NOTIFICATION OF TEST RESULTS

Issued to:	Wago-Kontakttechnik GmbH & Co. KG Hansastraβe 27, 32423 Minden/Westfalen, Germany
For the product:	Splicing wire connectors
Trade name:	WAGO
Type/Model:	221
Manufactured by:	Wago-Kontakttechnik GmbH & Co. KG Hansastraβe 27, 32423 Minden/Westfalen, Germany
Ratings:	450 V, 32 A, 4 mm²
Additional information:	This NTR replaces NTR NL-7698 issued on 27 August 2018, due to the fact that new types 221-2401 and 221-2411 and factory locations are added See Annex for factory locations CTF Stage 3

A sample of the product has been tested and found to be in conformity with the current HD/EN and equivalent national standard
EN 60998-1:2004, EN 60998-2-2:2004

As shown in the Test Report
2245563.50

This Notification of Test Results is the result of testing a sample of the product submitted, in accordance with the provisions of the relevant specific standard.

This Notification of Test Results has been established by a body, which participates in the CENELEC Certification Agreement (CCA) of 11th September 1973 as amended on 29th March 1983. Any other body participating in the CCA will take this Notification as a basis for granting a national mark of conformity or a national approval as specified in the CCA, as long as the standard referred to above is still in force in the country of that body.

Arnhem, 30 March 2021 Number: NTR NL-7827

DEKRA Certification B.V.

H.R.M. Barends
Certification Manager

CCA
CENELEC CERTIFICATION AGREEMENT
ACCORD DE CERTIFICATION DU CENELEC

CCA
CENELEC CERTIFICATION AGREEMENT
ACCORD DE CERTIFICATION DU CELENEC

Factory locations:

Wago Elwag sp.z.o.o.
ul. Piekna 58 a
50-506, Wroclaw
Poland

Wago Elwag
Innowacyjna 2
55-330 Wroblowice
Poland

Wago Pvt. Ltd.
C-27, Sector-58, Phase III
201301 Noida Uttar Pradesh
India

Wago Electronic (Tianjin) Co. Ltd.
No. 5 Quanhui Road
Wu Qing Development Area
301700 Tianjin
China

WAGO Kontakttechnik GmbH & Co. KG
Hansastraße 27, 32423 Minden/Westfalen
Germany

WAGO Kontakttechnik GmbH & Co. KG, Werk Sondershausen
Waldstrasse 1, 99706, Sondershausen
Germany

WAGO Contact S.A.
Route de l'Industrie 19, CP 168, 1564, Domdidier
Switzerland

WAGO Kontakttechnik
Cammer Str. 17,
32423 Minden
Germany

Test Report issued under the responsibility of:

TEST REPORT
IEC 60998-2-2:2004
Connecting devices for low voltage circuits for household and similar purposes Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units

Report Reference No.....:	**2245563.50**
Date of issue……..:	**2021-02-24**
Total number of page……:	**41**
Applicant's name……. ……:	**WAGO Kontakttechnik GmbH & Co. KG**
Address.....……..:	**Hansastraße 27, 32423 Minden/Westfalen, Germany**
Test specification:	
Standard.....….:	IEC 60998-2-2 (see also IEC 60 998-1:2002)
Test procedure..... :	CB Scheme
Non-standard test method……..:	N/A
Test Report Form No. ..... :	IEC60998_2_2B
Test Report Form(s) Originator..... :	DEKRA certification B.V.
Master TRF..... :	Dated 2012-02

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

Test item description.....:	**Splicing wire connector**
Trade Mark ..... :	**WAGO**
Manufacturer..... :	**WAGO Kontakttechnik GmbH & Co. KG**
Model/Type reference ..... :	**Series 221**
Ratings ..... :	**450 V, 32 A, 4 mm²**

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒ **DEKRA Certification B.V.**	**DEKRA Certification B.V.**	
Testing location/ address.....:	**Meander 1051, 6825 MJ Arnhem, The Netherlands**	
☐ **Associated CB Testing Laboratory:**		
Testing location/ address.....:		
Tested by (name, function, signature).....:	**A. A. P. Vught** (Technician Industrial Safety)	
Approved by (name, function, signature)...:	**F.S Strikwerda** (Project Manager Industrial Safety)	
☐ **Testing procedure: CTF Stage 1:**		
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Approved by (name, function, signature)...:		
☐ **Testing procedure: CTF Stage 2:**		
Testing location/ address.....:		
Tested by (name + signature) .....:		
Witnessed by (name, function, signature)..:		
Approved by (name, function, signature)...:		
☒ **Testing procedure: CTF Stage 3:**	**WAGO Kontakttechnik GmbH & Co. KG**	
☐ **Testing procedure: CTF Stage 4:**		
Testing location/ address.....:	**Hansastraβe 27, 32423 Minden/Westfalen, Germany**	
Tested by (name, function, signature).....:	**J. Olbrich** (Engineer)	
Witnessed by (name, function, signature)..:	**H.L. Schendstok** (Project Manager Industrial Safety)	
Approved by (name, function, signature)...:	**R. Gioia** (Team Leader)	
Supervised by (name, function, signature) :	**F.S Strikwerda** (Project Manager Industrial Safety)	

List of Attachments (including a total number of pages in each attachment):

Attachment A: EN 60998-1 CENELEC COMMON MODIFICATIONS and
EN 60998-2-2 CENELEC COMMON MODIFICATIONS (2 pages)
Attachment B: EN 60998-1 SPECIAL NATIONAL CONDITIONS, United Kingdom (1 page)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
First Edition, 2168803.50: Complete type-testing Tests are carried out on type 221-415 unless otherwise stated.	**WAGO Kontakttechnik GmbH & Co. KG** **Hansastraβe 27, 32423 Minden/Westfalen, Germany**
Second Edition, 2221141.50: This report replaces report 2168803.50 issued on 2014-02-12 Due to the fact of re-verification a temperature-rise test (clause 15) on 221-415 is carried out.	**WAGO Kontakttechnik GmbH & Co. KG** **Hansastraβe 27, 32423 Minden/Westfalen, Germany**
Third Edition, 2224732.50: This report replaces report 2221141.50 issued on 2017-10-19 Due to the fact that types 221-482, 221-483 and 221-485 are added. The following tests are carried out: clause 12.1, 12.2, 13.3, 13.4, 14.101, 14.2, 16.2, 16.3, 18, 19	**WAGO Kontakttechnik GmbH & Co. KG** **Hansastraβe 27, 32423 Minden/Westfalen, Germany**
Fourth Edition, 2245563.50: This report replaces report 2224732.50 issued on 2018-08-21, due to the fact that types 221-2401 and 221-2411 are added. The following tests are carried out under CTF3: clause 8, 9, 10, 10.104, 10.105, 10.106, 11, 12.1, 12.2, 13.3, 13.4, 14.101, 14.2, 15, 15.101, 16.2, 16.3, 17, 19	**WAGO Kontakttechnik GmbH & Co. KG** **Hansastraβe 27, 32423 Minden/Westfalen, Germany**
The following test is carried out at DEKRA clause 18	**DEKRA Certification B.V.** **Meander 1051, 6825 MJ Arnhem** **The Netherlands**

Summary of compliance with National Differences
List of countries addressed:

European Group Differences
Special National Conditions United Kingdom

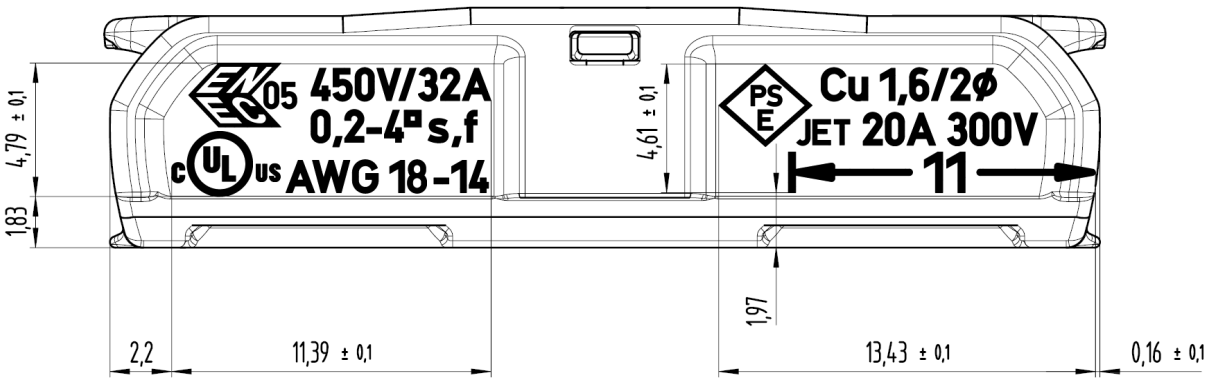
☒ **The product fulfils the requirements of EN 60998-2-2: 2004 in conjunction with EN 60998-1:2004.**

