	667	66,7
LH 1046	BL 546	15,875	4 × 6	2,48	5,98	5,96	15,34	15,09	27,7	19,5	667	66,7
LH 1066	BL 566	15,875	6 × 6	2,48	5,98	5,96	15,34	15,09	32,7	24,6	1000	100,1
LH 1222 [b]	BL 622	19,05	2 × 2	3,3	7,96	7,94	18,34	18,11	17,4	6,6	489	48,9
LH 1223	BL 623	19,05	2 × 3	3,3	7,96	7,94	18,34	18,11	20,8	9,9	489	48,9
LH 1234	BL 634	19,05	3 × 4	3,3	7,96	7,94	18,34	18,11	27,5	16,5	756	75,6
LH 1244 [b]	BL 644	19,05	4 × 4	3,3	7,96	7,94	18,34	18,11	30,8	19,8	979	97,9
LH 1246	BL 646	19,05	4 × 6	3,3	7,96	7,94	18,34	18,11	37,5	26,4	979	97,9
LH 1266	BL 666	19,05	6 × 6	3,3	7,96	7,94	18,34	18,11	44,2	33,2	1468	146,8
LH 1622 [b]	BL 822	25,4	2 × 2	4,09	9,56	9,54	24,38	24,13	21,4	8,2	845	84,5
LH 1623	BL 823	25,4	2 × 3	4,09	9,56	9,54	24,38	24,13	25,5	12,3	845	84,5

Table 1 (*continued*)

ISO chain number	ASME chain number	Pitch p nom.	Lacing	Thickness of plates b_0 max.	Hole diameter of inner plates d_1 min.	Pin diameter d_2 max.	Chain path depth h_1 [a] min.	Plate depth h_3 max.	Width over riveted pin b_1 to b_6 max.	Width between outer plates l_1 to l_6 min.	Measuring force	Minimum tensile strength
		mm		mm							N	kN
LH 1634	BL 834	25,4	3 × 4	4,09	9,56	9,54	24,38	24,13	33,8	20,5	1290	129
LH 1644 [b]	BL 844	25,4	4 × 4	4,09	9,56	9,54	24,38	24,13	37,9	24,6	1690	169
LH 1646	BL 846	25,4	4 × 6	4,09	9,56	9,54	24,38	24,13	46,2	32,7	1690	169
LH 1666	BL 866	25,4	6 × 6	4,09	9,56	9,54	24,38	24,13	54,5	41,1	2536	253,6
LH 2022 [b]	BL 1022	31,75	2 × 2	4,9	11,14	11,11	30,48	30,18	25,4	9,8	1156	115,6
LH 2023	BL 1023	31,75	2 × 3	4,9	11,14	11,11	30,48	30,18	30,4	14,8	1156	115,6
LH 2034	BL 1034	31,75	3 × 4	4,9	11,14	11,11	30,48	30,18	40,3	24,5	1824	182,4
LH 2044 [b]	BL 1044	31,75	4 × 4	4,9	11,14	11,11	30,48	30,18	45,2	29,5	2313	231,3
LH 2046	BL 1046	31,75	4 × 6	4,9	11,14	11,11	30,48	30,18	55,1	39,4	2313	231,3
LH 2066	BL 1066	31,75	6 × 6	4,9	11,14	11,11	30,48	30,18	65	49,2	3470	347
LH 2422 [b]	BL 1222	38,1	2 × 2	5,77	12,74	12,71	36,55	36,2	29,7	11,6	1512	151,2
LH 2423	BL 1223	38,1	2 × 3	5,77	12,74	12,71	36,55	36,2	35,5	17,4	1512	151,2
LH 2434	BL 1234	38,1	3 × 4	5,77	12,74	12,71	36,55	36,2	47,1	28,9	2446	244,6
LH 2444 [b]	BL 1244	38,1	4 × 4	5,77	12,74	12,71	36,55	36,2	52,9	34,4	3025	302,5
LH 2446	BL 1246	38,1	4 × 6	5,77	12,74	12,71	36,55	36,2	64,6	46,3	3025	302,5
LH 2466	BL 1266	38,1	6 × 6	5,77	12,74	12,71	36,55	36,2	76,2	57,9	4537	453,7
LH 2822 [b]	BL 1422	44,45	2 × 2	6,6	14,31	14,29	42,67	42,24	33,6	13,2	1913	191,3
LH 2823	BL 1423	44,45	2 × 3	6,6	14,31	14,29	42,67	42,24	40,2	19,7	1 913	191,3
LH 2834	BL 1434	44,45	3 × 4	6,6	14,31	14,29	42,67	42,24	53,4	32,7	3 158	315,8
LH 2844 [b]	BL 1444	44,45	4 × 4	6,6	14,31	14,29	42,67	42,24	60,0	39,1	3 826	382,6

