BS EN 61236:2011

BSI Standards Publication

Live working — Saddles, stick clamps and their accessories

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 61236:2011. It is identical to IEC 61236:2010. It supersedes BS EN 61236:1995, which will be withdrawn on 1 February 2014.

The UK participation in its preparation was entrusted to Technical Committee PEL/78, Tools for live working.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 72298 1

ICS 13.260; 29.240.20; 29.260.99

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2011.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61236

March 2011

ICS 13.260; 29.240.20; 29.260.99

Supersedes EN 61236:1995

English version

Live working - Saddles, stick clamps and their accessories
(IEC 61236:2010)

Travaux sous tension - Selles, manchons et leurs accessoires (CEI 61236:2010)

Arbeiten unter Spannung - Mastsättel, Stangenschellen und Zubehör (IEC 61236:2010)

This European Standard was approved by CENELEC on 2011-02-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 61236:2011 E

Foreword

The text of document 78/850/CDV, future edition 2 of IEC 61236, prepared by IEC TC 78, Live working, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61236 on 2011-02-01.

This European Standard supersedes EN 61236:1995.

This EN 61236:2011 includes the following significant technical changes with respect to EN 61236:1995:

– clarification of the requirements and of the test provisions;

– addition of a test for the durability of marking;

– application of conformity assessment for products having completed the production phase, according to EN 61318:2008.

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

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-11-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2014-02-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61236:2010 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60743:2008 NOTE Harmonized as EN 60743:2001+A1:2008 (not modified).

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60417	Data-base	Graphical symbols for use on equipment	-	-
IEC 61318	2007	Live working - Conformity assessment applicable to tools, devices and equipment	EN 61318	2008
IEC 61477	-	Live working - Minimum requirements for the utilization of tools, devices and equipment	EN 61477	-

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIVE WORKING – SADDLES, STICK CLAMPS AND THEIR ACCESSORIES

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61236 has been prepared by IEC technical committee 78: Live working.

This second edition cancels and replaces the first edition published in 1993. It constitutes a technical revision.

It includes the following significant technical changes from the previous edition:

– clarification of the requirements and of the test provisions;
– addition of a test for the durability of marking;
– application of conformity assessment for products having completed the production phase, according to IEC 61318:2007 (Ed. 3).

The text of this standard is based on the following documents:

Enquiry draft	Report on voting
78/850/CDV	78/867/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The requirements provided in this standard are essential requirements. Each user of this standard may supplement it with their own requirements. These will cover, for example, required mechanical performance and conditions of interchangeability with equipment already in service. In such cases, caution should be taken to maintain or improve the performance of the products.

This International Standard has been prepared in accordance with the requirements of IEC 61477.

The products covered by this standard may have an impact on the environment during some or all stages of its life cycle. These impacts can range from slight to significant, be of short-term or long-term, and occur at the global, regional or local level.

Except for a disposal statement in the instructions for use, this standard does not include requirements and test provisions for the manufacturers of the product, or recommendations to the users of the product for environmental improvement. However, all parties involved in the product's design, manufacture, packaging, distribution, use, maintenance, repair, reuse, recovery and disposal are encouraged to take account of environmental considerations.

LIVE WORKING – SADDLES, STICK CLAMPS AND THEIR ACCESSORIES

1 Scope

This International Standard is applicable to saddles, stick clamps and their accessories, used for live working.

The products designed and manufactured according to this standard contribute to the safety of the users provided they are used by skilled persons, in accordance with safe methods of work and the instructions for use.

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.

IEC 60417, *Graphical symbols for use on equipment*

IEC 61318:2007, *Live working – Conformity assessment applicable to tools, devices and equipment*

IEC 61477, *Live working – Minimum requirements for the utilization of tools, devices and equipment*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61318 and the following apply.

3.1.1
accessory
supplemental metal device used with saddles and stick clamps to carry out the live work

3.1.2
family of devices
devices which have the same function (utilization, use, etc.)

3.1.3
rated value
value of a quantity used for specification purposes, established for a specified set of operating conditions of a component, device, equipment, or system

[IEC 60050-151:2001, 151-16-08]

3.1.4
saddle
metal device fixed to a pole, cross-arm or tower and used with a stick clamp to hold or guide support sticks and other equipment

[IEC 60743:2008, 10.3.1 and IEC 60050-651:1999, 651-09-06, modified]

3.1.5
stick clamp
metal device used with a stick or saddle to hold or guide a support stick

[IEC 60743:2008, 10.3.6, modified]

3.1.6
type of device
devices which have the same design and application and are of similar dimensions

3.2 Symbols

T_N rated torque given by the manufacturer for a device or a part of a device and for testing purposes

F_{TN} rated tensile force given by the manufacturer for a device or a part of a device and for testing purposes

F_{BN} rated bending force given by the manufacturer for a device or a part of a device and for testing purposes

F_{GN} rated slippage force given by the manufacturer for a device and for testing purposes

4 Requirements

4.1 General

The following requirements have been prepared in order that the saddles, stick clamps and their accessories covered by this standard are designed and manufactured to contribute to the safety of the users, provided they are used by persons skilled for live working, in accordance with safe methods of work and the instructions for use.

NOTE Appropriate measures should be taken to minimize the weight and size of the equipment to optimize handling.

4.2 Dimensional requirements

For each type of device, the manufacturer shall indicate the dimensions or operating ranges related to the specific functions of the device, in particular the dimensions of acceptable supports for the saddles, and the specified diameters of acceptable tubes and rods for stick clamps shall be indicated.

4.3 Mechanical requirements

For each type of device, the manufacturer shall give the rated values as outlined in Table 1.

Table 1 – Mechanical ratings for each type of device

Type of device	Rated values			
	Bending F_{BN}	**Tensile** F_{TN}	**Torque** T_N	**Slippage** F_{GN}
Chain (strap) binder		- Whole device - Locking device	Tightening device	
Ring saddle with rigid bracket	- Whole device - Locking device	Chain (strap) and locking device		
Ring saddle with chain bracket	Locking device	- Whole device - Chain (strap) and locking device	Tightening device	
Lift-type saddle	- Whole device - Locking device	- Chain (strap) and locking device - Shackle		
Pole-type saddle	- Whole device [a] - Locking device	Chain (strap) and locking device		
Saddle extension	Whole device			
Tower-type saddle	Whole device [a]		Mounting bolts	
Crossarm-type saddle	Whole device [a]		Mounting bolts	
Block saddle	Whole device			
Tower-arm yoke	Whole device		Mounting bolts	
Platform pivot attachment	Whole device			
Saddles and accessories for hydraulic tension puller	- Saddle for triangular yoke - Saddle for rectangular yoke - Insulating rope gin	- Assembly - Tenon extension - Block anchoring point		
Stick clamp	Whole device	Assembly [b]	Mounting bolts	Whole device
Rigid support-stick stirrup	Whole device			Whole device
Swivel support-stick stirrup		Whole device		Whole device
Offset eye	Whole device			

[a] The manufacturer shall give the values F_{BN} for these devices with and without saddle extension.

[b] Applicable to stick clamps designed to be coupled.

4.4 Protection against corrosion

Metallic parts shall be protected against corrosion, either by their composition or by a suitable surface treatment.

For each type of device, the manufacturer shall demonstrate that the metallic parts are corrosion resistant.

4.5 Marking

Each device shall be marked with the following permanent items of marking:

– manufacturer’s name or trade mark;

– type reference;

– year and, if possible, month of manufacture;

– rating (or capacity if requested by the customer);

– symbol IEC 60417-5216:2002-10 – Suitable for live working; double triangle (Annex A);

NOTE The exact ratio of the height of the figure to the base of the triangle is 1,43. For the purpose of convenience, this ratio can be between the values of 1,4 and 1,5.

– number of the relevant IEC standard immediately adjacent to the symbol (IEC 61236).

Information or characteristics not required at the work site, such as year of publication of the standard, shall be provided by other means (bar codes, microchips, etc.) or shall be provided on the packaging.

4.6 Instructions for use

Each device shall come with the manufacturer's instructions for use and care. These instructions shall be prepared in accordance with the general provisions given in IEC 61477.

These instructions shall include at least

– maximum mechanical rating;

– recommended application(s);

– recommendations for cleaning, storage, transportation, periodic testing, refinishing and disposal.

5 Tests

5.1 General

This standard provides testing provisions to demonstrate compliance of the product with the requirements of Clause 4. These testing provisions are primarily intended to be used as type tests for validation of the design input. Where relevant, alternative means (calculation, examination, tests, etc.), are specified within the test subclauses for the purpose of saddles, stick clamps and their accessories having completed the production phase.

To show compliance with this standard, the manufacturer shall prove that the type tests have been carried out successfully on at least three devices for each type.

However, when the differences between several types of device are limited in number, tests that are unaffected by the differing characteristics of the devices can be carried out on a single type of device, and the results can be used for the other device types.

The different type tests, and the order in which these tests are performed are given in Annex B.

The tests in Tables B.1, B.2, B.3 and B.4 of Annex B shall be performed, following the specified order.

NOTE In Tables B.1, B.2, B.3 and B.4 the numbers within parentheses provide reference to the Subclause where the relevant test is explained. For some families of devices, columns are divided in sub-columns equal to the number of mechanical tests to be applied to these devices (these may be destructive). These sub-columns also show the sequence of tests to be applied (for an example see Table B.5).

Any device failing to pass any one of the tests mentioned in Tables B.1, B.2, B.3 and B.4 of Annex B shall result in the design being rejected.

5.2 Visual and functional inspection

Each device shall be visually inspected to detect manufacturing defaults and to check proper functioning.

The test shall be considered as passed if each device shows compliance with the requirements included in 4.3, 4.4, 4.5 and 4.6 where applicable.

5.3 Dimensional check

Each device shall be measured to ensure that its dimensions match the manufacturer's rated dimensions.

5.4 Durability of marking

The durability of the marking shall be verified by thoroughly cleaning the marking for at least 1 min with a piece of lint-free cloth dampened with water and then rubbing it vigorously for a further minimum of 1 min with a piece of lint-free cloth dampened with isopropanol (CH_3-$CH(OH)$-CH_3).

NOTE 1 It is the employer's duty to ensure that any relevant legislation and any specific safety instructions regarding the use of isopropanol are fully observed.

The test shall be considered as passed if the marking remains legible and the letters do not smear.

The surface of the device may change. No signs of loosening shall be present for labels.

NOTE 2 Marking made by moulding or engraving need not be subjected to this test.

5.5 Mechanical tests

5.5.1 General test provisions and pass criteria

The tensile, bending, and slippage force and the torque values shall be progressively applied in increments at a rate of (0,1 ± 0,025) F_{TN}/s, F_{BN}/s, F_{GN}/s and T_N/s until the values of 1,25 F_{TN}, 1,25 F_{BN}, 1,25 F_{GN} and 1,25 T_N are reached.

Each value shall then be maintained for 1 min before the results are noted.

The test shall be considered as passed if no visible signs of damage are observed on the device and no slippage occurs.

