

# TEST REPORT

Test Report No.: DQ2500014410

Sample Name: GPDseries single-phase pipeline screened electric pump

Model: See model list

Date(s) of tests: 2025.10.17~2025.11.03

Manufacturer: Moy Enerji ve Dış Ticaret A.Ş.

<b>TEST REPORT</b> <b>IEC 60335-2-51</b> <b>Household and similar electrical appliances – Safety –</b> <b>Part-2-51: Particular requirements for stationary circulation pumps for heating and service water installations</b>	
Report Number. ....:	DQ2500014410
Compiled by.....:	史剑剑 (ShiJianjian)      Signature:
Checked by.....:	赵凯挺 (ZhaoKaiting)      Signature:
Approved by.....:	何 鹏 (HePeng)      Signature:
Date of issue.....:	2025.11.03
<b>Testing Laboratory:</b>	
Laboratory.....:	Ningbo Customs District Technology Center
Address.....:	No. 66, Qingyi Road, Hi-Tech District, Ningbo, Zhejiang, China
Tel.....:	+86 574 8681 3877 +86 574 8756 1476
<b>Client:</b>	
Applicant's name .....	Moy Enerji ve Dış Ticaret A.Ş.
Address.....:	Maltepe Mh. Gümüşsuyu Cd. No: 56/B, Zeytinburnu / İstanbul / Türkiye No. 780, Mingchuan Road, High-Tech Zone, Hefei Anhui,P.R China
Manufacturer.....:	Moy Enerji ve Dış Ticaret A.Ş.
Address.....:	Maltepe Mh. Gümüşsuyu Cd. No: 56/B, Zeytinburnu / İstanbul / Türkiye No. 780, Mingchuan Road, High-Tech Zone, Hefei Anhui,P.R China
<b>Test specification:</b>	
Standard .....	EN IEC 60335-2-51:2023 + A11:2023 used in conjunction with EN 60335-1:2012 + A11:2014 + A13:2017 + A1:2019 + A14:2019 + A2:2019 + A15:2021 + A16:2023 EN 62233:2008
Test procedure.....:	CE-LVD
Non-standard test method.....:	—
<b>Test item description:</b>	
Trade Mark .....	<b>ZESS<sup>®</sup></b>
Model/Type reference.....:	See model list
Ratings.....:	See model list
Sampling institution .....	—
Date of receipt of test item.....:	2025.10.17
<b>Test Verdict</b> .....	All the clauses tested meet the requirements of the standards above.

**General remarks:**

1. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
2. The above test results are only responsible for the samples received.
3. If you have any objection to the test result, please explain in detail by written in ten days after receiving the report.
4. Please take the samples back in 30 days after receiving the report.
5. The report is only used for scientific research, teaching or internal quality control.

**Possible test case verdicts:**

- test case does not apply to the test object or the requirement is not tested ..... : N/A
- test object does meet the requirement..... : P(Pass)
- test object does not meet the requirement ..... : F(Fail)

**Summary of test:**

Full tests performed on models GPD65-12F and GPD25-4S Pro and passed.

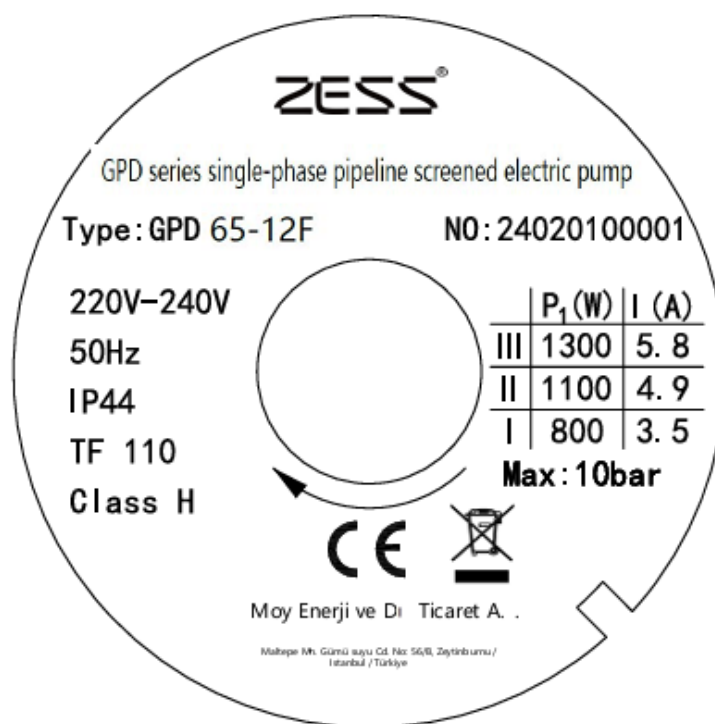
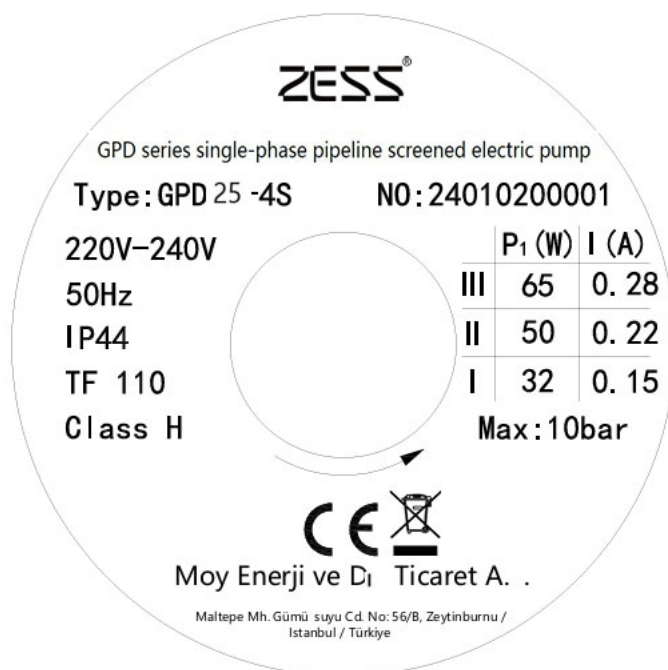
**General product information:**

The product covered in this report is a Circulating Pump for outdoor use.

-All models are similar except the following:

All models have same constructions and critical electric components, only the model names are different.  
See Model list:

## Copy of marking plate:



Model list								
Model	Rated voltage (V)	Rated frequency(Hz)	rated power(W)	Input power (W)	ated speed Or polar number	Duty	Inc. Class	rated current (A)
GPD15-4S	220-240VAC	50	20	65	2极	S1	H	2
GPD15-4FC	220-240VAC	50	20	65	2极	S1	H	2
GPD15-4FBC	220-240VAC	50	20	65	2极	S1	H	2
GPD25-4S	220-240VAC	50	20	65	2极	S1	H	2
GPD32-4S	220-240VAC	50	20	65	2极	S1	H	2
GPD32-4SN	220-240VAC	50	20	65	2极	S1	H	2
GPD32-4SE	220-240VAC	50	20	65	2极	S1	H	2
GPD32-4SG	220-240VAC	0	20	65	2极	S1	H	2
GPD15-5--	220-240VAC	50	25	75	2极	S1	H	2.5
GPD15-5S-	220-240VAC	50	25	75	2极	S1	H	2.5
GPD15-	220-240VAC	50	25	85	2极	S1	H	2.5
GPD15-5B	220-240VAC	50	25	85	2极	S1	H	2.5
GPD15-5N	220-240VAC	50	25	85	2极	S1	H	2.5
GPD15-5FC	220-240VAC	50	25	85	2极	S1	H	2.5
GPD15-5FBC	220-240VAC	50	25	85	2极	S1	H	2.5
GPD15-5P	220-240VAC	50	25	85	2极	S1	H	2.5
GPD15-5S	220-240VAC	50	25	85	2极	S1	H	2.5
GPD20-5	220-240VAC	50	25	85	2极	S1	H	2.5
GPD20-5B	220-240VAC	50	25	85	2极	S1	H	2.5
GPD32-5SN	220-240VAC	50	25	85	2极	S1	H	2.5
GPD32-5SE	220-240VAC	50	25	85	2极	S1	H	2.5
GPD32-5SG	220-240VAC	50	25	85	2极	S1	H	2.5

