Test Instruction for the Factory Surveillance of Plugs, Couplers, Socket Outlets and Parts which are integral with Flexible Cables and Cords according to VDE 0620-1, -2-1, -101, -300, VDE 0625-1,-2-1, -2-2, and VDE 0626 with and without ENEC-Mark	PM 375 E 2016-05-09

Supersedes Version dated: 2016-03-11

(For information purpose only. In any case the German version shall prevail.)

References

DIN VDE 0620-1
Plugs and socket outlets for household and similar purposes
Part 1: General requirements on fixed socked-outlets

DIN EN 0620-2-1
Plugs and socket outlets for household and similar purposes
Part 2-1: General requirements on Plugs and portable socket-outlets

DIN EN 50075 - VDE 0620-101
Plugs and socket outlets up to 400 V, 25 A
Flat non-rewirable two-pole plugs, 2,5 A 250 V, with cord, for the connection of class-II-equipment for household and similar purposes

DIN EN 61242 - VDE 0620−300
Electrical accessories –
Cable reels for household and similar purposes

DIN EN 60320-1 - VDE 0625-1
Appliance couplers for household and similar general purposes
Part 1: General requirements

DIN EN 60320-2-1 - VDE 0625-2-1
Appliance couplers for household and similar general purposes
Part 2-1: Sewing machine couplers

DIN EN 60320-2-2 - VDE 0625-2-2
Appliance couplers for
household and similar general purposes
Part 2-2: Interconnection couplers for household and similar general purposes

DIN EN 60799 - VDE 0626
Cord sets and interconnection cord sets

ENEC-303, Annex W, Annex AI and Annex X
Requirements for manufacturers

1. General

Any plug, socket outlet and appliance coupler has to be subjected to the following tests, as far as applicable:

VDE Testing and Certification Institute
A COMPANY OF THE VDE ASSOCIATION FOR ELECTRICAL, ELECTRONIC & INFORMATION TECHNOLOGIES
63069 Offenbach, Germany

Type of plug, socket outlet and appliance coupler	Test to be performed according to clause
two-pole	2.1.1, 2.3.2; 3.1, 4.1, 4.3
with more than two poles	2.1.1, 2.2, 2.3.2, 3.1.2; 4.1, 4.2, 4.3

The indicated tests are minimum requirements. The manufacturer shall perform additional tests or checks if he considers it necessary for a special product.
The performance of the tests has to be confirmed in writing; the records shall contain the main conditions. The test records have to contain the following information:

- Product type
- Date of test
- Place of manufacture (if manufactured at several places)
- Tested quantity
- Number of rejected products and measures, i. e. destroyed/repaired.

Prior to the use of the test equipment it has to be checked as to correct functioning. It has to be calibrated at least once a year.

1.1 Evaluation of base material and components

The manufacturer shall introduce a suitable programme to guarantee that only materials and components are used corresponding with the certified version. In any case this programme has to take into consideration the safety-relevant components, e. g. the plug insert and cord. The validity of VDE Certificates available for components has to be checked periodically.

1.2 Production line test (required on finished products at 100%)

The following tests have to be performed by the manufacturer on all manufactured products with and without ENEC-Mark. Products which fail to pass the tests shall not be delivered. They have to be segregated in appropriate ways.

The test equipment has to be checked prior to and after each use as well as in case of continuous use every 24 h. The checks have to show that the test equipment indicates errors when detected defect products are checked or reproduced errors have been used.

Products having been produced prior to the check of the test equipment are allowed to be placed on the market only if the check has been satisfactory.

1.3 Periodic Tests

For products with and without ENEC Mark, additional random tests have to be performed.

The tests are performed by the manufacturer or on his behalf, at least at the frequency indicated; the test records have to be kept at the place of manufacture for revision by the inspector of the certification body.

In selecting samples for periodic tests preference should be given to products whose characteristics are close to the limiting values and for which tests related to safety are necessary according to regulation.
For periodic tests preferably those products should be selected, the values of which are close to the limiting values and to tests for safety considerations according to the standard.

2. Production line test 100%

2.1 Continuity test

2.1.1 Polarized systems; Phase (L) und Neutral Conductor (N) – correct connection
In polarized systems the test has to be performed by applying the Safety Extra Low Votage (SELV) for not less than 2 s:
Note: For test equipment with an automatic time programme the time may be reduced from 2 s to not less than 1 s.

