



DPC: 18/30388913 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 17 December 2018

Origin: European

Latest date for receipt of comments: 01 February 2019

Project No. 2015/01805

Responsible committee: PEL/213 Cable management

Interested committees:

Title: Draft BS EN 61537 Cable management - Cable tray systems and cable ladder systems.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD. THIS DRAFT IS NOT CURRENT BEYOND 01 February 2019

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <https://standardsdevelopment.bsigroup.com/>.

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



23A/880/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

IEC 61537 ED3

DATE OF CIRCULATION:

2018-12-07

CLOSING DATE FOR COMMENTS:

2019-03-01

SUPERSEDES DOCUMENTS:

23A/776/CD, 23A/796A/CC

IEC SC 23A : CABLE MANAGEMENT SYSTEMS

SECRETARIAT:

United Kingdom

SECRETARY:

Mr Rajeev Vagdia

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:

☐

Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☒ SAFETY

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Cable management - Cable tray systems and cable ladder systems

NOTE FROM TC/SC OFFICERS:

Copyright © 2018 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

Documents
Document Sharing Hub

CONTENTS

1		
2	1	Scope 7
3	2	Normative references..... 7
4	3	Terms and definitions 8
5	4	General requirements 12
6	5	General conditions for tests 12
7	6	Classification 13
8	7	Marking and documentation 17
9	8	Dimensions..... 20
10	9	Construction 21
11	10	Mechanical properties 22
12	11	Electrical properties 86
13	12	Thermal properties 95
14	13	Fire hazards 95
15	14	External influences 99
16	15	Electromagnetic compatibility (EMC) 102
17		Annex A (informative) Sketches of typical cable tray lengths and cable ladder lengths 103
18		Annex B (informative) Sketches of typical support devices..... 104
19		Annex C (normative) Protective Earth (PE) function..... 107
20		Annex D (normative) Methods of applying and distributing a UDL for SWL tests using
21		load distribution plates 113
22		Annex E (informative) Typical methods of applying a UDL for SWL tests..... 118
23		Annex F Not Used..... 120
24		Annex G (informative) Example for clarification of allowed creep 121
25		Annex H (informative) Information for a safe installation of pendants with cantilever
26		brackets 122
27		Annex I (informative) Summary of compliance checks 124
28		Annex J (normative) Compliance checks to be carried out for cable tray systems and
29		cable ladder systems already complying with IEC 61537:2006 126
30		Annex K (informative) Number of samples required for tests..... 128
31		Annex L (informative) Illustrative flow chart for the SWL tests 129
32		Annex M (Normative) Application of a point load to a support..... 136
33		
34		Figure 1 – Flame propagating symbol 18
35		Figure 2 – Piston for durability of marking test 18
36		Figure 3 – Safe working load test – General arrangement..... 25
37		Figure 4 – Load and temperature diagrams with respect to time for test 10.2.1.3 28
38		Figure 5 –Test type I 31
39		Figure 6 –Test type II 32
40		Figure 7 –Test type III 33
41		Figure 8 –Test type IV 33
42		Figure 9 – Safe working load for single span test..... 35
43		Figure 10 – Test conditions for cable tray or cable ladder mounted in the vertical plane
44		running horizontally 41

45	Figure 11 – Load position for cable tray or cable ladder mounted in the vertical plane	
46	running horizontal	42
47	Figure 12 – Example of applying the test load for cable tray or cable ladder mounted in	
48	the vertical plane running horizontally	44
49	Figure 13 – Example of test arrangements for lengths mounted vertically running	
50	vertically	47
51	Figure 14 – Safe working load test for fittings	51
52	Figure 15 – Test set-up for cantilever brackets (Horizontal plane)	60
53	Figure 16 – Test set-up for cantilever brackets (Vertical plane)	67
54	Figure 17 – Test set-up Pendants for cantilever brackets	68
55	Figure 18 – Test set up for centrally supported brackets for specified use	74
56	Figure 19 – Test set up for uneven loaded centrally supported brackets intended for	
57	unspecified use	76
58	Figure 20 – Centrally-supported brackets intended for use with uneven loaded	
59	unspecified cable ladder and cable tray systems	76
60	Figure 21 – Test set up for even loaded centrally supported brackets intended for	
61	unspecified use	78
62	Figure 22 – Test set-up for a “C shape” ceiling support	79
63	Figure 23 – Test set-up for trapeze system designed for supporting cable ladder only	80
64	Figure 24 – Test set-up for trapeze system designed for supporting cable tray or cable	
65	ladder	81
66	Figure 25 – Alternative test set-up for trapeze systems	82
67	Figure 26 – Impact test stroke arrangement	85
68	Figure 27 – Test set-up impedance along the length	87
69	Figure 28 – Test set-up impedance across the width	89
70	Figure 29 – Test set-up impedance of a joint	91
71	Figure 30 – Test set-up impedance of an earthing terminal or termination	92
72	Figure 31 – Test set-up impedance of the connection between an access cover and a	
73	cable tray or cable ladder	92
74	Figure 32 – Typical arrangement of surface resistivity test	94
75	Figure 33 – Arrangement for the flame test	97
76	Figure 34 – Enclosure for the flame test	99
77	Figure A.1 – Solid bottom cable tray lengths	103
78	Figure A.2 – Perforated cable tray lengths	103
79	Figure A.3 – Mesh cable tray lengths	103
80	Figure A.4 – Cable ladder lengths	103
81	Figure B.1 – Cantilever brackets	104
82	Figure B.2 – Pendants	105
83	Figure B.3 – Fixing brackets	105
84	Figure B.4 – C shaped ceiling support	106
85	Figure C.1 – Arrangement for the test of 5 seconds current carrying capability	112
86	Figure D.1 – Examples of distribution load points across the width	114
87	Figure D.2 – Typical arrangement of load distribution plates	115
88	Figure D.3 – Example of equispaced point loads along the length	115
89	Figure D.4 – Examples of test load distribution on cable ladder lengths	117
90	Figure E.1 – Point loads applied through a mechanical linkage	118

91	Figure E.2 – Point loads applied individually	119
92	Figure E.3 – Block loads	119
93	Figure G.1 – Example for clarification of allowed creep.....	121
94	Figure H.1 – Forces on pendant and cantilever bracket.....	122
95	Figure H.2 – Illustration of the safe area	123
96	Figure M.1 – Maximum area of the applied point load to a support	136
97		
98	Table 1A – Classification for resistance against corrosion for coated mild steel products	14
99	Table 1B – Classification for resistance against corrosion for stainless steel products.....	14
100	Table 2 – Minimum temperature classification	16
101	Table 3 – Maximum temperature classification	16
102	Table 4 – Perforation base area classification.....	17
103	Table 5 – Free base area classification	17
104	Table 6 – Use of Test type IV	33
105	Table 7 – Load distribution plates for the SWL test of the cable tray lengths and cable	
106	ladder lengths mounted in the vertical plane running horizontally	41
107	Table 8 – Impact test values.....	83
108	Table 9 – System component compliance and classification for resistance against	
109	corrosion.....	99
110	Table 10 – Zinc coating thickness of reference materials	100
111	Table C.1 - Calculated and declared cross sectional area of the system used for the PE	
112	function equivalent to copper conductors	110
113	Table D.1 – Number of point loads across the width of a cable tray or a cable ladder	113
114	Table D.2 – Number of point loads along the length of a cable tray	114
115	Table I.1 – Summary of compliance checks	124
116	Table J.1 – Required compliance checks.....	126
117	Table K.1 Number of samples required for tests	128
118		

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CABLE MANAGEMENT –
CABLE TRAY SYSTEMS AND CABLE LADDER SYSTEMS**

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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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 61537 has been prepared by subcommittee 23A: Cable management systems, of IEC technical committee 23: Electrical accessories.

This third edition cancels and replaces the second edition published in 2006. This edition constitutes a technical revision. It incorporates additional tables, annexes and figures as well as revisions to such that appeared in the second edition. In places, the text has been substantially altered including:

- new, repositioned and renumbered figures,
- revised classification for corrosion,
- revised SWL test types and procedures,
- new tests for lengths mounted vertical running horizontal and mounted vertical running vertical.
- tests for support devices: cantilevers, pendants, C-shaped ceiling supports and trapeze systems,
- new and revised annexes including use of tray as a protective earth conductor.

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

CD	Report on voting
23A/776/CD	23A/796A/CC

176
177 Full information on the voting for the approval of this standard can be found in the report on
178 voting indicated in the above table.

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

180 The following differences exist in some countries:

181 In the USA it is permitted to use cable tray systems and cable ladder systems as a PE
182 conductor, in which case national wiring regulations have to be adhered to.

183 In France it is not permitted to use cable tray systems and cable ladder systems as a PE
184 conductor.

185 In France the use of flame propagating cable tray and cable ladder systems is not permitted.

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

- 189 • reconfirmed;
190 • withdrawn;
191 • replaced by a revised edition, or
192 • amended.

193

194

CABLE MANAGEMENT – CABLE TRAY SYSTEMS AND CABLE LADDER SYSTEMS

1 Scope

This International Standard specifies requirements and tests for cable tray systems and cable ladder systems intended for the support and accommodation of cables and possibly other electrical equipment in electrical and/or communication systems installations. Where necessary, cable tray systems and cable ladder systems may be used for the division or arrangement of cables into groups.

This standard does not apply to conduit systems, cable trunking systems and cable ducting systems or any current-carrying parts.

NOTE Cable tray systems and cable ladder systems are designed for use as supports for cables and not as enclosures.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60068-2-75:2014, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60364-5-52:2009 *Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems*

IEC 60417 *Graphical symbols for use on equipment*

IEC 60695-2-11:2014, *Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60695-11-2:2013, *Fire hazard testing - Part 11-2: Test flames - 1 kW nominal pre-mixed flame - Apparatus, confirmatory test arrangement and guidance*

ISO 1461:2009, *Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods*

ISO 2081:2008, *Metallic and other inorganic coatings – Electroplated coatings of zinc with supplementary treatments on iron or steel*

ISO 2178:1982, *Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method*

ISO 2808:2007, *Paints and varnishes - Determination of film thickness*

ISO 3575: 2011, *Continuous hot dipped galvanised carbon steel sheet of commercial and drawing qualities*

ISO 4046 (all parts), *Paper, board, pulp and related terms – Vocabulary*

ISO 9227:2012, *Corrosion tests in artificial atmospheres – Salt spray tests*

ISO 10289:1999, *Methods for corrosion testing of metallic and other inorganic coatings on metallic substrates - Rating of test specimens and manufactured articles subjected to corrosion tests*

234 ISO 4628-8: 2012 *Paints and varnishes. Evaluation of degradation of coatings. Designation of*
235 *quantity and size of defects, and of intensity of uniform changes in appearance. Assessment of*
236 *degree of delamination and corrosion around a scribe or other artificial defect*

237 ISO 4628-3: 2003 *Paints and varnishes. Evaluation of degradation of coatings. Designation of*
238 *quantity and size of defects, and of intensity of uniform changes in appearance.*

239 ISO 4998: 2014 *Continuous hot-dip zinc-coated and zinc-iron alloy-coated carbon sheet steel*
240 *of structural quality*

241 **3 Terms and definitions**

242 For the purpose of this document, the following definitions apply.

243 ISO and IEC maintain terminological databases for use in standardization at the following
244 addresses:

- 245 • IEC Electropedia: available at <http://www.electropedia.org/>
- 246 • ISO Online browsing platform: available at <http://www.iso.org/obp>

247 **3.1**

248 **cable tray system or cable ladder system**

249 assembly of cable supports consisting of cable tray lengths or cable ladder lengths and other
250 system components

251 **3.2**

252 **system component**

253 part used within the system. System components are as follows:

- 254 a) cable tray length or cable ladder length
- 255 b) cable tray fitting or cable ladder fitting
- 256 c) support device
- 257 d) mounting device
- 258 e) system accessory

259 Note 1 to entry: System components may not necessarily be included together in a system. Different combinations
260 of system components may be used.

261 **3.3**

262 **cable tray length**

263 system component used for cable support consisting of a base with integrated side members
264 or a base connected to side members

265 Note 1 to entry: Tray made from wires is referred to as mesh cable tray. Typical examples of cable tray types are
266 shown in Figures A.1 to A.3.