Model	Rated voltage (V)	Rated frequency(Hz)	rated power(W)	Input power (W)	ated speed Or polar number	Duty	Inc. Class	rated current (A)
GPD15-5	220-240VAC	50Hz	25W	90W	2极	S1	H	2.5
GPD15-5S	220-240VAC	50Hz	25W	90W	2极	S1	H	2.5
GPD15-6S PLUS	220-240VAC	50Hz	36W	90W	2极	S1	H	2.5
GPD25-6S PLUS	220-240VAC	50Hz	36W	90W	2极	S1	H	2.5
GPD15-6	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD15-6B	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD15-6N	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD20-6S	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD20-6E	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD20-6G	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD25-6S	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD25-6E	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD25-6G	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD25-6SB	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD32-6	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD32-6B	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD32-6SE	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD32-6SG	220-240VAC	50Hz	30W	100W	2极	S1	H	2.5
GPD15-8P	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD15-8SP	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD15-9	220-240VAC	50Hz	40W	120W	2极	S1	H	3

Model	Rated voltage (V)	Rated frequency(Hz)	rated power(W)	Input power (W)	ated speed Or polar number	Duty	Inc. Class	rated current (A)
GPD15-9S	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD15-9E	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD15-9G	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD15-9SE	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD15-9A	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD15-9AB	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD15-9AE	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD15-9SG	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD20-8P	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD20-8SP	220-240VAC	50Hz	40W	120W	2极	S1	H	3
GPD20-7	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD20-7B	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25-7	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25-7B	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25-7N	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25-7P	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25-7S	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25-7E	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25-7G	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25-7SB	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25 7S N	220-240VAC	50Hz	45W	130W	2 极	S1	H	3

Model	Rated voltage (V)	Rated frequency(Hz)	rated power(W)	Input power (W)	ated speed Or polar number	Duty	Inc. Class	rated current (A)
GPD25-7SE	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25-7SG	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD25-7SP	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7B	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7N	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7P	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7S	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7E	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7G	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7SB	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7SN	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7SE	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7SG	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-7SP	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD15-7	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD15-7S	220-240VAC	50Hz	45W	130W	2极	S1	H	3
GPD32-5F	220-240VAC	50Hz	65W	145W	2极	S1	H	5
GPD32-5SF	220-240VAC	50Hz	65W	145W	2极	S1	H	5
GPD40-3F	220-240VAC	50Hz	65W	145W	2极	S1	H	5
GPD40-3SF	220-240VAC	50Hz	65W	145W	2极	S1	H	5
GPD20-7S Pro	220-240VAC	50Hz	70W	140W	2极	S1	H	3



Model	Rated voltage (V)	Rated frequency(Hz)	rated power(W)	Input power (W)	ated speed Or polar number	Duty	Inc. Class	rated current (A)
GPD25-7S Pro	220-240VAC	50Hz	70W	140W	2极	S1	H	3
GPD32-7S Pro	220-240VAC	50Hz	70W	140W	2极	S1	H	3
GPD20-8SL	220-240VAC	50Hz	95W	180W	2极	S1	H	4
GPD25-8SL	220-240VAC	50Hz	95W	180W	2极	S1	H	4
GPD32-8SL	220-240VAC	50Hz	95W	180W	2极	S1	H	4
GPD25-8S PLUS	220-240VAC	50Hz	90W	180W	2极	S1	H	5
GPD20-8A	220-240VAC	50Hz	80W	200W	2极	S1	H	5
GPD25-8	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8B	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8N	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8P	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8S	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8E	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8G	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8SB	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8SN	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8SP	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8SE	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD25-8SG	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD32-8	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD32-8B	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD32-8N	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD32-8F	220-240VAC	50Hz	90W	245W	2极	S1	H	5

Model	Rated voltage (V)	Rated frequency(Hz)	rated power(W)	Input power (W)	ated speed Or polar number	Duty	Inc. Class	rated current (A)
GPD32-8P	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD32-8S	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD32-8E	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD32-8SG	220-240VAC	50Hz	90W	245W	2极	S1	H	5
GPD15-12--	220-240VAC	50Hz	120W	270W	2极	S1	H	6
GPD15-12A-	220-240VAC	50Hz	120W	270W	2极	S1	H	6
GPD15-12S	220-240VAC	50Hz	120W	270W	2极	S1	H	6
GPD20-12S	220-240VAC	50Hz	120W	270W	2极	S1	H	6
GPD20-12SB	220-240VAC	50Hz	120W	270W	2极	S1	H	6
GPD25-12-	220-240VAC	50Hz	120W	270W	2极	S1	H	6
GPD25-12S	220-240VAC	50Hz	120W	270W	2极	S1	H	6
GPD25-12SB	220-240VAC	50Hz	120W	270W	2极	S1	H	6
GPD15-12	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD15-12A	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD15-15	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD20-12	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD20-12Z	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD20-12ZB	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD20-15Z	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD25-9	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD25-9Z	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD25-9N	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD25-12L	220-240VAC	50Hz	150W	300W	2极	S1	H	10

Model	Rated voltage (V)	Rated frequency(Hz)	rated power(W)	Input power (W)	ated speed Or polar number	Duty	Inc. Class	rated current (A)
GPD32-9	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD32-9F	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD40-4.5F	220-240VAC	50Hz	150W	300W	2极	S1	H	5
GPD50-5F	220-240VAC	50Hz	150W	300W	2极	S1	H	5
GPD20-12SZXL	220-240VAC	50Hz	150W	300W	2极	S1	H	6
GPD20-12SZBXL	220-240VAC	50Hz	150W	300W	2极	S1	H	6
GPD20-15SZXL	220-240VAC	50Hz	150W	300W	2极	S1	H	6
GPD25-9SXL	220-240VAC	50Hz	150W	300W	2极	S1	H	6
GPD25-9SZXL	220-240VAC	50Hz	150W	300W	2极	S1	H	6
GPD25-9SNXL	220-240VAC	50Hz	150W	300W	2极	S1	H	6
GPD25-12SL	220-240VAC	50Hz	150W	300W	2极	S1	H	6
GPD40-4.5F	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD50-5F	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD20-12SZXL	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD32-9SXL	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD32-9SFXL	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD40-4.5SFXL	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD50-5SFXL	220-240VAC	50Hz	150W	300W	2极	S1	H	8
GPD15-15A	220-240VAC	50Hz	180W	320W	2极	S1	H	8
GPD20-16Z	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD20-16ZB	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD20-16BZ	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD20-15	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5

Model	Rated voltage (V)	Rated frequency(Hz)	rated power(W)	Input power (W)	ated speed Or polar number	Duty	Inc. Class	rated current (A)
GPD25-12	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD25-12Z	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD25-12N	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD32-12	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD32-12F	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD40-6F	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD50-8F	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD20-16SZXL	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD20-16SZBXL	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD20-15SXL	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD25-12SXL	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD25-12SZXL	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD25-12SNXL	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD32-12SXL	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD32-12SFXL	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD40-6SFXL	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD50-8SFXL	220-240VAC	50Hz	280W	500W	2极	S1	H	12.5
GPD20-20Z	220-240VAC	50Hz	400W	700W	2极	S1	H	15
GPD20-20ZB	220-240VAC	50Hz	400W	700W	2极	S1	H	15
GPD25-16	220-240VAC	50Hz	400W	700W	2极	S1	H	15
GPD25-16Z	220-240VAC	50Hz	400W	700W	2极	S1	H	15
GPD32-16	220-240VAC	50Hz	400W	700W	2极	S1	H	15
GPD40-12F	220-240VAC	50Hz	400W	700W	2极	S1	H	15
GPD65-5F	220-240VAC	50Hz	400W	700W	2极	S1	H	15