- for plugs, couplers, plugs and socket outlets between the external terminal of L and N of the flexible cable and cord and the corresponding L and N pin or contact of the plug and socket outlet.
- for extension cord sets, cord sets and interconnection cord sets between L and N pin on one terminal and the corresponding L and N contact on the other terminal of the flexible cable and cord.

The polarity has to be correct.

Other suitable test can be used.

2.2 Protective earth conductor (E) connection
The test has to be performed at safety extra low voltage (SELV) which is applied for not less than 2 s.

Note: For test equipment with an automatic time programme the time may be reduced from 2 s to not less than 1 s.

- for plugs, couplers and plugs and socket outlets between the external terminal of the protective earth conductor of the flexible cable and cord and the earth conductor pin or contact of the plug and socket outlet.
- for extension cord sets, cord sets and interconnection cord sets between the corresponding protective earth conductor or contact on each terminal of the extension cord.

It must be possible to measure the continuity.
Other suitable test can be used.

2.3 Dielectric strength test

2.3.1 Short circuit/wrong connection, connection and reduction of the creepage distances and clearances Phase (L) or Neutral Conductor (N) connected to the protective earth conductor (E)

The test is performed between L and N conductors and the protective earth conductor.

An a. c. voltage of 50 or 60 Hz is applied for 2 s on the supply terminal, i. e. on the plug.
Note: For test equipment with an automatic time programme the time may be reduced from 2 s to not less than 1 s.

- 1250 V +/- 10% for products having arated voltage up to and including 130 V
- 2000 V +/- 10% for products having a rated voltage over 130 V

or

- through an impulse voltage test having a waveform 1,2/50 μs, peak value 4 kV; three impulses with intervals not below 1 s are applied on each pole:
  - between L and protective earth conductor
  - between N and protective earth conductor

Note: L and N may be connected for this test.

A flashover shall not occur.

2.3.2 Contour check

It shall be checked that live parts, e. g. loose strands, are not accessible.

If this danger cannot be prevented by the construction itself and suitable manufacturing processes, the following test or a similar one (e. g. impulse voltage test) shall be performed:

The endangered parts of plug and socket outlet surfaces, except the engagement face of plugs, are scanned by adjusted electrodes and a pressure force of 20 N, applying to live parts of the plugs and socket outlets a voltage of AC 2000 V (r. m. s. value) for at least 1 s.

Neither a flash-over nor a breakdown shall occur.

Note: It is recommended to set the tripping device to 30mA or less. The high voltage transformer is to be capable of maintaining the specified voltage untilthe tripping current flows.Tripping of the current sensing device (indicated by audible and/or visual means) is considered a breakdown.

3. Random tests (only for products with certification according to DIN VDE 0620-2-1)

3.1 Tests to be performed during the production of plugs and couplings with crimp connections

- A capability test of the tool used must be performed on at least 50 test objects.

At least the following must be documented:
- crimp height; or
- withdrawal force; or
- voltage drop in the crimp connection.

It is recommended to perform the test following
DIN EN 60352-2 Solderless connections – Crimp connections – General requirements, test methods and instructions for use.
The values obtained in this test must not be worse than those laid down in the type test in accordance with VDE 0620-2-1, Section 12.4.

Crimp connections in non-reconnectable plugs and connectors must possess adequate electrical and mechanical properties. Photographic documentation must be drawn up of a total of 3 points of contact from 3 sides, consisting of side view, top view and perspective view. The values for crimp height, withdrawal force or voltage drop (lower and upper limit values) are to be determined and documented by the manufacturer and are the basis for continuous production inspections.

- The crimp height, withdrawal force and/or voltage drop in the crimp connection are to be checked during production. The determined values must not be worse than those laid down in the type test in accordance with VDE 0620-2-1, Section 12.4.

The test is to be performed on at least 3 test objects per product at the beginning and end of the production of the batch, but at the latest after 8 hours.
The results must not be worse than those laid down in the type test in accordance with VDE 0620-2-1, Section 12.4.

The results are to be documented by the manufacturer and archived for ten years.

4. Periodic tests

4.1 Periodic tests (only for products with certification according to DIN EN 50075 – with ENEC-Mark)

4.1.1 Dimensions according to section 7

4.1.2 Dielectric strength test according to section11.2

4.1.3 Flexing test according to section 12.3

4.1.4 Torque test on the plug pins as prescribed in section 13.2

The test of 4.1.1, 4.1.2 and 4.1.3 have to be performed by the manufacturer, at least 2 times per year, on 3 samples from each series/family (same construction) when in production.