267 **3.4**

268 **cable ladder length**

269 system component used for cable support consisting of supporting side members, fixed to each
270 other by means of rungs

271 Note 1 to entry: Typical examples of cable ladder types are shown in Figure A.4.

272 **3.5**

273 **fitting**

274 system component used to change direction, change dimension or terminate cable tray lengths
275 or cable ladder lengths

276 Note 1 to entry: Typical examples are , bends, tees, crosses.

- 277 **3.6**
278 **cable runway**
279 assembly comprised of cable tray lengths or cable ladder lengths and fittings only
- 280 **3.7**
281 **support device**
282 system component designed to provide mechanical support
- 283 Note 1 to entry: Typical examples of support devices are shown in Annex B, support devices may provide
284 additional functions such as fixings.
- 285 **3.8**
286 **mounting device**
287 system component used to attach or fix other devices to the cable runway
- 288 **3.9**
289 **apparatus mounting device**
290 part used to accommodate electrical apparatus like switches, socket outlets, circuit- breakers,
291 telephone outlets, etc. which can be an integral part of the electrical apparatus and which is not
292 part of the cable tray system and cable ladder system
- 293 **3.10**
294 **system accessory**
295 system component used for a supplementary function such as cable retention, and covers, etc.
- 296 **3.11**
297 **protective earthing (PE)**
298 earthing a point or points in a system or in an installation or in equipment, for purposes of
299 electrical safety
300 IEC[195-01-11]
- 301 **3.12**
302 **metallic system component**
303 system component which consists of metal only. Screws for connections and other fasteners
304 are not considered
- 305 **3.13**
306 **non-metallic system component**
307 system component which consists of non-metallic material only. Screws for connections and
308 other fasteners are not considered
- 309 **3.14**
310 **composite system component**
311 system component which consists of both metallic and non-metallic materials. Screws for
312 connections and other fasteners are not considered
- 313 **3.15**
314 **non-flame propagating system component**
315 system component which may catch fire as a result of an applied flame and the resulting flame
316 does not propagate and extinguishes itself within a limited time after the applied flame is
317 removed
- 318 **3.16**
319 **external influence**
320 presence of water, oil, building materials, corrosive and polluting substances, and external
321 mechanical forces such as snow, wind, and other environmental hazards

- 322 **3.17**
323 **safe working load**
324 **SWL**
325 maximum load that can be applied safely in normal use
- 326 **3.18**
327 **uniformly distributed load**
328 **UDL**
329 load applied evenly over a given area
- 330 Note 1 to entry: Methods of applying uniformly distributed loads are shown in Annexes D and E.
- 331 **3.19**
332 **span**
333 distance between the centres of two adjacent support devices
- 334 **3.20**
335 **internal fixing device**
336 device for joining and/or fixing system components to other system components. This device is
337 part of the system but not a system component
- 338 Note 1 to entry: Typical examples are nuts and bolts.
- 339 **3.21**
340 **external fixing device**
341 device used for fixing a support device to walls, ceilings or other structural parts. This device is
342 not part of the system
- 343 Note 1 to entry: Typical examples are anchor bolts.
- 344 **3.22**
345 **base area of cable tray length or cable ladder length**
346 plan area available for cables
- 347 **3.23**
348 **free base area**
349 part of the base area which is open to the flow of the air. Holes in cable ladder rungs are
350 included in the free base area
- 351 **3.24**
352 **load distribution plate**
353 means through which a point load is applied to the sample for testing purposes
- 354 **3.25**
355 **product type**
356 A group of system components for which only one dimension is allowed to be changed as specified
357 below:
- 358 - the width of a cable tray length
 - 359 - the width of a cable ladder length
 - 360 - the length of a cantilever bracket
 - 361 - the length of a centrally supported bracket
 - 362 - the length of a pendant
 - 363 - the length of a trapeze support
 - 364 - the width of a C-shaped ceiling support

365 When a product type comprises a combination of the above system components then only one
366 dimension at a time can be changed.

367 Different jointing methods or different jointing positions constitute different product types

368 **3.26**

369 **transverse deflection**

370 vertical deflection across the width of the base area, omitting the longitudinal deflection, when
371 mounted horizontally

372 **3.27**

373 **localized weakness**

374 Area of the cable tray or cable ladder length which, due to the design has

- 375 • a lower shearing resistance than the medium shearing resistance of the length.
- 376 • a lower resistance to the bending moment than the medium resistance to the bending
- 377 moment.

378 Note 1 to entry: Typical example of localized weakness is the perforation of side members to accommodate the
379 rungs of cable ladder

380 **3.28**

381 **organic coating**

382 coating (such as paint, lacquer or powder coating) in which the principal ingredients are derived
383 from some compound of carbon

384 **3.29**

385 **pendant**

386 vertical suspension device

387 **3.30**

388 **trapeze support**

389 Horizontal supporting device supported by two or more pendants

390 **3.31**

391 **trapeze system**

392 Assembly comprising pendants and a trapeze support

393 **3.32**

394 **centrally supported bracket**

395 Horizontal supporting device supported in the centre by a single pendant

396 **3.33**

397 **specified cable tray system**

398 a unique combination of cable tray system components assembled according to manufacturer's
399 instructions

400 **3.34**

401 **specified cable ladder system**

402 a unique combination of cable ladder system components assembled according to
403 manufacturer's instructions

404 **3.35**

405 **Joint**

406 connection of two cable tray lengths, cable ladder lengths or fittings either with or without a
407 coupler

408 **3.36**

409 **coupler**

410 part to connect two cable tray lengths, cable ladder lengths or fittings

411 Note 1 to entry: a coupler may be an integral part of a system component or an individual item.

4 General requirements

Cable tray systems and cable ladder systems shall be so designed and so constructed that in normal use, when installed according to the manufacturer's or responsible vendor's instructions, they ensure reliable support to the cables contained therein. They shall not impose any unreasonable hazard to the user or cables.

Compliance is checked by carrying out all the relevant tests specified in this standard.

The system components shall be designed to withstand the stresses likely to occur during recommended transport and storage.

Cable tray systems and cable ladder systems according to this standard are not intended to be used for human support.

5 General conditions for tests

5.1 Tests according to this standard are type tests.

5.2 Unless otherwise specified, tests shall be carried out with cable tray system components or cable ladder system components assembled and installed as in normal use according to the manufacturer's or responsible vendor's instructions.

5.3 Tests on non-metallic system components or composite system components shall not commence earlier than 168 h after manufacture.

5.4 Unless otherwise specified, tests shall be carried out at an ambient temperature of $20\text{ °C} \pm 5\text{ °C}$.

Unless otherwise specified, all tests are carried out on new samples.

5.5 When toxic or hazardous processes are used, precautions should be taken to safeguard the person performing the test.

5.6 Unless otherwise specified, three samples are subjected to the tests and the requirements are satisfied if all the tests are met.

If one of the samples does not satisfy a test due to an assembly or a manufacturing fault, that test and any preceding one which may have influenced the results of the test shall be repeated and also the tests which follow shall be made in the required sequence on another full set of samples, all of which shall comply with the requirements.

NOTE The applicant, when submitting a set of samples, may also submit an additional set of samples which may be necessary, should one sample fail. The testing station will then, without further request, test the additional set of samples and will reject only if a further failure occurs. If the additional set of samples is not submitted at the same time, the failure of one sample will entail rejection.

5.7 If the relative humidity of the atmosphere has a significant effect on the classified properties of the samples under test, the manufacturer or responsible vendor shall declare this information.

5.8 If a system component or system is coated in paint or any other substance which is likely to affect its classified properties, then the relevant tests in this standard shall be performed on the coated sample.

5.9 For the SWL test specified in subclauses from 10.2 to 10.8, deflections shall be measured by instruments with a precision of 0,1 mm or better in all the range of measurement.

The total applied load for each of the SWL tests shall have a tolerance of 0 to + 3 %

454 All lengths and distances for test arrangements shall not exceed a tolerance of $\pm 5\%$ with a
455 limiting value of ± 50 mm.

456 **5.10** to avoid the possibility of false deflection results arising because of slippage between
457 the fixing device and the test sample, the sample shall be positioned either at the limit of
458 its adjustment, which prevents slippage or marked so that any slippage can be easily
459 identified during the test.

460 **6 Classification**

461 **6.1 According to material**

462 **6.1.1** Metallic system component

463 **6.1.2** Non-metallic system component

464 **6.1.3** Composite system component

465 **6.2 According to resistance to flame propagation**

466 **6.2.1** Flame propagating system component

467 **6.2.2** Non-flame propagating system component

468 **6.3 According to electrical continuity characteristics**

469 **6.3.1** Cable tray system or cable ladder system without electrical continuity characteristics

470 **6.3.2** Cable tray system or cable ladder system with electrical continuity characteristics

471 **6.3.3** Cable tray system or cable ladder system with electrical continuity characteristics and
472 with protective earthing (PE) function

473 **6.4 According to electrical conductivity**

474 **6.4.1** Electrically conductive system component

475 **6.4.2** Electrically non-conductive system component

476 NOTE Metal cable tray systems and metal cable ladder systems with a coating are considered as conductive.

477 **6.5 According to resistance against corrosion**

478 If system components within the cable tray system or cable ladder system have different
479 classifications, then the manufacturer or responsible vendor shall declare all relevant
480 classifications.

481 Within this clause, special local environmental conditions are not considered in this standard.

482 **6.5.1** Non-metallic system component

483 **6.5.2** System component made of mild steel with metallic coating or of stainless steel

484 Resistance against corrosion is classified according to Tables 1A and 1B. These tables lists
485 some of the commonly used materials as reference for classification purposes. The
486 classification is an indication only and is used for comparison purposes and should not be used
487 to determine life expectancy of the coating.

488 NOTE To indicate the life to first maintenance for zinc coated products refer to ISO 14713 Part 1 and Part 2.

489 Tables 1A and 1B shall be read as tables in which a classification is given to the materials
490 materials used for the manufacturing of metallic cable trays and ladders and components.

491 **Table 1A – Classification for resistance against corrosion for coated mild steel products**

Class	Neutral salt spray (NSS) test duration h		Reference material and metallic coating
0	-		None ^a
1	24	or	Electroplated to a minimum thickness of 5 µm according to ISO 2081
2	96	or	Electroplated to a minimum thickness of 12 µm according to ISO 2081
3	155	or	Pre-galvanised to grade 275 according to ISO 3575, ISO 4998 or EN 10346
4	195	or	Pre-galvanised to grade 350 according to ISO 3575, ISO 4998 or EN 10346
5	450	or	Post-galvanised to a zinc mean coating thickness (minimum) of 45 µm according to ISO 1461 for zinc thickness only
6	550	or	Post-galvanised to a zinc mean coating thickness (minimum) of 55 µm according to ISO 1461 for zinc thickness only
7	700	or	Post-galvanised to a zinc mean coating thickness (minimum) of 70 µm according to ISO 1461 for zinc thickness only
8	850	or	Post-galvanised to a zinc mean coating thickness (minimum) of 85 µm according to ISO 1461 for zinc thickness only (usually high silicon steel)
9	1000		No reference
10	1250		No reference
11	1500		No reference
12	2000		No reference
13	> 2500		No reference
^a For materials which have no declared corrosion resistance classification.			

492 - If a coating is referenced in Table 1A, a classification without testing can be obtained;

493 - For materials made of mild steel with a coating and not referenced in Table 1A, a salt spray
494 test is required. The classification obtained shall be the one corresponding to the duration of
495 the salt spray test;

496 - The classification of coating referenced in Table 1A can be higher if it passes a salt spray test
497 for a longer duration. The classification obtained shall be the one corresponding to the longer
498 duration of the salt spray test.

499 Example:-

500 A sample electroplated to a minimum thickness of 12 µm according to ISO 2081 is classified as
501 class 2 according to Table 1A, equivalent to 96 hours. If the sample is tested in accordance
502 with 14.2.3 for a duration of 195 hours and passes the test then it may be classified as class 4.