Model	Rated voltage (V)	Rated frequency(Hz)	rated power(W)	Input power (W)	ated speed Or polar number	Duty	Inc. Class	rated current (A)
GPD65-5E	220-240VAC	50Hz	400W	700W	2极	S1	H	15
GPD65-8F	220-240VAC	50Hz	400W	700W	2极	S1	H	15
GPD 40-12SF	220-240VAC	50Hz	400W	700W	2极	S1	H	15
GPD40-12F Pro	220-240VAC	50Hz	400W	700W	2极	S1	H	15
GPD20-26Z	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD20-26ZB	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD25-20	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD25-20S	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD25-20Z	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD32-20	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD40-16F	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD50-12F	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD65-10F	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD80-10F	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD 50-12SF	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD50-12F Pro	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD40-16F Pro	220-240VAC	50Hz	600W	1000W	2极	S1	H	22
GPD20-35Z	220-240VAC	50Hz	850W	1300W	2极	S1	H	28
GPD20-35ZB	220-240VAC	50Hz	850W	1300W	2极	S1	H	28
GPD50-20F	220-240VAC	50Hz	850W	1300W	2极	S1	H	28
GPD50-16F	220-240VAC	50Hz	850W	1300W	2极	S1	H	28
GPD65-12F	220-240VAC	50Hz	850W	1300W	2极	S1	H	28
GPD80-12F	220-240VAC	50Hz	850W	1300W	2极	S1	H	28

**Note:**

The GPD series and BASIC series have different names, while others are the same,

BASICm-4y X;BASICm-4.5y X;BASICm-5y X;BASICm-6y X;

BASICm-7y X;BASICm-7.5y X;BASICm-8y X;BASICm-9y X;

BASICm-10y X;BASICm-12y X;BASICm-15y X;BASICm-16y X;

BASICm-18y X;BASICm-20y X;BASICm-26y X;BASICm-35y X;

(m=15;20;25;32;40;50;65;80;

y=blank,A,B,C,E,F,G,H,K,L,N,P,Q,R,S,T,X,Z,AE,SG,ZB,BZ,XL,SXL,SZXL,SNXL,SFXL,AB,BC,NC,FC,FB,FBC,FN;FNC,PC,SC,SZ,SK,SB,SZB,SBC,SE,SN;SNC;SF;SFC,SFB,SFBC,SFN;SFNC;SP,SPC,ZB,BZ,ZBXL;SZBXL;ZQXL;SZQXL;XXL;X=blank,Plus,Pro) (The letters in "y" can be combined in any way to form a new alphabetic order)