Table 1 (*continued*)

ISO chain number	ASME chain number	Pitch p nom.	Lacing	Thickness of plates b_0 max.	Hole diameter of inner plates d_1 min.	Pin diameter d_2 max.	Chain path depth h_1[a] min.	Plate depth h_3 max.	Width over riveted pin b_1 to b_6 max.	Width between outer plates l_1 to l_6 min.	Measuring force	Minimum tensile strength
		mm		mm							N	kN
LH 2846	BL 1446	44,45	4 × 6	6,6	14,31	14,29	42,67	42,24	73,2	52,3	3 826	382,6
LH 2866	BL 1466	44,45	6 × 6	6,6	14,31	14,29	42,67	42,24	86,4	65,5	5 783	578,3
LH 3222[b]	BL 1622	50,8	2 × 2	7,52	17,49	17,46	48,74	48,26	40.0	15,0	2 891	289,1
LH 3223	BL 1623	50,8	2 × 3	7,52	17,49	17,46	48,74	48,26	46,6	22,5	2 891	289,1
LH 3234	BL 1634	50,8	3 × 4	7,52	17,49	17,46	48,74	48,26	61,8	37,5	4 404	440,4
LH 3244[b]	BL 1644	50,8	4 × 4	7,52	17,49	17,46	48,74	48,26	69,3	44,8	5 783	578,3
LH 3246	BL 1646	50,8	4 × 6	7,52	17,49	17,46	48,74	48,26	84,5	59,9	5 783	578,3
LH 3266	BL 1666	50,8	6 × 6	7,52	17,49	17,46	48,74	48,26	100,0	75,0	8 674	867,4
LH 4022[b]	BL 2022	63,5	2 × 2	9,91	23,84	23,81	60,88	60,33	51,8	19,9	4 337	433,7
LH 4023	BL 2023	63,5	2 × 3	9,91	23,84	23,81	60,88	60,33	61,7	29,8	4 337	433,7
LH 4034	BL 2034	63,5	3 × 4	9,91	23,84	23,81	60,88	60,33	81,7	49,4	6 494	649,4
LH 4044[b]	BL 2044	63,5	4 × 4	9,91	23,84	23,81	60,88	60,33	91,6	59,1	8 674	867,4
LH 4046	BL 2046	63,5	4 × 6	9,91	23,84	23,81	60,88	60,33	111,5	78,9	8 674	867,4
LH 4066	BL 2066	63,5	6 × 6	9,91	23,84	23,81	60,88	60,33	131,4	99,0	13 011	1301,1

[a] Chain path depth is the minimum depth of channel through which the assembled chain will pass.

[b] These chains have reduced fatigue strength and wear life compared with uneven lacings of the same pitch and same minimum tensile strength. This should be taken into account when selecting a chain for a particular application.

Table 2 — Principle chain dimensions, measuring forces and tensile strengths, LL series

