INTERNATIONAL STANDARD

ISO 1082

Second edition
1990-08-01

Mining — Shackle type connector units for chain conveyors

Exploitation minière — Étriers de raccordement pour convoyeurs à chaînes

Reference number
ISO 1082 : 1990 (E)

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.

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.

International Standard ISO 1082 was prepared by Technical Committee ISO/TC 82, *Mining*.

This second edition cancels and replaces the first edition (ISO 1082 : 1984), of which it constitutes a minor revision. All references to ISO/R 147 have been replaced by a reference to ISO 7500-1.

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Mining — Shackle type connector units for chain conveyors

1 Scope

This International Standard specifies the requirements for a range of shackle type connector units for use with chain conveyors. Each unit consists of the following components:

a) shackle type connector;

b) connector bolt;

c) connector nut.

This International Standard is not intended to indicate a complete design, but it gives sufficient detail to ensure dimensional compatibility with chains complying with ISO 610 and scraper bars complying with ISO 5612. The connector units specified are intended for use as part of 14, 18, 22, 24 and 26 mm diameter chain assemblies in which the connectors are fitted tightly on to scraper bars.

2 Normatives references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 610 : 1990, *High-tensile steel chains (round link) for chain conveyors and coal ploughs.*

ISO 5612 : 1990, *Mining — Scraper bars for chain conveyors.*

ISO 7500-1 : 1986, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tensile testing machines.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 size: The nominal size of the chain for which the connector is made.

3.2 test force: The specified force to which a sample finished connector unit shall be subjected without exceeding the percentage elongation stated in table 3.

3.3 breaking force: The maximum force which a sample finished connector unit withstands during the course of a tensile test to destruction.

3.4 percentage elongation: The extension expressed as a percentage of the outside length.

3.5 processing: Any treatment of the connector units subsequent to forging; for example heat treatment, machining or surface treatment.

3.6 inspector: The representative of the purchaser.

4 Components of connector units

4.1 Shackle type connector

4.1.1 Material

The steel used shall be fully killed, of forgeable quality and of a type not liable to embrittlement, including strain age embrittlement. Within these limitations, and unless otherwise specified, it shall be the responsibility of the connector manufacturer to select the steel so that the finished connector, suitably heat-treated, meets the specified mechanical properties.

4.1.2 Heat treatment

Connectors conforming to this International Standard shall be heat treated in the course of manufacture. Heating to an appropriate temperature above the critical point (Ac_3) of the steel used shall form part of such heat treatment.

4.1.3 Workmanship

All finished connectors shall be sound and free from cracks, surface flaws, laminations and other harmful defects. All flashes or fins produced in manufacture shall be removed.

4.1.4 Surface condition

Unless otherwise agreed between purchaser and manufacturer, connectors shall be supplied unpolished and free from any coating.

4.1.5 Identification marking

Where identification marking is applied during forging, the marks shall comply with 6.2.1 and be positioned on the connector body so that the mechanical properties of the connector are unaffected and the marking is not readily removable by abrasion in use.

4.1.6 Dimensions

The connector (see figure 1) shall be produced to the dimensions shown in table 1 for the appropriate size of chain. All other dimensions shall be chosen to ensure correct mating between the connector and the associated sprocket, scraper bar and conveyor pan.

4.2 Connector bolt and nut

The essential dimensions and mechanical properties of bolts and nuts shall comply with table 2 and the appropriate International Standards.

5 Sampling and testing

5.1 General

The dimensions and mechanical properties of connectors shall be as stated in tables 1 and 3. The testing procedure shall be as follows.

5.2 Selection of samples

Unless otherwise specified by the purchaser, the following sampling arrangements shall apply, but this shall not preclude the inspector asking for such further samples as he may deem necessary:

a) test samples shall be selected at random; they shall be in the same condition as the bulk of the connectors;

b) for sampling purposes, the connectors shall be divided into lots, a lot comprising 500 connectors; any fraction shall be considered as a complete lot;

c) for the dimensional test, five samples shall be taken from each lot;

d) for the static tensile test, one sample shall be taken from each lot;

e) for the fatigue test, one sample shall be taken from each lot.