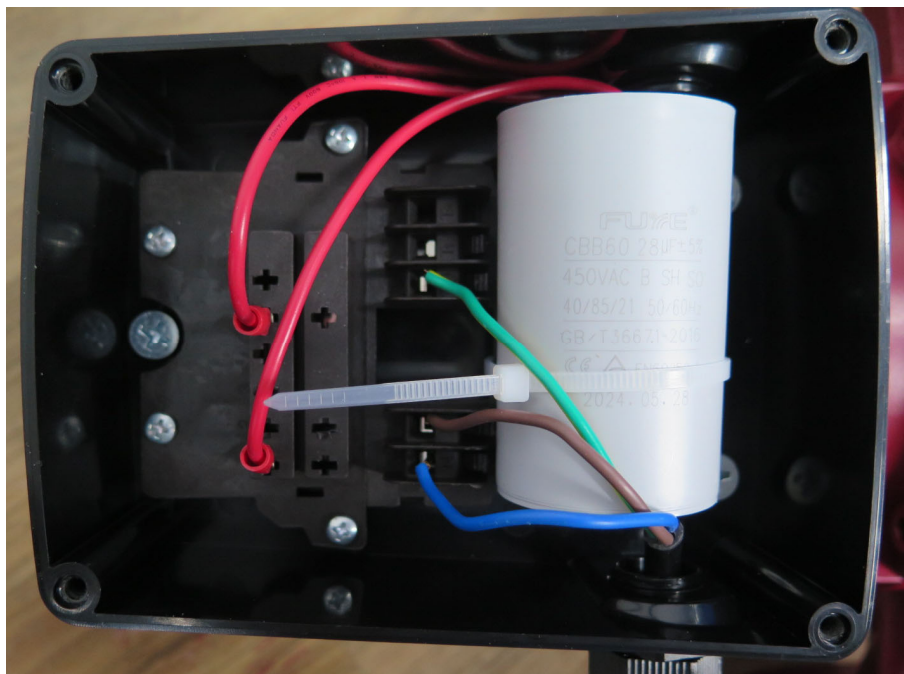
**Photo(s):**

Model: GPD65-12F



**Photo(s):**

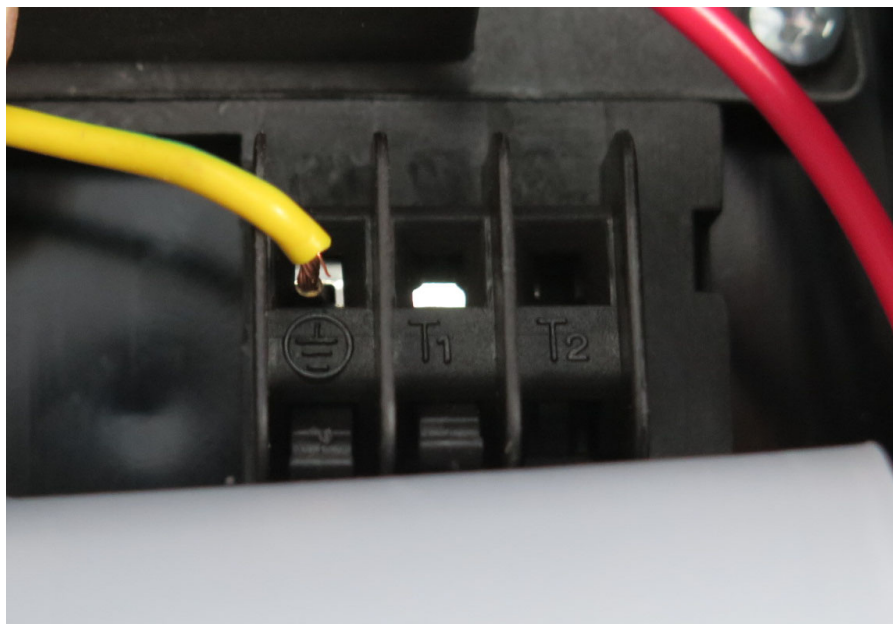
Model: GPD65-12F





**Photo(s):**

Model: GPD65-12F



**Photo(s):**

Model: GPD65-12F



**Photo(s):**

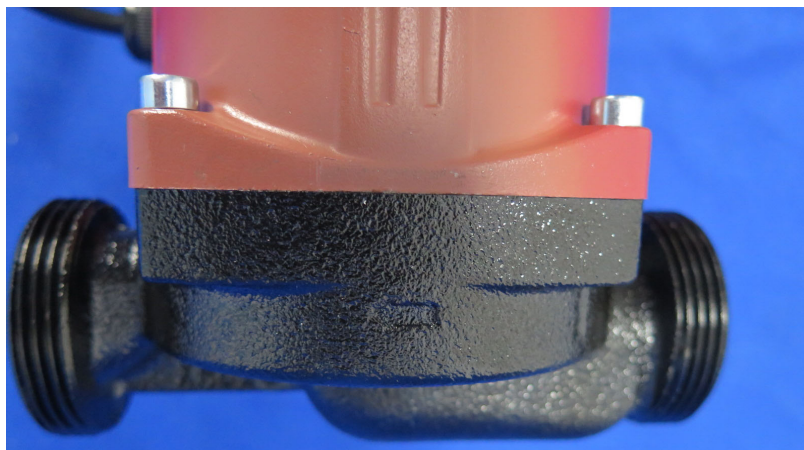
Model: GPD25-4S





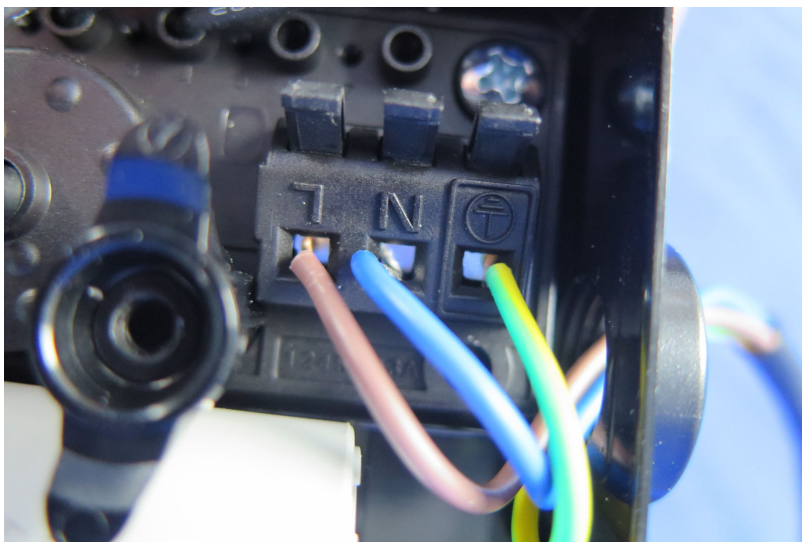
**Photo(s):**

Model: GPD25-4S



**Photo(s):**

Model: GPD25-4S



**Photo(s):**

Model: GPD25-4S



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
<b>5</b>	<b>GENERAL CONDITIONS FOR THE TESTS</b>		<b>P</b>
	Tests performed according to clause 5, e.g. nature of supply, sequence of testing, etc.		P
5.7	The water temperature at the inlet is maintained between 0 °C and –5 °C of the value corresponding to the TF class of the pump. (IEC 60335-2-51)		N/A
	For circulation pumps intended to be located within the enclosure of a boiler, the tests of Clauses 10, 11 and 13 are carried out at an ambient temperature of 55 °C or at the temperature specified in the instructions, whichever is higher.		N/A
5.8.2	Appliances having more than one rated voltage.....	Upper value: 240V Lower value: 220V	P
5.8.3	Heating Appliances and combined appliances marked with a rated power input range.....	Upper value: ... W Lower value: ... W	N/A
5.8.4	Appliances with a rated voltage range and with a rated power input corresponding to the mean value of the rated voltage range.	Upper calculated input: .....W Lower calculated input: .....W	N/A
5.101	Circulation pumps having a three-phase motor that does not incorporate a protective device are installed with an appropriate device, in accordance with the instructions. (IEC 60335-2-51)		N/A
<b>6</b>	<b>CLASSIFICATION</b>		<b>P</b>
6.1	Circulation pumps be class I, class II or class III. (IEC 60335-2-51)	Class I	P
6.2	Protection against harmful ingress of water.		P
	Circulation pumps be at least IPX2. (IEC 60335-2-51)	IPX4	P
6.101	Circulation pumps are one of the classes shown in Table 101. (IEC 60335-2-51)		P
<b>7</b>	<b>MARKING AND INSTRUCTIONS</b>		<b>P</b>
7.1	Appliances marked with		P
	Rated voltage or voltage range (V) .....	Refer to marking plates	P
	Symbol for nature of supply, or .....		N/A
	Rated frequency (Hz) .....	Refer to marking plates	P
	Rated power input (W), or .....	Refer to marking plates	P
	Rated current (A) .....		N/A
	Manufacturer's or responsible vendor's name, trademark or identification mark .....	Refer to marking plates	P
	Model or type reference.....	Refer to marking plates	P
	Symbol IEC 60417-5172, for class II appliances		N/A
	IP number, other than IPX0 .....	Refer to marking plates	P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Symbol IEC 60417-5180, for class III appliances, unless		N/A
	the appliance is operated by batteries only, or		N/A
	the appliance is powered by rechargeable batteries recharged in the appliance.		N/A
	Appliance outlets accessible to the user and socket-outlets accessible to the user:		N/A
	- that are incorporated in appliances connected to the supply mains, and		N/A
	- that operate at rated voltage		N/A
	marked with their outlet load (W or A).....:		N/A
	Appliances intended to be supplied from a detachable power supply part to re-charge the battery marked with:		N/A
	- symbol ISO 7000-0790		N/A
	- symbol IEC 60417-6181		N/A
	- model or type reference of the detachable power supply part, or .....:		N/A
	- the substance of the following: "Use only with <model or type reference> supply unit"		N/A
	Symbol IEC 60417-5018, for class II and class III appliances incorporating a functional earth		N/A
	Symbol IEC 60417-5036, for the enclosure of electrically-operated water valves in external hose-sets for connection of an appliance to the water mains, if the working voltage exceeds extra-low voltage.		N/A
	Circulation pumps marked with:		P
	– the TF class;		P
	– the direction of the water flow;		P
	– the direction of rotation (for pumps having three-phase motors);		N/A
	– the rated current (for pumps having three-phase motors if a protective device has to be installed in the fixed wiring).		P
7.2	stationary appliances for multiple supply:		N/A
	Warning to disconnect all supply circuits.		N/A
	Warning placed in vicinity of terminal cover.		N/A
7.3	Range of rated values marked with the lower and upper limits separated by a hyphen.	220-240	P
	Different rated values marked with the values separated by an oblique stroke.		N/A
	Requirement also applied to appliances for connection to both single phase and multiphase supplies.		N/A