The test of 4.1.4 has to be performed on at least 3 randomly selected samples of each production lot. The test of 4.1.4 may also be performed in the incoming inspection on 3 randomly selected samples of each lot of received inserts.

4.2 Periodic tests (only for products with certification according to DIN EN 60320 – with ENEC-Mark)

4.2.1 Dielectric strength test
The dielectric strength test has to be performed according to:
- Part 1 Section 15

4.2.2 Mechanical strength test
The mechanical strength - tensile test has to be performed according to:
- Part 2-2, 2-3, 2-4 Section 23

4.2.3 Connection of conductors
The connection of conductors test has to be performed according to:
- Section 22 (of the relevant parts; exept twist test part 2-1)

4.2.4 Force to insert and withdraw connector
Force necessary to insert and withdraw the connector (Part 1, section 16).

The tests 4.2.1, 4.2.2 and 4.2.3 have to be performed on three selected samples of each series/family (same construction) when in production at least two times per year.

The test 4.2.4 has to be performed on three randomly selected samples of each production lot. This test may also be performed in the incoming inspection on 3 randomly selected samples of each lot of received inserts

4.3 Periodic tests (only for products with certification according to DIN EN 60799 - with ENEC-Mark)
The manufacturer has to guarantee by suitable periodic tests that the manufactured products comply with the certified version. For this purpose he has to introduce a uitable working instruction to ensure that only materials and components are used corresponding with the certified version.

4.4 Periodic tests (only for products with certification according to VDE 0620-1, -2-1, 0620-101, and 0625 with VDE-Mark)
The manufacturer has to guarantee by suitable periodic tests that the manufactured products comply with the certified version. The periodic tests have to be performed by the manufacturer on each day of production for each production lot at least on one sample per produced type.

	Plugs and portable socket outlets	Euro plug	Socket outlets Appliance couplers
	DIN VDE 0620-2-1 Clauses	DIN VDE 0620-101 Clauses	Corresponding parts of standard DIN EN 60320 (VDE 0625) Clauses
4.1 Visual check and markings	8	6	8
4.2 Pull forces	22	-	16
4.3 Twist test on plug pins *)	24.2	13.2	-
4.4 Dimensions	9	7	9

Testing:
The periodic tests are performed by measurement and/or with gauges.

***) Remark:**
24.2 The tumbling barrel test need not be performed.

Informative / 附页

Test-Requirements for periodic Test, according clauses 4.4 for plugs and socket outlets/ 4.4章节中插头插座的定期确认检验要求

The periodic tests are performed by measurement and/or with gauges.

- To ensure that the test-requirements for periodic test during mass production can be fulfilled in compliance with the standards, the gauges/devices mentioned in DIN VDE 0620-1, 0620-2-1, 0620-101 should be prepared for each manufacturer.
- All concerned gauges are listed for reference as bellows.

定期确认检验需通过测量及/或借助制具进行。

- 为保证批量生产中的定期确认检验能满足相关标准要求，生产商应备有标准 DIN VDE 0620-1 和 DIN VDE 0620-2-1 中列出的制具和设备。
- 相关制具请参见下文。

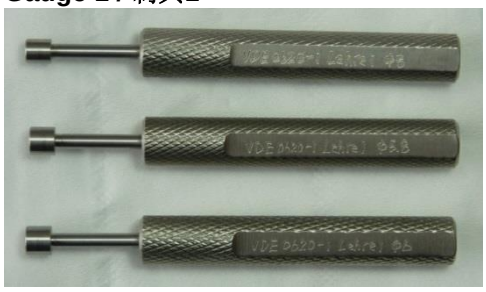
1. Dimensions / 尺寸

1.1 Gauge for the size of the socket outlet's insertion hole:

1.1 插座插孔开口大小的测量制具

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章
The test is performed with gauges.
该测试需借助相关制具进行.

Gauge 1 / 制具1



Gauge for the size of the socket outlet's insertion hole:

Gauge with diameter 6.0 mm：	for 16 A socket with cover material made of rubber or ceramic
Gauge with diameter 5.8 mm:	for 16 A socket with cover material made of all except rubber/ ceramic
Gauge with diameter 5.0 mm	for 2.5 A socket with cover made of any material

The weight of the gauges is not greater than 150 g. The applicable force is the gauge's own weight.