503

504

505

506

507

508

509 **Table 1B – Classification for resistance against corrosion for stainless steel products**

Corrosion Resistance Classes for stainless steel products (CRC)

Standard CRC ^a	Steel designation			
	EN	ASTM	UNS	GOST
I	1.4003	S40977		X2CrNi12
	1.4016	430	S43000	12Ch17
	1.4512	409	S40900	X2CrTi12
II	1.4301	304	S30400	08Ch18N10
	1.4307	304L	S30403	03Ch18N11
	1.4311	304LN	S30453	
	1.4541	321	S32100	12Ch18N10T
	1.4318	301LN		
	1.4306	304L	S30403	03Ch18N11
	1.4567	304Cu	S30430	
	1.4462		S32001	
III	1.4401	316	S31600	08Ch16N11M3
	1.4404	316L	S31603	
	1.4435			03Ch17N14M3
	1.4571	316Ti	S31635	10Ch17N13M2T
	1.4429	316LN	S31653	
	1.4432	316L	S31603	06Ch17N13M3-WD
	1.4162		S32101	
	1.4662		S82441	
	1.4362		S32304	
	1.4062		S32202	
	1.4578			
IV	1.4439		S31726	
	1.4462		S31803	
	1.4539	904L	N08904	
V	1.4565		S34565	
	1.4529	926	N08926	
	1.4547		S31254	
	1.4410		S32750	
	1.4501		S32760	
	1.4507			
^a Where post treatment is carried out the classification reference (see 7.3 d) shall be suffixed with (pt) e.g. No post treatment Table 1B class III, with post treatment Table 1B class III(pt). The post treatment process is used to improve the protection against crevice crack corrosion and the contamination by other steels.				

510 This table contains information from EN 1993-1-4 including additional information from ASTM, UNS and GOST.

511 - Stainless steel referenced in Table 1B is classified according to the table;

512 - Stainless steel not referenced in Table 1B is classified by the steel supplier's declaration.

513 - Additionally the manufacturer has to declare the execution of the post-treatment process,
514 where used, to improve the protection against crevice crack corrosion and the contamination
515 by other steels according to ASTM: A380/A380M: 2013 or equivalent EN, ISO standard for
516 example EN 2516.

517 **6.5.3** System component made from aluminium alloys

518 Under consideration

519 **6.5.4** System component with organic coating intended to provide resistance against
520 corrosion

521 Resistance to corrosion is classified according to Table 1A.

522 **6.5.4.1 Assessment of the degree of delamination and corrosion around a scribe or**
523 **other artificial defect.**

524 In accordance with Table 1A and when the degree of corrosion around a scribe is measured
525 according to ISO 4628-8.

526 **6.5.4.2 Designation of quantity and size of defects, and of intensity of uniform**
527 **changes in appearance**

528 In accordance with Table 1A and when the degree of corrosion of the surface is measured
529 according to ISO 4628-3.

530 **6.6 According to temperature**

531 **6.6.1 Minimum temperature for the system component as given in Table 2**

532 **Table 2 – Minimum temperature classification**

Minimum transport, storage, installation and application temperature °C
+5
–5
–15
–20
–25
–40
–50
–70

533 **6.6.2 Maximum temperature for the system component as given in Table 3**

534 **Table 3 – Maximum temperature classification**

Maximum transport, storage, installation and application temperature °C
+40
+60
+90
+105
+120
+150

535

6.7 According to the perforation in the base area of the cable tray length as given in Table 4

Table 4 – Perforation base area classification

Classification	Perforation in the base area
A	Up to 2 %
B	Over 2 % and up to 15 %
C	Over 15 % and up to 30 %
D	More than 30 %
NOTE Classification D relates to IEC 60364-5-52, B.52.6.2 b).	

6.8 According to the free base area of mesh cable tray length or cable ladder length as given in Table 5

Table 5 – Free base area classification

Classification	Free base area
X	Up to 80 %
Y	Over 80 % and up to 90 %
Z	More than 90 %
NOTE Classification Z relates to IEC 60364-5-52, B.52.6.2 c).	

6.9 According to impact resistance of non-metallic and composite systems

6.9.1 System component offering impact resistance up to 2 J

6.9.2 System component offering impact resistance up to 5 J

6.9.3 System component offering impact resistance up to 10 J

6.9.4 System component offering impact resistance up to 20 J

6.9.5 System component offering impact resistance up to 50 J

7 Marking and documentation

7.1 Each system component shall be durably and legibly marked with

- the manufacturer's or responsible vendor's name or trade mark or identification mark;
- a product identification mark which may be, for example, a catalogue number, a symbol, or the like.

When system components other than cable tray lengths and cable ladder lengths are supplied in a package, the product identification mark may be, as an alternative, marked on the smallest package unit.

- flame propagating system components declared as 6.2.1 shall be marked with a flame propagating symbol in accordance with IEC 60417-6180, as shown in Figure 1. The symbol shall be placed on the system component and on the smallest supplied package or label. When it is not feasible to have this identification mark on small system components, due to the small size of the item, it is sufficient to place the symbol on the smallest supplied package.



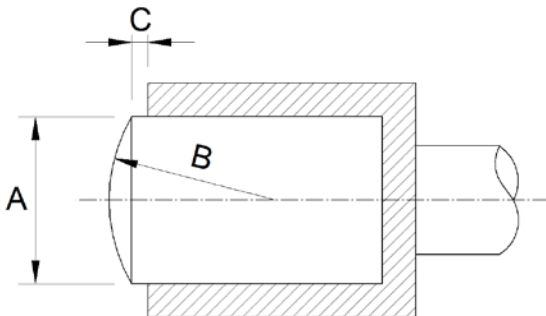
Figure 1 – Flame propagating symbol

– If an earth terminal is supplied then it shall be marked with the symbol  in accordance with IEC 60417-symbol 5019.

All labels shall be durable.

Laser marking directly on the product and marking made by moulding, pressing or engraving are not subjected to this test.

Compliance is checked by the tests in 7.1.1 and 7.1.2 and by inspection, using normal or corrected vision, without additional magnification and by rubbing the label using the equipment shown in Figure 2. New samples for 7.1.1 and 7.1.2 shall be used.



Key

A	Diameter of the piston	(20 ± 1) mm
B	Radius of the piston head	(20 ± 1) mm
C	Gap between piston head and cylinder	(2 + 1-0) mm

Figure 2 – Piston for durability of marking test

The test piston head shall be made of an elastic material which is inert against the test liquids and has a Shore-A hardness of 47 ± 5 (for example synthetic rubber). The piston shall be wrapped with cotton comprising of cotton wool covered by a piece of cotton medical gauze.

When it is not possible to carry out the test on the specimens due to the shape/size of the product, a suitable piece having the same characteristics as the product can be submitted to the test.

The test shall be carried out on one sample. If the sample does not satisfy the test, the test shall be repeated on two new samples, both of which shall comply with the requirements.

590 7.1.1 Durability of marking

591 *The sample shall be rubbed by applying a compression force of (5 ± 1) N at a rate of one cycle*
592 *per second for 15 s (a cycle comprising a forward and backward movement along the length of*
593 *the marking) by means of the test piston shown in Figure 2.*

594 *Rubbing shall commence immediately after soaking the piece of cotton with water. For*
595 *markings longer than 20 mm, rubbing can be limited to a part of the marking, over a path of at*
596 *least 20 mm length.*

597 *The sample surface shall then be dried and the test repeated on the same sample using new*
598 *cotton soaked in n-hexane 95 % solvent.*

599 *When using this liquid precautions as stated in the relative material safety datasheet provided*
600 *by the chemical supplier shall be taken to safeguard the person performing the test.*

601 *NOTE n-hexane 95 % (Chemical Abstracts Service Registry Number, CAS RN, 110-54-3) is available from a variety*
602 *of chemical suppliers as a high pressure liquid chromatography (HPLC) solvent.*

603 *After the test, the marking shall be legible.*

604 7.1.2 Durability of label adhesion

605 Under consideration.

606 **7.2** If a system component can, by taking precautions, be stored and transported at a
607 temperature outside the declared temperatures according to Tables 2 and 3, the
608 manufacturer or responsible vendor shall declare the precautions and the alternative
609 temperature limits.

610 *Compliance is checked by inspection.*

611 **7.3** The manufacturer or responsible vendor shall provide in his literature all information
612 necessary for the proper and safe installation and use of the cable tray system and cable
613 ladder system. The SWL and impact resistance is valid for the whole temperature
614 classification declared. For the declared applications the information shall include:

615 a) instructions for the assembly and installation of system components and for the precautions
616 required to avoid excessive transverse deflection, which could cause damage to the cables
617 (see 5.2, 9.2, 10.3, 10.7, 10.8, and 14.1),

618 b) thermal expansion properties and precautions to be taken, if necessary,

619 c) relative humidity if it affects the classifications (see 5.7),

620 d) classification according to Clause 6. Where classification refers to corrosion resistance the
621 relevant table shall also be specified e.g. for non-stainless steel Table 1A class 3, for
622 stainless steel Table 1B class IV,

623 e) information on holes or devices when provided for equipotential bonding (see 6.3.2) in
624 particular when a specific electrical connection device is necessary,

625 f) precautions for transport and storage outside the declared temperature classification,
626 where applicable (see 7.2),

627 g) product dimensions (see Clause 8),

628 h) torque settings in Nm for screwed connections and internal fixing devices as well as
629 threads, where applicable (see 9.3d) and 9.3.1),

630 i) SWL in N/m for the cable tray lengths or cable ladder lengths for the declared span including
631 joints, where applicable for one or more of the following installation methods (see 10.1),

632 a) mounted in the horizontal plane running horizontally on multiple spans according to the
633 declared test type and end span limitations (see 10.3)

- 634 b) mounted in the horizontal plane running horizontally on a single span (see 10.4)
- 635 c) mounted in the vertical plane running horizontally (see 10.5)
- 636 j) type of coupling where applicable,
- 637 k) SWL in N/m for cable tray lengths and cable ladder lengths mounted in the vertical plane
- 638 running vertically, together with the supports used in the test, for the declared span V. The
- 639 declaration shall include the distance C which is the maximum cable fixing distance for
- 640 vertical installation and used in the test defined in clause 10.6, as shown in Figures 13a and
- 641 13b,
- 642 l) SWL in N/m for the fittings when not directly supported and the distance Y from the
- 643 supports adjacent to the fittings (see 10.7),
- 644 m) fixing method for installing cable tray or cable ladder to the supports when declared for the
- 645 test (see 10.3, 10.4 and 10.8.1),
- 646 n) associated information for cantilever brackets when used to support cable tray lengths and
- 647 cable ladder lengths mounted in the horizontal plane for the following types of installation.
- 648 (i) SWL in N of cantilever brackets declared for use with unspecified cable tray systems only. If
- 649 appropriate, the minimum width of cable tray used with the cantilever for unspecified cable tray
- 650 system (see 10.8.1.1.1)
- 651 (ii) SWL in N of cantilever brackets declared for use with unspecified cable ladder systems
- 652 only. If appropriate, the minimum width of cable ladder used with the cantilever for unspecified
- 653 cable ladder system. (see 10.8.1.1.2)
- 654 (iii) SWL in N of cantilever brackets declared for use with both cable tray and cable ladder
- 655 systems which are unspecified. If appropriate, the minimum width of cable tray or cable ladder
- 656 used with the cantilever for both cable tray and cable ladder systems which are unspecified
- 657 (see 10.8.1.1.3)
- 658 (iv) SWL in N of cantilever brackets declared for use with specified cable tray systems. All of
- 659 the components and details of the assembly for specified cable tray system (see 10.8.1.1.4)
- 660 (v) SWL in N of cantilever brackets declared for use with specified cable ladder systems. All of
- 661 the components and details of the assembly for specified cable ladder system (see 10.8.1.1.5)
- 662 o) SWL of pendants for cantilever brackets as a bending moment in Nm and/or as a force in N
- 663 (see 10.8.2.1):
- 664 p) SWL in N for C shape ceiling supports and if used for cable tray only (see 10.8.2.3)
- 665 q) SWL in N and the degree of uneven loading of a centrally supported bracket (see 10.8.2.2)
- 666 r) SWL in N for trapeze system or trapeze support only (see 10.8.2.4)
- 667 s) the appropriate material specification and environmental conditions, chemical environments
- 668 or aggressive agents for which the product is suitable (see 14.2).

669 NOTE For the list shown under 7.3 the SWL information can be given in the form of a diagram, table, or similar.

670 *Compliance is checked by inspection.*

671 **7.4** For PE marking and documentation see Annex C.

672 **8 Dimensions**

673 The manufacturer or responsible vendor shall give the following information:

- 674 – the overall envelope of the cross-section of the cable tray length or cable ladder length

- 675 – the width of the base area of cable tray length or cable ladder length;
- 676 – the height of the cable tray length or cable ladder length available for the accommodation
- 677 of cables when a cover is fitted;
- 678 – the minimum internal radius of fittings available for the accommodation of cables;
- 679 – the dimensions of the perforations, and their arrangements on the cable tray lengths;
- 680 – the dimensions of the rungs including perforations, if any, and the centre line spacing of the
- 681 rungs.

682 NOTE System components, such as fittings, when used as part of the system, may change the effective area
683 available for the accommodation of cables.