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
7.4	Appliances adjustable for different rated voltages or rated frequencies, the voltage or the frequency setting is clearly discernible .		N/A
	frequent changes in voltage or frequency setting not required, adjustment of rated voltage or rated frequency determined from wiring diagram		N/A
	Wiring diagram may be on the inside of a cover that has to be removed to connect the supply conductors.		N/A
	Wiring diagram not on a label loosely attached to the appliance.		N/A
7.5	Appliances with more than one rated voltage or one or more rated voltage ranges, marked with rated input or rated current for each rated voltage or range, unless		N/A
	the power input or current are related to the arithmetic mean value of the rated voltage range.		P
	Relation between marking for upper and lower limits of rated power input or rated current and voltage is clear.		N/A
7.6	Correct symbols used.		P
	Symbol for nature of supply placed next to rated voltage.		P
	Symbol for class II appliances placed unlikely to be confused with other marking.		N/A
	Units of physical quantities and their symbols according to international standardized system.		P
	Additional symbols give no rise to misunderstanding.		P
	Symbols specified in IEC60417 and ISO7000 are used.		P
7.7	Connection diagram fixed to appliances to be connected to more than two supply conductors and appliances for multiple supply, unless		N/A
	correct mode of connection is obvious.		N/A
	For multi-phase appliances, correct mode of connection considered to be obvious if:		N/A
	- indicated by arrows pointing towards the terminals, or		N/A
	- marked in words		N/A
	Connection diagram is the wiring diagram.		N/A
7.8	Except for type Z attachment, terminals for connection to the supply mains indicated as follows:		N/A
	- marking of terminals exclusively for the neutral conductor (letter N)		P
	- marking of protective earthing terminals (symbol IEC 60417-5019)		P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- marking of functional earthing terminals (symbol IEC 60417-5018)		N/A
	- marking not placed on removable parts		P
7.9	Marking or placing of switches which may cause a hazard.		N/A
7.10	Indications of switches on stationary appliances and controls on all appliances by use of figures, letters or other visual means .....		N/A
	This applies also to switches which are part of a control.		N/A
	If figures are used, the off position indicated by the figure 0.		N/A
	The figure 0 indicates only OFF position, unless no confusion with the OFF position .		N/A
	The figure 0 is used on a digital programming key-board.		N/A
7.11	Indication for direction of adjustment of controls.		P
7.12	Instructions for safe use provided in hard copy form.		P
	Instructions marked on the appliance are visible in normal use.		P
	Details concerning precautions during user maintenance.		P
	The instructions the substance of the following:		P
	The instruction concerning persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge is not applicable. (IEC 60335-2-51)	Replaced by EN standard	N/A
	The instruction regarding supervision of children is not applicable. (IEC 60335-2-51)	Replaced by EN standard	N/A
	For a part of class III construction supplied from a detachable power supply part, the instructions state that the appliance is only to be used with the unit provided		N/A
	Instructions for class III appliances state that it must only be supplied at SELV, unless		N/A
	it is a battery-operated appliance, the battery being charged outside the appliance.		N/A
	For appliances for altitudes exceeding 2 000 m, the maximum altitude is stated .....		N/A
	The instructions for appliances incorporating a functional earth state that the appliance incorporates an earth connection for functional purposes.		N/A
	The instructions for appliances intended to be connected to a supply for battery recharging state a warning to only use an external supply with the described specifications		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	The instructions for appliances intended to be supplied from a detachable power supply part for battery recharging state the type reference of the supply part along with a warning to only use the unit provided with this appliance.		N/A
	The instructions for appliances intended for use with batteries using metal-ion chemistries state the normal temperature range for battery charging.		N/A
	Meaning of symbol for detachable power supply part explained, unless not used.		N/A
7.12.1	Sufficient details for installation supplied.		P
	For an appliance intended to be permanently connected to the water mains and not connected by a hose-set, this is stated.		P
	If different rated voltages or different rated frequencies are marked, the instructions state what action to be taken to adjust the appliance.		N/A
	The installation instructions include the following: (IEC 60335-2-51)		P
	– the maximum flow rate or total head; (IEC 60335-2-51)		P
	– the maximum ambient temperature at which the pump is to be used; (IEC 60335-2-51)		P
	– the maximum system pressure, which is not less than: (IEC 60335-2-51)		P
	0,6 MPa for pumps for heating systems; (IEC 60335-2-51)		N/A
	1,0 MPa for pumps for service water systems; (IEC 60335-2-51)		N/A
	– the intended orientation of the pump; (IEC 60335-2-51)		P
	– for pumps having a three-phase motor not incorporating a protective device, the substance of the following: (IEC 60335-2-51)		N/A
	A protective device is to be installed in the fixed wiring and its characteristics are to be specified. (IEC 60335-2-51)		N/A
	– for the thermal insulation of circulation pumps in heating systems, the substance of the following: (IEC 60335-2-51)		N/A
	Only the supplied kit or a kit made available by the manufacturer is used. It is ensured that the drain openings are not sealed after installation of the thermal insulation. (IEC 60335-2-51)		N/A
	For circulation pumps intended for permanent connection to fixed wiring, delivered with a separate connector to ease the installation and establish the supply connection, the instructions state the substance of the following: (IEC 60335-2-51)		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Only use the supplied connector when installing the circulation pump. (IEC 60335-2-51)		N/A
7.12.2	Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.		N/A
7.12.3	Insulation of the fixed wiring in contact with parts exceeding 50 K during clause 11; instructions state that the fixed wiring must be protected.		N/A
7.12.4	Instructions for built-in appliances:		N/A
	- dimensions of space		N/A
	- dimensions and position of supporting and fixing		N/A
	- minimum distances between parts and surrounding structure		N/A
	- minimum dimensions of ventilating openings and arrangement		N/A
	- connection to supply mains and interconnection of separate components		N/A
	- allow disconnection of the appliance after installation, by accessible plug or a switch in the fixed wiring, unless		N/A
	a switch complying with 24.3.		N/A
7.12.5	Replacement cord instructions, type X attachment with a specially prepared cord.		N/A
	Replacement cord instructions, type Y attachment		P
	Replacement cord instructions, type Z attachment		N/A
	Replacement cord set instructions, if required according to 22.58		N/A
7.12.6	Caution in the instructions for appliances incorporating a non-self-resetting thermal cut-out that is reset by disconnection of the supply mains, if this cut-out is required to comply with the standard.		N/A
7.12.7	Instructions for fixed appliances stating how the appliance is to be fixed.		P
7.12.8	Instructions for appliances connected to the water mains:		P
	- max. inlet water pressure (Pa) .....		P
	- min. inlet water pressure, if necessary (Pa) .....		N/A
	Instructions concerning new and old hose-sets for appliances connected to the water mains by detachable hose-sets.		P
7.12.9	Instructions specified in 7.12 and from 7.12.1 to 7.12.8 are in hard copy form and appear together before any other instructions supplied with the appliance.		P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Alternatively, these instructions may be supplied with the appliance separately from any functional use booklet		P
	They may follow the description of the appliance that identifies parts, or follow the drawings/sketches common to the languages of the instructions.		P
	They may follow the description of the appliance that identifies parts, or follow the drawings/sketches.		P
	In addition, instructions are also available in an alternative format such as on a website or on request in a format such as a DVD..... :	Onwebsite	P
7.13	Instructions and other texts in an official language.		P
7.14	Markings clearly legible:		P
	Signal words WARNING, CAUTION, DANGER in uppercase having a height as specified..... :		P
	Uppercase letter of the text explaining the signal word not smaller than 1,6 mm ..... :		P
	Moulded in, engraved, or stamped markings either raised above or have a depth below the surface of at least 0,25 mm, unless		N/A
	contrasting colours are used.		N/A
	Markings checked by inspection, measurement and rubbing test as specified.		P
	Markings clearly durable, and on containers that are likely to be cleaned frequently they are not by means of paint or enamel, other than vitreous enamel.		P
7.15	Markings specified in 7.1 to 7.5 on a main part.		P
	Marking clearly discernible from the outside, if necessary after removal of a cover.		P
	For portable appliances, cover can be removed or opened without a tool.		N/A
	For stationary appliances, name, trademark or identification mark and model or type reference visible after installation.		N/A
	For fixed appliances, name, trademark or identification mark and model or type reference visible after installation according to the instructions.		P
	Indications for switches and controls placed on or near the components. Marking not on parts which can be positioned or repositioned in such a way that the marking is misleading.		N/A
	The symbol IEC 60417-5018 placed next to the symbol IEC 60417-5172 or IEC 60417-5180.		N/A
	Type reference of detachable power supply part placed next to symbol IEC 60417-6181.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Marking of outlet load close to appliance outlet or socket-outlet.		N/A
<b>8</b>	<b>PROTECTION AGAINST ACCESS TO LIVE PARTS</b>		P
8.1	Adequate protection against accidental contact with live parts.		P
8.1.1	Requirement applies for all positions, detachable parts removed unless otherwise specified.		P
	Use of test probe B of IEC 61032:		P
	- force not exceeding 1 N: no contact with live parts		P
	- force of 20 N: no contact with live parts		P
	- lamps behind a detachable cover not removed, if conditions met		N/A
	- protection against contact with live parts of the lamp cap during lamp insertion or removal		N/A
	Use of test probe 18 of IEC 61032 for non-commercial appliances and commercial appliances intended for public access:		N/A
	- force not exceeding 1 N: no contact with live parts		N/A
	- force of 10 N: no contact with live parts		N/A
	- appliance fully assembled as in normal use, no parts removed		N/A
	No contact with live parts protected by materials as specified.		N/A
8.1.2	Use of test probe 13 of IEC 61032, with a force not exceeding 1 N, through openings in class 0 appliances and class II appliances/constructions: no contact with live parts.		P
	Test probe 13 also applied through openings in earthed metal enclosures having a non-conductive coating: no contact with live parts.		P
8.1.3	For appliances other than class II, use of test probe 41 of IEC 61032, with a force not exceeding 1 N: no contact with live parts of visible glowing heating elements or supporting parts.		N/A
	For a single switching action obtained by a switching device, requirements as specified.		N/A
	For appliances with a supply cord and without a switching device, the single switching action may be obtained by the withdrawal of the plug.		N/A
8.1.4	Appliance supplied at rated voltage (V)..... :	Test voltage =	N/A
	Accessible part not considered live if:		N/A
	- safety extra-low AC voltage: peak value not exceeding 42,4 V		N/A
	- safety extra-low DC voltage: not exceeding 42,4 V		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- or separated from live parts by protective impedance		N/A
	If protective impedance: DC current not exceeding 2 mA, and		N/A
	AC peak value not exceeding 0,7 mA.		N/A
	- for peak values over 42,4 V up to and including 450 V, capacitance not exceeding 0,1 $\mu$ F		N/A
	- for peak values over 450 V up to and including 15 kV, discharge not exceeding 45 $\mu$ C		N/A
	- for peak values over 15 kV, the energy in the discharge not exceeding 350 mJ		N/A
8.1.5	Live parts protected at least by basic insulation before installation or assembly:		P
	- built-in appliances		N/A
	- fixed appliances		P
	- appliances delivered in separate units		N/A
8.2	Class II appliances and constructions constructed so that there is adequate protection against accidental contact with basic insulation and metal parts separated from live parts by basic insulation only.		P
	Only possible to touch parts separated from live parts by double or reinforced insulation.		P
8.3	For battery-operated appliances with a functional earth or supply connection, parts within a battery compartment only accessible if:		N/A
	- class I, 0I and II appliances: separated from live parts by double and reinforced insulation		N/A
	- class 0 appliances: separated from live parts by basic insulation		N/A
	- battery compartment of class III construction, and basic insulation in addition to supply at SELV, if limits in 8.1.4 exceeded		N/A
<b>9</b>	<b>STARTING OF MOTOR-OPERATED APPLIANCES</b>		N/A
	This clause of Part 1 is not applicable.		N/A
<b>10</b>	<b>POWER INPUT AND CURRENT</b>		P
10.1	Appliance supplied at rated voltage (V):	(See appended table)	P
	Power input at normal operating temperature and normal operation not deviating from rated power input by more than shown in Table 1.	(See appended table)	P
	If the power input varies throughout the operating cycle and its maximum value exceeds twice its arithmetic mean value occurring during a representative period, the power input is the maximum value that is exceeded for more than 10 % of the representative period if this value is greater than the arithmetic mean value,		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	otherwise the power input is the arithmetic mean value.		N/A
	In case of doubt, the power input of the motors may be measured separately.	(See appended table)	N/A
	In case of measurement during a representative period, duration of the representative period.....:		N/A
	Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless		N/A
	the rated power input is related to the arithmetic mean value of the relevant range.		P
	Appliance outlets accessible to the user and socket-outlets accessible to the user incorporated in appliances connected to the supply mains and operating at rated voltage are not loaded during test,		N/A
	however, their contribution to the power input is considered to be the marked outlet load per appliance outlet or socket-outlet.		N/A
10.2	Appliance supplied at rated voltage (V).....:	(See appended table)	N/A
	Current at normal operating temperature and normal operation not deviating from rated current by more than shown in Table 2.	(See appended table)	N/A
	If the current varies throughout the operating cycle and its maximum value exceeds twice its arithmetic mean value occurring during a representative period, the current is the maximum value that is exceeded for more than 10 % of the representative period if this value is greater than the arithmetic mean value,		N/A
	otherwise the current is the arithmetic mean value.		N/A
	In case of doubt, the current of the motors be measured separately.	(See appended table)	N/A
	In case of measurement during a representative period, duration of the representative period.....:		N/A
	Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless		N/A
	the rated current is related to the arithmetic mean value of the relevant range.		N/A
	Appliance outlets and socket-outlets accessible to the user incorporated in appliances connected to the supply mains and operating at rated voltage are not loaded during test,		N/A
	however, their contribution to the current is considered to be the marked outlet load per appliance outlet or socket-outlet.		N/A
<b>11</b>	<b>HEATING</b>		P
11.1	No excessive temperatures in normal use.		P