插座插孔开口大小的测量制具：

直径6.0mm制具（德式插座）：16A的插孔，插座外壳材料为橡胶或陶瓷；

直径5.8mm制具（德式插座）：16A的插孔，插座外壳材料为除橡胶和陶瓷之外的材料；

直径5.0mm制具（欧洲头插座）：2.5A的插孔， 任意的插座外壳材料；

在应用这些制具的时候，要求在自身重量不大于150克时，制具不能垂直插入到插座的插孔中去；

1.2. Gauge to test the distances of the contacts and minimum withdrawal force for plug and socket outlet:

1.2. 插孔内金属片的最短接触距离和最小拔出力的测量制具

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章
The test is performed with gauges.
该测试需借助相关制具进行.

Gauge 2 / 制具2

2A

2B

Gauge to test the distances of the contacts and minimum withdrawal force for plug and socket outlet:

插孔内金属片的最短接触距离和最小拔出力的测量制具，常用

Gauge 2A：diameter 3.8 mm weight 200 g.
Insert into the contact of the socket outlet vertically, it will not slip out within 30 s;

2A制具：3.8 mm的直径，自重200克，
测量插座插孔内的金属片的最小拔出力。
垂直插入插座插孔，要求在30秒内不从孔内滑脱；

Gauge 2B：diameter 4.6 mm weight 200 g.
Insert into the earthing contact of the plug vertically, it will not slip out within 30 s;

2B制具：4.6 mm的直径，自重200克，
测量插头接地孔内的金属片的最小拔出力。
垂直插入插座插孔，要求在30秒内不从孔内滑脱；

1.3. Gauge for two-pole plug's insertability:

1.3. 插座插孔（两极）开孔间距的测量制具

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章
The test is performed by measurement and/or with gauges.
该测试可通过测量及/或借助相关制具进行.

Gauge 3 / 制具3

Gauge for two-pole plug's insertability:

Both sides' pin of the gauge can be introduced freely and fully into the socket outlet**.**

插座插孔（两极）开孔间距的测量制具：

该制具两侧的插针，都应该可以自由地插入到插座孔内。

1.4. Gauge to check the socket's insertion capability for plugs with side earthing contacts:

1.4. 德式插座（两芯带接地）插孔的可插入性的测量制具

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章
The test is performed by measurement and/or with gauges.
该测试可通过测量及/或借助相关制具进行.

Gauge 4 / 制具4

Gauge to check the socket's insertion capability for plugs with side earthing contacts:

德式插座（两芯带接地）插孔的可插入性的测量制具:

The pins of the gauge can be introduced freely and fully into the socket-outlet.

制具**4**可以轻松的插入到德式插座的插孔中去。

1.5. Gauge to test the distance between the cover and the contacts of the socket:

1.5 插座插孔表面与内部载流金属片间隙的测量制具

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章
The test is performed with gauges.
该测试需借助相关制具进行.

Gauge 5 / 制具5

Gauge to test the distance between the cover and the contacts of the socket:

插座插孔表面与内部载流金属片间隙的测量制具：

When inserting the short side of the gauge (6.95 mm) it shall not touch the contacts;
When inserting the long side of the gauge (9 mm) it shall touch the contacts;

要求这些制具短的插针（**6.95 mm**）插入插孔时不能碰到插孔内的金属片；
要求这些制具长的插针（**9 mm**）插入插孔时，能够碰到到插孔内的金属片。

1.6. Gauges for the plug pin's diameter:
1.6 插头插针直径的测量制具

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章
The test is performed with gauges.
该测试需借助相关制具进行.

Gauge 6/ 制具6

Gauges for the plug pin's diameter:

插头插针直径的测量制具：

For gauge 6A: the plug's pin can insert through the inner hole of the gauges;
For gauge 6B: the plug's pin cannot pass through the slot of the gauges;

对于**6A**制具， 要求插头的插针可以插入制具的开孔；
对于**6B**制具， 要求插头的插针不能推入制具圆孔的缺口；

1.7 Gauge to test the pin spacing for plugs (2P + earth)/ (2P) AC 16 A:
1.7 交流16A的插头(2P+earth)/ (2P)插针之间的内间隙和外间隙的测量制具

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章
The test is performed by measurement and/or with gauges.
该测试可通过测量及/或借助相关制具进行.