These force and torque values shall then be increased again at the same rate as above until the values of 2,5 F_{TN}, 2,5 F_{BN}, 1,5 F_{GN} and 2,5 T_N are reached. Each value shall be maintained for 1 min before the results are noted again.

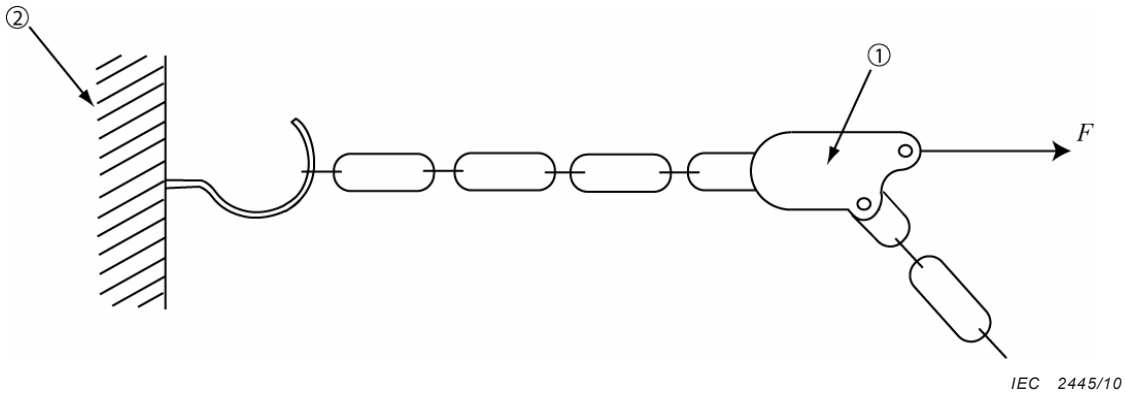
The test shall be considered as passed if no permanent deformation or breakage is observed on the device and no slippage occurs.

5.5.2 Specific test provisions

5.5.2.1 Locking device with chain or strap

5.5.2.1.1 Tensile test

The locking device with chain or strap shall be attached to a fixed support (see Figure 1). Refer to 5.5.1 for the tensile test provisions and pass criteria.



Key

1 locking device

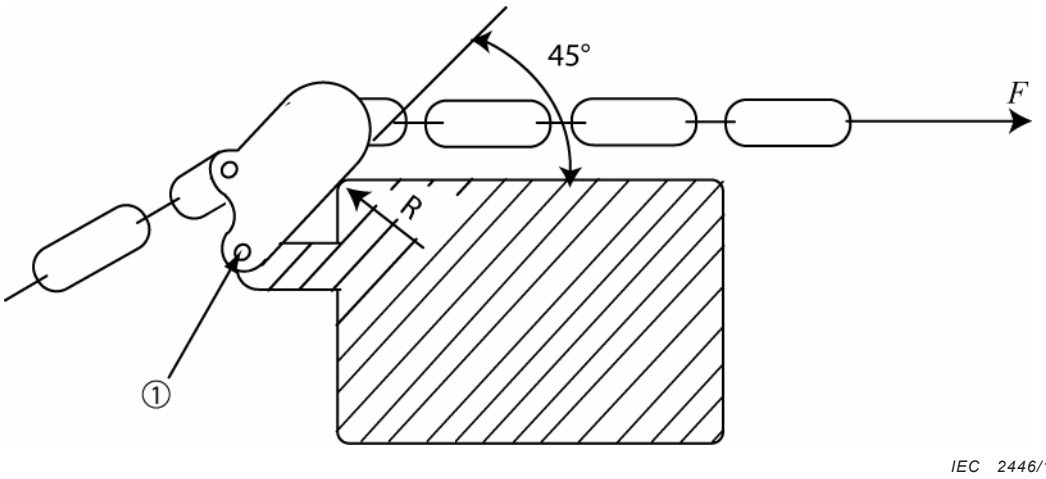
2 fixed support

Figure 1 – Locking device with chain or strap – tensile test

5.5.2.1.2 Bending test

The locking device with chain or strap shall be fixed on a support at an angle of 45° to the direction of the force F (see Figure 2). A load equal to 0,9 F_{TN} shall be progressively applied in increments at a rate of (0,1 ± 0,025) F_{TN}/s and shall then be maintained for 1 min before the results are noted.

The test shall be considered as passed if no visible signs of damage is observed on the device.



Key

1 fixing-pin point

R radius of curvature = 5 mm

Figure 2 – Locking device with chain or strap – bending test

5.5.2.2 Chain (strap) binder

5.5.2.2.1 Tensile test

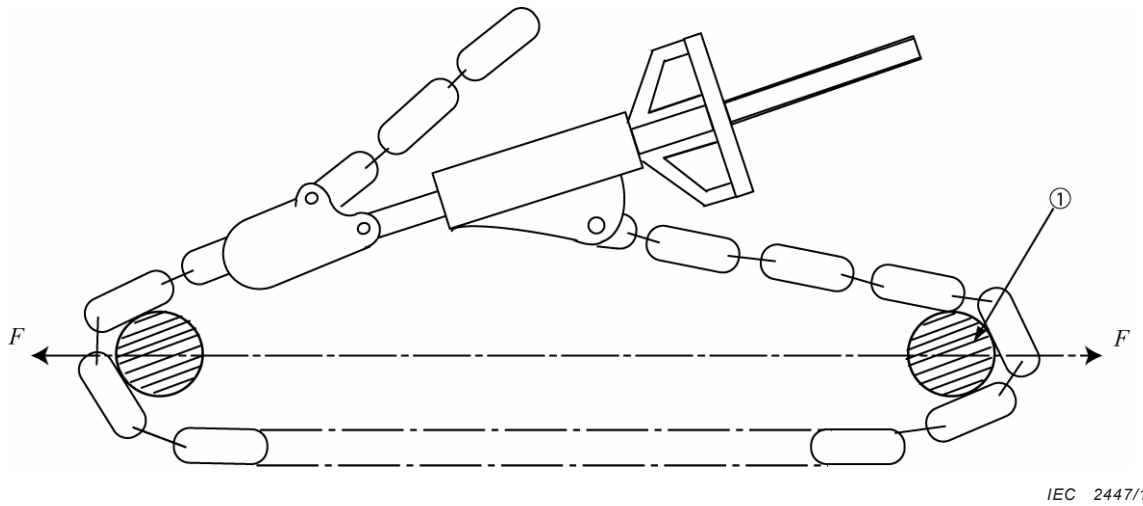
The binder shall be in a full tightened position. The end of the chain (strap) shall be locked in the locking device to obtain a loop (see Figure 3). The tensile force shall be applied by means of two 30 mm diameter rods. It shall be applied progressively in increments at a rate of (0,1 ± 0,025) F_{TN}/s until it reaches 1,25 F_{TN} and shall then be maintained for 1 min before the results are noted.

The test shall be considered as passed if no visible signs of damage are observed on the device.

The force shall then be increased again until it reaches 2,5 F_{TN}.

The test shall be considered as passed if no permanent deformation or breakage is observed on the device.

NOTE The 1,25 and 2,5 coefficients are applicable to each leg of the loop. Therefore, the total force applied is doubled (2,5 F_{TN} and 5 F_{TN}).



Key

1 30 mm diameter rod

Figure 3 – Chain (strap) binder – tensile test

5.5.2.2.2 Bending test on the locking device

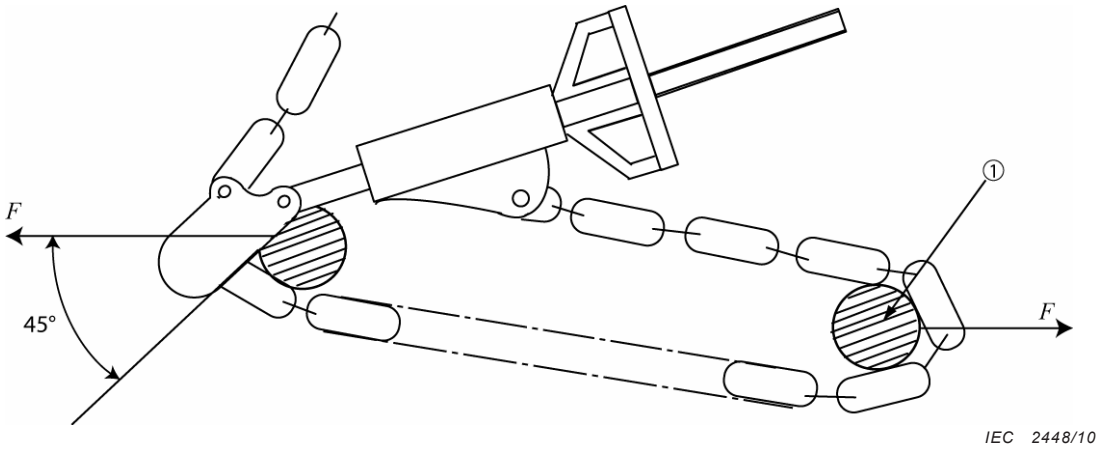
The previous test shall be resumed after having fixed the locking device on a support (a rod with a flat part) at an angle of 45° to the direction of the force F (see Figure 4).

A force F equal to 0,9 F_{TN} is applied. The force shall be increased progressively in increments at a rate of (0,1 ± 0,025) F_{TN}/s until it reaches 2,5 F and shall then be maintained for 1 min before the results are noted.

The test shall be considered as passed if no visible signs of damage is observed on the device.

The force shall then be repeated until it reaches 5 F.

The test shall be considered as passed if no permanent deformation or breakage is observed on the device.



Key

1 30 mm diameter rod

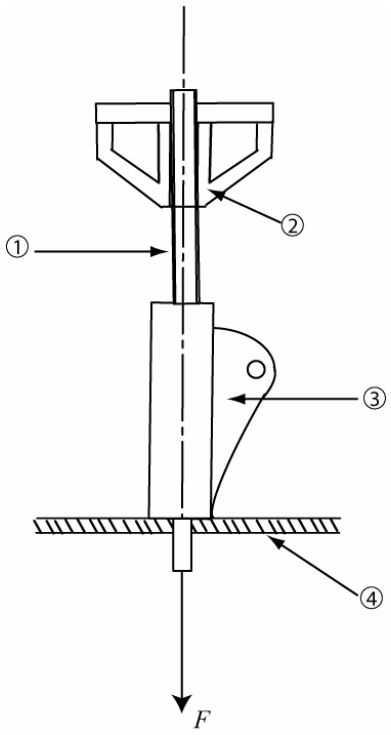
Figure 4 – Locking device – bending test

5.5.2.2.3 Test on the retractable spring of the hand wheel type binder

The hand wheel shall be fully retracted and the body of the tightening device shall be maintained in a vertical position (see Figure 5).

A vertical tensile force F shall be applied on the tightening device rod.

The test shall be considered as passed if the value of the force to achieve full compression of the spring is greater than 120 N, but less than 180 N.