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
11.2	The appliance is held, placed or fixed in position as described .....		P
11.3	Temperature rises, other than of windings, determined by thermocouples		P
	Temperature rises of windings determined by resistance method, unless		P
	the windings are non-uniform or it is difficult to make the necessary connections.		N/A
11.4	Heating appliances operated under normal operation at 1,15 times rated power input (W) .....		N/A
11.5	Motor operated appliances operated under normal operation at most unfavourable voltage between 0,94 and 1,06 times rated voltage (V) .....	(See appended table)	P
11.6	Combined appliances operated under normal operation at most unfavourable voltage between 0,94 and 1,06 times rated voltage (V) .....		N/A
11.7	Circulation pumps are operated until steady conditions are established. (IEC 60335-2-51)		P
	Appliance outlets and socket-outlets accessible to the user loaded with a resistive load that gives the marked outlet load.		N/A
	For appliances incorporating integral batteries or separable batteries not disconnected from the appliance during charging:		N/A
	- the fully discharged battery is charged for 1 h, while the appliance is operated continuously performing its intended function		N/A
	- the fully discharged battery is charged for 24 h or until it is fully charged, without the appliance performing its intended function		N/A
11.8	Temperature rises monitored continuously and not exceeding the values in Table 3 .....	(See appended table)	P
	If the temperature rise of a motor winding exceeds the value of Table 3, or		N/A
	if there is doubt with regard to classification of insulation.		N/A
	tests of Annex C are carried out.		N/A
	Sealing compound does not flow out.		P
	Protective devices do not operate, except		P
	components in protective electronic circuits tested for the number of cycles specified in 24.1.4.		N/A
	The temperature rise limits were considered. (IEC 60335-2-51)		P
<b>12</b>	<b>CHARGING OF METAL-ION BATTERIES</b>		N/A
	Charging a battery that uses metal-ion chemistry does not cause any cell to exceed its operating region for charging		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Fully discharged battery is charged with the charging system indicated in the instructions at an ambient temperature of 20 °C ± 5 °C		N/A
	Test repeated at:		N/A
	- minimum ambient temperature, if specified to be less than 10 °C by the manufacturer (°C).....		N/A
	- at maximum ambient temperature, if specified to be greater than 40 °C by the manufacturer (°C) .. :		N/A
	For all individual cells, the voltage, temperature and charging current are monitored .....	(See appended table)	N/A
	For parallel configuration, analysis used to avoid measuring the individual branch currents,		N/A
	the test result not exceeding the specified operating region for charging.		N/A
	Location of thermocouples for each cell temperature measurement on the outer surface, halfway along the longest dimension of the cell		N/A
	For each cell, the specified operating region for charging specified by the cell manufacturer is not exceeded at the temperature of the cell.		N/A
	For batteries where cells are configured in series, the test is repeated with the charge in one battery deliberately imbalanced, the imbalance being introduced into a fully discharged battery by charging one cell to:		N/A
	- approximately 50 % of its full charge, or		N/A
	- less than 50 % of its full charge, if it is demonstrated as specified that this would occur in normal operation		N/A
<b>13</b>	<b>LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE</b>		P
13.1	Leakage current not excessive and electric strength adequate.		P
	Heating appliances operated at 1,15 times the rated power input (W) .....		N/A
	Motor-operated appliances and combined appliances supplied at 1,06 times the rated voltage (V):	254.4	P
	Protective impedance and radio interference filters disconnected before carrying out the tests.		N/A
13.2	The leakage current is measured by means of the circuit described in Figure 4 of IEC 60990:2016.		P
	For class 0I appliances and class I appliances, except parts of class II construction, C replaced by a low impedance ammeter.		P
	Leakage current measurements .....	(See appended table)	P
13.3	The appliance is disconnected from the supply.		P
	Electric strength tests according to Table 4 .....	(See appended table)	P
	No breakdown during the tests.		P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
<b>14</b>	<b>TRANSIENT OVERVOLTAGES</b>		N/A
	Appliances withstand the transient over-voltages to which they may be subjected.		N/A
	Clearances having a value less than specified in Table 16 subjected to an impulse voltage test, the test voltage specified in Table 6 ..... :	(See appended table)	N/A
	No flashover during the test, unless		N/A
	of functional insulation if the appliance complies with clause 19 with the clearance short-circuited.		N/A
<b>15</b>	<b>MOISTURE RESISTANCE</b>		P
15.1	Enclosure provides the degree of moisture protection according to classification of the appliance.		P
	Compliance checked as specified in 15.1.1, taking into account 15.1.2, followed by the electric strength test of 16.3.		P
	No trace of water on insulation which can result in a reduction of clearances or creepage distances below values specified in clause 29.		P
	No water in the enclosure of appliances and parts of appliances with pins for insertion into socket-outlets.		P
15.1.1	Appliances, other than IPX0, subjected to tests as specified in IEC 60529:1989 including IEC 60529:1989/AMD1:1999 and IEC 60529:1989/AMD2:2013..... :	IP44	P
	Water valves containing live parts in external hoses for connection of an appliance to the water mains tested as specified for IPX7 appliances.		N/A
15.1.2	Hand-held appliances turned continuously through the most unfavourable positions during the test.		N/A
	Appliances with an automatic cord reel are tested according to 15.1.1 with the supply cord unreeled, coiled and reeled again as specified, and		N/A
	for fixed appliances mounted on the wall or ceiling, the cord is dropped from the minimum height as specified in the instructions before being coiled.		N/A
	Built-in appliances installed according to the instructions.		N/A
	Appliances placed or used on the floor or table placed on a horizontal unperforated support.		N/A
	Appliances normally fixed to a wall are mounted on a wooden board.		N/A
	Appliances and parts of appliances with integral pins for insertion into socket-outlets are held by the pins in the most unfavourable position without being mounted in a socket-outlet.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	For IPX3 appliances, the base of wall mounted appliances is placed at the same level as the pivot axis of the oscillating tube.		N/A
	For IPX4 appliances, the horizontal centre line of the appliance is aligned with the pivot axis of the oscillating tube, and		P
	for appliances normally used on the floor or table, the movement is limited to two times 90° for a period of 5 min, the support being placed at the level of the pivot axis of the oscillating tube.		P
	Wall-mounted appliances with the distance to the floor stated in the instructions are tested with a board placed accordingly under the appliance.		N/A
	Appliances normally fixed to a ceiling are mounted underneath a horizontal unperforated support, the pivot axis of the oscillating tube located at the level of the underside of the support, and		N/A
	for IPX4 appliances, the movement of the tube is limited to two times 90° from the vertical for a period of 5 min.		P
	Appliances with type X attachment fitted with a flexible cord as described, unless		N/A
	having a specially prepared cord.		N/A
	Detachable parts removed and subjected to the relevant treatment with the main part, however not removed if the instructions state that the part must be removed for user maintenance and a tool is needed.		N/A
15.2	Spillage of liquid does not affect the electrical insulation.		N/A
	Spillage solution comprising water containing approximately 1 % NaCl and 0,6 % rinsing agent.		N/A
	Appliances with type X attachment fitted with a flexible cord as described, unless		N/A
	having a specially prepared cord.		N/A
	Appliances incorporating an appliance inlet tested with or without a connector, whichever is most unfavourable.		N/A
	Detachable parts are removed.		N/A
	Overfilling test with additional amount of the solution, over a period of 1 min (l)..... :		N/A
	Non-ionic rinsing agent complies with the specified properties.		N/A
	The appliance withstands the electric strength test of 16.3.		N/A