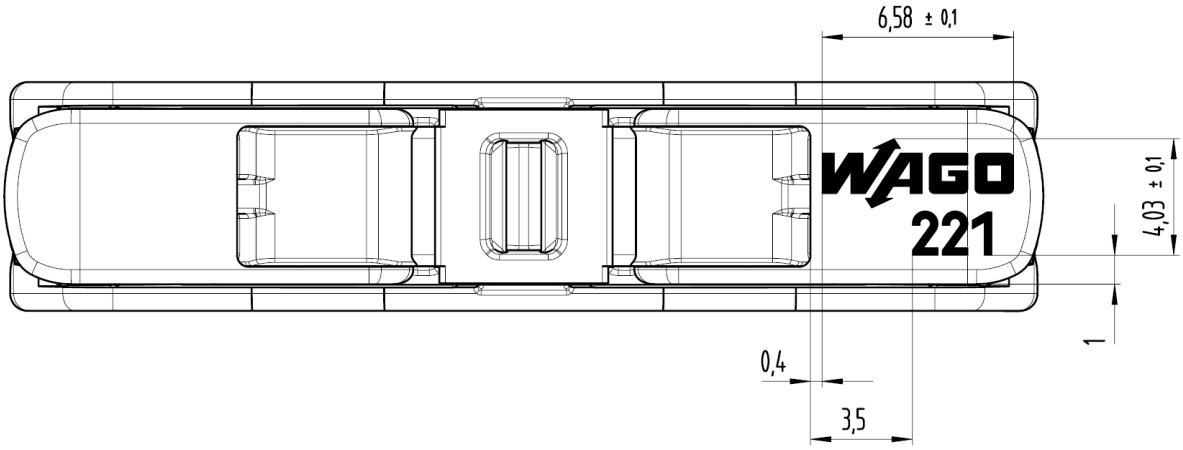
Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Example for all types, except 221-2401 and 221-2411

Example for type 221-2411





Test item particulars:

Number of terminals……..:	☒**single** ☐**multiway**
Protection against electric shock……..:	☒**with** ☐**without**
Means of fixing……..:	☐**with** ☒**without**
Rated temperature……..:	☐**without T marking** ☒**with T marking (85**°C**)**
IP number……:	**IP-**
Type of terminals, screwless-type.....:	☒**universal non-universal** ☐**push wire**
Conductor type……:	☒**rigid** ☒**flexible**
Rated connecting capacity……..:	☒ **0,14mm² ”f”** ☒ **0,2mm²** ☒ **4mm²** ☐ **1,5mm²** ☐ **2,5mm²** ☐ **4mm²** ☐ **6mm²** ☐ **10mm²**
Conductor insulation……:	☐ **16mm²** ☐ **25mm²** ☐ **35 mm²**
Rated voltage (V ac / V dc)……..:	☒ **AC** ☒ **DC**

Classification of installation and use ..... :

Supply Connection ..... :

.....:
Possible test case verdicts: **- test case does not apply to the test object .....: N/A** **- test object does meet the requirement.....: P (Pass)** **- test object does not meet the requirement .....: F (Fail)**
Testing.....: **Date of receipt of test item .....: 2019-11** **Date (s) of performance of tests.....: 2021-01**
General remarks: **The test results presented in this report relate only to the object tested.** **This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.** **"(see Enclosure #)" refers to additional information appended to the report.** **"(see appended table)" refers to a table appended to the report.** **Throughout this report a ☒ comma / ☐ point is used as the decimal separator.** N.B.: Projects performed under the IECEE CB-Scheme CTF procedure, are fully in line with the procedures and requirements of the IECEE CB-Scheme, but do not fall under DEKRA Netherland's laboratory accreditation, according to ISO/IEC 17025, by the Dutch Accreditation Council.

Manufacturer's Declaration per sub-clause 6.2.5 of IECEE 02: **The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :** ☒ **Yes** ☐ **Not applicable** **When differences exist; they shall be identified in the General product information section.**
Name and address of factory (ies)..... :
General product information: **Factory locations:** **Wago Elwag sp.z.o.o.** **ul. Piekna 58 a** **50-506, Wroclaw, Poland** **Wago Elwag** **Innowacyjna 2** **55-330 Wroblowice, Poland** **Wago Pvt. Ltd.** **C-27, Sector-58, Phase III** **201301 Noida Uttar Pradesh, India** **Wago Electronic (Tianjin) Co. Ltd.** **No. 5 Quanhui Road** **Wu Qing Development Area** **301700 Tianjin, China** **WAGO Kontakttechnik GmbH & Co. KG** **Hansastraße 27, 32423 Minden/Westfalen** **Germany** **WAGO Kontakttechnik GmbH & Co. KG, Werk Sondershausen** **Waldstrasse 1, 99706, Sondershausen** **Germany** **WAGO Contact S.A.** **Route de l'Industrie 19, CP 168, 1564, Domdidier, Switzerland**

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
8	**MARKING**		
8.1	On main part: **All types, except 221-2401 and 221-2411**		
	a) rated connecting capacity (mm²) ..... :	**0,14 mm² ”f”** **0,2 mm² - 4 mm²**	**P**
	b) rated insulation voltage (V)..... :	**450 V**	**P**
	c) T marking (°C) (if > 40 °C or < -5 °C) ..... :	**85 °C** **catalogue**	**P**
	d) type reference ..... :	**221-415 example**	**P**
	e) manufacturer's or responsible vendor's name, trademark or identification mark ..... :	**WAGO**	**P**
	f) IP if > IP20 ..... :		**N**
	Small devices: only d) and e) indicated on device		**N**
	All marks visible on smallest package unit		**P**
8.1	On main part: **Types 221-2401 and 221-2411**		
	a) rated connecting capacity (mm²) ..... :	**0,2 mm² - 4 mm²**	**P**
	b) rated insulation voltage (V)..... :	**450 V**	**P**
	c) T marking (°C) (if > 40 °C or < -5 °C) ..... :	**85 °C** **catalogue**	**P**
	d) type reference ..... :	**221**	**P**
	e) manufacturer's or responsible vendor's name, trademark or identification mark ..... :	**WAGO**	**P**
	f) IP if > IP20 ..... :		**N**
	Small devices: only d) and e) indicated on device		**N**
	All marks visible on smallest package unit		**P**
8.101	Type of acceptable conductor "s" "r" or "f"		**P**
8.102	Marking indicating the length of insulation to be removed before insertion of the conductor		**P**
8.2	Multiway terminal devices: at least two adjacent		**N**
8.3	When symbols are used they shall be as follow: V for volts mm² or ☐ for square millimetres T for T-rating		**P**
8.4	Marking: durable and easily legible; 15 s water; 15 s hexane		**P**

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
9	**PROTECTION AGAINST ELECTRIC SHOCK**		
	Live parts not accessible		**P**
10	**CONNECTION OF CONDUCTORS**		
10.1	Connecting devices allow correct connection of conductors		**P**
10.101	Connection or disconnection: use a general tool or simple insertion	lever operated	**P**
	Disconnection operation other than a pull	lever operated	**P**
10.102	Terminals accept two or more conductors of same or different nominal cross-sectional areas; see table 101 (as specified by manufacturer):		**P**
	Universal terminals shall accept rigid(solid or stranded) and flexible unprepared conductors		**P**
	Non-universal terminals shall accept the types of conductors declared by the manufacturer		**P**
	Rated connecting capacity (mm²) ..... :	**all types, except 221-2401 and 221-2411** **0,14 mm² ”f”** **0,2 mm² - 4 mm²** **type 221-2401** **0,34 mm² - 4 mm²** **type 221-2411** **0,2 mm² - 4 mm²**	**P**
	Suitable for connecting cross-sectional areas (mm²) ..... :	**all types, except 221-2401 and 221-2411** **0,14 mm² ”f”** **0,2 mm² - 4 mm² ”f” “sol”** **1,5 mm² - 4 mm² “str”** **type 221-2401** **0,2 mm² - 4 mm “sol”** **0,34 mm² - 4 mm²”f”** **0,2 mm² - 2,5 mm² “str”** **type 221-2411** **0,2 mm² - 4 mm²”f” “sol”** **0,2 mm² - 2,5 mm² “str”**	**P**
10.103	Terminals accept rigid and flexible conductors (table 101), unless otherwise specified (see 8.1)		**P**