684 *Compliance is checked by inspection.*

685 9 Construction

686 The same sample may be used for all the tests in this clause.

687 **9.1** Surfaces of system components which are likely to come into contact with cables during
688 installation or use shall not cause damage to the cables when installed according to the
689 manufacturer's or responsible vendor's instructions.

690 *Compliance is checked by inspection and, if necessary, by manual test.*

691 **9.2** Where the manufacturer or responsible vendor does not declare the use of gloves for
692 installation purposes, then the surfaces of system components shall be safe for
693 handling.

694 *Compliance is checked by inspection and, if necessary, by manual test.*

695 **9.3** Screwed connections and other fixing methods including electrical connections shall be
696 so designed to withstand the mechanical stresses occurring during installations
697 according to the manufacturer's or responsible vendor's instructions and normal use.
698 They shall not cause damage to the cable when correctly inserted.

699 Screwed connections can be either

- 700 a) ISO metric threads, or
- 701 b) a thread forming type, or
- 702 c) a thread cutting type if suitable design provisions are made, or
- 703 d) threads other than a) to c) as specified by the manufacturer or responsible vendor.

704 *Compliance is checked by 9.3.1 or 9.3.2 or 9.3.3.*

705 **9.3.1** Sudden or jerky motions shall not be used to tighten reusable screwed connections.
706 To test the screwed connection, it shall be tightened and removed

- 707 • 10 times for metal screwed connections in engagement with a thread of non-metallic
- 708 material and for screwed connections of non-metallic material,

709 or

- 710 • 5 times in all other cases.

711 *The test is carried out using a suitable screwdriver or spanner to apply the torque as specified*
712 *by the manufacturer or responsible vendor.*

713 *After the test, there shall be no breakage or damage, that will impair the further use of the*
714 *screwed connection.*

715 **9.3.2** Reusable connections other than screwed connections, for example push-on and
716 clamping connections, shall be tightened and removed 10 times.

717 NOTE the term reusable means that the connection can be disassembled and reassembled.

718 *After the test, there shall be no damage to impair the further use of the reusable connections.*

719 **9.3.3** Non-reusable connections are checked by inspection and, if necessary, by manual
720 test.

721 **9.4** Any apparatus mounting device shall meet the requirement of the appropriate standard.

722 **9.5** Cable tray lengths, when perforated, shall exhibit a regular perforation pattern over the
723 base area.

724 *Compliance is checked by inspection and measurement.*

725 **9.6** Cable ladder lengths shall exhibit a regular rung pattern over the base area.

726 *Compliance is checked by inspection and measurement.*

727 **9.7** Internal fixing devices shall have adequate performance to meet at least the
728 requirements of the system component with which they are intended to be used.

729 **10 Mechanical properties**

730 **10.1 Mechanical strength**

731 Cable tray systems and cable ladder systems shall provide adequate mechanical strength.

732 The main criterion for the SWL is safety in use of the product.

733 For the declared application, the manufacturer or responsible vendor shall declare the SWL to
734 be tested

735 – in N/m for each type of cable tray length or cable ladder length at specified distances,
736 preferably in spans of 0,5 m increments, between the support devices,

737 – in N/m for each type of fitting which is not directly supported by a support device,

738 – in N or N/m for each type of support device.

739 NOTE 1 This information can be given in the form of a diagram or table or similar.

740 *Compliance for cable runways is checked by carrying out the relevant tests according to the*
741 *manufacturer's or responsible vendor's declaration as specified in 10.3, 10.4, 10.5, 10.6 and*
742 *10.7 on samples of the widest and narrowest width for each product type. For the intermediate*
743 *widths the SWLs shall then be determined by interpolation of the test results. The alternative is*
744 *to test only the widest product. For the tests specified in 10.3, 10.4 and 10.7, the SWL of an*
745 *untested narrower width may be derived by multiplying the SWL of the tested widest width by*
746 *the factor of the narrower width divided by the widest (tested) width.*

747 *Horizontal lengths running in the horizontal plane which are declared for use with both multiple*
748 *span and single span applications must be tested in accordance with both 10.3 and 10.4.*

749 *Vertical lengths running in the horizontal plane which are declared for use with both multiple*
750 *span and single span applications must be tested in accordance with both 10.5.1 and 10.5.2.*

751 *Compliance for support devices is checked by carrying out the tests specified in 10.8.*

752 NOTE 2 An overview of the SWL test procedure is shown in Annex L.

753 Cable tray system components and cable ladder system components shall withstand impacts
754 occurring during transport, storage and installation.

755 *Compliance is checked by the test specified in 10.9.*

756 **10.2 SWL test procedure**

757 *In 10.2.1 and 10.2.2, the general procedure and alternative procedures for particular cases are*
758 *respectively described.*

759 *For the minimum, maximum and alternative temperature tests the method used to apply the*
760 *load shall not restrain creepage.*

761 **10.2.1 General procedure**

762 *Two tests shall be carried out:*

- 763 • *at a minimum temperature declared by the manufacturer in accordance with Table 2 and*
764 *tested in accordance with 10.2.1.1 or 10.2.1.3;*
- 765 • *at a maximum temperature declared by the manufacturer in accordance with Table 3 and*
766 *tested in accordance with 10.2.1.2 or 10.2.1.3.*

767 NOTE For alternative test conditions, see 10.2.2.

768 **10.2.1.1 Preferred Minimum temperature test**

769 *The test shall be carried out at minimum temperature declared according to the classification of*
770 *Table 2. During this test, the uniformity of the temperature shall be maintained within the*
771 *tolerance of $\pm 5^\circ \text{C}$, 0,25 m around the samples.*

772 *The mounted sample shall be conditioned for a minimum of 2 h at the minimum temperature*
773 *before loading.*

774 *All loads shall be uniformly distributed over the length and width of the sample as shown in*
775 *Annex D.*

776 *The load shall be applied in such a way that a UDL is ensured even in the case of extreme*
777 *deformation of the sample.*

778 *Typical methods of applying a UDL are shown in Annex E.*

779 When testing the sample upside down, the applied load shall be the declared SWL plus twice
780 the weight of the sample.

781 When mechanical linkages are used, care must be taken to ensure all point loads are equal
782 and transmitted through the load distribution plates.

783 *To allow for settlement of the sample, a pre-load of 10 % of the SWL, unless otherwise*
784 *specified, shall be applied for 5 min $\pm$ 30 s and then removed. At this time, the measurement*
785 *apparatus shall be calibrated to zero.*

786 *The load shall then be increased by increments or continuously on each sample through the*
787 *load distribution plates, evenly longitudinally and transversely up to the SWL. Increments*
788 *shall not be heavier than a quarter of the SWL.*

789 *After loading, the deflection shall be measured at the points specified for each test*
790 *arrangement.*

For the tests in 10.3, 10.4, 10.5, 10.6, and 10.7, the mid span deflection of each sample is the arithmetic mean of the deflections at the two measuring points near the side members as shown in Figure 3, key 8.

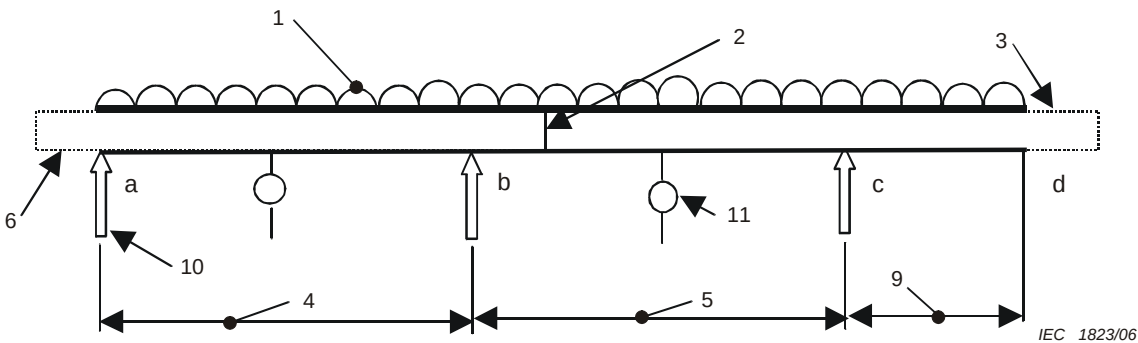


Figure 3a

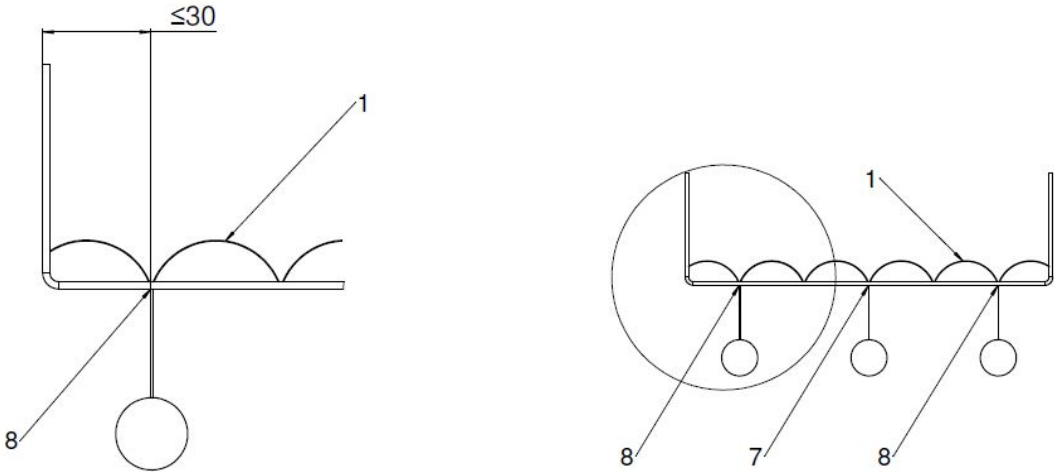


Figure 3b

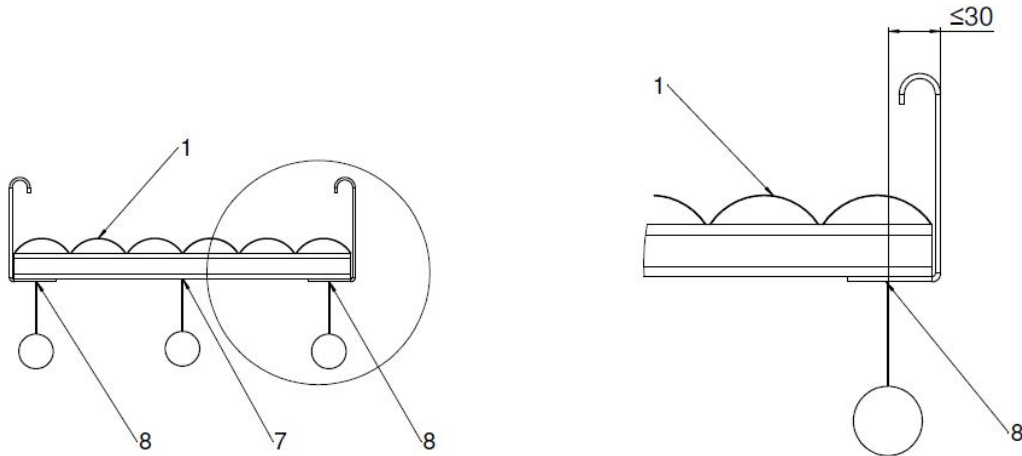


Figure 3c

All dimensions are in millimetres

Key

1	Symbol to indicate a uniformly distributed load (UDL)
2	Joint
3	Extension of cantilever only permitted when required to support loading media
4	End span
5	Intermediate span = L
6	Maximum unloaded overhang length = 500 mm
7	Deflection measuring point at mid-width
8	Deflection measuring point
9	Cantilever = $0,4L$
10	Symbol to indicate a support position
11	Symbol to indicate a deflection measurement point
a	Support
b	Support
c	Support
d	End of load
L	Distance between supports on lengths as declared by the manufacturer

801 **Figure 3 – Safe working load test – General arrangement**

802 *Where visible transversal deformation occurs, a third measurement of deflection shall be taken*
 803 *in the centre of the cable tray base or cable ladder base at mid-span as shown in Figure 3, key*
 804 *7 or Figure 14, point s for fittings. For cable ladder, if there is no rung at mid-span, the*
 805 *deflection shall be measured at the nearest rung. The transverse deflection shall be calculated*
 806 *by subtracting the mid-span deflection from the third readings.*