	No trace of water on insulation that can result in a reduction of clearances or creepage distances below values specified in clause 29		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
15.3	Appliances proof against humid conditions.		P
	Checked by test Cab: Damp heat steady state in IEC 60068-2-78.		P
	Cable entries, if any, left open.		N/A
	If knock-outs provided, one of them opened.		N/A
	Detachable parts removed and subjected, if necessary, to the humidity test with the main part.		N/A
	Humidity test for 48 h in a humidity cabinet.	25°C,93%RH	P
	Reassembly of those parts that may have been removed.		N/A
	The appliance withstands the tests of clause 16.		P
<b>16</b>	<b>LEAKAGE CURRENT AND ELECTRIC STRENGTH</b>		P
16.1	Leakage current not excessive and electric strength adequate.		P
	Protective impedance disconnected from live parts before carrying out the tests.		N/A
	Tests carried out at room temperature and not connected to the supply.		P
16.2	Single-phase appliances: test voltage 1,06 times rated voltage (V) .....	254.4	P
	Three-phase appliances: test voltage 1,06 times rated voltage divided by $\sqrt{3}$ (V) .....		N/A
	Leakage current measurements .....	(See appended table)	P
	Limit values doubled if:		N/A
	- all controls have an off position in all poles, or		N/A
	- the appliance has no control other than a thermal cut-out, or		N/A
	all thermostats, temperature limiters and energy regulators do not have an off position, or		N/A
	- the appliance has radio interference filters		N/A
	With the radio interference filters disconnected, the leakage current does not exceed limits specified. :		N/A
16.3	Electric strength tests according to Table 7 .....	(See appended table)	P
	No breakdown during the tests.		P
<b>17</b>	<b>OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS</b>		N/A
	No excessive temperatures in transformer or associated circuits in event of short-circuits likely to occur in normal use .....	(See appended table)	N/A
	Appliance supplied with 1,06 or 0,94 times rated voltage under the most unfavourable short-circuit or overload likely to occur in normal use (V) .....	Test voltage = Frequency =	N/A
	Basic insulation is not short-circuited.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Temperature rise of insulation of the conductors of safety extra-low voltage circuits not exceeding the relevant value specified in Table 3 by more than 15 K.		N/A
	Temperature of the winding not exceeding the value specified in Table 8.		N/A
	However, limits do not apply to fail-safe transformers complying with subclause 15.5 of IEC 61558-1:2017.		N/A
<b>18</b>	<b>ENDURANCE</b>		N/A
	This clause of Part 1 is not applicable.		N/A
<b>19</b>	<b>ABNORMAL OPERATION</b>		P
19.1	The risk of fire, mechanical damage or electric shock under abnormal or careless operation obviated.		P
	Electronic circuits so designed and applied that a fault will not render the appliance unsafe:	(See appended table)	N/A
	Appliances incorporating heating elements subjected to the tests of 19.2 and 19.3, and		N/A
	if the appliance also has a control that limits the temperature during clause 11 it is subjected to the test of 19.4, and		N/A
	if applicable, to the test of 19.5.		N/A
	Appliances incorporating PTC heating elements are also subjected to the test of 19.6.		N/A
	Appliances incorporating motors subjected to the tests of 19.7 to 19.10, as applicable.		P
	Appliances incorporating electronic circuits subjected to the tests of 19.11 and 19.12, as applicable.		N/A
	Appliances incorporating contactors or relays subjected to the test of 19.14, being carried out before the tests of 19.11.		N/A
	Appliances incorporating voltage selector switches subjected to the test of 19.15.		N/A
	Appliances having a mains connection and replaceable batteries subjected to the test of 19.16		N/A
	Appliances incorporating rechargeable batteries that use metal-ion chemistries subjected to the test of 19.17.		N/A
	Unless otherwise specified, the tests are continued until a non-self-resetting thermal cut-out operates, or		N/A
	until steady conditions are established.		P
	If a heating element or an intentionally weak part becomes open-circuited, the relevant test is repeated on a second sample, and		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	that same part on the second sample does also become permanently open-circuited in the second test.		N/A
	unless a non-self-resetting thermal cut-out operates or steady conditions are established		N/A
	Circulation pumps are also subjected to the test of 19.101. (IEC 60335-2-51)		N/A
19.2	Test of appliances with heating elements with restricted heat dissipation; test voltage (V), power input of 0,85 times rated power input or if marked with a voltage range 0,85 times the calculated power input at the lower limit of the range (W) .... : See 5.8.4 $\text{Power input} = 0,85 \times (V_L/V_m)^2$ See clause 10	Test power input = Test voltage = Frequency =	N/A
19.3	Test of 19.2 repeated; test voltage (V), power input of 1,24 times rated power input or if marked with a voltage range 1,24 times the calculated power input at the upper limit of the range (W) ..... : See 5.8.4 $\text{Power input} = 1,24 \times (V_u/V_m)^2$ See clause 10	Test power input = Test voltage = Frequency =	N/A
19.4	Test conditions as in clause 11, any control limiting the temperature during tests of clause 11 short circuited.		N/A
19.5	Test of 19.4 repeated on class 0I and I appliances with tubular sheathed or embedded heating elements. No short-circuiting, but one end of the element connected to the sheath.		N/A
	The test repeated with reversed polarity and the other end of the heating element connected to the sheath.		N/A
	The test is not carried out on appliances intended to be permanently connected to fixed wiring, on appliances where an all-pole disconnection occurs during the test of 19.4, or on appliances used in a system with polarized plugs intended for connection to polarized socket outlets.		N/A
19.6	Appliances with PTC heating elements tested at rated voltage, establishing steady conditions	Test voltage = Frequency = (maybe relevant for CA or SMPS)	N/A
	The working voltage of the PTC heating element is increased by 5 % and the appliance is operated until steady conditions are re-established. The voltage is then increased in similar steps until 1,5 times working voltage or until the PTC heating element ruptures (V) ..... :	Final voltage applied =	N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
19.7	Stalling test by locking the rotor if the locked rotor torque is smaller than the full load torque, or Note: See DSH 543AA (also applicable to iron cored transformers)	Test voltage =240V Frequency =50Hz	P
	locking moving parts of other appliances.	Test voltage = Frequency =	N/A
	Locked rotor, capacitors open-circuited one at a time.	(See appended table)	P
	Test repeated with capacitors short-circuited one at a time, unless		N/A
	the capacitor is of class S2 or S3 of IEC 60252-1:2010 including IEC 60252-1:2010/AMD1:2013.		N/A
	Appliances with timer or programmer supplied with rated voltage for each of the tests, for a period equal to the maximum period allowed..... :	Test voltage = Frequency =	N/A
	An electronic timer or programmer that operates to ensure compliance with the test before the maximum period under the conditions of Clause 11 is reached, is a protective electronic circuit.		N/A
	Other appliances supplied with rated voltage for a period as specified..... :	Test voltage = Frequency =	N/A
	Winding temperatures not exceeding values specified in Table 8..... :	(See appended table)	P
	The test is carried out with the water flow stopped or reduced to 5 l/min, whichever is more unfavourable. (IEC 60335-2-51)		P
19.8	Multi-phase motors operated at rated voltage with one phase disconnected (V)..... :	Test voltage = Frequency =	N/A
19.9	Running overload test on appliances incorporating motors intended to be remotely or automatically controlled or liable to be operated continuously.		N/A
	Motor-operated and combined appliances for which 30.2.3 is applicable and that use overload protective devices relying on electronic circuits to protect the motor windings, are also subjected to the test.		N/A
	Winding temperatures not exceeding values as specified..... :	(See appended table)	N/A
19.10	Series motor operated at 1,3 times rated voltage for 1 min (V).....		N/A
	During the test, parts not being ejected from the appliance.		N/A
19.11	Electronic circuits, compliance checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless		N/A
	they comply with the conditions specified in 19.11.1.		N/A