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Smallest diameter (mm); largest diameter (mm).... :	**0,42 mm, 2,7 mm**	**P**
	During the test: terminals show no damage		**P**
10.104	Terminals clamp the conductor without undue damage: **All types, except 221-2401 and 221-2411**		
10.104.1	Connection/disconnection 5 times: smallest diameter (mm)..... :	**0,14 mm² "f"**	**P**
	Connection/disconnection 5 times: largest diameter (mm)..... :	**4 mm²**	**P**
	After the test, terminal not damaged		**P**
10.104	Terminals clamp the conductor without undue damage: **Types 221-2411**		
10.104.1	Connection/disconnection 5 times: smallest diameter (mm)..... :	**0,2 mm² solid and flexible**	**P**
	Connection/disconnection 5 times: largest diameter (mm)..... :	**4 mm² solid, stranded and flexible**	**P**
	After the test, terminal not damaged		**P**
10.104.2	Rated cross-sectional area (mm²) ..... :	**4 mm²**	**P**
	Type ..... :	**rigid and flexible**	**P**
	After the test, no wire of conductor escaped outside the terminal		**P**
10.105	Secureness test:		
	during the test: the conductor does not slip out, no break near clamping unit and no damage	See appended table 10.105	**P**
10.106	Pull test:		
	- during the test the conductor does not come out	See appended table 10.106	**P**

11	**CONSTRUCTION**		
11.101	Contact pressure not transmitted via insulating material, unless there is sufficient resiliency		**P**
11.102	Insertion and disconnection, in accordance with manufacturer's instructions		**P**
	Openings clearly distinguishable		**P**
11.103	Terminals so constructed that:		
	- each conductor is clamped individually		**P**
	- conductors can be connected or disconnected at same time or separately	**separately**	**P**
	Possible to clamp maximum number of conductors	**1**	**P**

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
11.104	Inadequate insertion of conductor avoided		**P**
11.2	Clamping units clamp conductors reliably and between metal surfaces		**P**
11.3	Connecting devices: insulation of conductors not in contact with live parts of different polarity		**P**
11.4	Insulating lining: adequate mechanical strength and secured in a reliable manner		**P**
11.5	Current-carrying parts: adequate mechanical strength, electrical conductivity and resistance to corrosion; type of metal.....:	**tin plated copper**	**P**
	Current-carrying parts not made with electroplated coating if subjected to mechanical wear		**N**
11.6	Terminals: possible to connect number of conductors as specified by the manufacturer:		
	- number of conductors.....:	**1**	**P**
	- rigid, cross-sectional area (mm²).....:	**0,2 mm² - 4 mm²**	**P**
	- flexible, cross-sectional area (mm²).....:	**all types, except 221-2401 and 221-2411** **0,14 mm² - 4 mm²** **all types, except 221-2401 and 221-2411** **0,2 mm² - 4 mm²**	**P**
11.7	Fixing means of bases do not serve any other purpose		**P**

12	**RESISTANCE TO AGEING, TO HUMIDITY CONDITIONS, TO INGRESS OF SOLID OBJECTS AND TO HARMFUL INGRESS OF WATER** **Type 221-413, 221-482, 221-483, 221-485, 221-2411**		
12.1	Connecting devices resistant to ageing; after the test (168 h): no cracks visible, not sticky or greasy, no damage; test temperature (°C).....:	☐ **85 °C** ☒ **T + 30 °C=115 °C**	**P**
12.2	After humidity test (91-95%): no damage; test duration (168 h for connecting devices > IPx2, 48 h for all other).....:	**48 h**	**P**
12.3	IP test (IEC 60529).....:	IP__	**N**
	After the test, electric strength test as 13.4, and by inspection	IP__	**N**
	no appreciable entry of water		**N**

13	**INSULATION RESISTANCE AND ELECTRIC STRENGTH** **Type 221-415, 221-485, 221-2411**	

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
13.1	Insulated connecting devices provided with adequate insulation resistance and electric strength		**P**
13.2	Insulation between the connected conductors and the external surface is adequate for all the combinations of conductors		**P**
13.3	Insulation resistance measured 1 min after application of 500 V d.c.	See appended table 13.3	**P**
13.4	Electric strength test	See appended table 13.4	**P**
14	**MECHANICAL STRENGTH** **Type 221-415, 221-485, 221-2411**		
14.101	the test conductor, properly inserted into a clamping unit of the connection devices shall be allowed to be bent (deflected) in all 12 directions each of them differing from the adjacent directions by 30° ± 5°		
	Deflection test (principle of test apparatus shown in figure 103a):		
	- requirement: ≤ 2,5 mV	See appended table 14.101	**P**
	max measured voltage drop (mV)	**0,99 mV**	**P**
14.2	Tumbling barrel (for < 50 g): 50 falls; after the test no damage	**4,15 g**	**P**
14.3	Impact test (for > 50 g): 10 blows:		
	- height of fall: 7,5 cm		**N**
	- height of fall: 10 cm		**N**
	- height of fall: 20 cm		**N**
	- height of fall: 25 cm		**N**
	After the test, no damage and live parts shall not become accessible		**N**
15	**TEMPERATURE RISE**		
	requirement: ≤ 45K		**P**
	max measured temperature rise (K)	See appended table 15	**P**
15.101	192 temperature cycles test, each cycle with a duration of 1 h, with the test current as defined in Table 2 of Part I		**P**
	Cabinet temperature (°C).....:	☐ 40 ☒ T-marking: **85 °C**	**P**
	Maximum voltage drop did not exceed 22,5 mV or 1,5 times 24th cycle value	See appended table 15.101	**P**
16	**RESISTANCE TO HEAT**		
16.1	Connecting devices are sufficiently resistant to heat		**P**

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
16.2	Heating cabinet test	See appended table 16.2	**P**
	After the test: no changes impairing further use and markings still legible		**P**
16.3	Ball-pressure test (IEC 60695-10-2) for parts necessary to retain current-carrying parts and parts of the earthing circuit in position	See appended table 16.3A	**P**
	Impression diameter not exceed 2 mm		**P**
	Ball-pressure test (IEC 60695-10-2) for parts not necessary to retain current-carrying parts and parts of the earthing circuit in position	See appended table 16.3B	**N**
	Impression diameter not exceed 2 mm		**N**
17	**CLEARANCES AND CREEPAGE DISTANCES**		**P**
	Creepage distances, clearances and distances through sealing compound	See appended table 17	**P**
18	**RESISTANCE OF INSULATING MATERIAL TO ABNORMAL HEAT AND FIRE**		
	Glow-wire test (clauses 4 to 10 of IEC 60695-2-10)	See appended table 18	**P**
	No visible flames and no sustained glowing or flame and glowing extinguished within 30 s		**P**
	No ignition of the tissue paper or scorching of the board		**P**
19	**RESISTANCE OF INSULATING MATERIAL TO TRACKING**		
	Tracking test (IEC 60112): PTI 175 V, 50 drops, solution A	See appended table 19	**P**

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.105	**TABLE: Clamping securement and damage to the conductor test**					
	Model/type reference……..…..:	**221-415**				
No of sample	Conductor cross-sectional area (mm²)	Conductor type	Mass for conductor (kg)	Height H (mm)	Diameter of bushing hole (mm)	
1-3	**0,14**	**Flexible**	**0,1**	**260**	**6,4**	**P**
4-6	**0,2**	**Solid / flexible**	**0,1**	**260**	**6,4**	**P**
7-9	**4**	**Solid/ flexible**	**0,9**	**280**	**9,5**	**P**
10-12	**4**	**stranded**	**0,9**	**280**	**9,5**	**P**
Supplementary information:						