Key

1 rod

2 hand-wheel in retracted position

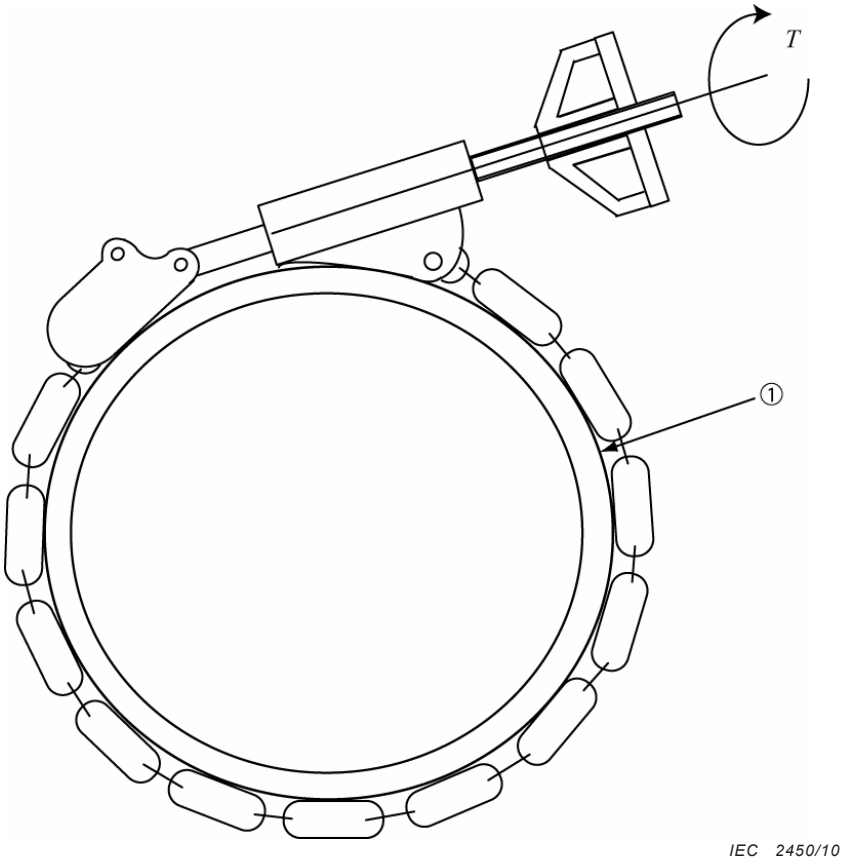
3 body of the tightening device

4 support

Figure 5 – Test on the retractable spring

5.5.2.2.4 Torque test

The chain (strap) binder shall be set on a 160 mm diameter metallic cylinder (see Figure 6). The chain (strap) binder shall be maintained in position by the retractable spring of the tightening device. Refer to 5.5.1 for the torque test provisions and pass criteria.



Key

1 cylinder 160 mm diameter

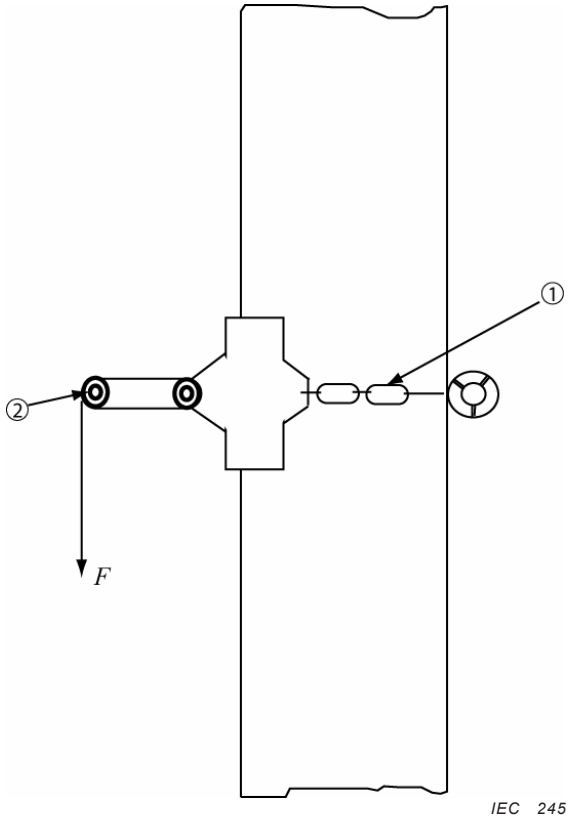
Figure 6 – Chain (strap) binder – torque test

5.5.2.3 Ring saddle with rigid bracket

5.5.2.3.1 Bending test on the whole saddle

The saddle shall be set on a metal support or the support agreed to by the manufacturer and the customer (wood, concrete, fibreglass or metal) with a chain (strap) binder. Where applicable, the hand wheel shall then be tightened with a torque of (30 ± 3) N·m (see Figure 7).

Refer to 5.5.1 for the bending test provisions and pass criteria.



Key

1 chain binder of the whole saddle

2 force applied on the extreme part of the rigid bracket

Figure 7 – Ring saddle with rigid bracket – bending test

5.5.2.3.2 Tensile test on the chain (strap) and locking device

(See 5.5.2.2.1)

5.5.2.3.3 Bending test on the locking device

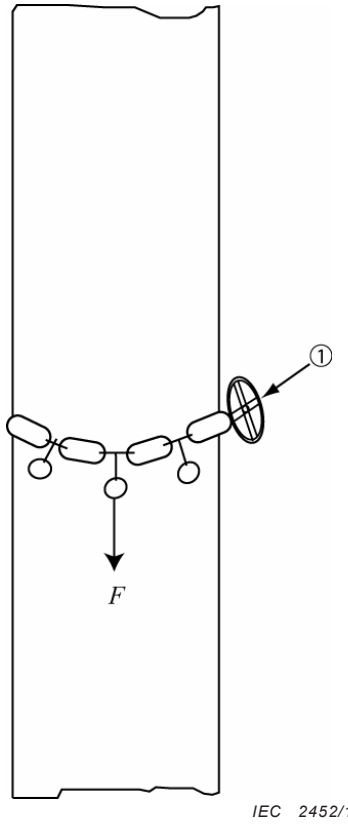
(See 5.5.2.2.2)

5.5.2.4 Ring saddle with chain bracket

5.5.2.4.1 Tensile test on the whole saddle

The saddle shall be set on a metal support or the support agreed to by the manufacturer and the customer (wood, concrete, fibreglass or metal) with a chain (strap) binder. Where applicable, the hand wheel shall then be tightened to a torque of (30 ± 3) N·m (see Figure 8).

The tensile force F shall be applied on one of the rings. Refer to 5.5.1 for the tensile test provisions and pass criteria.



Key

1 tightened hand-wheel (30 ± 3) N·m

Figure 8 – Ring saddle with chain bracket – tensile test

5.5.2.4.2 Additional tests for ring saddles with chain bracket

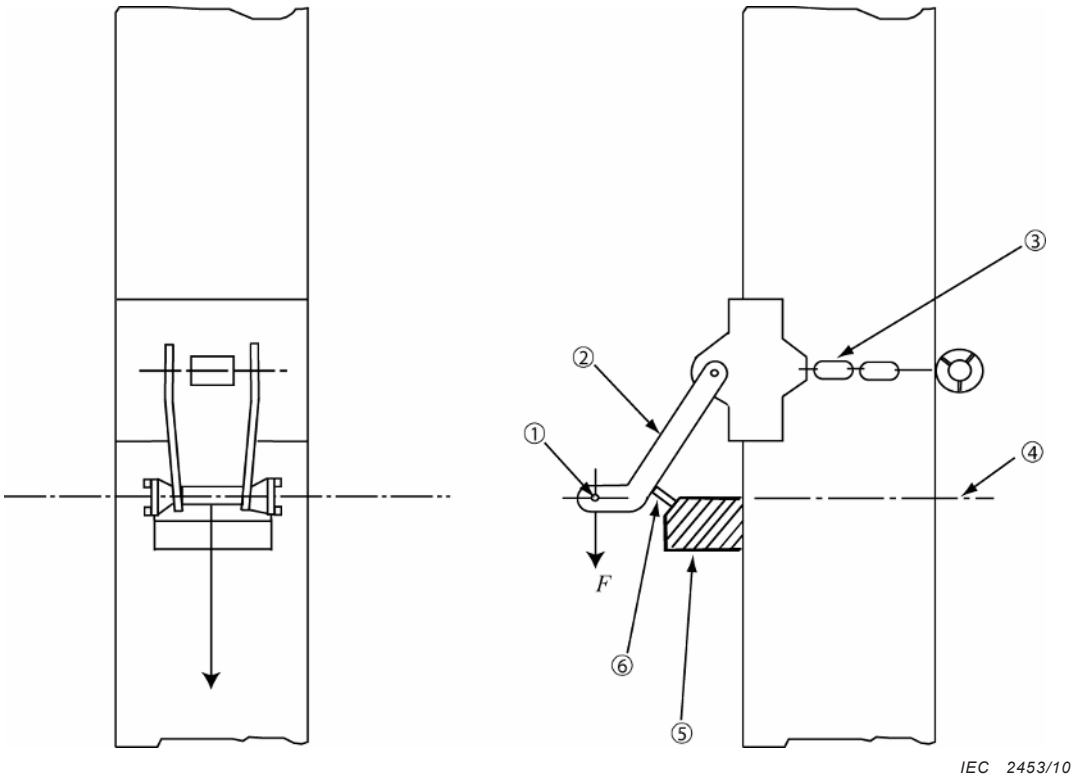
– Tensile test on the locking device (see 5.5.2.2.1)
– Bending test on the locking device (see 5.5.2.2.2)
– Test on the retractable spring (see 5.5.2.2.3)
– Torque test (see 5.5.2.2.4)

5.5.2.5 Lift-type saddle

5.5.2.5.1 Bending test on the whole saddle

The saddle shall be set on a metal support or the support agreed to by the manufacturer and the customer (wood, concrete, fibreglass or metal) with a chain (strap) binder. Where applicable, the hand wheel shall then be tightened with a torque of (30 ± 3) N·m. The extremity of the handle shall be supported horizontally by the handle prop resting against a hard wood block between the handle prop and the support (see Figure 9).

Refer to 5.5.1 for the bending test provisions and pass criteria.