Gauge 7 / 制具7

Gauge to test the pin spacing for plugs (2P + earth)/ (2P) AC 16 A:

交流16A的插头(2P+earth)/ (2P)插针之间的内间隙和外间隙的测量制具:

Gauge 7A slot can pass over the two pins;
Gauge 7B can pass through the inner space between two pins.

制具**7A**要能够通过两插针的最大的外侧间距；
制具**7B**要能够穿过两插针的内侧间距。

1.8. Gauge to test the largest opening insertion of contact tubes:
1.8 插座的载流金属片插入强度的测量制具

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章
The test is performed by measurement and/or with gauges.
该测试可通过测量及/或借助相关制具进行.

Gauge 8 / 制具8

Gauge to test the largest opening insertion of contact tubes:

The gauge can be introduced into the contact tubes without excessive undue force.

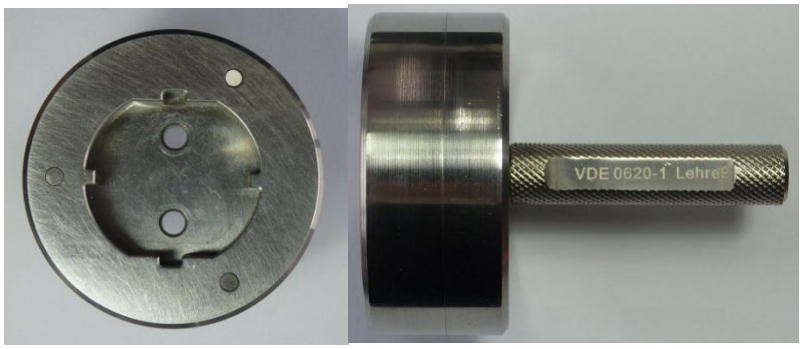
插座的载流金属片插入强度的测量制具:

要求制具无需用很大的力就能够轻易的插入到插座插孔的载流金属片里面。

1.9 Gauges for plug's exchangeability:
1.9 插头互换性的测量制具

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章
The test is performed with gauges.
该测试需借助相关制具进行.

Gauge 9/ 制具9



Gauges for plug's exchangeability:

The plug with side protective earthing contact can be easily inserted into the gauge without excessive undue force.

插头互换性的测量制具：

要求两芯带接地的插头可以不费力气就插入到该制具中。

1.10 Gauges for non insertion of the two-pole plug without side earthing protective contact:

1.10 插座插孔的插入性测量制具（两芯不带接地插头）：

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章

The test is performed with gauges.

该测试需借助相关制具进行

Gauge 11/ 制具11

Gauges for non insertion of the two-pole Plug without side earthing protective Contact	**插座插孔的插入性测量制具（两芯不带接地插头）：**
It shall not be possible to introduce the gauge into the socket outlet.	要求该制具不能插入到插座的插孔内。

1.11 Gauge to test the withdrawal force of the earthing contact of the plug DIN 49441, form R2:

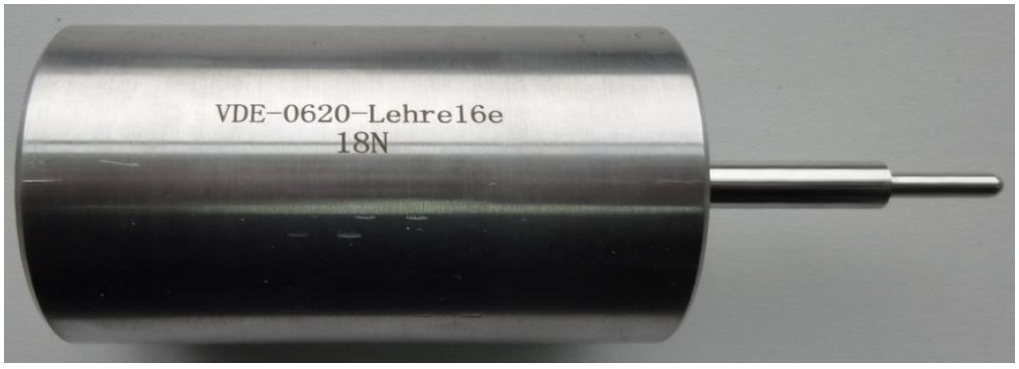
1.11 DIN 49441-R2类型插头的接地孔最大拔出力制具

DIN VDE 0620-2-1, clause 9/ DIN VDE 0620-2-1, 第9章

The test is performed with gauges.

该测试需借助相关制具进行.