10.106	**TABLE: Pull-out test**			
	Model/type reference……..…..:	**221-415**		
No of sample	Conductor cross-sectional area (mm²)	Conductor type	Pull force (N)	
1-3	**0,14**	**flexible**	**10**	**P**
4-6	**0,2**	**solid / flexible**	**10**	**P**
7-9	**4**	**solid / flexible**	**60**	**P**
10-12	**4**	**stranded**	**60**	**P**
Supplementary information:				

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.105	TABLE: Clamping securement and damage to the conductor test					
	Model/type reference…….....:	221-2411				
No of sample	Conductor cross-sectional area (mm²)	Conductor type	Mass for conductor (kg)	Height H (mm)	Diameter of bushing hole (mm)	
1-3	0,2	solid / flexible	0,2	260	6,4	P
4-6	4	solid / flexible	0,9	280	9,5	P
7-9	1,5	stranded	0,4	260	6,5	P
10-12	2,5	stranded	0,7	280	9,5	P
13-15	0,2	stranded	0,2	260	6,4	P
Supplementary information:						

10.106	TABLE: Pull-out test			
	Model/type reference…….....:	221-2411		
No of sample	Conductor cross-sectional area (mm²)	Conductor type	Pull force (N)	
1-3	0,2	solid / flexible	10	P
4-6	4	solid / flexible	60	P
7-9	1,5	stranded	40	P
10-12	2,5	stranded	50	P
13-15	0,2	stranded	10	P
Supplementary information:				

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.105	**TABLE: Clamping securement and damage to the conductor test**					
	Model/type reference……..…..:	**221-2401**				
No of sample	Conductor cross-sectional area (mm²)	Conductor type	Mass for conductor (kg)	Height H (mm)	Diameter of bushing hole (mm)	
1-3	**0,2**	**solid**	**0,2**	**260**	**6,4**	**P**
4-6	**0,34**	**flexible**	**0,2**	**260**	**6,4**	**P**
7-9	**4**	**solid / flexible**	**0,9**	**280**	**9,5**	**P**
13-15	**2,5**	**stranded**	**0,7**	**280**	**9,5**	**P**
16-18	**0,2**	**stranded**	**0,2**	**260**	**6,4**	**P**
Supplementary information:						

10.106	**TABLE: Pull-out test**			
	Model/type reference……..…..:	**221-2401**		
No of sample	Conductor cross-sectional area (mm²)	Conductor type	Pull force (N)	
1-3	**0,2**	**solid**	**10**	**P**
4-6	**0,34**	**flexible**	**15**	**P**
7-9	**4**	**solid / flexible**	**60**	**P**
13-15	**2,5**	**stranded**	**50**	**P**
16-18	**0,2**	**stranded**	**10**	**P**
Supplementary information:				

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

13.3	**TABLE: Insulation resistance**			
	Model/type reference……..…..:	**221-415**		
	Smallest cross-sectional area (mm²) :	**0,14 mm² ”f” / 0,2 mm² ”r”**		
	Largest cross-sectional area (mm²) :	**4 mm² ”r”**		
Test voltage applied between		**Measured (MΩ)**	**Required (MΩ)**	
All clamping units together and the body		**>20 MΩ**	**5 MΩ**	
Each clamping unit and all others together				
Supplementary information:				

13.3	**TABLE: Insulation resistance**			
	Model/type reference……..…..:	**221-485**		
	Smallest cross-sectional area (mm²) :	**0,14 mm² ”f” / 0,2 mm² ”r” / 0,2 mm² ”f”**		
	Largest cross-sectional area (mm²) :	**4 mm² ”r” / 4 mm² ”f”**		
Test voltage applied between		**Measured (MΩ)**	**Required (MΩ)**	
All clamping units together and the body		**>20 MΩ**	**5 MΩ**	
Each clamping unit and all others together				
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

13.3	**TABLE: Insulation resistance**		
	Model/type reference……..…..:	**221-2411**	
	Smallest cross-sectional area (mm²) :	**0,2 mm² solid and flexible**	
	Largest cross-sectional area (mm²) :	**4 mm² solid, stranded and flexible**	

Test voltage applied between	**Measured (MΩ)**	**Required (MΩ)**
All clamping units together and the body	**>5 MΩ**	**5 MΩ**
Each clamping unit and all others together		

Supplementary information:

13.4	**TABLE: Electric strength test**		
	Model/type reference……..…..:	**221-415**	
	Rated insulation voltage (V)……..:	**450 V**	

Test voltage applied between	**Test voltage (V)**	**Flashover / breakdown (Yes/No)**
All clamping units together and the body	**2500 V**	**No**
Each clamping unit and all others together		

Supplementary information:

13.4	**TABLE: Electric strength test**		
	Model/type reference……..…..:	**221-485**	
	Rated insulation voltage (V)……..:	**450 V**	

Test voltage applied between	**Test voltage (V)**	**Flashover / breakdown (Yes/No)**
All clamping units together and the body	**2500 V**	**No**
Each clamping unit and all others together		

Supplementary information:

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

13.4	**TABLE: Electric strength test**		
	Model/type reference……..…..:	**221-2411**	
	Rated insulation voltage (V)……..:	**450 V**	

Test voltage applied between	**Test voltage (V)**	**Flashover / breakdown (Yes/No)**
All clamping units together and the body	**2500 V**	**No**
Each clamping unit and all others together		

Supplementary information:

14.101	**TABLE: Mechanical strength** **Type 221-413**				
	0,1 times the test current (A).....:	**0,2 A**			**P**
	smallest cross-sectional area (mm^2) 10.103 .....:	**0,14 mm²**			**P**
	force (N) (table 104) .....:	**0,09 N**			**P**
	Distance (mm) (table 104) ……..:	**100 mm**			**P**
	-screwless terminal number	1	2	3	**-**
	- voltage drop measured (mV) (1^{st} deflection) .....:	0,39	0,38	0,39	**P**
	- voltage drop measured (mV) (2^{nd} deflection) .....:	0,39	0,38	0,38	**P**
	- voltage drop measured (mV) (3^{rd} deflection) .....:	0,39	0,38	0,38	**P**
	- voltage drop measured (mV) (4^{th} deflection) .....:	0,38	0,39	0,38	**P**
	- voltage drop measured (mV) (5^{th} deflection) .....:	0,38	0,39	0,38	**P**
	- voltage drop measured (mV) (6^{th} deflection) .....:	0,39	0,39	0,38	**P**
	- voltage drop measured (mV) (7^{th} deflection) .....:	0,38	0,39	0,39	**P**
	- voltage drop measured (mV) (8^{th} deflection) .....:	0,39	0,39	0,39	**P**
	- voltage drop measured (mV) (9^{th} deflection) .....:	0,39	0,39	0,39	**P**
	- voltage drop measured (mV) (10^{th} deflection) .....:	0,38	0,39	0,39	**P**
	- voltage drop measured (mV) (11^{th} deflection) .....:	0,38	0,39	0,39	**P**
	- voltage drop measured (mV) (12^{th} deflection) .....:	0,39	0,39	0,39	**P**
	- requirement: $\leq$ 2,5 mV				**P**