Key

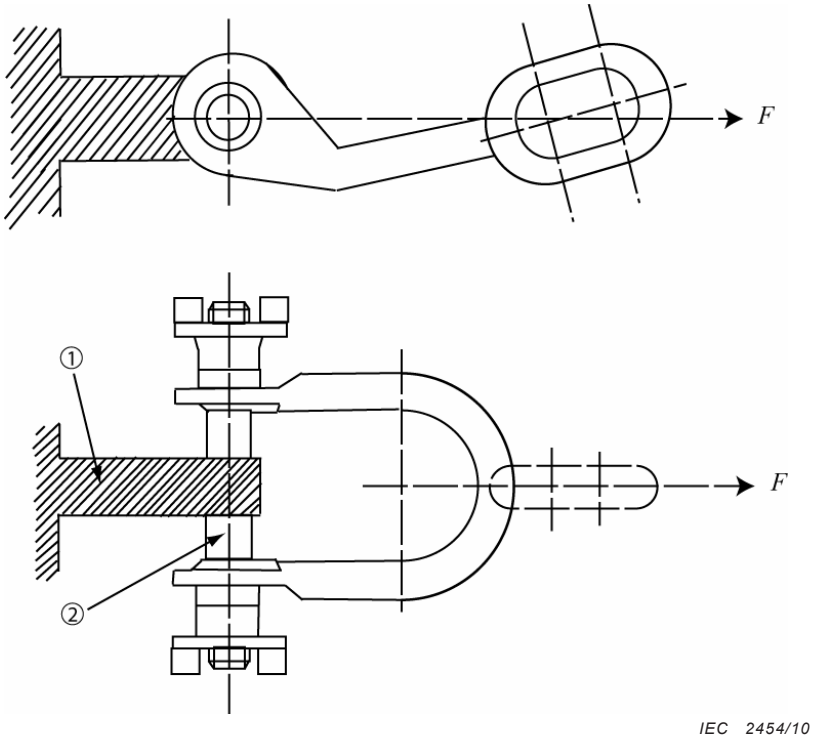
1	axis of the shackle	4	horizontal axis
2	handle	5	hard wood block
3	fastening device	6	handle prop

Figure 9 – Lift-type saddle – bending test

5.5.2.5.2 Tensile test on the shackle (butt ring)

The shackle, with pin, shall be placed on a tensile test bench (see Figure 10). The pin of the shackle shall be fixed by a tenon of the same width as that of the handle.

Refer to 5.5.1 for the tensile test provisions and pass criteria.



Key

1 tenon support

2 axle of the shackle

Figure 10 – Shackle – tensile test

5.5.2.5.3 Additional tests for lift-type saddles

– Tensile test on the chain (strap) and locking device (see 5.5.2.2.1)

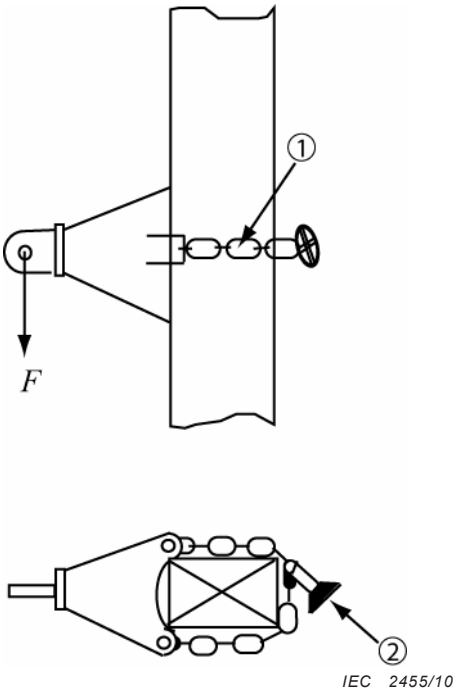
– Bending test on the locking device (see 5.5.2.1.2)

5.5.2.6 Pole-type saddle

5.5.2.6.1 Bending test on the whole saddle

The saddle shall be set on a metal support or the support agreed to by the manufacturer and the customer (wood, concrete, fibreglass or metal) with a chain (strap) binder. Where applicable, the hand wheel shall then be tightened to a torque of (30 ± 3) N·m (see Figure 11).

Refer to 5.5.1 for the bending test provisions and pass criteria.



Key

1 chain binder

2 tightening device

Figure 11 – Pole-type saddle – bending test

5.5.2.6.2 Additional tests for pole-type saddles

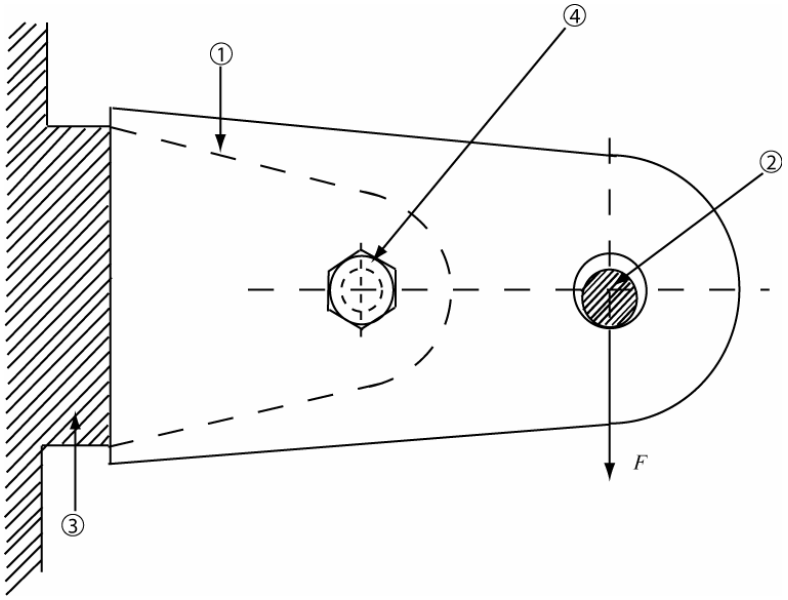
– Tensile test on the chain (strap) and locking device (see 5.5.2.2.1)

– Bending test on the locking device (see 5.5.2.1.2)

5.5.2.7 Saddle extension – bending test

The saddle extension shall be mounted on the corresponding saddle or a support having the same shape (see Figure 12). The holding-down bolt of the extension shall be tightened to a torque of (15 ± 1,5) N·m.

Refer to 5.5.1 for the bending test provisions and pass criteria.



Key

1	saddle extension	3	horizontal support
2	axle 11 mm diameter	4	holding-down bolt

Figure 12 – Saddle extension – bending test

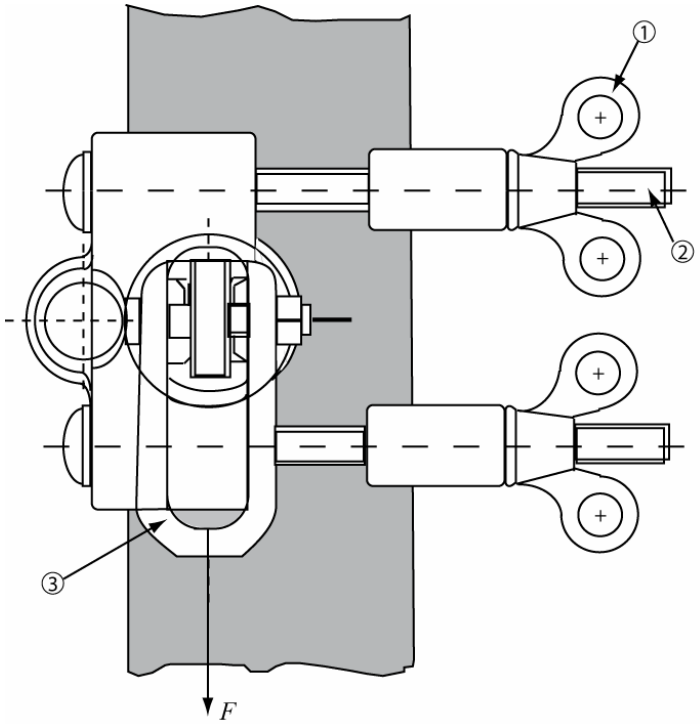
5.5.2.8 Tower-type saddle

5.5.2.8.1 Bending test

The tower-type saddle shall be mounted on a steel angle (or an assembly of two steel angles) having the capability to support the maximum rated capacity. The wing-nuts (thumb-nuts) shall be tightened to a torque of (20 ± 2) N·m.

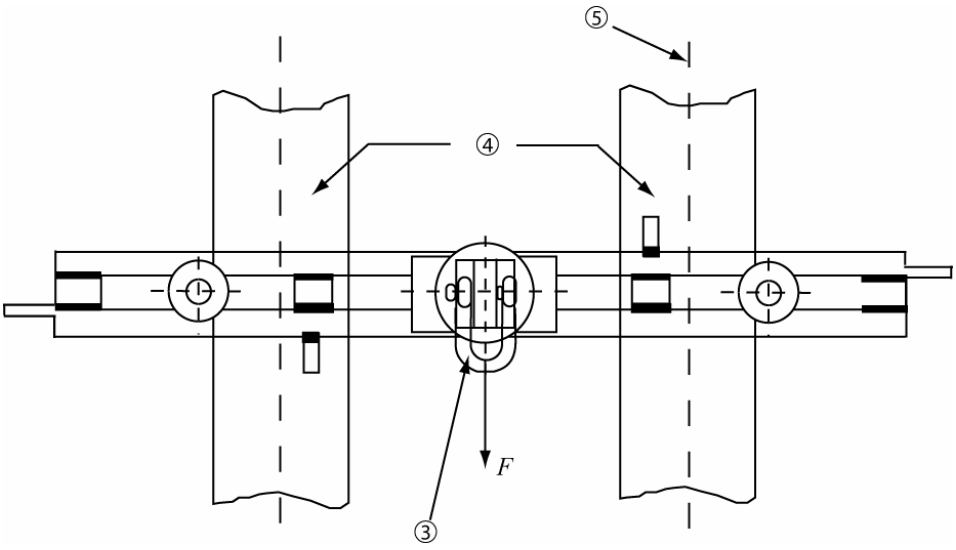
The bending force F shall then be applied parallel to the axis of the steel angle(s) (see Figure 13).

Refer to 5.5.1 for the bending test provisions and pass criteria.



IEC 2457/10

Figure 13a – Example 1



IEC 2458/10

Figure 13b – Example 2

Key

1 wing-nut
2 mounting screw
3 shackle
4 steel angles
5 axis

Figure 13 – Tower-type saddle – bending test

5.5.2.8.2 Torque test

The saddle shall be mounted on the same assembly as for the previous test.

The tightening torque shall be applied to the wing-nuts (thumb-nuts). Refer to 5.5.1 for the torque test provisions and pass criteria.

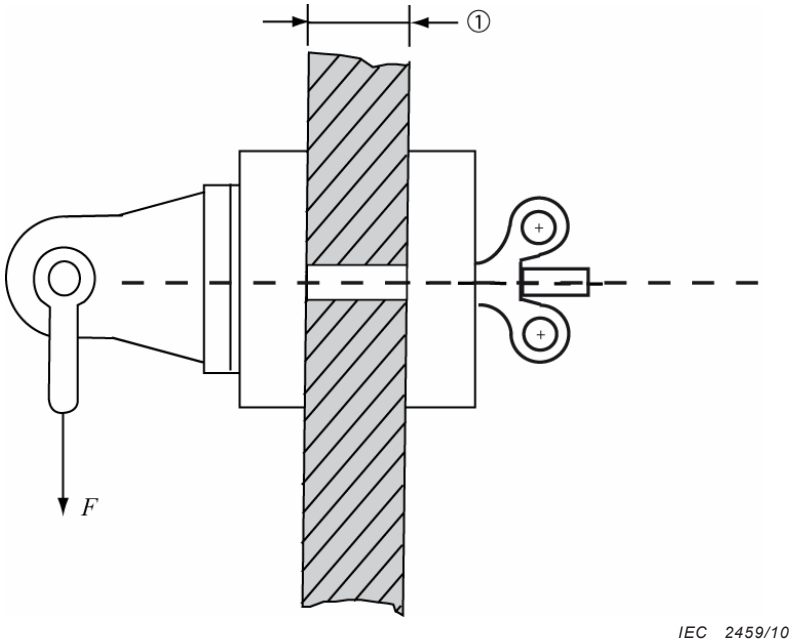
5.5.2.9 Crossarm-type saddle

5.5.2.9.1 Bending test

The saddle shall be mounted on a crossarm of minimum width and maximum thickness. The mounting bolts shall be set to their maximum spacing and the wing-nuts (thumb-nuts) tightened to a torque of (20 ± 2) N·m.