ISO chain number	Pitch p nom.	Lacing	Thickness of plates b_0 max.	Hole diameter of inner plates d_1 min.	Pin diameter d_2 max.	Chain path depth h_1[a] min.	Plate depth h_3 max.	Width over riveted pin b_1 to b_3 max.	Width between outer plates l_1 to l_6 min.	Measuring force	Minimum tensile strength
	mm		mm							N	kN
LL 0822	12,7	2 × 2	1,55	4,46	4,45	11,18	10,92	8,5	3,1	180	18
LL 0844	12,7	4 × 4	1,55	4,46	4,45	11,18	10,92	14,6	9,1	360	36
LL 0866	12,7	6 × 6	1,55	4,46	4,45	11,18	10,92	20,7	15,2	540	54
LL 1022	15,875	2 × 2	1,65	5,09	5,08	13,98	13,72	9,3	3,4	220	22
LL 1044	15,875	4 × 4	1,65	5,09	5,08	13,98	13,72	16,1	10,1	440	44
LL 1066	15,875	6 × 6	1,65	5,09	5,08	13,98	13,72	22,9	16,8	660	66
LL 1222	19,05	2 × 2	1,9	5,73	5,72	16,39	16,13	10,7	3,9	290	29
LL 1244	19,05	4 × 4	1,9	5,73	5,72	16,39	16,13	18,5	11,6	580	58
LL 1266	19,05	6 × 6	1,9	5,73	5,72	16,39	16,13	26,3	19,0	870	87
LL 1622	25,4	2 × 2	3,2	8,3	8,28	21,34	21,08	17,2	6,2	600	60
LL 1644	25,4	4 × 4	3,2	8,3	8,28	21,34	21,08	30,2	19,4	1 200	120
LL 1666	25,4	6 × 6	3,2	8,3	8,28	21,34	21,08	43,2	31,0	1 800	180
LL 2022	31,75	2 × 2	3,7	10,21	10,19	26,68	26,42	20,1	7,2	950	95
LL 2044	31,75	4 × 4	3,7	10,21	10,19	26,68	26,42	35,1	22,4	1 900	190
LL 2066	31,75	6 × 6	3,7	10,21	10,19	26,68	26,42	50,1	36,0	2 850	285
LL 2422	38,1	2 × 2	5,2	14,65	14,63	33,73	33,4	28,4	19,2	1 700	170
LL 2444	38,1	4 × 4	5,2	14,65	14,63	33,73	33,4	49,4	30,6	3 400	340
LL 2466	38,1	6 × 6	5,2	14,65	14,63	33,73	33,4	70,4	51,0	5 100	510
LL 2822	44,45	2 × 2	6,45	15,92	15,9	37,46	37,08	34	12,8	2 000	200
LL 2844	44,45	4 × 4	6,45	15,92	15,9	37,46	37,08	60	38,4	4 000	400

Table 2 (*continued*)

ISO chain number	Pitch p nom.	Lacing	Thickness of plates b_0 max.	Hole diameter of inner plates d_1 min.	Pin diameter d_2 max.	Chain path depth h_1[a] min.	Plate depth h_3 max.	Width over riveted pin b_1 to b_3 max.	Width between outer plates l_1 to l_6 min.	Measuring force	Minimum tensile strength
	mm		mm							N	kN
LL 2866	44,45	6 × 6	6,45	15,92	15,9	37,46	37,08	86	64,0	6 000	600
LL 3222	50,8	2 × 2	6,45	17,83	17,81	42,72	42,29	35	12,8	2 600	260
LL 3244	50,8	4 × 4	6,45	17,83	17,81	42,72	42,29	61	38,4	5 200	520
LL 3266	50,8	6 × 6	6,45	17,83	17,81	42,72	42,29	87	64,0	7 800	780
LL 4022	63,5	2 × 2	8,25	22,91	22,89	53,49	52,96	44,7	16,2	3 600	360
LL 4044	63,5	4 × 4	8,25	22,91	22,89	53,49	52,96	77,9	48,6	7 200	720
LL 4066	63,5	6 × 6	8,25	22,91	22,89	53,49	52,96	111,1	81,0	10 800	1080
LL 4822	76,2	2 × 2	10,3	29,26	29,24	64,52	63,88	56,1	20,2	5 600	560
LL 4844	76,2	4 × 4	10,3	29,26	29,24	64,52	63,88	97,4	60,6	11 200	1120
LL 4866	76,2	6 × 6	10,3	29,26	29,24	64,52	63,88	138,9	101,0	16 800	1680

[a] Chain path depth is the minimum depth of channel through which the assembled chain will pass.

3.4 Tensile testing

3.4.1 General

The tensile test shall be considered as a destructive test. Even though a chain may not visibly fail when subjected to a force equivalent to the minimum tensile strength, it will have been stressed beyond the yield point and will be unfit for service.

3.4.2 Minimum tensile strength

The minimum tensile strength shall be that value exceeded when a tensile force is applied to a sample tested to destruction in accordance with 3.4.3.

NOTE The minimum tensile strength is not a working force. It is intended primarily as a comparative figure between chains of different construction. For application information, it is necessary to consult the manufacturers or their published data.

3.4.3 Application of tensile force

Slowly apply a tensile force of not less than the measuring force specified in Tables 1 and 2 for that particular chain number to the ends of a chain length containing at least five free pitches by means of fixtures permitting free movement on both sides of the chain centreline, in the normal plane of articulation.

Failure shall be considered to have occurred at the first point where increasing extension is no longer accompanied by increasing force, i.e. the summit of the force/extension diagram.