5.3 Dimensional test

The finished connector dimensions shall be verified as being in accordance with those specified in table 1.

5.4 Static tensile test

5.4.1 Test conditions

For the purpose of the test, the finished connector shall be assembled with

a) a suitable spacer;

b) a connector bolt and nut of the type described in table 2;

c) two lengths of chain of the appropriate size as given in ISO 610 of the same grade or better than the connector under test and to suit the requirements of the testing machine. Alternatively special anchorages, with dimensions corresponding to those of the appropriate size of chain, may be used to anchor the connector in the testing machine.

The spacer shall have the same profile as the scraper bar that is to be used with the connector. With the spacer in position the bolt/nut shall be tightened to the relevant value of torque given in table 2.

The type and accuracy of the testing machine shall be in accordance with class 1 of ISO 7500-1 or equivalent national standard. The testing machine shall be used only within its appropriate range as shown by the test certificate.

5.4.2 Elongation at test force

The connector unit shall be subjected to a force equal to half of the test force stated in table 3. The force shall then be reduced to the setting force stated in table 3 and the outside length of the connector (C in figure 1) measured.

The force shall then be increased, at a rate of approximately 20 kN/s, to the test force specified in table 3 and the outside length of the connector again measured.

The total elongation so determined shall not exceed the relevant percentage stated in table 3.

5.4.3 Breaking force

Following application of the test force, the force shall then be increased further until the sample breaks. The breaking force determined by the test shall be not less than the appropriate value stated in table 3. If, during the test, the sample does not reach the breaking force stated in table 3, because of prior failure of the connector bolt or nut, the test is void and shall be repeated on another sample.

5.4.4 Permanent elongation after fracture

After the test break, the broken parts of the connector shall be fitted together and the outside length of the connector (C in figure 1) measured. The permanent elongation determined by the test shall be not less than the minimum percentage given in table 3.

5.5 Fatigue test

5.5.1 General

The fatigue test is not mandatory. It is an optional test which may be used as an additional acceptance criterion subject to agreement between purchaser and manufacturer at the time of order.

5.5.2 Description of test

The test involves subjecting a connector/chain assembly, as previously described in 5.4.1, to repeated forces (between a lower and an upper limit, see table 3) at a given frequency. The number of cycles sustained before the sample breaks constitutes the fatigue resistance (or endurance) of the sample.

5.5.3 Conditions of test

Fatigue tests should be performed under the following conditions.

5.5.3.1 Testing machine

The type and accuracy of the testing machine shall be suitable for applying the forces specified in table 3. The machine shall be calibrated statically, where appropriate, in accordance with class 1 of ISO 7500-1 or an equivalent national standard. Compensation for dynamic effects should not be based on calculations, but the actual forces on the test piece should be checked occasionally by some electrical measuring device that can be mounted on the machine in series with the sample.

5.5.3.2 Frequency of force application

The frequency of force application shall be not less than 200 cycles per minute and not greater than 1 000 cycles per minute. In case of dispute, check tests shall be carried out at 500 cycles per minute.

5.5.3.3 Criteria of acceptance

Each sample tested shall be deemed satisfactory if its fatigue resistance/endurance is not less than 40 000 cycles.

If a result is less than 40 000 cycles, two further samples shall be subjected to the same test; both shall have an endurance of not less than 40 000 cycles.

The purchaser and manufacturer may, by agreement, determine the acceptance level for fatigue resistance by using a statistical method as outlined in annex E of ISO 610 : 1990.

6 Inspection procedure

6.1 Acceptance

A connector lot shall be deemed to comply with this International Standard if each of the samples taken from the lot fulfils all the specified test requirements.

Should any of the samples fail to meet any one of the specified tests, two further samples shall be selected from the same lot. If both these additional samples meet all the specified tests, the lot shall be deemed to comply with this International Standard. Should either of the two further samples fail any one of the specified tests, the connector lot shall be rejected.

6.2 Marking

6.2.1 Identification marking

All finished connectors shall be legibly marked to indicate the manufacturer and, by agreement between the purchaser and the manufacturer, any other relevant information.