Gauge 16e/ 制具16e



Gauge to test the withdrawal force of the earthing contact of the plug DIN 49441, form R2:	**DIN 49441-R2**类型插头的接地孔最大拔出力制具:

The gauge 16e is inserted vertically into the elastic earthing contact of the plug. The gauge will be 10 times inserted in the earthing contact and detracted. The gauge will be inserted again and shall not be stuck to the contact.	18N制具16e应垂直插入到 DIN 49441-R2类型的插头的接地孔。 反复将该制具插入拔出接地孔10次。 再次将该制具插入接地孔，该制具不应留在接地孔内，应滑脱。

1.12 Gauge for the interchangeability of the European plug:
1.12欧式插头的互换性的测试制具

EN 50 075, - DIN VDE 0620-101, clauses 7/ EN 50 075**,** - DIN EN 0620-101,
The test is performed with gauges.
该测试需借助相关制具进行.

Gauge 2/Figure 2 制具2

Gauge for the interchangeability of the European plug: It shall be possible to insert the European plug into the gauge without undue force so that the engagement face comes into contact with the surface of the gauge.	**欧式插头的互换性的测试制具：** 无需用太大的力就可以将欧洲头插头插入到该制具中，使得插头的端面与制具的表面相贴合。

2. Withdraw forces/ 拔出力

2.1 Gauges for the maximum withdrawal force of the socket outlet:

2.1 插座插孔的最大拔出力测量制具:

DIN VDE 0620-1; clause 22/ DIN VDE 0620-1; 第 22 章
DIN EN 60320-1; clause 16/ DIN EN 60320-1; 第 16 章

The test is performed with test devices and gauges.
该测试需借助检验设备和制具进行。

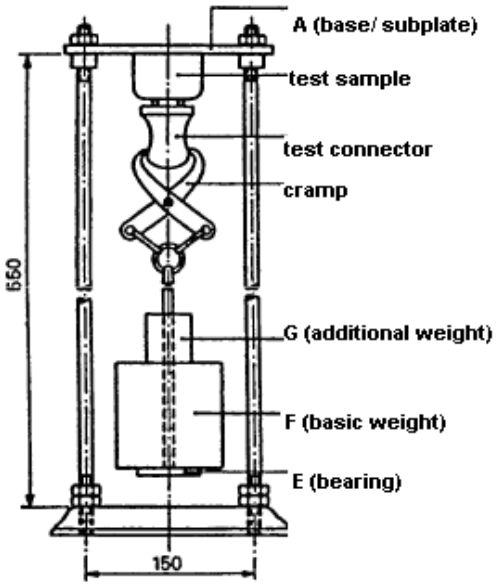


Figure 1/ 图1
Apparatus for testing of withdrawal forces

测量拔出力所用装置

Gauges for the maximum withdrawal force of the socket outlet:
测试连接器

Gauges for the maximum withdrawal force of the socket outlet:

Fix the socket outlet vertically on device as shown in Figure 1. The gauge with main and additional weight is inserted in the socket outlet. Then let the additional weight fall from a height of 50 mm on the main weight. The gauge shall not remain in the socket outlet.

插座插孔的最大拔出力测量制具:

将插座固定在图1的架子上, 插孔朝下, 然后针对德式以及欧式的插座插孔, 分别插入德式和欧式插头的制具,在对应的的重量下, 要求制具要从插座的插孔内滑脱。

3. Twist test for plug pin / 插头插针的扭矩测试

3.1 Torque test for plug pin:
3.1插头插针的扭矩测试

DIN VDE 0620-2-1, clause 24.2*/* DIN VDE 0620-2-1, 第24.2章
DIN VDE 620-101, clause 13.2*/* DIN VDE 620-101, 第13.2章

Torque test for plug pin
The pins must not rotate when a torque of 0.4 Nm is applied, first for 1 minute in one direction then 1 minute in the other direction

插头插针的扭矩测试：

The plug's pin shall not loose or rotate when

applying a torque of 0.4 Nm on the plug pin.

No part should be loosened.

(1 min in one direction and then 1 min in the other direction)

针对插头的插针， 需要进行扭矩测试。
要求在~~不小于~~ **0.4 Nm** 的扭矩下，
插针不能松动或转动。

The relevant standards should be kept in the factory for the performance of the tests.
工厂应备有相关标准以保证检验的顺利进行。

The above-mentioned tests have to be specified by the manufacture in a testing or working instruction and the performance has to be documented in writing.