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

14.101	**TABLE: Mechanical strength** **Type 221-413**				
	0,1 times the test current (A) ..... :	**0,4 A**			**P**
	smallest cross-sectional area (mm^2) 10.103 ..... :	**0,2 mm²**			**P**
	force (N) (table 104) ..... :	**0,09 N**			**P**
	Distance (mm) (table 104) …….:	**100 mm**			**P**
	-screwless terminal number	1	2	3	**-**
	- voltage drop measured (mV) (1^{st} deflection) ..... :	0,42	0,43	0,43	**P**
	- voltage drop measured (mV) (2^{nd} deflection) ..... :	0,45	0,44	0,44	**P**
	- voltage drop measured (mV) (3^{rd} deflection) ..... :	0,46	0,45	0,45	**P**
	- voltage drop measured (mV) (4^{th} deflection) ..... :	0,45	0,45	0,45	**P**
	- voltage drop measured (mV) (5^{th} deflection) ..... :	0,46	0,44	0,45	**P**
	- voltage drop measured (mV) (6^{th} deflection) ..... :	0,46	0,45	0,45	**P**
	- voltage drop measured (mV) (7^{th} deflection) ..... :	0,45	0,45	0,44	**P**
	- voltage drop measured (mV) (8^{th} deflection) ..... :	0,46	0,46	0,45	**P**
	- voltage drop measured (mV) (9^{th} deflection) ..... :	0,45	0,45	0,45	**P**
	- voltage drop measured (mV) (10^{th} deflection) ..... :	0,46	0,46	0,45	**P**
	- voltage drop measured (mV) (11^{th} deflection) ..... :	0,45	0,45	0,45	**P**
	- voltage drop measured (mV) (12^{th} deflection) ..... :	0,46	0,45	0,45	**P**
	- requirement: ≤ 2,5 mV				**P**

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

14.101	**TABLE: Mechanical strength** **Type 221-413**				
	0,1 times the test current (A) ..... :	**3,2 A**			**P**
	smallest cross-sectional area (mm^2) 10.103 ..... :	**4 mm²**			**P**
	force (N) (table 104) ..... :	**2 N**			**P**
	Distance (mm) (table 104) ……..:	**100 mm**			**P**
	-screwless terminal number	1	2	3	**-**
	- voltage drop measured (mV) (1^{st} deflection) ..... :	0,62	0,57	0,60	**P**
	- voltage drop measured (mV) (2^{nd} deflection) ..... :	0,61	0,60	0,60	**P**
	- voltage drop measured (mV) (3^{rd} deflection) ..... :	0,57	0,54	0,54	**P**
	- voltage drop measured (mV) (4^{th} deflection) ..... :	0,54	0,54	0,55	**P**
	- voltage drop measured (mV) (5^{th} deflection) ..... :	0,61	0,58	0,56	**P**
	- voltage drop measured (mV) (6^{th} deflection) ..... :	0,60	0,57	0,55	**P**
	- voltage drop measured (mV) (7^{th} deflection) ..... :	0,60	0,58	0,59	**P**
	- voltage drop measured (mV) (8^{th} deflection) ..... :	0,61	0,60	0,59	**P**
	- voltage drop measured (mV) (9^{th} deflection) ..... :	0,61	0,60	0,60	**P**
	- voltage drop measured (mV) (10^{th} deflection) ..... :	0,59	0,58	0,58	**P**
	- voltage drop measured (mV) (11^{th} deflection) ..... :	0,59	0,58	0,59	**P**
	- voltage drop measured (mV) (12^{th} deflection) ..... :	0,58	0,58	0,58	**P**
	- requirement: ≤ 2,5 mV				**P**

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Clause	Requirement + Test	Result - Remark	Verdict

14.101	**TABLE: Mechanical strength** **Type 221-485**				
	0,1 times the test current (A) ..... :	**0,2 A**			**P**
	smallest cross-sectional area (mm^2) 10.103 ..... :	**0,14 mm² flexible**			**P**
	force (N) (table 104) ..... :	**0,09 N**			**P**
	Distance (mm) (table 104) …….:	**100 mm**			**P**
	-screwless terminal number	1	2	3	**-**
	- voltage drop measured (mV) (1st deflection) ..... :	0,38	0,38	0,39	**P**
	- voltage drop measured (mV) (2nd deflection) ..... :	0,38	0,38	0,38	**P**
	- voltage drop measured (mV) (3rd deflection) ..... :	0,38	0,38	0,38	**P**
	- voltage drop measured (mV) (4th deflection) ..... :	0,37	0,39	0,38	**P**
	- voltage drop measured (mV) (5th deflection) ..... :	0,37	0,39	0,37	**P**
	- voltage drop measured (mV) (6th deflection) ..... :	0,37	0,39	0,37	**P**
	- voltage drop measured (mV) (7th deflection) ..... :	0,37	0,39	0,39	**P**
	- voltage drop measured (mV) (8th deflection) ..... :	0,37	0,39	0,37	**P**
	- voltage drop measured (mV) (9th deflection) ..... :	0,39	0,39	0,37	**P**
	- voltage drop measured (mV) (10th deflection) ..... :	0,37	0,39	0,39	**P**
	- voltage drop measured (mV) (11th deflection) ..... :	0,38	0,39	0,37	**P**
	- voltage drop measured (mV) (12th deflection) ..... :	0,37	0,39	0,39	**P**
	- requirement: ≤ 2,5 mV				**P**

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Clause	Requirement + Test	Result - Remark	Verdict

14.101	**TABLE: Mechanical strength** **Type 221-485**				
	0,1 times the test current (A) ..... :	**0,4 A**			**P**
	smallest cross-sectional area (mm^2) 10.103 ..... :	**0,2 mm² solid**			**P**
	force (N) (table 104) ..... :	**0,09 N**			**P**
	Distance (mm) (table 104) …….:	**100 mm**			**P**
	-screwless terminal number	1	2	3	**-**
	- voltage drop measured (mV) (1^{st} deflection) ..... :	0,41	0,43	0,43	**P**
	- voltage drop measured (mV) (2^{nd} deflection) ..... :	0,44	0,44	0,45	**P**
	- voltage drop measured (mV) (3^{rd} deflection) ..... :	0,45	0,44	0,45	**P**
	- voltage drop measured (mV) (4^{th} deflection) ..... :	0,45	0,45	0,41	**P**
	- voltage drop measured (mV) (5^{th} deflection) ..... :	0,46	0,44	0,41	**P**
	- voltage drop measured (mV) (6^{th} deflection) ..... :	0,45	0,46	0,42	**P**
	- voltage drop measured (mV) (7^{th} deflection) ..... :	0,45	0,45	0,42	**P**
	- voltage drop measured (mV) (8^{th} deflection) ..... :	0,46	0,46	0,43	**P**
	- voltage drop measured (mV) (9^{th} deflection) ..... :	0,45	0,45	0,41	**P**
	- voltage drop measured (mV) (10^{th} deflection) ..... :	0,44	0,46	0,45	**P**
	- voltage drop measured (mV) (11^{th} deflection) ..... :	0,45	0,47	0,43	**P**
	- voltage drop measured (mV) (12^{th} deflection) ..... :	0,44	0,45	0,45	**P**
	- requirement: ≤ 2,5 mV				**P**

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Clause	Requirement + Test	Result - Remark	Verdict

14.101	**TABLE: Mechanical strength** **Type 221-485**				
	0,1 times the test current (A) ..... :	**3,2 A**			**P**
	smallest cross-sectional area (mm^2) 10.103 ..... :	**4 mm² solid**			**P**
	force (N) (table 104) ..... :	**2 N**			**P**
	Distance (mm) (table 104) ……..:	**100 mm**			**P**
	-screwless terminal number	1	2	3	**-**
	- voltage drop measured (mV) (1^{st} deflection) ..... :	0,62	0,57	0,60	**P**
	- voltage drop measured (mV) (2^{nd} deflection) ..... :	0,61	0,60	0,60	**P**
	- voltage drop measured (mV) (3^{rd} deflection) ..... :	0,59	0,54	0,54	**P**
	- voltage drop measured (mV) (4^{th} deflection) ..... :	0,56	0,54	0,55	**P**
	- voltage drop measured (mV) (5^{th} deflection) ..... :	0,62	0,58	0,56	**P**
	- voltage drop measured (mV) (6^{th} deflection) ..... :	0,61	0,57	0,55	**P**
	- voltage drop measured (mV) (7^{th} deflection) ..... :	0,63	0,58	0,59	**P**
	- voltage drop measured (mV) (8^{th} deflection) ..... :	0,61	0,60	0,59	**P**
	- voltage drop measured (mV) (9^{th} deflection) ..... :	0,61	0,60	0,60	**P**
	- voltage drop measured (mV) (10^{th} deflection) ..... :	0,55	0,58	0,58	**P**
	- voltage drop measured (mV) (11^{th} deflection) ..... :	0,56	0,58	0,59	**P**
	- voltage drop measured (mV) (12^{th} deflection) ..... :	0,57	0,58	0,58	**P**
	- requirement: ≤ 2,5 mV				**P**