The force F shall be applied on the swivel (see Figure 14). Refer to 5.5.1 for the bending test provisions and pass criteria.

In addition, no slippage shall occur on the crossarm.



Key

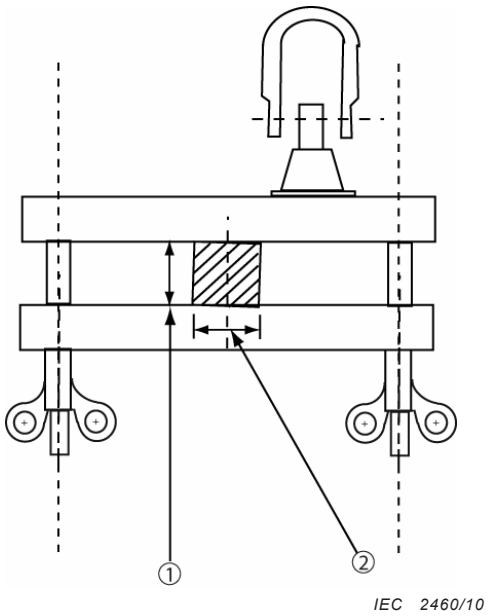
1 maximum rated thickness

Figure 14 – Crossarm-type saddle – bending test

5.5.2.9.2 Torque test

The saddle shall be mounted on the same crossarm as for the bending test and the mounting bolts shall be set to their maximum spacing (see Figure 15).

The tightening torque shall be applied to the wing-nuts. Refer to 5.5.1 for the torque test provisions and pass criteria.



Key

1 maximum rated thickness

2 minimum rated width

Figure 15 – Crossarm-type saddle – torque test

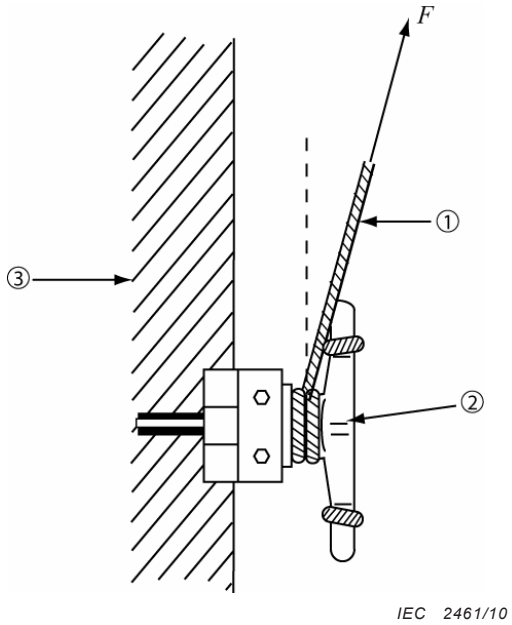
5.5.2.10 Block saddle

5.5.2.10.1 Bending test

The block saddle shall be mounted on the largest steel angle for which it is designed. The wing-nuts (thumb-nuts) shall be tightened to a torque of (20 ± 2) N·m. A rope shall be attached to the cleat.

The force F shall be applied with the rope at an angle of 15° to the steel angle (see Figure 16). Refer to 5.5.1 for the bending test provisions and pass criteria.

In addition, no slippage shall occur on the steel angle.



Key

1 rope

2 cleat

3 steel angle

Figure 16 – Block saddle – bending test

5.5.2.10.2 Torque test

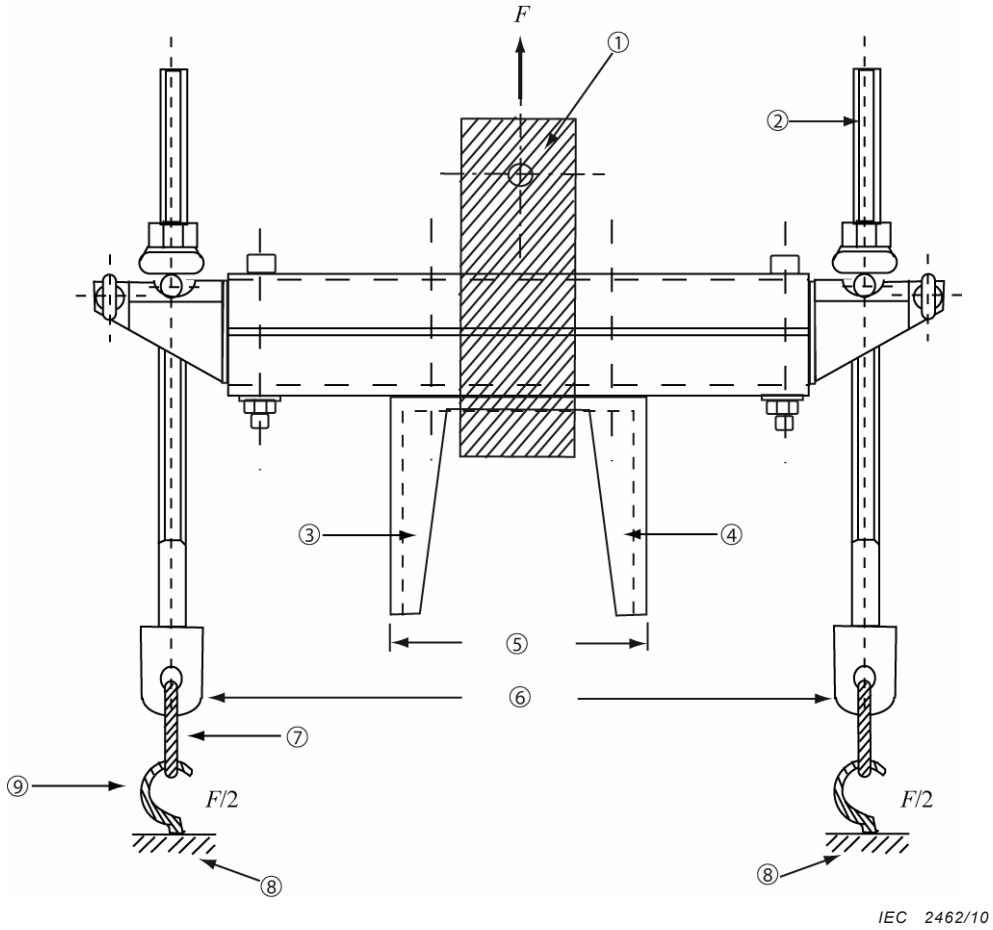
Same test as for the tower-type saddle given in 5.5.2.8.2.

5.5.2.11 Tower-arm yoke – bending test

The tower-arm yoke shall be supported by a pulling yoke. The pulling yoke width shall be such that the pulling yoke fits between legs 1 and 2 at their minimum extension (see Figure 17). The distance between the jack screws shall be set at maximum. The clevis end of each jack screw is fixed to a support.

The force F shall be applied to the pulling yoke. Refer to 5.5.1 for the bending test provisions and pass criteria.

NOTE The tensile force on each jack screw is equal to $F/2$.



Key

1	pulling yoke	6	maximum extension
2	jack screw	7	shackle
3	leg 1	8	support
4	leg 2	9	hook
5	minimum extension		

Figure 17 – Tower-arm yoke – bending test

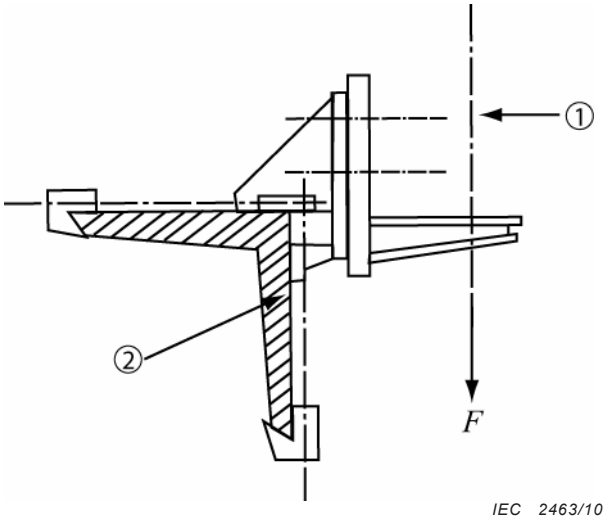
5.5.2.12 Platform pivot attachment – bending test

5.5.2.12.1 On inner flange of steel angle

The platform pivot attachment, equipped with a tower-type saddle to fit the inner flange of steel angle, shall be set on the largest size of steel angle for which it is designed. The wing-nuts (thumb-nuts) shall be tightened to a torque of (25 ± 2,5) N·m.

The bending force F shall be applied progressively in increments at a rate of (0,1 ± 0,025) F_{BN}/s, in the axis of the pivot bearing, until it reaches 1,25 F_{BN} (see Figure 18) and shall then be maintained for 1 min and the results noted.

The test shall be considered as passed if no visible signs of damage is observed on the device.



Key

1 axis of the pivot bearing

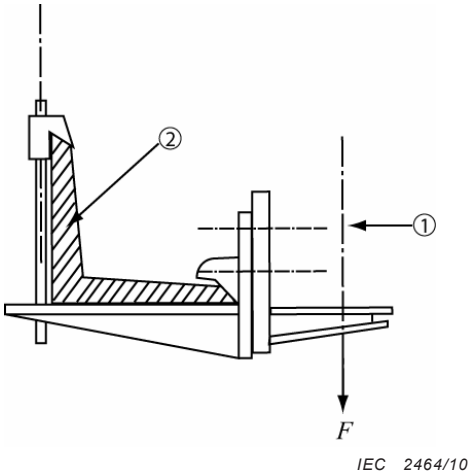
2 steel angle

Figure 18 – Platform pivot attachment – bending test on inner flange of steel angle

5.5.2.12.2 On outer flange of steel angle

The platform pivot attachment equipped with a tower-type saddle to fit the outer flange of steel angle, shall be set on the largest size of steel angle for which it is designed. The wing-nuts (thumb-nuts) shall be tightened to a torque of (25 ± 2,5) N·m.

A force F shall be applied in the axis of the pivot bearing (see Figure 19). Refer to 5.5.1 for the bending test provisions and pass criteria.