Tests in which failures occur adjacent to the fixtures shall be disregarded.

3.5 Pre-loading

Chain manufactured in accordance with this International Standard shall be preloaded by applying a tensile force equivalent to at least 30 % of the minimum tensile strength given in Tables 1 or 2.

3.6 Length validation

“LL” series chains can be constructed from plates that are also used for short-pitch transmission roller chains, the actual pitch of the chain not necessarily being equal to its nominal pitch but depending upon the manufacturer.

Finished chains shall be measured after preloading, but before lubricating.

The standard length for measurement shall be a minimum of

a) 610 mm for ISO chains up to 19,05 mm pitch, or

b) 1 220 mm for ISO chains above 19,05 mm pitch.

The chain shall be supported throughout its entire length and a measuring force specified in Table 1 or 2 for the particular chain number shall be applied.

The measured length shall be nominal pitch times the number of pitches specified by the manufacturer, subject to a tolerance of ± 0,25 %. The number of pitches shall conform to the minimum specified in a) or b) of this subclause.

3.7 Cranked links

Cranked links shall not be used in leaf chains.

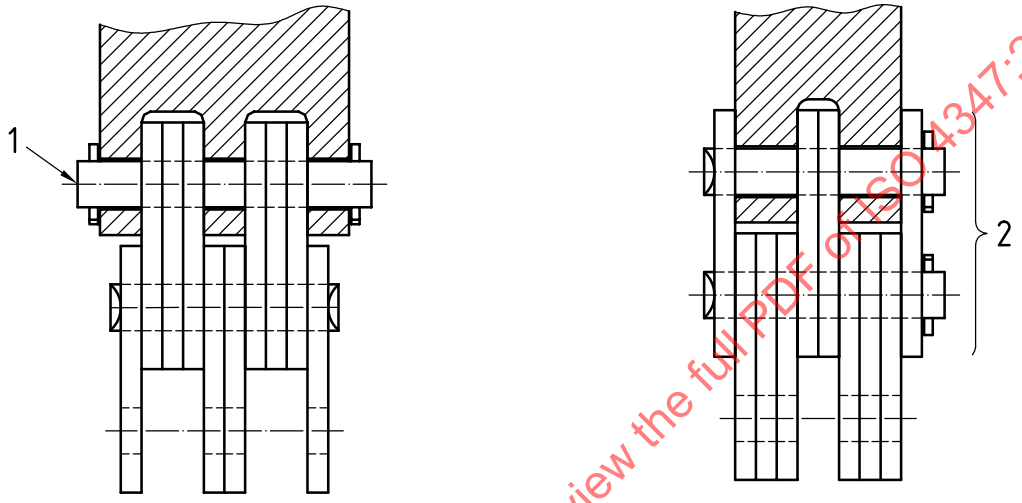
3.8 Marking

The chains shall be marked with the manufacturer's name or trademark. The chain numbers quoted in Tables 1 or 2, less the digits indicating lacing, should be marked on the chain.

4 Clevises

4.1 Types

There are two basic types of leaf chain clevis: the outside and the inside clevis (see Figure 2).



a) Outside clevis **b) Inside clevis**

Key

1 connecting pin

2 connecting link[a]

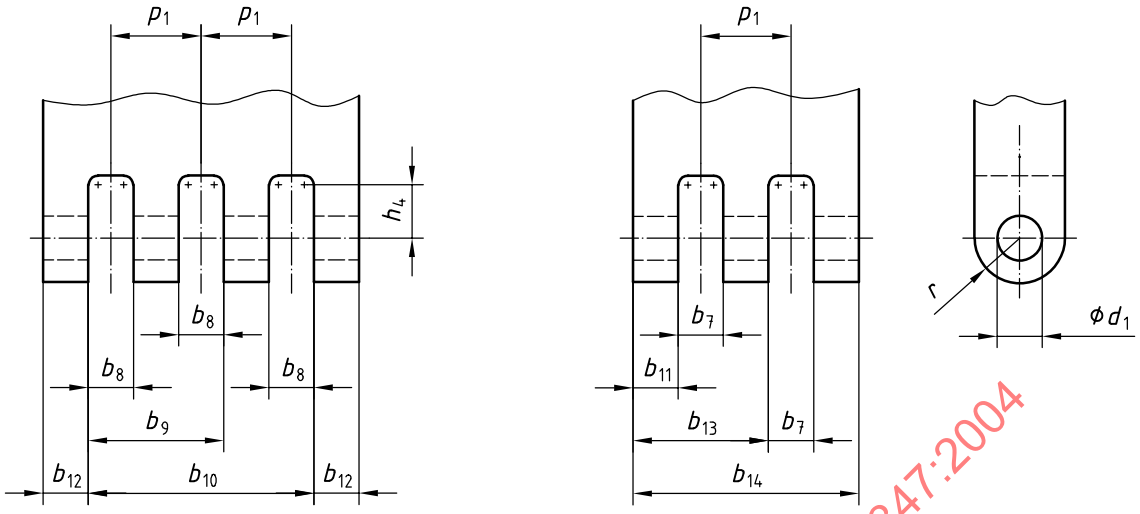
[a] The connecting link should be used with a press fit outer plate.