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Clause	Requirement + Test	Result - Remark	Verdict

14.101	**TABLE: Mechanical strength** **Type 221-485**				
	0,1 times the test current (A) ..... :	**3,2 A**			**P**
	smallest cross-sectional area (mm^2) 10.103 ..... :	**4 mm² stranded**			**P**
	force (N) (table 104) ..... :	**2 N**			**P**
	Distance (mm) (table 104) ……..:	**100 mm**			**P**
	-screwless terminal number	1	2	3	**-**
	- voltage drop measured (mV) (1^{st} deflection) ..... :	0,68	0,66	0,65	**P**
	- voltage drop measured (mV) (2^{nd} deflection) ..... :	0,68	0,72	0,71	**P**
	- voltage drop measured (mV) (3^{rd} deflection) ..... :	0,69	0,65	0,65	**P**
	- voltage drop measured (mV) (4^{th} deflection) ..... :	0,64	0,74	0,73	**P**
	- voltage drop measured (mV) (5^{th} deflection) ..... :	0,66	0,73	0,73	**P**
	- voltage drop measured (mV) (6^{th} deflection) ..... :	0,68	0,64	0,67	**P**
	- voltage drop measured (mV) (7^{th} deflection) ..... :	0,69	0,66	0,69	**P**
	- voltage drop measured (mV) (8^{th} deflection) ..... :	0,64	0,62	0,68	**P**
	- voltage drop measured (mV) (9^{th} deflection) ..... :	0,71	0,75	0,73	**P**
	- voltage drop measured (mV) (10^{th} deflection) ..... :	0,72	0,74	0,71	**P**
	- voltage drop measured (mV) (11^{th} deflection) ..... :	0,72	0,73	0,72	**P**
	- voltage drop measured (mV) (12^{th} deflection) ..... :	0,73	0,75	0,74	**P**
	- requirement: ≤ 2,5 mV				**P**

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Clause	Requirement + Test	Result - Remark	Verdict

14.101	**TABLE: Mechanical strength** **Type 221-42411**				
	0,1 times the test current (A) ..... :	**0,4 A**			**P**
	smallest cross-sectional area (mm^2) 10.103 ..... :	**0,2 mm² solid**			**P**
	force (N) (table 104) ..... :	**0,09 N**			**P**
	Distance (mm) (table 104) …….:	**100 mm**			**P**
	-screwless terminal number	1	2	3	**-**
	- voltage drop measured (mV) (1st deflection) ..... :	0,56	0,55	0,55	**P**
	- voltage drop measured (mV) (2nd deflection) ..... :	0,56	0,55	0,55	**P**
	- voltage drop measured (mV) (3rd deflection) ..... :	0,56	0,56	0,56	**P**
	- voltage drop measured (mV) (4th deflection) ..... :	0,55	0,56	0,55	**P**
	- voltage drop measured (mV) (5th deflection) ..... :	0,56	0,56	0,56	**P**
	- voltage drop measured (mV) (6th deflection) ..... :	0,58	0,58	0,56	**P**
	- voltage drop measured (mV) (7th deflection) ..... :	0,57	0,56	0,56	**P**
	- voltage drop measured (mV) (8th deflection) ..... :	0,57	0,56	0,56	**P**
	- voltage drop measured (mV) (9th deflection) ..... :	0,58	0,57	0,56	**P**
	- voltage drop measured (mV) (10th deflection) ..... :	0,57	0,56	0,56	**P**
	- voltage drop measured (mV) (11th deflection) ..... :	0,57	0,56	0,56	**P**
	- voltage drop measured (mV) (12th deflection) ..... :	0,56	0,56	0,56	**P**
	- requirement: ≤ 2,5 mV				**P**

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

14.101	**TABLE: Mechanical strength** **Type 221-42411**				
	0,1 times the test current (A) ..... :	**3,2 A**			**P**
	smallest cross-sectional area (mm^2) 10.103 ..... :	**4 mm² solid**			**P**
	force (N) (table 104) ..... :	**2 N**			**P**
	Distance (mm) (table 104) ……..:	**100 mm**			**P**
	-screwless terminal number	1	2	3	**-**
	- voltage drop measured (mV) (1st deflection) ..... :	0,99	0,84	0,89	**P**
	- voltage drop measured (mV) (2nd deflection) ..... :	0,96	0,91	0,93	**P**
	- voltage drop measured (mV) (3rd deflection) ..... :	0,78	0,94	0,74	**P**
	- voltage drop measured (mV) (4th deflection) ..... :	0,65	0,71	0,63	**P**
	- voltage drop measured (mV) (5th deflection) ..... :	0,50	0,51	0,52	**P**
	- voltage drop measured (mV) (6th deflection) ..... :	0,47	0,53	0,58	**P**
	- voltage drop measured (mV) (7th deflection) ..... :	0,51	0,51	0,51	**P**
	- voltage drop measured (mV) (8th deflection) ..... :	0,47	0,44	0,48	**P**
	- voltage drop measured (mV) (9th deflection) ..... :	0,48	0,51	0,63	**P**
	- voltage drop measured (mV) (10th deflection) ..... :	0,55	0,55	0,60	**P**
	- voltage drop measured (mV) (11th deflection) ..... :	0,51	0,58	0,67	**P**
	- voltage drop measured (mV) (12th deflection) ..... :	0,81	0,82	0,92	**P**
	- requirement: ≤ 2,5 mV				**P**

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Clause	Requirement + Test	Result - Remark	Verdict

15	**TABLE: Temperature rise**		
	Model/type reference……..:	**221-415**	
	Terminal ..... :	☒ **single** ☐ **multiway**	—
	T marking (°C) ..... :	☒ **Yes** **(85°C):**	—
	Largest cross-sectional area (mm²)..... :	**4 mm²**	
	Conductors ..... :	**rigid and flexible**	
	Rated connecting capacity (mm²)..... :	**4 mm²**	
	Test current (A)..... :	**32 A**	

Thermocouple Locations	**max. temperature measured, (K)**	**max. temperature limit, (K)**
On conductor in the terminal T1	**21**	**45**
On conductor in the terminal T2	**22**	**45**
On conductor in the terminal T3	**21**	**45**
On conductor in the terminal T4	**22**	**45**
On conductor in the terminal T5	**22**	**45**

	Model/type reference……..:	**221-415**	
	Terminal ..... :	☒ **single** ☐ **multiway**	—
	T marking (°C) ..... :	☒ **Yes** **(85°C):**	—
	Used cross-sectional area (mm²) ..... :	**4 mm²**	
	Conductors ..... :	**rigid**	
	Test current (A)..... :	**32 A**	

Thermocouple Locations	**max. temperature measured, (K)**	**max. temperature limit, (K)**
On conductor in the terminal T1	**24**	**45**
On conductor in the terminal T2	**23**	**45**
On conductor in the terminal T3	**22**	**45**
On conductor in the terminal T4	**23**	**45**
On conductor in the terminal T5	**24**	**45**

Supplementary information:

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Clause	Requirement + Test	Result - Remark	Verdict

15	**TABLE: Temperature rise**		
	Model/type reference……..:	**221-2411**	
	Terminal ..... :	☒ **single** ☐ **multiway**	—
	T marking (°C) ..... :	☒ **Yes** **(85°C):**	—
	Largest cross-sectional area (mm²)..... :	**4 mm²**	
	Conductors ..... :	**solid, stranded and flexible**	
	Rated connecting capacity (mm²)..... :	**4 mm²**	
	Test current (A)..... :	**32 A**	

Thermocouple Locations	**max. temperature measured, (K)**	**max. temperature limit, (K)**
On conductor in the terminal and wire (sample with solid wire)	**27** **26** **26**	**45**
On conductor in the terminal and wire (sample with flexible wire)	**24** **28** **25**	**45**
On conductor in the terminal and wire (sample with stranded wire)	**19** **20** **19**	**45**
Supplementary information:		

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Clause	Requirement + Test	Result - Remark	Verdict