807 *The load shall be maintained during the test and the deflections measured every 5 min $\pm$ 30 s*
 808 *until the difference between two consecutive sets of readings is less than 2 % with regard to*
 809 *the first set of the two consecutive sets of readings. The last set of readings measured at this*
 810 *point are the deflections measured at the SWL. For an example see Annex G.*

811 *When subjected to the SWL, the sample, its joints and internal fixing devices shall show no*
 812 *damage or crack visible to normal view or corrected vision without magnification and the*
 813 *deflections of each sample shall not exceed the values specified in 10.3, 10.4, 10.5, 10.6, 10.7,*
 814 *and 10.8.*

815 *The load on the sample shall then be increased to 1,7 times the SWL.*

816 *The load shall be maintained and the deflections measured every 5 min $\pm$ 30 s until the*
 817 *difference between two consecutive sets of readings is less than 2 % with regard to the first set*
 818 *of the two consecutive sets of readings.*

819 *The sample shall sustain the increased loading without collapsing. Buckling and deformation of*
 820 *the sample are permissible at this loading.*

821 **10.2.1.2 Preferred Maximum temperature test**

822 *The test shall be carried out at maximum temperature declared according to the classification*
 823 *of Table 3. During this test, the uniformity of the temperature shall be maintained within the*
 824 *tolerance of $\pm 5^\circ\text{C}$, 0,25 m around the samples.*

825 *The mounted sample shall be conditioned for a minimum of 2 h at the maximum temperature*
 826 *before loading.*

827 *All loads shall be uniformly distributed over the length and width of the sample as shown in*
 828 *Annex D.*

829 *The load shall be applied in such a way that a UDL is ensured even in the case of extreme*
 830 *deformation of the sample.*

- 831 *Typical methods of applying a UDL are shown in Annex E.*
- 832 When testing the sample upside down, the applied load shall be the declared SWL plus twice
833 the weight of the sample.
- 834 *To allow for settlement of the sample, a pre-load of 10 % of the SWL, unless otherwise*
835 *specified, shall be applied for 5 min $\pm$ 30 s and then removed. At this time, the measurement*
836 *apparatus shall be calibrated to zero.*
- 837 *The load shall then be increased by increments or continuously on each sample through the*
838 *load distribution plates, evenly longitudinally and transversely up to the SWL. Increments*
839 *shall not be heavier than a quarter of the SWL.*
- 840 *After loading, the deflection shall be measured at the points specified for each test*
841 *arrangement.*
- 842 *For the tests in 10.3, 10.4, 10.5, 10.6, and 10.7, the mid span deflection of each sample is the*
843 *arithmetic mean of the deflections at the two measuring points near the side members as*
844 *shown in Figure 3, key 8.*
- 845 *Where visible transversal deformation occurs, a third measurement of deflection shall be taken*
846 *in the centre of the cable tray base or cable ladder base at mid-span as shown in Figure 3, key*
847 *7 or Figure 14, point s for fittings. For cable ladder, if there is no rung at mid-span, the*
848 *deflection shall be measured at the nearest rung. The transverse deflections shall be*
849 *calculated by subtracting the mid-span deflection from the third readings.*
- 850 *The load shall be maintained during the test and the deflections measured every 5 min $\pm$ 30 s*
851 *until the difference between two consecutive sets of readings is less than 2 % with regard to*
852 *the first set of the two consecutive sets of readings. The last set of readings measured at this*
853 *point are the deflections measured at the SWL. For an example, see Annex G.*
- 854 *When subjected to the SWL, the sample, its joints and internal fixing devices shall show no*
855 *damage or crack visible to normal view or corrected vision without magnification and the*
856 *deflections of each sample shall not exceed the values specified in 10.3, 10.4, 10.5, 10.6, 10.7,*
857 *and 10.8.*
- 858 *The load on the sample shall then be increased to 1,7 times the SWL.*
- 859 *The load shall be maintained and the deflections measured every 5 min $\pm$ 30 s until the*
860 *difference between two consecutive sets of readings is less than 2 % with regard to the first set*
861 *of the two consecutive sets of readings.*
- 862 *The sample shall sustain the increased loading without collapsing. Buckling and deformation of*
863 *the sample are permissible at this loading.*
- 864 **10.2.1.3 Alternative test for minimum or maximum temperature**
- 865 *The test is carried out as sub-tests A and B. The number of samples for each sub-test is*
866 *determined from the sample requirement detailed in tests 10.3 to 10.8. The number of samples*
867 *shall be equal for each sub-test.*
- 868 *Sub-tests A and B shall be carried out from phase 1 through to phase 3 as shown in Figure 4.*
- 869

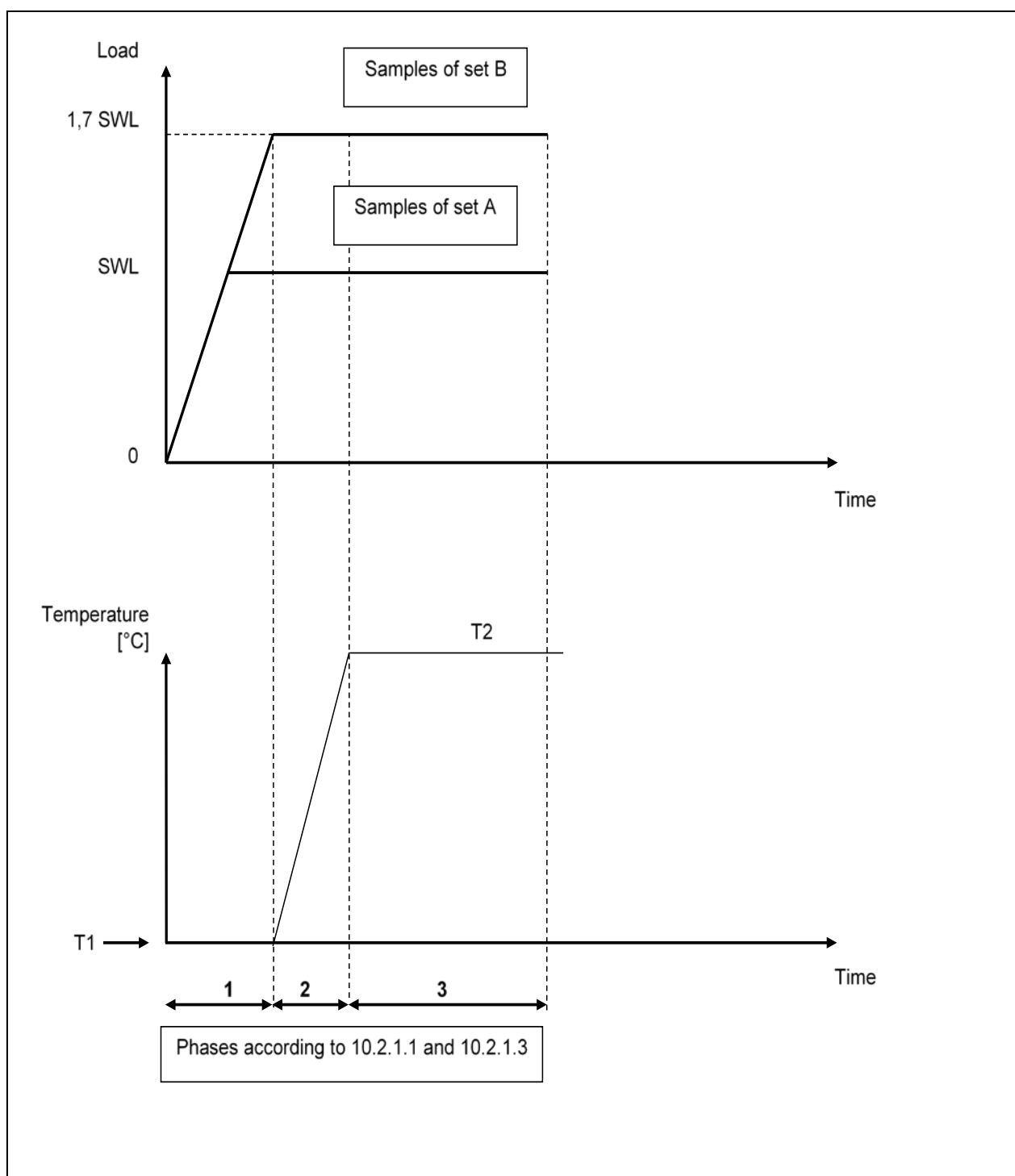


Figure 4a – Load and temperature diagrams for maximum temperature

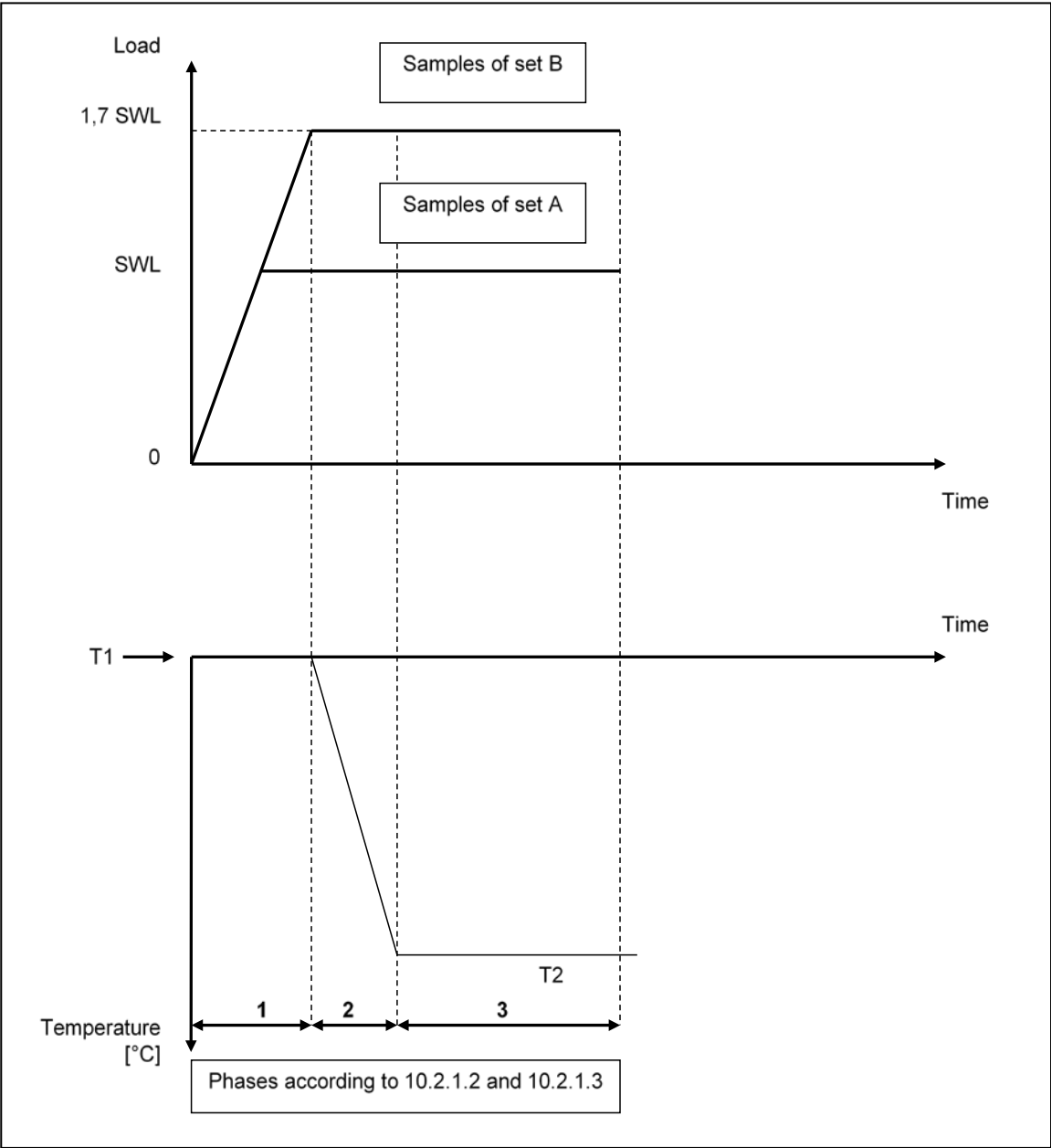


Figure 4b – Load and temperature diagrams for minimum temperature

Key
T1 Ambient temperature
T2 Temperature declared in Table 3

Figure 4 – Load and temperature diagrams with respect to time for test 10.2.1.3

882 **Phase 1: loading from zero to SWL for sub-test A and from zero to 1,7 SWL**
883 **for sub-test B**