Key

1 axis of the pivot bearing

2 steel angle

Figure 19 – Platform pivot attachment – bending test on outer flange of steel angle

5.5.2.13 Saddles and accessories for hydraulic tension puller

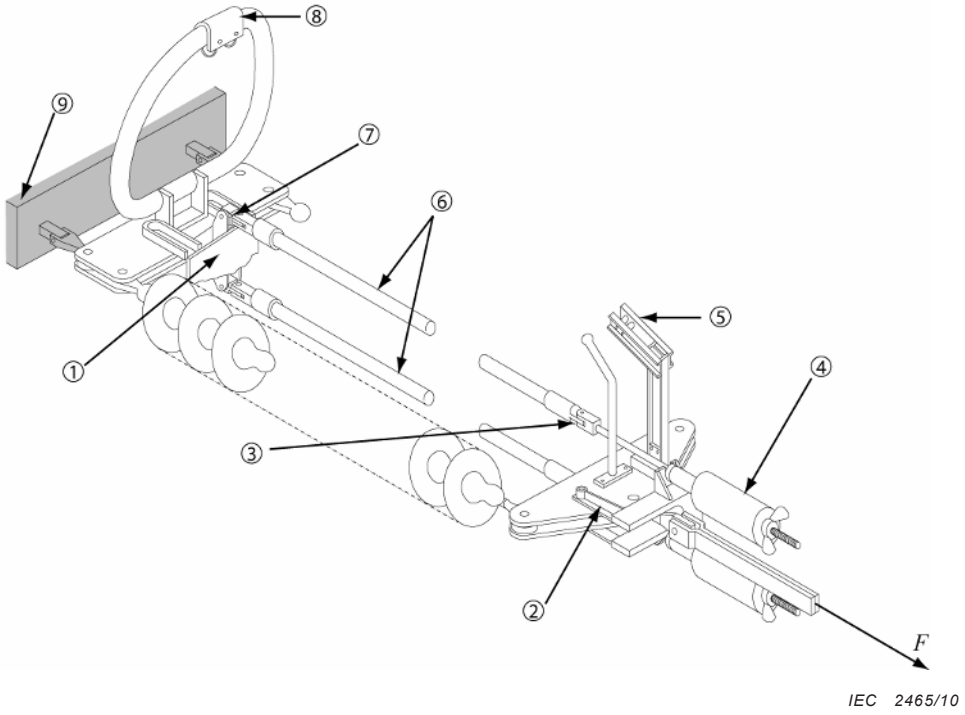
5.5.2.13.1 General

There are many different types of devices for hydraulic tension pullers. These are based on the differing characteristics of the network components and the types of insulator strings and yokes (single- or double-suspension string, double-, triple- or quadruple-tension string).

This subclause outlines the test principles for a limited number of these devices.

5.5.2.13.2 Tensile test on the whole device

The assembly of the saddles and accessories for the hydraulic tensile puller shall be supported on a test bench with the conductor end yoke fixed to a common support (see Figure 20). Force F shall be applied to the other end of the assembly. Refer to 5.5.1 for the tensile test provisions and pass criteria.



Key

1	saddle for rectangular yoke (see Figure 22)	6	insulating clevis and tongue sticks
2	saddle for triangular yoke (see Figure 21)	7	tenon extension
3	jacking screw	8	anchoring point for insulating rope
4	hydraulic jack	9	support
5	insulating rope gin		

Figure 20 – Example of tensile test on a hydraulic tension puller on double-string set

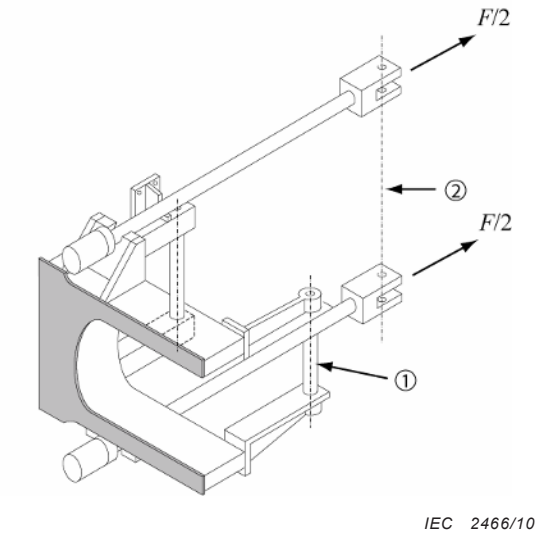
5.5.2.13.3 Saddles and accessories of the whole device

5.5.2.13.3.1 General

The following tests shall be carried out on the saddles and accessories used with the hydraulic tension puller.

5.5.2.13.3.2 Bending test on the saddle for triangular conductor yoke

The saddle shall be mounted on a fixed triangular conductor yoke plate. A force F equal to $F_{BN}/2$ shall be applied to each jack rod (see Figure 21). Refer to 5.5.1 for the bending test provisions and pass criteria.



Key

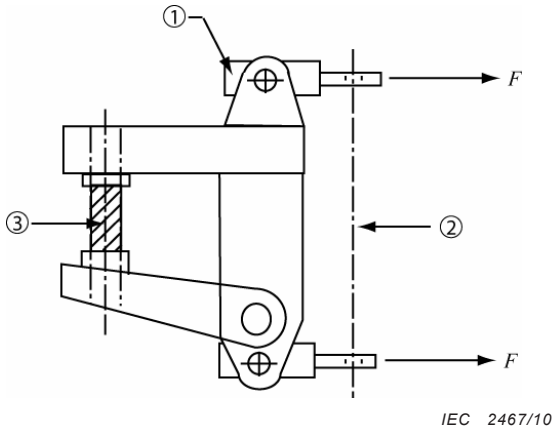
1 axle for network yoke used as support

2 axis for clevis and tenon stick

Figure 21 – Example of bending test on a saddle for triangular yoke

5.5.2.13.3.3 Bending test on the saddle for rectangular yoke

The saddle shall be mounted on a fixed rectangular conductor yoke plate. A force F equal to $F_{BN}/2$ shall be applied to each tenon extension (see Figure 22). Refer to 5.5.1 for the bending test provisions and pass criteria.



Key

1 tenon extension

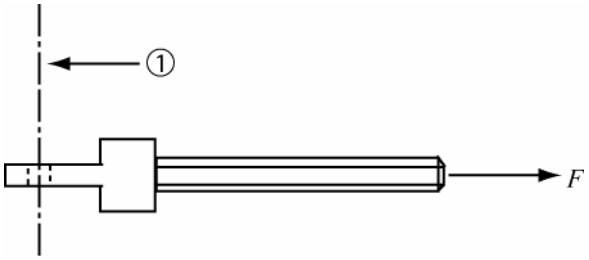
2 axis for clevis and tongue stick

3 axle for network yoke used as support

Figure 22 – Example of bending test on a saddle for rectangular yoke

5.5.2.13.3.4 Tensile test on the tenon extension

The tensile force F shall be applied to the tenon extension (see Figure 23). Refer to 5.5.1 for the tensile test provisions and pass criteria.



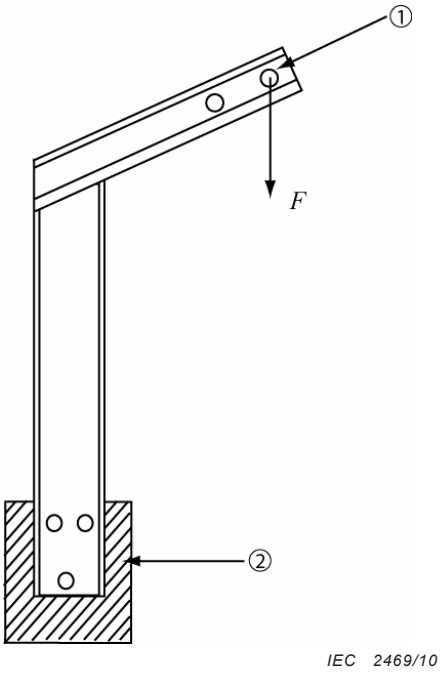
Key

1 axis of fixed support test

Figure 23 – Example of tensile test on a tenon extension

5.5.2.13.3.5 Bending test on the insulating rope gin

The bending force F shall be applied to the insulating rope gin at the position to give the maximum bending load (see Figure 24). Refer to 5.5.1 for the bending test provisions and pass criteria.



Key

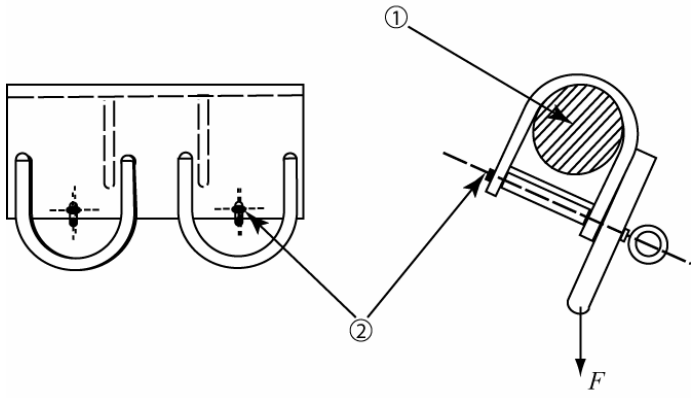
1 hole for maximum bending

2 fixed support

Figure 24 – Example of bending test on a insulating rope gin

5.5.2.13.3.6 Tensile test on the block anchoring point of insulating rope

The tensile force F shall be applied to the block anchoring point (see Figure 25). Refer to 5.5.1 for the tensile test provisions and pass criteria.



IEC 2470/10

Key

1 corona ring as support

2 axis of locking pins

Figure 25 – Example of tensile test on the block anchoring point of insulating rope

5.5.2.14 Stick clamp

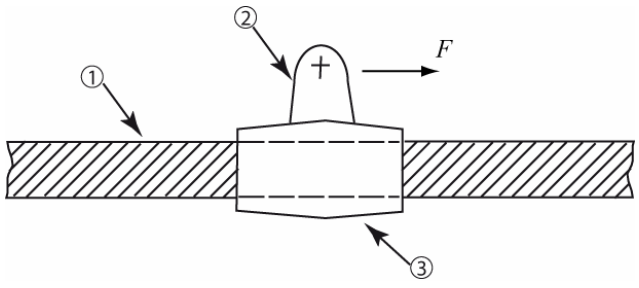
5.5.2.14.1 Slippage test

The stick clamp shall be mounted on an insulating tube or rod having the largest size diameter for the clamp. The tube or rod shall be coated with a silicone-base waterproofing product. The fastening device shall be tightened to a torque of 17 N·m.

The tensile force F shall be applied parallel to the axis of the tube or rod without movement of the wing-nut (see Figure 26). Refer to 5.5.1 for the slippage test provisions and pass criteria.

In addition, the force shall be maintained at a constant value (2,5 F_{GN}) and the stick clamp loosened to allow slippage between the clamp and the insulating tube or rod.

The test shall be considered as passed if the slippage is gradual and controlled.