Figure 2 — Clevis types

4.2 Dimensions

The dimensions of terminal clevises for use with LH and LL series leaf chains shall be in accordance with Tables 3 and 4 and Figure 3.

NOTE Limiting dimensions given in those tables are for the purpose of ensuring connection to chains built in accordance with previous editions of this International Standard.



a) Outside clevis

b) Inside clevis

Figure 3 — Symbols related to Tables 3 and 4

Table 3 — Clevis dimensions, LH series

ISO chain number	ASME chain number	b_7	b_8	b_9	b_{10}	b_{12}	b_{11}	b_{13}	b_{14}	p_1	d_1	h_4	r
		H12[a]				min.	max.	max.	max.	nom.	min.	min.	max.
		mm											
LH 0822	BL 422	—	4,41	—	—	3,12	4,03	—	—	—	5,11	6,35	6,35
LH 0823	BL 423	—	6,53	—	—	3,12	6,05	—	—	—	5,11	6,35	6,35
LH 0834	BL 434	2,21	4,33	10,68	—	3,12	4,03	10,20	—	6,35	5,11	6,35	6,35
LH 0844	BL 444	4,41	4,41	12,89	—	3,12	4,03	12,25	—	8,47	5,11	6,35	6,35
LH 0846	BL 446	4,41	6,53	17,12	—	3,12	6,05	16,32	—	10,59	5,11	6,35	6,35
LH 0866	BL 466	4,41	4,41	12,89	21,36	3,12	4,03	12,25	20,47	8,47	5,11	6,35	6,35
LH 1022	BL 522	—	5,24	—	—	3,72	4,80	—	—	—	5,98	7,92	7,92
LH 1023	BL 523	—	7,76	—	—	3,72	7,20	—	—	—	5,98	7,92	7,92
LH 1034	BL 534	2,62	5,14	12,69	—	3,72	4,80	12,12	—	7,55	5,98	7,92	7,92
LH 1044	BL 544	5,24	5,24	15,31	—	3,72	4,80	14,56	—	10,07	5,98	7,92	7,92
LH 1046	BL 546	5,24	7,76	20,35	—	3,72	7,20	19,40	—	12,59	5,98	7,92	7,92
LH 1066	BL 566	5,24	5,24	15,31	25,38	3,72	4,80	14,56	24,31	10,07	5,98	7,92	7,92
LH 1222	BL 622	—	6,96	—	—	4,95	6,41	—	—	—	7,96	9,53	9,53
LH 1223	BL 623	—	10,31	—	—	4,95	9,61	—	—	—	7,96	9,53	9,53
LH 1234	BL 634	3,48	6,83	16,88	—	4,95	6,41	16,18	—	10,05	7,96	9,53	9,53
LH 1244	BL 644	6,96	6,96	20,36	—	4,95	6,41	19,43	—	13,40	7,96	9,53	9,53
LH 1246	BL 646	6,96	10,31	27,06	—	4,95	9,61	25,89	—	16,75	7,96	9,53	9,53
LH 1266	BL 666	6,96	6,96	20,36	33,76	4,95	6,41	19,43	32,45	13,40	7,96	9,53	9,53
LH 1622	BL 822	—	8,59	—	—	6,13	7,93	—	—	—	9,56	12,70	12,70
LH 1623	BL 823	—	12,73	—	—	6,13	11,89	—	—	—	9,56	12,70	12,70
LH 1634	BL 834	4,29	8,43	20,86	—	6,13	7,93	19,97	—	12,42	9,56	12,70	12,70
LH 1644	BL 844	8,59	8,59	25,15	—	6,13	7,93	23,98	—	16,56	9,56	12,70	12,70