6.2.2 Inspection marking

Provided all specified tests are satisfactory and a lot has been accepted, the inspector shall signify his acceptance. The precise extent and nature of the inspection marking to be used shall be subject to agreement between the purchaser and the manufacturer.

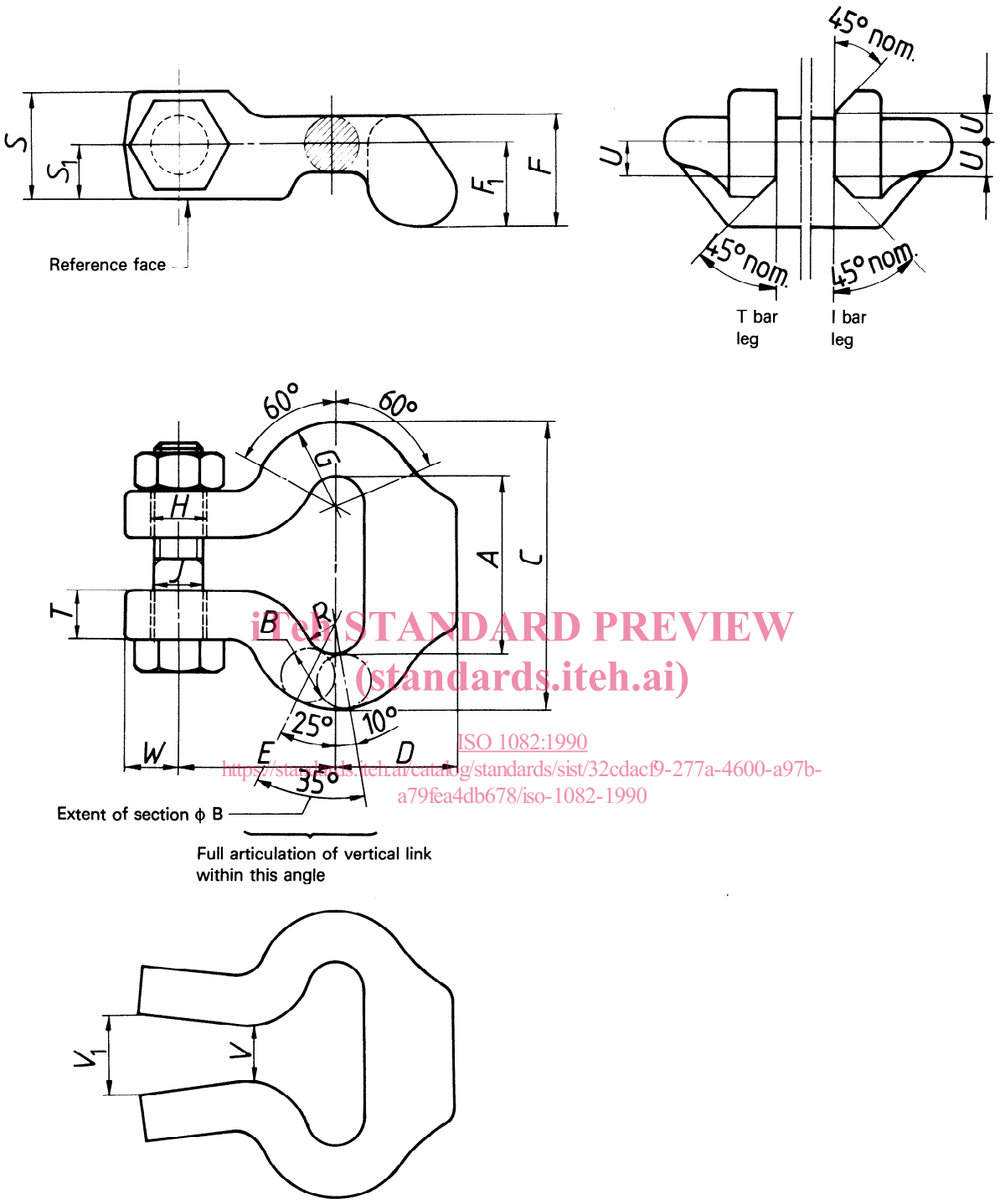
6.3 Test certificate

At the option of the purchaser, the manufacturer shall supply a representative certificate(s) of test and examination with every consignment of connector units supplied as conforming to this International Standard; when so agreed between the purchaser and the manufacturer, identification of the cast number of the steel shall be stated. This shall also apply in instances where connector units are supplied as part of a complete conveyor chain assembly.