IEC 2471/10

Key

1 insulating tube or rod

2 clevis of clamp

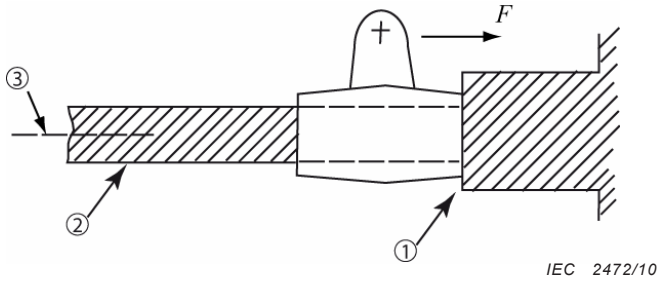
3 stick clamp

Figure 26 – Slippage test on a stick clamp

5.5.2.14.2 Bending test

The stick clamp shall be mounted on a metal tube or rod having the largest size diameter for the clamp. The stick clamp shall be mounted against the limit stop.

The bending force F shall be applied parallel to the axis of the tube or rod (see Figure 27). Refer to 5.5.1 for the bending test provisions and pass criteria.



Key

1 limit stop

2 metal tube or rod

3 axis

Figure 27 – Bending test on a stick clamp

5.5.2.14.3 Torque test

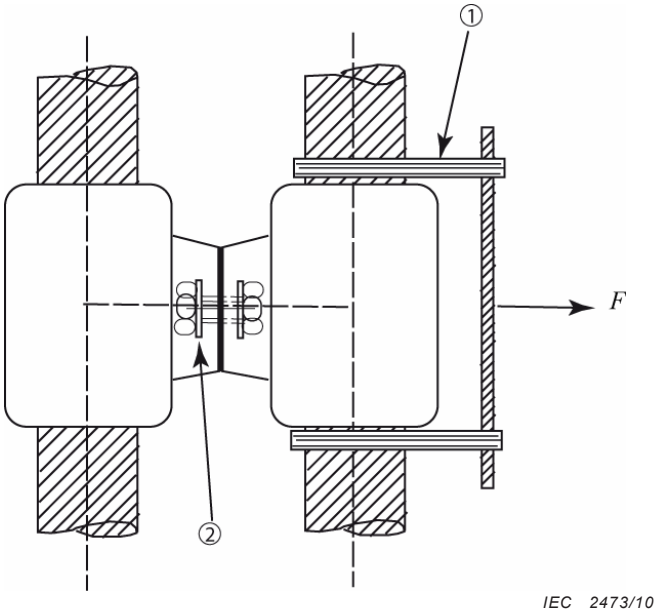
The stick clamp shall be mounted on a metal tube or rod having the largest size diameter for the clamp. The torque shall be applied on the wing-nut (thumb-nut). Refer to 5.5.1 for the torsion test provisions and pass criteria.

5.5.2.14.4 Tensile test on the assembling screw

This test is applicable to stick clamps designed to be coupled with stick clamps of the same type.

The test piece assembly is made with two stick clamps of the same type positioned on a metal tube or rod (see Figure 28). The tensile force shall be applied in the direction of the axis of the assembling screw. Refer to 5.5.1 for the tensile test provisions and pass criteria.

NOTE In use, when the assembly consists of two different types of pole clamps, the lower value of F_{TN} applies.



Key

1 sling, level with the stick clamp

2 assembling screw

Figure 28 – Tensile test on the assembling screw for coupled stick clamps

5.5.2.15 Support-stick stirrup (wire-tong stirrup)

5.5.2.15.1 Slippage test

The support-stick stirrup shall be mounted on an insulating tube or rod having the largest size diameter for the clamp. The tube or rod is coated with a silicone-base waterproofing product. The fastening device shall be tightened to a torque of 5 N·m.

The tensile force F shall be applied parallel to the axis of the tube or rod without movement of the wing-nut (see Figure 29). Refer to 5.5.1 for the slippage test provisions and pass criteria.

In addition, the force shall be maintained at a constant value (2,5 F_{GN}) and the clamp loosened to allow slippage between the clamp and the insulating tube or rod.

The test shall be considered as passed if the slippage is gradual and controlled.

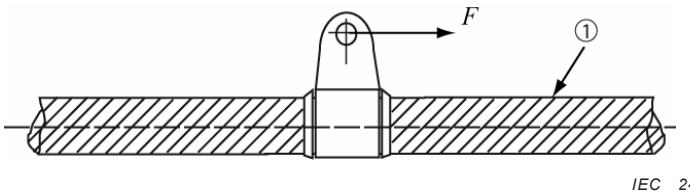


Figure 29a – Rigid stirrup

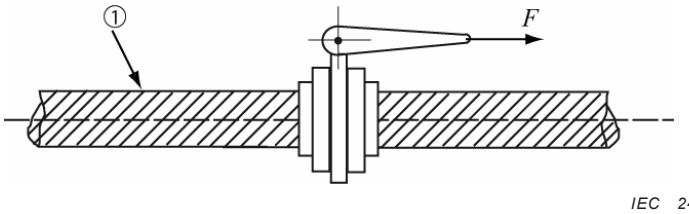


Figure 29b – Swivel stirrup

Key

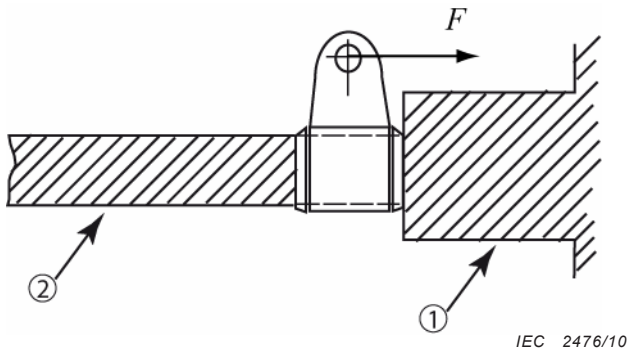
1 insulating tube or rod

Figure 29 – Slippage test of a support-stick stirrup

5.5.2.15.2 Bending test (rigid stirrup)

The rigid stirrup shall be mounted on a metal tube or rod having the largest size diameter for the clamp.

The clamp shall be mounted against the limit stop. The force shall be applied to the stirrup parallel to the axis of the tube or rod (see Figure 30). Refer to 5.5.1 for the bending test provisions and pass criteria.



Key

1 limit stop

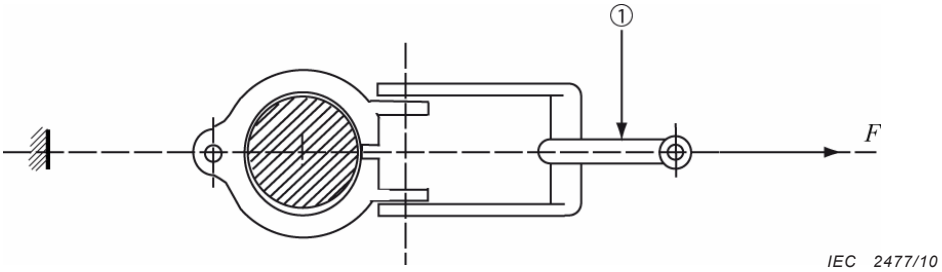
2 metal tube or rod

Figure 30 – Bending test of a support-stick stirrup (rigid stirrup)

5.5.2.15.3 Tensile test (swivel stirrup)

The swivel stirrup shall be mounted on a tensile test bench.

The tensile force F shall be applied, perpendicular to the support-stick stirrup (see Figure 31). Refer to 5.5.1 for the tensile test provisions and pass criteria.



Key

1 swivel 20 mm diameter

Figure 31 – Tensile test of a support-stick stirrup (swivel stirrup)

5.5.2.16 Offset eye – bending test

The offset eye shall be mounted on a fixed support (see Figure 32a). The bending force F shall be applied by means of a 20 mm diameter rod (see Figure 32b). Refer to 5.5.1 for the bending test provisions and pass criteria.

Dimensions in millimetres

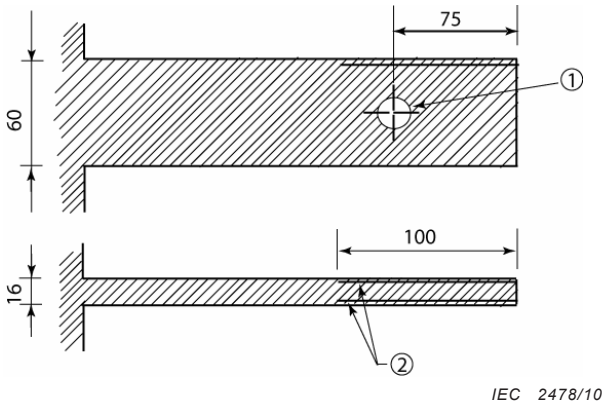


Figure 32a – Support for offset eye

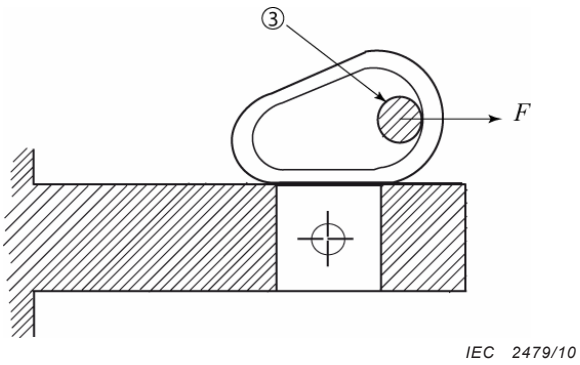


Figure 32b – Bending test

Key

1 diameter appropriate for the diameter of the bolt

2 3 mm chamfer

3 rod of 20 mm diameter

Figure 32 – Bending test of a offset eye

6 Conformity assessment

IEC 61318 shall be used in conjunction with the present standard for conducting the conformity assessment during the production phase.

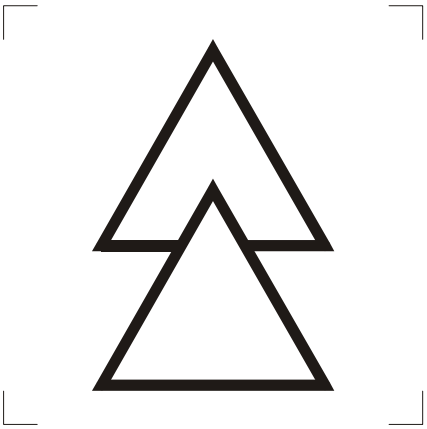
Annex C provides the classification of defects and identifies the associated tests applicable in case of production follow-up.

7 Modifications

Any modification of a device shall require the type tests to be repeated, in whole or in part (if the degree of modification so justifies), as well as a change in device reference literature.

Annex A
(normative)

Suitable for live working; double triangle (IEC 60417-5216:2002-10)



IEC 2480/10

Annex B
(normative)

General type test procedure

Refer to Tables B.1 to B.5 for general type test procedure.