15.101	**TABLE: Temperature-cycling test**				
	Model/type reference ..... :	**221-415**			
	Smallest cross-sectional area (mm^2) ..... :	**0,14 mm² flexible**			
	Test current (Table 2) (A)..... :	**2 A**			
Measured voltage drop of:		Measured voltage drop (mV)			
		Sample 1	Sample 2	Sample 3	
Solid conductors (after 24 cycles)					
Stranded conductors (after 24 cycles)					
Flexible conductors (after 24 cycles)		**1,31**	**1,40**	**1,36**	**P**
Solid conductors (1,5 times 24th cycle value)					
Stranded conductors (1,5 times 24th cycle value)					
Flexible conductors (1,5 times 24th cycle value)		**1,96**	**2,10**	**2,04**	**P**
Solid conductors (after 192 cycles)					
Stranded conductors (after 192 cycles)					
Flexible conductors (after 192 cycles)		**0,89**	**1,01**	**0,99**	**P**
	Largest cross-sectional area (mm^2) ..... :	**4 mm² rigid flexible**			
	Test current (Table 2) (A)..... :	**32 A**			
Measured voltage drop of:		Measured voltage drop (mV)			
		Sample 1	Sample 2	Sample 3	
Solid conductors (after 24 cycles)		**2,31**	**2,10**	**2,00**	**P**
Stranded conductors (after 24 cycles)		**2,12**	**2,23**	**2,10**	**P**
Flexible conductors (after 24 cycles)		**2,00**	**2,50**	**2,64**	**P**
Solid conductors (1,5 times 24th cycle value)		**3,46**	**3,15**	**3,00**	**P**
Stranded conductors (1,5 times 24th cycle value)		**3,18**	**3,34**	**3,15**	**P**
Flexible conductors (1,5 times 24th cycle value)		**3,00**	**3,75**	**3,96**	**P**
Solid conductors (after 192 cycles)		**1,85**	**1,83**	**1,87**	**P**
Stranded conductors (after 192 cycles)		**1,79**	**1,81**	**1,80**	**P**
Flexible conductors (after 192 cycles)		**2,00**	**2,50**	**2,64**	**P**
Supplementary information:					

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

15.101	**TABLE: Temperature-cycling test**				
	Model/type reference ..... :	**221-415**			
	Smallest cross-sectional area (mm^2) ..... :	**0,2 mm² rigid flexible**			
	Test current (Table 2) (A)..... :	**4 A**			
Measured voltage drop of:		Measured voltage drop (mV)			
		Sample 1	Sample 2	Sample 3	
Solid conductors	(after 24 cycles)	**1,72**	**1,54**	**1,71**	**P**
Stranded conductors	(after 24 cycles)				
Flexible conductors	(after 24 cycles)	**1,79**	**1,79**	**2,10**	**P**
Solid conductors	(1,5 times 24th cycle value)	**2,58**	**2,31**	**2,56**	**P**
Stranded conductors	(1,5 times 24th cycle value)				
Flexible conductors	(1,5 times 24th cycle value)	**2,68**	**2,68**	**3,15**	**P**
Solid conductors	(after 192 cycles)	**1,48**	**1,27**	**1,26**	**P**
Stranded conductors	(after 192 cycles)				
Flexible conductors	(after 192 cycles)	**1,28**	**1,14**	**1,89**	**P**

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

15.101	**TABLE: Temperature-cycling test**				
	Model/type reference ..... :	**221-2411**			
	Smallest cross-sectional area (mm^2) ..... :	**0,2 mm² solid and flexible**			
	Test current (Table 2) (A)..... :	**4 A**			
Measured voltage drop of:		Measured voltage drop (mV)			
		Sample 1	Sample 2	Sample 3	
Solid conductors (after 24 cycles)		**10,18**	**11,90**	**12,14**	
Stranded conductors (after 24 cycles)					
Flexible conductors (after 24 cycles)		**11,10**	**15,04**	**13,51**	**P**
Solid conductors (1,5 times 24th cycle value)		**15,27**	**17,85**	**18,21**	
Stranded conductors (1,5 times 24th cycle value)					
Flexible conductors (1,5 times 24th cycle value)		**16,65**	**22,56**	**20,27**	**P**
Solid conductors (after 192 cycles)		**10,03**	**11,46**	**11,80**	
Stranded conductors (after 192 cycles)					
Flexible conductors (after 192 cycles)		**11,35**	**15,24**	**13,47**	**P**
	Largest cross-sectional area (mm^2) ..... :	**4 mm² solid, stranded and flexible**			
	Test current (Table 2) (A)..... :	**32 A**			
Measured voltage drop of:		Measured voltage drop (mV)			
		Sample 1	Sample 2	Sample 3	
Solid conductors (after 24 cycles)		**15,33**	**12,71**	**13,91**	**P**
Stranded conductors (after 24 cycles)		**13,36**	**14,49**	**10,92**	**P**
Flexible conductors (after 24 cycles)		**13,41**	**16,01**	**16,31**	**P**
Solid conductors (1,5 times 24th cycle value)		**23,00**	**19,07**	**20,87**	**P**
Stranded conductors (1,5 times 24th cycle value)		**20,04**	**21,74**	**16,38**	**P**
Flexible conductors (1,5 times 24th cycle value)		**20,12**	**24,02**	**24,47**	**P**
Solid conductors (after 192 cycles)		**15,28**	**12,44**	**13,83**	**P**
Stranded conductors (after 192 cycles)		**13,26**	**14,71**	**13,00**	**P**
Flexible conductors (after 192 cycles)		**13,68**	**16,55**	**16,33**	**P**
Supplementary information:					

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

16.2	**TABLE: Heating cabinet test**				
	Test temperature (°C).....:		☐ 85°C ☒ T + 45 = 130 °C		
Model/type reference		Sample 1	Sample 2	Sample 3	
221-413		**P**	**P**	**P**	**P**
221-485		**P**	**P**	**P**	**P**
221-2411		**P**	**P**	**P**	**P**
Supplementary information:					

16.3A	**TABLE: Ball pressure test of insulating materials all types, except 221-2401 and 221-2411**			
	Test temperature (°C).....:		☐ 125 ☒ T + 45 =130 °C	
Part under test		Material designation / manufacturer	Impression diameter (mm)	
Housing		Xantar	**1 mm**	**P**
Lever orange		Celanex	**1 mm**	**P**
Lever orange		Ultradur	**1 mm**	**P**
Lever grey		Polyamide for Zytel	**0,8 mm**	**P**
Supplementary information:				

16.3A	**TABLE: Ball pressure test of insulating materials types 221-2401 and 221-2411**			
	Test temperature (°C).....:		☐ 125 ☒ T + 45 =130 °C	
Part under test		Material designation / manufacturer	Impression diameter (mm)	
Housing		Xantar	**0,99 mm**	**P**
Lever orange		Celanex	**0,85 mm**	**P**
Cover		Makrolon	**1,01 mm**	**P**
Supplementary information:				

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

16.3B	**TABLE: Ball pressure test of insulating materials**		
	Test temperature (°C).....:	☐ 70 ☐ T + 40 =	
Part under test	Material designation / manufacturer	Impression diameter (mm)	**N**
Supplementary information:			

17	**TABLE: Clearances and creepage distances all types, except 221-2401 and 221-2411**				
	Rated insulation voltage (V) .....:	450 V			**P**
Clearance cl, creepage distance cr and distance through sealing compound tsc at/of:		Required cl, cr, tsc (mm)	Measured cl (mm)	Measured cr (mm)	Measured tsc (mm)
Between clamping units					
Clamping units - surface		**4**	**4,05**	**4,07**	**-**
Supplementary information:					

17	**TABLE: Clearances and creepage distances types 221-2401 and 221-2411**				
	Rated insulation voltage (V) .....:	450 V			**P**
Clearance cl, creepage distance cr and distance through sealing compound tsc at/of:		Required cl, cr, tsc (mm)	Measured cl (mm)	Measured cr (mm)	Measured tsc (mm)
Between clamping units					
Clamping units - surface		**4**	**4,11**	**4,11**	**-**
Supplementary information:					

IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

18	TABLE: Glow-wire test		
Part under test	Material designation / manufacturer	Test temperature (°C)	Time of extinguish of flames and glowing, if any
housing and lever (type 221-415)	Xantar / Celanex / Ultradur	**850°C**	flame extinguished immediately after removal.
housing and lever (type 221-485)	Xantar / Polyamide for Zytel	**850°C**	flame extinguished immediately after removal.
Supplementary information:			