The certificate shall be signed by the manufacturer and by the inspector if he witnessed the inspection test.

6.4 General inspection

For the purpose of witnessing the tests and inspecting the testing machines and methods of examination, the inspector shall be given access to the relevant parts of the works of the manufacturer at all reasonable times.



NOTE — The connector illustrated is a short leg connector.

Figure 1 — Connector unit

Table 1 — Dimensions of connectors

Dimensions and tolerances in millimetres

Nominal size and pitch of chain	Connector pitch		Material diameter		Length	Chain centre to outside pad	Chain centre to hole centre	Pad		Outer radius	Hole diameter	Bolt diameter	Inner radius	Leg height	Hole centre from datum	Leg width	Chamfer location	Leg gap unbolted		Hole to end of leg	
								Height	Offset									Inside	Outside	Long leg[2]	Short leg[2]
	A		B		C	D	E	F	F_1	G	H	J	R	S	S_1	T	U	V	V_1	W	W_1
	max.	min.	max.	min.	max.		± 1			max.	+1 0		+0,5 0	0 −1,5	0 −0,5	0 −1	+0,5 0	+2 0	max.	max.	max.
14 × 50	50	49	16	14	81	1)	51	1)	1)	24	17	M16	8	32	16	14,5	11	18	V actual +2	—	18
18 × 64	64	63	20	18	103	1)	55	1)	1)	30	21	M20	10	43	21,5	18,5	14,5	21		41	23
22 × 86	86,5	85,0	24	22	134	1)	75	1)	1)	37	25	M24	12	52	26	22,5	17	25		45	—
24 × 86	86,5	85,0	26	24	138	1)	78	1)	1)	39,5	25[3]	M24	13	52	26	24,5	17	26,5		45	24
24 × 87,5	88,0	86,5	26	24	139,5	1)	78	1)	1)	39,5	25	M24	13	52	26	24,5	17	26,5		45	—
26 × 92	93	91	28	26	148	1)	85	1)	1)	43	28	M27	14	58	29	26,5	17,5	28,5	V actual +3	45	—

1) These dimensions are dependent on associated line pans.

2) The purchaser may specify a combination of long and short legs at the time of order.

3) Hole tolerance to be agreed between the purchaser and manufacturer.

Table 2 — Dimensions and mechanical properties of the connector bolt and nut

Nominal size and pitch of chain mm × mm	Bolt				Nut		
	Thread	Length under head [1] min. mm	Plain length max. mm	Property class min.	Thread	Property class min.	Tightening torque min. N·m
14 × 50	M16	62	42	8.8	M16	8	180
18 × 64	M20	75	49	10.9	M20	10	400
22 × 86	M24	90	62	10.9	M24	10	500
24 × 86	M24	95	62	10.9	M24	10	500
24 × 87,5	M24	95	62	10.9	M24	10	500
26 × 92	M27	105	75	10.9	M27	10	700

1) Based on ordinary hexagonal nut. If a torque prevailing nut is used, the length shall be chosen according to the type of nut used.

Table 3 — Mechanical properties of shackle type connectors

Nominal size and pitch of chain mm × mm	Test force kN	Percentage elongation at test force max. %	Breaking force min. kN	Permanent elongation after fracture min. %	Setting force kN	Fatigue test		
						Force levels lower kN	Force levels upper kN	Number of cycles min.
14 × 50	180	2	225	8	8	15	77	40 000
18 × 64	300	2	370	8	13	25	127	40 000
22 × 86	415	2	550	8	19	38	190	40 000
24 × 86	490	2	650	8	23	45	226	40 000
24 × 87,5	490	2	650	8	23	45	226	40 000
26 × 92	575	2	765	8	26	53	265	40 000

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Descriptors: mining equipment, chain conveyors, shackles, connectors, specifications, dimensions, tests, marking.

Price based on 6 pages