884 *This phase shall be carried out at ambient temperature.*

885 *All loads shall be uniformly distributed over the length and width of each sample as shown in*
886 *Annex D.*

887 *The load shall be applied in such a way that a UDL is ensured even in the case of extreme*
888 *deformation of the samples.*

889 *Typical methods of applying a UDL are shown in Annex E.*

890 *When testing the sample upside down, the applied load shall be the declared SWL plus twice*
891 *the weight of the sample.*

892 *To allow for settlement of each sample, a pre-load of 10 % of the SWL, unless otherwise*
893 *specified, shall be applied for 5 min $\pm$ 30 s and then removed. At this time, the measurement*
894 *apparatus shall be calibrated to zero.*

895 *The load shall then be increased by increments or continuously on each sample through the*
896 *load distribution plates, evenly longitudinally and transversely up to the SWL for sub-test A and*
897 *up to 1,7 SWL for sub-test B. Increments shall not be heavier than a quarter of the SWL.*

898 **Phase 2: temperature change**

899 *Immediately after phase 1, sub-tests A and B shall be continued by changing the temperature*
900 *on the samples from ambient temperature to the temperature declared by the manufacturer in*
901 *accordance with Table 2 or Table 3. The declared temperature shall be reached no later than*
902 *48 h after starting the temperature change.*

903 *The declared temperature is considered to be reached when no change of measured*
904 *temperature within the tolerance of $\pm 5^\circ \text{C}$ in the test chamber occurs during 4 h.*

905 **Phase 3: evaluation of test results**

906 *This phase shall be carried out immediately after phase 2 at the declared temperature*
907 *according to Table 3. During this phase, the uniformity of the temperature shall be maintained*
908 *within the tolerance of $\pm 5^\circ \text{C}$, 0,25 m around the samples.*

909 *This phase requires different procedures for sub-tests A and B.*

910 *Sub-test A (measurement of deflection)*

911 *During this phase the deflection of the sample, subjected to SWL, shall be measured at the*
912 *points specified for each test arrangement.*

913 *For the tests in 10.3, 10.4, 10.5, 10.6 and 10.7, the mid-span deflection of each sample is the*
914 *arithmetic mean of the deflections at the two measuring points near the side members as*
915 *shown in Figure 3, key 8.*

916 *Where visible transversal deformation occurs, a third measurement of deflection shall be taken*
917 *in the centre of each cable tray base or cable ladder base at mid span as shown in Figure3,*
918 *key 7, or Figure 14, point s for fittings. For cable ladder, if there is no rung at mid-span, the*
919 *deflection shall be measured at the nearest rung.*

920 *The transverse deflections shall be calculated by subtracting the mid span deflections from the*
921 *third readings.*

922 *The load shall be maintained during the test and the deflections measured every 5 min $\pm$ 30 s*
923 *until the difference between two consecutive sets of readings is less than 2 % with regard to*
924 *the first set of the two consecutive set of readings. The last set of readings, measured at this*
925 *point, is all the deflections measured at the SWL. For an example, see Annex G.*

926 *When subjected to the SWL, the sample, its joints and internal fixing devices shall show no*
927 *damage or crack visible to normal view or corrected vision without magnification and the*
928 *deflections shall not exceed the values specified in 10.3, 10.4, 10.5, 10.6, 10.7 and 10.8.*

929 *Sub-test B (evaluation of no collapsing)*

930 *The load shall be maintained and the deflections measured every 5 min $\pm$ 30 s until the*
931 *difference between two consecutive sets of readings is less than 2 % with regard to the first set*
932 *of the two consecutive sets of readings.*

933 *The sample shall sustain the increased loading without collapsing. Buckling and deformation of*
934 *the sample is permissible at this loading.*

935 **10.2.2 Alternative test conditions for 10.2.1**

936 *The procedure according to 10.2.1 can be modified by the conditions detailed in either a) or b)*
937 *below. Different conditions, as detailed in a) or b) can be used for different system*
938 *components:*

939 *a) at any temperature within the declared range if documentation is available which states that*
940 *the relevant mechanical properties of the materials as used within the samples do not differ*
941 *by more than $\pm$ 5 % of the average between the maximum and minimum property values*
942 *due to temperature change within the declared temperature range;*

943 *NOTE Examples of materials that fulfil this condition are steel and aluminium in a range of temperature from -*
944 *25 °C to + 120 °C.*

945 *b) only at maximum temperature within the range according to 10.2.1.2 or 10.2.1.3, if*
946 *documentation is available which states that the relevant mechanical properties of the*
947 *materials improve when the temperature is decreasing.*

948 **10.3 Test for SWL of cable tray lengths and cable ladder lengths mounted in the** 949 **horizontal plane running horizontally on multiple spans**

950 *Each test shall be carried out on one sample. If the sample does not satisfy the test, the test*
951 *shall be repeated on two new samples, both of which shall comply with the requirements.*

952 *Each test is carried out on cable tray lengths and joints or cable ladder lengths and joints to*
953 *verify the declared SWL when mounted over multiple spans with the cable tray or cable ladder*
954 *in the flat and horizontal plane.*

955 *Each test is carried out with the samples consisting of two or more cable tray lengths or cable*
956 *ladder lengths. These shall be coupled, as shown in Figure 3 to form two full spans plus a*
957 *cantilever. Joints are to be positioned as required for each test type following the*
958 *manufacturer's or responsible vendor's instructions.*

959 *The samples shall be placed on fixed, rigid supports 'a', 'b' and 'c', which shall be horizontal*
960 *and level with a width of 45 mm $\pm$ 5 mm. The samples shall not be fixed to the supports unless*
961 *a fixing method is declared by the manufacturer or responsible vendor in which case this fixing*
962 *method shall be used.*

963 *If the manufacturer or responsible vendor declares supports as part of the cable tray systems*

964 or cable ladder systems and the width of the supports is smaller than 40 mm, then supports a,
965 b and c are replaced by the supports declared in the system.

966 For all test types, full standard cable tray lengths or cable ladder lengths shall be used except
967 for the end positions where cut lengths shall be used when required.

968 The cantilever of $0,4L$ can be increased, if necessary, to ensure a UDL on the cantilever.

969 Depending on the installation method(s) declared by the manufacturer or responsible vendor,
970 one or more of the test types in accordance with 10.3.1 to 10.3.4 shall be used.

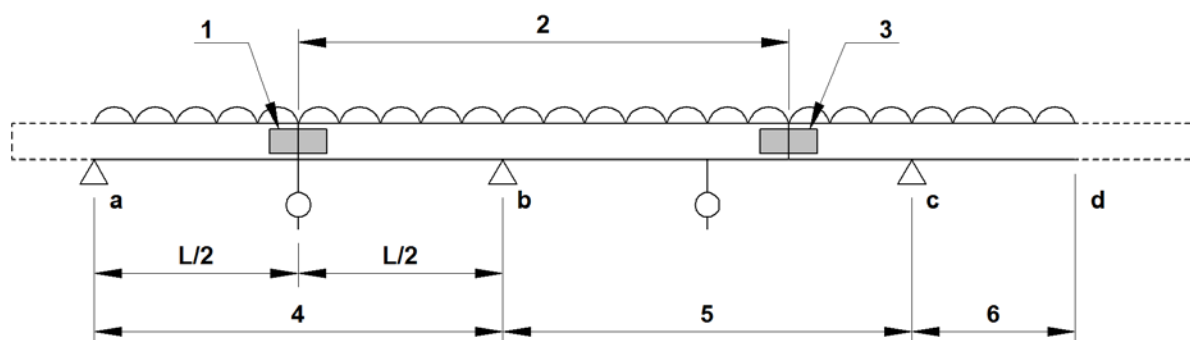
971 The tests for 10.3.1 to 10.3.4 shall be carried out in accordance with 10.1 and 10.2.

972 The practical mid-span deflection of each span at the SWL shall not exceed 1/100th of the
973 span.

974 The transverse deflection of each span at the SWL shall not exceed 1/20th of the width of the
975 sample and the samples shall still ensure reliable support to any cables that would normally be
976 contained therein without imposing any unreasonable hazard or danger to the user or cables.

977 10.3.1 Test type I

978 Test type I shall be used when the manufacturer or responsible vendor does not declare any
979 end span length limitations or joint position limitations. In this case, joints can occur anywhere
980 on an installation. The test arrangement shall be as shown in
981 Figure 5.



Key

- 1 Joint at the mid-point of span a-b
- 2 Product standard length; this shall be reduced for test purposes only if the joint is in the cantilever c-d or within 25 % of the span length from support c
- 3 One or more joints may be required dependent upon the product length and span
- 4 End span = L
- 5 Intermediate span = L
- 6 Cantilever = $0,4L$
- a, b and c Support positions
- d End of load
- L Distance between supports on lengths as declared by the manufacturer

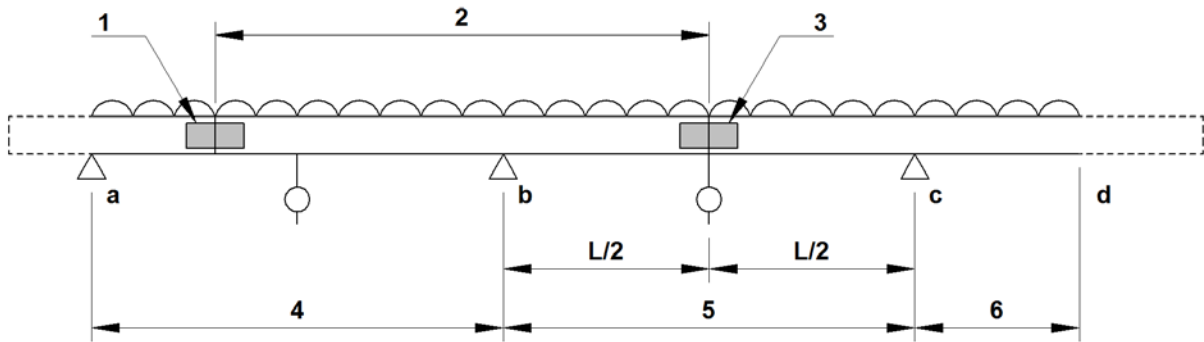
Figure 5 – Test type I

984 10.3.2 Test type II

985 Test type II shall be used when the manufacturer or responsible vendor declares that on all
986 installations there shall be no joints in the end span. The test arrangement shall be as shown in
987 Figure 6.

Only for test purposes, a joint may be required in span a-b because the joint in span b-c shall always be at the mid-span position.

If the manufacturer or responsible vendor declares that on all installations the end span shall be reduced in length, the end span X shall then be declared.



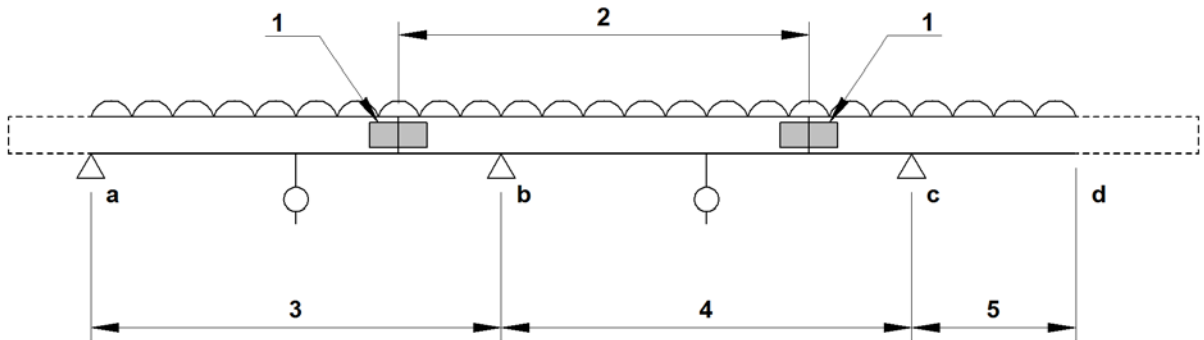
- Key**
- 1 Joint for test purposes only, if required
 - 2 Product standard length
 - 3 Joint at the mid-point of span b-c
 - 4 End span = X (Where $X \leq L$)
 - 5 Intermediate span = L
 - 6 Cantilever = $0,4L$
 - a, b and c Support positions
 - d End of load
 - L Distance between supports on lengths as declared by the manufacturer

Figure 6 –Test type II

10.3.3 Test type III

Test type III shall be used when the standard cable tray length or cable ladder length is equal to the span or multiples of the span and the manufacturer or responsible vendor declares the joint position, relative to the supports, to be used on all installations. Test type III can also be used when the standard cable tray length or cable ladder length is 1,5 times the span and the position of the joint is at 25 % of the span from the support position.