Table B.1 – Sequence number of the type tests to be carried out

Type test	Family of devices									
	Chain (strap) binder			Ring saddle (with rigid bracket)			Ring saddle (with chain bracket)			
	Test group 1	Test group 2	Test group 3	Test group 1	Test group 2	Test group 3	Test group 1	Test group 2	Test group 3	Test group 4
Visual and functional inspection (5.2)	1	1	1	1	1	1	1	1	1	1
Dimensional check (5.3)	2	2	2	2	2	2	2	2	2	2
Durability of marking (5.4)	3			3			3			
Bending - Whole device				4 (5.5.2.3.1)						
Tensile - Whole device	5 (5.5.2.2.1)						4 (5.5.2.4.1)			
Torque		3 (5.5.2.2.4)						4 (5.5.2.4.2)		
Tensile - Locking device					3 (5.5.2.3.2)				3 (5.5.2.4.2)	
Bending - Locking device			3 (5.5.2.2.2)			3 (5.5.2.3.3)				3 (5.5.2.4.2)
Particular type tests	4 Test on the retractable spring (5.5.2.2.3)							3 Test on the retractable spring (5.5.2.4.2)		

Table B.2 – Sequence number of the type tests to be carried out

Type test	Family of devices												
	Lift-type saddle			Pole-type saddle			Saddle extension	Tower-type saddle		Crossarm-type sadle		Block saddle	
	Test group 1	Test group 2	Test group 3	Test group 1	Test group 2	Test group 3	Test group 1	Test group 1	Test group 2	Test group 1	Test group 2	Test group 1	Test group 2
Visual and functional inspection (5.2)	1	1	1	1	1	1	1	1	1	1	1	1	1
Dimensional check (5.3)	2	2	2	2	2	2	2	2	2	2	2	2	2
Durability of marking (5.4)	3			3			3	3		3		3	
Bending - Whole device	5 (5.5.2.5.1)			4[a] (5.5.2.6.1)			4 (5.5.2.7)	4[a] (5.5.2.8.1)		4[a] (5.5.2.9.1)		4 (5.5.2.10.1)	
Tensile - Whole device													
Torque									3 (5.5.2.8.2)		3 (5.5.2.9.2)		3 (5.5.2.10.2)
Tensile - Locking device		3 (5.5.2.5.3)			3 (5.5.2.6.2)								
Bending - Locking device			3 (5.5.2.5.3)			3 (5.5.2.6.2)							
Particular type tests	4 Tensile test on the shackle (5.5.2.5.2)												

[a] The tests are to be made with saddle extension and without saddle extension.

Table B.3 – Sequence number of the type tests to be carried out

Type test	Family of devices							
	Tower-arm yoke	Platform pivot attachment	Saddles and accessories for hydraulic tension puller					
			Whole device	Saddles and accessories				
				Saddle for triangular yoke	Saddle for rectangular yoke	Tenon extension	Insulating rope gin	Block anchoring point
	Test group 1	Test group 1	Test group 1	Test group 1	Test group 1	Test group 1	Test group 1	Test group 1
Visual and functional inspection (5.2)	1	1	1	1	1	1	1	1
Dimensional check (5.3)	2	2	2	2	2	2	2	2
Durability of marking (5.4)	3	3	3					
Bending - Whole device	4 (5.5.2.11)	4[b] (5.5.2.12)		3 (5.5.2.13.3.2)	3 (5.5.2.13.3.3)		3 (5.5.2.13.3.5)	
Tensile - Whole device			4 (5.5.2.13.2)			3 (5.5.2.13.3.4)		3 (5.5.2.13.3.6)

[b] The test is to be made in two configurations: on inner flange and on outer flange.

Table B.4 – Sequence number of the type tests to be carried out

Type test	Family of devices								
	Stick clamp				Rigid support-stick stirrup		Swivel support-stick stirrup		Offset eye
	Test group 1	Test group 2	Test group 3	Test group 4	Test group 1	Test group 2	Test group 1	Test group 2	Test group 1
Visual and functional inspection (5.2)	1	1	1	1	1	1	1	1	1
Dimensional check (5.3)	2	2	2	2	2	2	2	2	2
Durability of marking (5.4)	3				3		3		3
Bending - Whole device		3 (5.5.2.14.2)			4 (5.5.2.15.2)				4 (5.5.2.16)
Tensile - Whole device			3[c] (5.5.2.14.4)				4 (5.5.2.15.3)		
Torque	4 (5.5.2.14.3)								
Slippage				3 (5.5.2.14.1)		3 (5.5.2.15.1)		3 (5.5.2.15.1)	

[c] The test concerns only stick clamps designed to be coupled.

Table B.5 – Example of a type test sequence for tower-type saddle

Number of devices	Sequence of type test	Observations
3	First Second Third Fourth	Visual and functional Dimensional Durability of marking Bending: 1,25 F_{BN} without extension and bending: 2,5 F_{BN} without extension
3 additional	First Second Third	Visual and functional Dimensional Bending: 1,25 F_{BN} with extension and bending: 2,5 F_{BN} with extension
3 additional	First Second Third	Visual and functional Dimensional Torque: 1,25 T_N and Torque: 2,5 T_N

Annex C
(normative)

Classification of defects and associated requirements and tests

This annex was developed to address the type of defect of saddles, stick clamps and their accessories (critical, major or minor) in a consistent manner (see IEC 61318). For each requirement identified in Table C.1, both the type of defect and the associated test are specified.

Table C.1 – Classification of defects and associated requirements and tests for saddles, stick clamps and their accessories

Requirements	Family of devices							Tests
	Chain (strap) binder	Ring saddle (with rigid bracket)	Ring saddle (with chain bracket)	Lift-type saddle	Pole-type saddle	Saddle extension	Tower-type saddle	
	Type of defect							
Dimensional (4.2)	Major	Major	Major	Major	Major	Major	Major	5.3
Mechanical: Torque (4.3)	Critical (retractable spring and whole device torque) 5.5.2.2.3 5.5.2.2.4		Critical (retractable spring and tightening) 5.5.2.4.2				Critical (mounting bolts) 5.5.2.8.2	
Mechanical: Bending (4.3)		Critical (whole device and locking device) 5.5.2.3.1 5.5.2.3.3	Critical (locking device) 5.5.2.4.2	Critical (whole device and locking device) 5.5.2.5.1 5.5.2.5.3	Critical (whole device and locking device) 5.5.2.6.1 5.5.2.6.2	Critical (device) 5.5.2.7	Critical (device) 5.5.2.8.1	
Mechanical: Tension (4.3)	Critical (whole device and locking device) 5.5.2.2.1 5.5.2.2.2	Critical (chain and locking device) 5.5.2.3.2	Critical (whole device and locking device) 5.5.2.4.1 5.5.2.4.2	Critical (shackle, chain(strap) and locking device) 5.5.2.5.2 5.5.2.5.3	Critical (chain and locking device) 5.5.2.6.2			
Mechanical: Slippage (4.3)								
Protection against corrosion (4.4)	Minor	Minor	Minor	Minor	Minor	Minor	Minor	5.2
Marking: items (4.5)	Critical	Critical	Critical	Critical	Critical	Critical	Critical	5.2
Marking: durability (4.5)	Minor	Minor	Minor	Minor	Minor	Minor	Minor	5.4
Instructions for use (availability) (4.6)	Major	Major	Major	Major	Major	Major	Major	5.2

Table C.1 (*continued*)

Requirements	Family of devices				Tests
	Crossarm-type saddle	Block saddle	Tower-arm yoke	Platform pivot attachment	
	Type of defect				
Dimensional (4.2)	Major	Major	Major	Major	5.3
Mechanical: Torque (4.3)	Critical (mounting bolts) 5.5.2.9.2	Critical (mounting bolts) 5.5.2.10.2	Critical (mounting bolts) 5.5.2.11.2		
Mechanical: Bending (4.3)	Critical (whole device) 5.5.2.9.1	Critical (whole device) 5.5.2.10.1	Critical (whole device) 5.5.2.11.1	Critical (whole device) 5.5.2.12.1.1 5.5.2.12.1.2	
Mechanical: Tension (4.3)					
Mechanical: Slippage (4.3)					
Protection against corrosion (4.4)	Minor	Minor	Minor	Minor	5.2
Marking: items (4.5)	Critical	Critical	Critical	Critical	5.2
Marking: durability (4.5)	Minor	Minor	Minor	Minor	5.4
Instructions for use (availability) (4.6)	Major	Major	Major	Major	5.2

Table C.1 (*continued*)

Requirements	Family of devices						Tests
	Saddle for triangular yoke	**Saddle for rectangular yoke**	**Tenon extension**	**Insulating rope gin**	**Block anchoring point**	**Whole assembly**	
	Type of defect						
Dimensional (4.2)	Major	Major	Major	Major	Major	Major	5.3
Mechanical: Torque (4.3)							
Mechanical: Bending (4.3)	Critical (whole device) 5.5.2.13.2.1	Critical (whole device) 5.5.2.13.2.2		Critical 5.5.2.13.2.4			
Mechanical: Tension (4.3)			Critical 5.5.2.13.2.3		Critical 5.5.2.13.2.5	Critical (whole device) 5.5.2.13.1	
Mechanical: Slippage (4.3)							
Protection against corrosion (4.4)	Minor	Minor	Minor	Minor	Minor	Minor	5.2
Marking: items (4.5)	Critical	Critical	Critical	Critical	Critical	Critical	5.2
Marking: durability (4.5)	Minor	Minor	Minor	Minor	Minor	Minor	5.4
Instructions for use (availability) (4.6)	Major	Major	Major	Major	Major	Major	5.2

Table C.1 (*continued*)

Requirements	Family of devices				Tests
	Stick clamp	Rigid support-stick stirrup	Swivel support-stick stirrup	Offset eye	
	Type of defect				
Dimensional (4.2)	Major	Major	Major	Major	5.3
Mechanical: Torque (4.3)	Critical (mounting bolts) 5.5.2.14.3				
Mechanical: Bending (4.3)	Critical (whole device) 5.5.2.14.2	Critical (whole device) 5.5.2.15.2	Critical (whole device) 5.5.2.15.2	Critical (whole device) 5.5.2.16	
Mechanical: Tensile (4.3)	Critical (applicable clamps designed to be coupled) 5.5.2.14.4		Critical (swivel) 5.5.2.15.3		
Mechanical: Slippage (4.3)	Critical (whole device) 5.5.2.14.1	Critical (whole device) 5.5.2.15.1	Critical (whole device) 5.5.2.15.1		
Protection against corrosion (4.4)	Minor	Minor	Minor	Minor	5.2
Marking: items (4.5)	Critical	Critical	Critical	Critical	5.2
Marking: durability (4.5)	Minor	Minor	Minor	Minor	5.4
Instructions for use (availability) (4.6)	Major	Major	Major	Major	5.2

Bibliography

IEC 60050-151:2001, *International Electrotechnical Vocabulary – Part 151: Electrical and magnetic devices*

IEC 60743:2008, *Live working – Terminology for tools, equipment and devices*

_____

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™