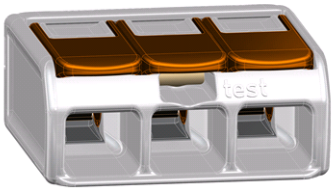
18	TABLE: Glow-wire test		
Part under test	Material designation / manufacturer	Test temperature (°C)	Time of extinguish of flames and glowing, if any
housing and lever (type 221-2401)	Xantar (transparent) / Celanex (orange)	**850°C**	flame extinguished immediately after removal.
Supplementary information:			

19	TABLE: Tracking		
Part under test	Material designation / manufacturer	Test voltage (V)	Remarks
housing	Xantar	**175 V**	**P**
Lever orange	Celanex	**175 V**	**P**
Lever orange	Ultradur	**175 V**	**P**
Lever grey	Polyamide for Zytel	**175 V**	**P**
Cover	Makrolon	**175 v**	**P**
Supplementary information:			

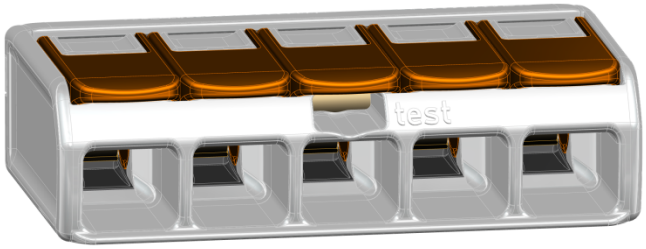
Remarks

Illustrations:

Type: 221-412



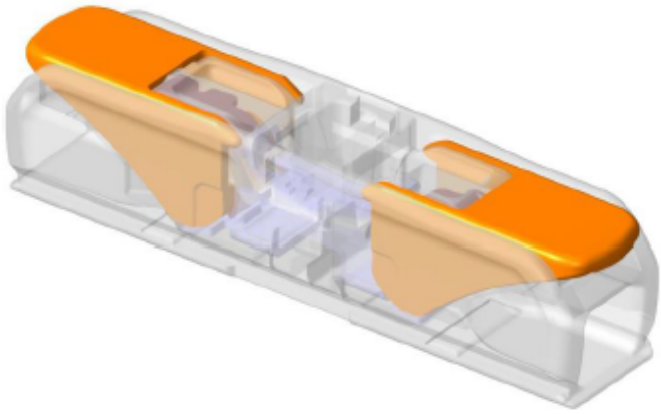
Type: 221-413



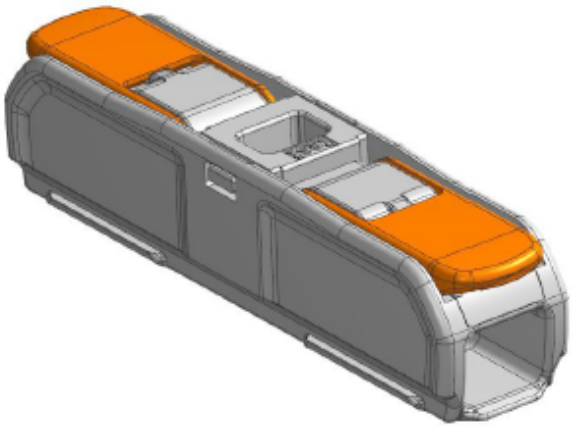
Type: 221-415

Type: 221-482 Type: 221-483 Type: 221-485

Remarks



Type 221-2401



Type 221-2411

Annex A IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 60998-2-2
EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

Connecting devices for low voltage circuits for household and similar purposes
Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units

Differences according to .....: EN 60998-1 : 2004 and EN 60998-2-2 : 2004 in conjunction with IEC 60998-1 : 2002 and IEC 60998-2-2 : 2002

Attachment Form No. .....: EU_GD_IEC60998_2_2B

Attachment Originator.....: DEKRA certification B.V.

Master Attachment .....: Date (2013-02)

	EN 60998-1 **CENELEC COMMON MODIFICATIONS**		
1	**Scope**		
delete	In the first paragraph ", and equivalent AWG conductors".		**P**
6.2	**Main characteristics**		
delete	NOTE 1		**P**
8.3	**Marking**		
delete	the NOTE		**P**
11.6	**Construction**		
delete	", or equivalent AWG conductors".		**P**
15.4	**Temperature rise**		
delete	the NOTE		**P**
Annex	**B**		
delete	The whole annex		**P**

Annex A IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

	EN 60998-2-2 CENELEC COMMON MODIFICATIONS		
10.103	**Connection of conductors**		
delete	NOTE 1		**P**
delete	In Table 101, NOTE 2, "and for AWG conductors, on ASTM B172-71, ICEA publication S-19-81, ICEA Publication S-66-524 and ICEA Publication S-65-516."		
10.105			
delete	NOTE 1 and NOTE 2		**P**
10.106			
delete	NOTE 1 and NOTE 2		**P**
14.101	**Mechanical strength**		
delete	the NOTE		**P**
Annex	**BB**		
delete	The whole annex		**P**

Annex B IEC 60998-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX ZB
(normative)
SPECIAL NATIONAL CONDITIONS
(EN 60998-1)

Special national condition: National characteristic or practice that cannot be changed even over a long period, e.g. climatic conditions, electrical earthing conditions.

NOTE If it affects harmonization, it forms part of the European Standard.

For the countries in which the relevant special national conditions apply these provisions are normative, for other countries they are informative.

Clause			
6.2	**United Kingdom**		
Replace	The entire subclause by: 6.2 The standard rated connecting capacities are 0,2 mm², 0,34 mm², 0,5 mm², 0,75 mm², 1 mm², 1,25mm², 1,5 mm², 2,5 mm², 4 mm², 6 mm², 10 mm², 16 mm², 25 mm², and 35 mm²		**P**

ETICS	OD ECS 040-1 January 2019	Responsible CB DEKRA

TEST REPORT SUMMARY

Report Number..... :	**2245563.50**
Date of issue..... :	**2021-02-24**
Tested by (name, function, signature):	**J. Olbrich (Engineer)**
Witnessed by (name, function, signature):	**H.L. Schendstok (Project Manager Industrial Safety)**
Approved by (name, function, signature):	**R. Gioia (Team leader)**
Supervised by (name, function, signature):	**F.S. Strikwerda (Project Manager Industrial Safety)**

Testing Laboratory..... :	**DEKRA Certification B.V.**
Address ..... :	**Meander 1051, 6825 MJ Arnhem, The Netherlands**
Testing procedure..... :	☐ ENEC ☒ CCA NTR
	☐ ENEC based on IECEE CBTC with number: .....
Customer Testing Procedure..... :	☐ TMP/CTF Stage 1 ☐ WMT/CTF Stage 2 ☒ SMT/CTF Stage 3
Applicant..... :	**WAGO Kontakttechnik GmbH & Co. KG**
Address ..... :	**Hansastraße 27, 32423 Minden/Westfalen, Germany**
Manufacturer..... :	**WAGO Kontakttechnik GmbH & Co. KG**
Address ..... :	**Hansastraße 27, 32423 Minden/Westfalen, Germany**
Product..... :	**Splicing wire connector**
Model/Type reference ..... :	**Series 221**
Trademark ..... :	WAGO
Ratings ..... :	**450 V, 32 A, 4 mm²**
Certification Scheme ..... :	☐ ENEC ☒ CCA ☐ Other: _____
Standard(s)..... :	**EN 60998-2-2: 2004 in conjunction with EN 60998-1:2004**

☒ The text of the a.m. European Standard was approved by CENELEC is equivalent with the corresponding IEC Publication.

☒ The text of the a.m. European Standard was approved by CENELEC with agreed common modifications and is not equivalent with the corresponding IEC Publication. An EU Deviation Addendum has to be issued.

This EN test report consists of the following parts:

☒ IEC Test Report Number..... :	**2245563.50**
☒ EU Deviation Addendum..... :	**2245563.50 Attachment A**

This ECS document together with the test report is only valid if signed by an approved ENEC or CCA Testing Laboratory and accompanied by the associated ENEC Licence or CCA Notification of Test Results, issued by a Certification Body member of ECS.