The test arrangement is shown in Figure 7.

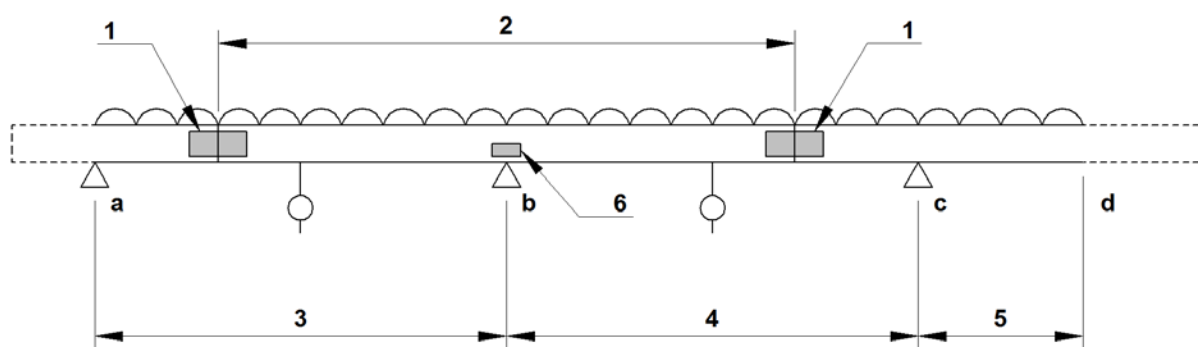


Key

- 1 Joint position within each span
- 2 Product standard length
- 3 End span = L
- 4 Intermediate span = L (Distance between supports on lengths as declared by the manufacturer)
- 5 Cantilever = $0,4L$
- a, b and c Support positions
- d End of load

Figure 7 –Test type III**10.3.4 Test type IV**

Test type IV shall be used for products with localized weakness, see Table 6 for an explanation of when Test type IV is required. In this case, the localized weakness is positioned over support 'b' as shown in Figure 8.

**Key**

- 1 Joint positioned as required in test type I or II, but offset by the minimum distance necessary so that support b is directly underneath any point of local weakness
- 2 Product standard length
- 3 End span = X (Where $X \leq L$)
- 4 Intermediate span = L (Distance between supports on lengths as declared by the manufacturer)
- 5 Cantilever = $0,4L$
- 6 Localized weakness
- a, b and c Support positions
- d End of load

Figure 8 –Test type IV**Table 6 – Use of Test type IV**

Installation conditions	No localised weakness	With localised weakness
No end span length limitations or joint position limitations.	Test type I carried out according to 10.3.1	If the distance between the localised weakness and the central support b is less than 10% of the span L then Test type IV shall be carried out according to 10.3.4. If the distance between the localised weakness and the central support b is greater than 10% of the span L then both test Type I and Test type IV shall be carried out.
No joints in the end span and optional end span reduction	Test type II carried out according to 10.3.2	If the distance between the localised weakness and the central support b is less than 10% of the span L then Test type IV shall be carried out according to 10.3.4. If the distance between the localised weakness and the central support b is greater than 10% of the span L then both test Type II and Test type IV shall be carried out.
Joint position fixed in the span	Test type III carried out according to 10.3.3	Test type III carried out according to 10.3.3



1012 When tests are required for a range of widths of one product type, and localised weakness
1013 requires two tests as shown in Table 6, then the two tests only need to be carried out on one
1014 width. The Test type which gives the lowest SWL may then be used for the other widths for that
1015 product type. Interpolation may still be used in accordance with 10.1.

1016 **10.4 Where classification according to Table 2 or Table 3 requires the use of a climatic**
1017 **chamber and it is not possible because of space limitations to accommodate the**
1018 **sample, the test can be carried out in accordance with 10.4. Test for SWL of cable**
1019 **tray lengths and cable ladder lengths mounted in the horizontal plane running**
1020 **horizontally on a single span installation**

1021 *This test is applied to cable tray systems or cable ladder systems:*

- 1022 – *if the manufacturer declares the application of a single span installation or*
- 1023 – *the test in 10.3 cannot be carried out in a climatic chamber due to its size.*

1024 *The test shall be carried out on one sample. If the sample does not satisfy the test, the test*
1025 *shall be repeated on two new samples, both of which shall comply with the requirements.*

1026 *The test is carried out on cable tray length(s) or cable ladder length(s) to verify the declared*
1027 *SWL when used as a single beam over a single span with the cable tray or cable ladder in the*
1028 *flat and horizontal plane.*

1029 *The samples shall be placed on fixed, rigid supports a and b which shall be horizontal and level*
1030 *with a width of 45 mm ± 5 mm as shown in Figure 9. The samples shall not be fixed to the*
1031 *supports unless a fixing method is declared by the manufacturer or responsible vendor, in*
1032 *which case this fixing method shall be used.*

1033 *If the manufacturer or responsible vendor declares supports as part of the cable tray systems*
1034 *or cable ladder systems and the width of the supports is smaller than 40 mm, then supports a*
1035 *and b are replaced by the supports declared in the system.*

1036 *If the span is greater than the cable tray length or cable ladder length and the manufacturer or*
1037 *responsible vendor does not declare where the joint(s) shall be placed, they shall be at mid-*
1038 *span position.*

1039 *If the test is carried out as alternative to the tests according to 10.3 then a joint shall be located*
1040 *at the mid-span position.*

1041 *The test shall be carried out in accordance with 10.1 and 10.2.*

1042 *The practical mid-span deflection at the SWL shall not exceed 1/100th of the span.*

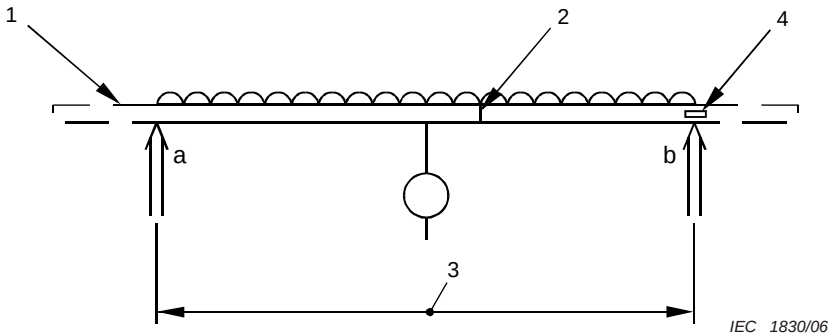
1043 *The transverse deflection at the SWL shall not exceed 1/20th of the width of the samples and*
1044 *the samples shall still ensure reliable support to any cables that would normally be contained*
1045 *therein without imposing any unreasonable hazard or danger to the user or cables.*

1046 *If the cable tray length or cable ladder length includes one or more localized weaknesses and if*
1047 *the manufacturer or responsible vendor does not declare any limitation in the position of the*
1048 *localized weaknesses, special test conditions are required.*

1049 *One test is carried out for each following conditions:*

- 1050 – *when the localized weakness is positioned over support a or b, as shown in Figure 9;*
- 1051 – *when the localized weakness is positioned at the mid-point of the span. If a joint is*
1052 *used, the localized weakness can be moved around mid-point of the span within +/- 10% of*
1053 *L.*

1054 When both conditions can be fulfilled in the same test arrangement, one test is sufficient.



1055

- Key**
- 1 Maximum unloaded overhang length = 500 mm
 - 2 Joint may be required at the position declared by the manufacturer
 - 3 Span = L (Distance between supports on lengths as declared by the manufacturer)
 - 4 Localized weakness
 - a, b Support positions

1056 **Figure 9 – Safe working load for single span test**

1057 **10.5 Test for SWL of cable tray lengths and cable ladder lengths mounted in the**
1058 **vertical plane running horizontally**

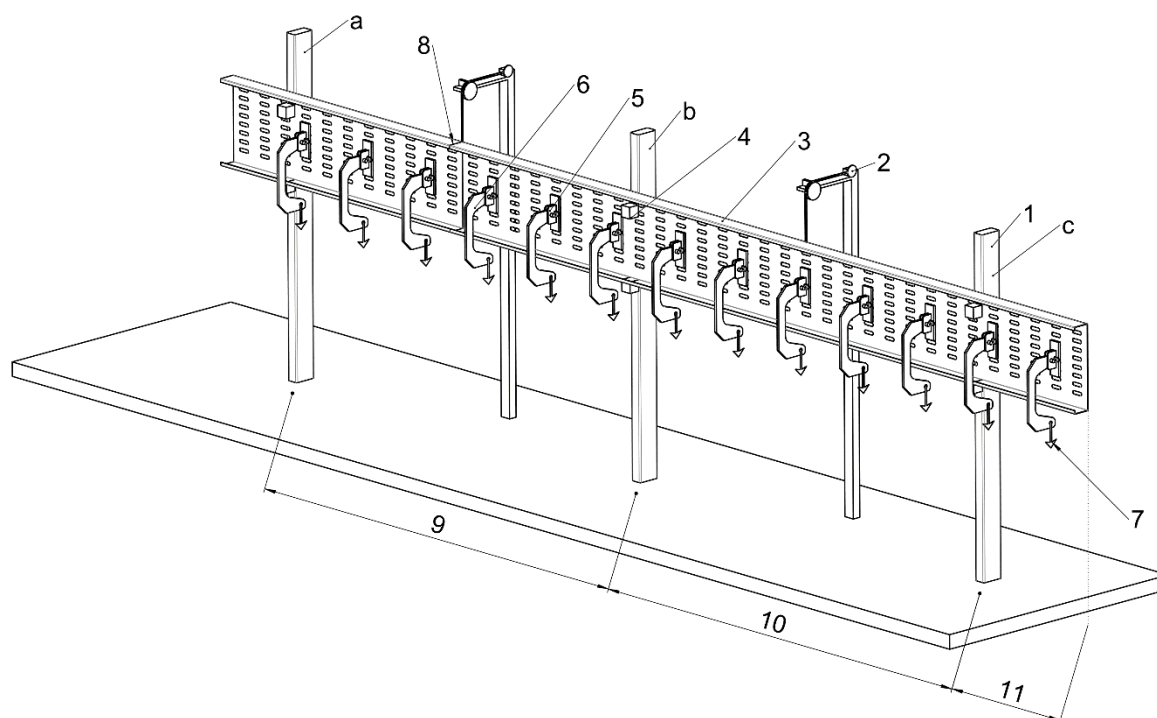
1059 **10.5.1 Multiple span test**

1060 *The test is carried out on cable tray lengths and joints or cable ladder lengths and joints*
1061 *together with support devices, to verify the declared SWL when mounted over multiple spans*
1062 *with the cable tray or cable ladder in vertical plane running horizontally.*

1063 *The test shall be carried out on one sample. If the sample does not satisfy the test, the test*
1064 *shall be repeated on two new samples both of which shall comply with the requirements.*

1065 *The test is carried out with samples of cable tray lengths (see Figure 10a) or cable ladder*
1066 *lengths (see Figure 10b) consisting of two full spans and a cantilever. . Joints are to be*
1067 *positioned as shown in Figure 10a or Figure 10b unless stated differently by the manufacturer.*

1068



1069

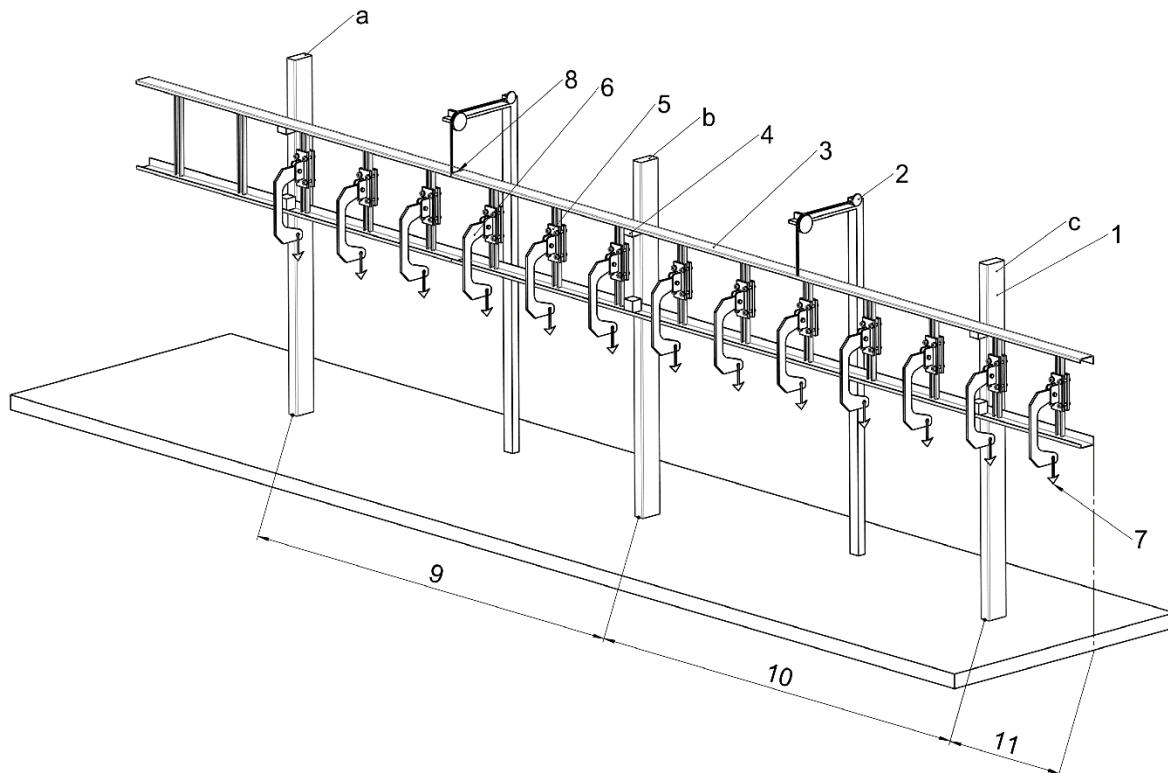
Key

- 1 Rigid test support for cable tray (a,b,c)
- 2 Deflection measurements (see Fig 10e)
- 3 Cable tray
- 4 Cable tray fixing /support device
- 5 Load distribution plate
- 6 Example of a hinged connector
- 7 Load
- 8 Cable tray joint positioned at mid-span
- 9 End span
- 10 Intermediate span
- 11 Cantilever

1070

Figure 10a – Test conditions multi span cable tray mounted in the vertical plane running horizontally

1071



Key

- 1 Rigid test support for cable ladder (a,b,c)
- 2 Deflection measurements (see Fig 10e)
- 3 Cable ladder
- 4 Cable ladder fixing /support device
- 5 Load distribution plate
- 6 Example of a hinged connector
- 7 Load
- 8 Cable ladder joint positioned at mid-span
- 9 End span
- 10 Intermediate span
- 11 Cantilever

Figure 10b – Test conditions multi span cable ladder mounted in the vertical plane running horizontally

Full standard cable tray lengths or cable ladder lengths shall be used for all intermediate lengths. Cut lengths shall only be used at the end positions required.

The cantilever of $0,4 L$ can be increased , if necessary, to ensure a UDL on the cantilever.

The test shall be carried out in accordance with 10.1 and 10.2.

For products with localised weakness, a test is required with the localised weakness positioned over support b, in the same way as indicated in Figure 8, for cable tray lengths and cable ladder lengths mounted in the horizontal plane, running horizontally.

For the test the samples shall be fixed on vertical rigid structures, with the fixing method and if any support device, declared by the manufacturer. Separate tests shall be carried out on each product type using all fixing methods and support devices

1087 *For cable tray the load shall be applied in the middle of the base area by load distribution*
1088 *plates with a hinged connector. All loads shall be uniformly distributed over the length of the*
1089 *sample as shown in Annex D.3. Where this is difficult to achieve because of the design of the*
1090 *cable tray, then the load distribution plate may be repositioned to within 50 mm from the*
1091 *theoretical position.*

1092 *For cable ladder the load shall be applied on the middle of each rung by a load distribution*
1093 *plate with a hinged connector. Where this is difficult to achieve because of the design of the*
1094 *cable ladder, then the load distribution plate may be repositioned to within 50 mm from the*
1095 *theoretical position.*

1096 *Load distribution plate dimensions are indicated in Table 7. The distance between the loads*
1097 *and the base area shall be 30 +/-3 mm as shown in Figure11.*

1098 *The resultant deflection at the SWL measured according to Figure 10e shall not exceed 1/100th*
1099 *of the span.*

1100 *Where classification according to Table 2 or Table 3 requires the use of a climatic chamber and*
1101 *it is not possible because of space limitations to accommodate the sample, the test can be*
1102 *carried out in accordance with 10.5.2.*

1103 **10.5.2 Single span test**

1104 *This test is applied to cable tray systems or cable ladder systems if the manufacturer declares*
1105 *the application of a single span installation or the test in 10.5.1 cannot be carried out in a*
1106 *climatic chamber due to its size.*

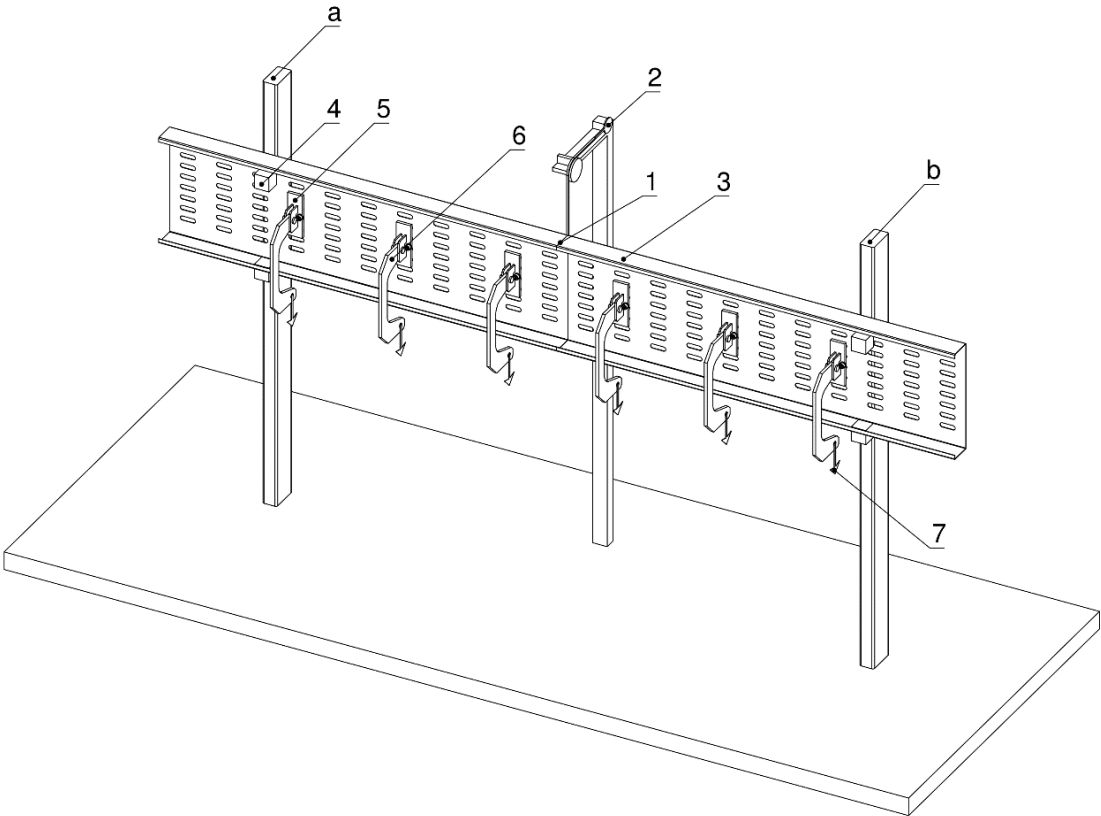
1107 *The test is carried out on two cable tray sections and a joint or two cable ladder sections and a*
1108 *joint together with support devices, to verify the declared SWL when mounted over a single*
1109 *span with the cable tray or cable ladder in vertical plane running horizontally.*

1110 *The test shall be carried out on one sample. If the sample does not satisfy the test, the test*
1111 *shall be repeated on two new samples both of which shall comply with the requirements.*

1112 *The test is carried out with samples of cable tray lengths (see Figure 10c) or cable ladder*
1113 *lengths (see Figure 10d) consisting of a single span. The joint shall be positioned at the mid*
1114 *span.*

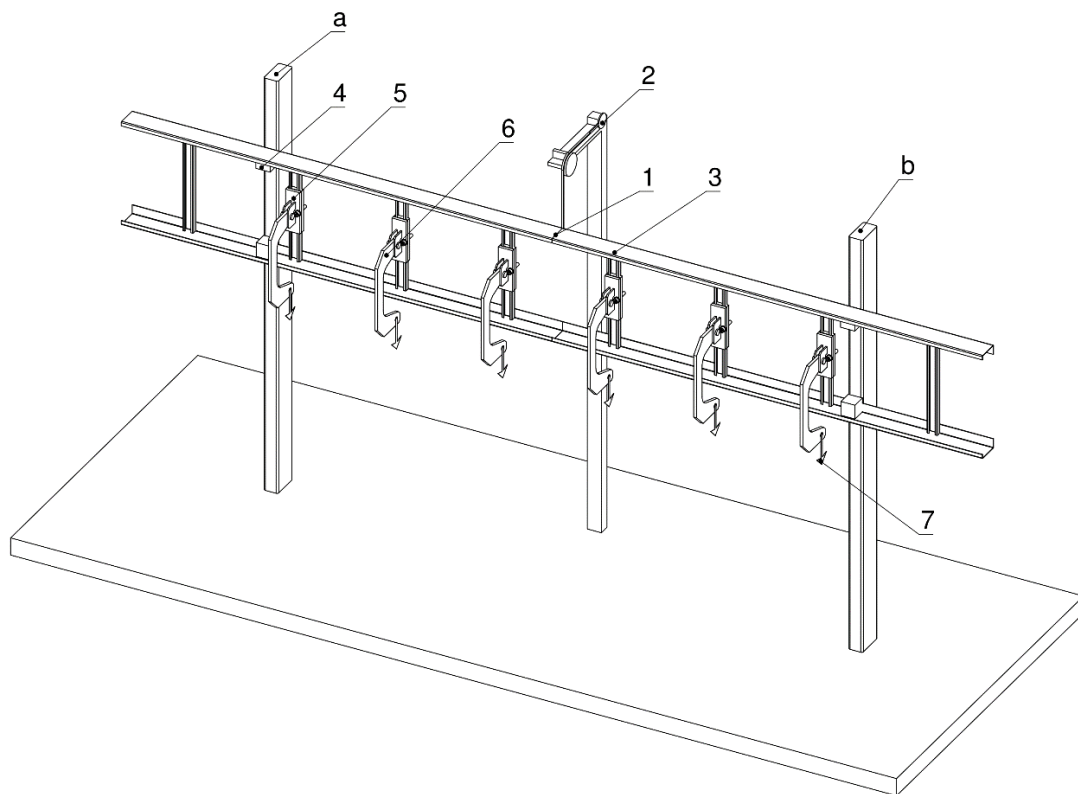
1115

1116



- Key**
- 1 Cable tray joint positioned at mid-span
 - a,b Rigid test support for cable tray
 - 2 Deflection measurements (see Fig 10e)
 - 3 Cable tray
 - 4 Cable tray fixing /support device
 - 5 Load distribution plate
 - 6 Example of a hinged connector
 - 7 Load

Figure 10c – Test conditions single span cable tray mounted in the vertical plane running horizontally

**Key**

- 1 Cable tray joint positioned at mid-span
- a,b Rigid test support for cable tray
- 2 Deflection measurements (see Fig 10e)
- 3 Cable ladder
- 4 Cable ladder fixing /support device
- 5 Load distribution plate
- 6 Example of a hinged connector
- 7 Load

Figure 10d – Test conditions single span cable ladder mounted in the vertical plane running horizontally

The test shall be carried out in accordance with 10.1 and 10.2.

For the test the samples shall be fixed on vertical rigid structures, with the fixing method and if any support device, declared by the manufacturer. Separate tests shall be carried out on each product type using all fixing methods and support devices.

For cable tray the load shall be applied in the middle of the base area by load distribution plates with a hinged connector. All loads shall be uniformly distributed over the length of the sample as shown in Annex D.3. Where this is difficult to achieve because of the design of the cable tray, then the load distribution plate may be repositioned to within 50 mm from the theoretical position.

For cable ladder the load shall be applied on the middle of each rung by a load distribution plate with a hinged connector. Where this is difficult to achieve because of the design of the cable ladder, then the load distribution plate may be repositioned to within 50 mm from the theoretical position.