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Appliances incorporating an electronic circuit that relies upon a programmable component to function correctly, subjected to the test of 19.11.4.8, unless		N/A
	restarting does not result in a hazard.		N/A
	Appliances having a device with an off position obtained by electronic disconnection, or a device placing the appliance in a stand-by mode, subjected to the tests of 19.11.4		N/A
	If the safety of the appliance under any of the fault conditions depends on the operation of a miniature fuse-link complying with IEC 60127, the test of 19.12 is carried out.		N/A
	During and after each test the following is checked:		N/A
	- the temperature of the windings does not exceed the values specified in Table 8		N/A
	the appliance complies with the conditions specified in 19.13		N/A
	- any current flowing through protective impedance not exceeding the limits specified in 8.1.4		N/A
	If a conductor of a printed board becomes open-circuited, the appliance is considered to have withstood the particular test, provided both of the following conditions are met:		N/A
	- the base material of the printed circuit board withstands the test of normative Annex E		N/A
	- any loosened conductor does not reduce clearance or creepage distances between live parts and accessible metal parts below the values specified in clause 29		N/A
19.11.1	Fault conditions a) to g) in 19.11.2 are not applied to circuits or parts of circuits meeting both of the following conditions:		N/A
	- the electronic circuit is a low-power circuit, that is, the maximum power at low-power points does not exceed 15 W according to the tests specified with the appliance supplied at rated voltage (V):	Test voltage = Frequency =	N/A
	- the protection against electric shock, fire hazard, mechanical hazard or dangerous malfunction of other parts of the appliance does not rely on the correct functioning of the electronic circuit		N/A
19.11.2	Fault conditions applied one at a time, the appliance operating under conditions specified in clause 11, but supplied at rated voltage duration of the tests as specified:		N/A
	Appliance supplied at rated voltage (V)..... :	Test voltage = Frequency =	N/A
	a) short circuit of functional insulation if clearances or creepage distances are less than the values specified in clause 29		N/A
	b) open circuit at the terminals of any component		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	c) short circuit of capacitors, unless		N/A
	they comply with IEC 60384-14:2013 including IEC 60384-14:2013/AMD:2016		N/A
	d) short circuit of any two terminals of an electronic component, other than integrated circuits		N/A
	This fault condition is not applied between the two circuits of an optocoupler		N/A
	f) failure of microprocessors and integrated circuits		N/A
	g) failure of an electronic power switching device		N/A
	Each low power circuit is short-circuited by connecting the low-power point to the pole of the supply source from which the measurements were made		N/A
	Any cord between a battery-operated appliance consuming more than 15 W and the detachable power supply part short-circuited as specified		N/A
19.11.3	If the appliance incorporates a protective electronic circuit that operates to ensure compliance with clause 19, the appliance is tested as specified.		N/A
19.11.4	Appliances having a device with an off position obtained by electronic disconnection, or		N/A
	a device that can be placed in the stand-by mode,		N/A
	subjected to the tests of 19.11.4.1 to 19.11.4.7, the device being set in the off position or in the stand-by mode with the appliance supplied at rated voltage (V) ..... : Note: In general, the result is not affected by the test frequency if a frequency range is marked.	Test voltage =	N/A
	Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.4.1 to 19.11.4.7, the tests being carried out after the protective electronic circuit has operated as specified, however		N/A
	tests of electromagnetic phenomena not applied to protective electronic circuits operating during 19.7 in appliances that are used while attended.		N/A
	Surge protective devices disconnected, unless		N/A
	they incorporate spark gaps.		N/A
19.11.4.1	The appliance is subjected to electrostatic discharges in accordance with IEC 61000-4-2, test level 4.		N/A
19.11.4.2	The appliance is subjected to radiated fields in accordance with IEC 61000-4-3, at frequency ranges as specified.		N/A
19.11.4.3	The appliance is subjected to fast transient bursts in accordance with IEC 61000-4-4, test level 3 or 4 as specified		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
19.11.4.4	The power supply terminals of the appliance subjected to voltage surges in accordance with IEC 61000-4-5 as specified		N/A
	An open circuit test voltage of 2 kV is applicable for the line-to-line coupling mode.		N/A
	An open circuit test voltage of 4 kV is applicable for the line-to-earth coupling mode.		N/A
	Earthed heating elements in class I appliances disconnected.		N/A
	For appliances having surge arresters incorporating spark gaps, tests repeated at 95 % of the flashover voltage.		N/A
19.11.4.5	The appliance is subjected to injected currents in accordance with IEC 61000-4-6, test level 3.		N/A
19.11.4.6	Appliances having a rated current not exceeding 16 A are subjected to the class 3 voltage dips and interruptions in accordance with IEC 61000-4-11:2020.		N/A
19.11.4.7	The appliance is subjected to mains signals in accordance with IEC 61000-4-13:2002 including IEC 61000-4-13:2002/AMD1:2009 and IEC 61000-4-13:2002/AMD2:2015, test level class 2		N/A
19.11.4.8	The appliance is operated under normal operation and supplied at rated voltage (V).....	Test voltage =	N/A
	After 60 s the power supply is reduced to a level such that the appliance ceases to respond or parts controlled by the programmable component cease to operate.		N/A
	The appliance continues to operate normally, or		N/A
	requires a manual operation to restart.		N/A
19.12	If the safety of the appliance for any of the fault conditions specified in 19.11.2 depends on the operation of a miniature fuse-link complying with IEC 60127, the test is repeated, measuring the current flowing through the fuse-link; measured current (A); current rating of the fuse-link (A) ..... :		N/A
19.13	During the tests the appliance does not emit flames, molten metal, poisonous or ignitable gas in hazardous amounts.		P
	Temperature rises not exceeding the values shown in table 9..... :	(See appended table)	P
	Compliance with clause 8 not impaired.		P
	If the appliance can still be operated, it complies with 20.2.		P
	Insulation, other than of class III appliances or class III constructions that do not contain live parts, withstands the electric strength test of 16.3, the test voltage as specified in Table 4:		P
	basic insulation (V) ..... :	1250	P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- supplementary insulation (V)..... :	1750	P
	- reinforced insulation (V) ..... :	3000	P
	After operation or interruption of a control, clearances and creepage distances across the functional insulation withstand the electric strength test of 16.3, the test voltage being twice the working voltage.		P
	The appliance does not undergo a dangerous malfunction, and		P
	no failure of protective electronic circuits, if the appliance is still operable.		N/A
	For accessible safety extra-low voltage outlets, connectors, or USB outlets, no increase of the no-load output voltage by more than 3 V or 10 % of the voltage in normal use, whichever higher, with a maximum/peak of 42,4 VDC/VAC.		N/A
	Appliances tested with an electronic switch in the off position, or in the stand-by mode:		N/A
	- do not become operational, or		N/A
	- if they become operational, do not result in a dangerous malfunction during or after the tests of 19.11.4		N/A
	If the appliance contains lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that both:		N/A
	- the lid or door does not move automatically to an open position when the interlock is released, and		N/A
	- the appliance does not start after the cycle in which the interlock was released		N/A
19.14	Appliances operated under the conditions of clause 11, any contactor or relay contact operating under the conditions of clause 11 being short-circuited.		N/A
	For a relay or contactor with more than one contact, all contacts are short-circuited at the same time.		N/A
	A relay or contactor operating only to ensure the appliance is energized for normal use is not short-circuited.		N/A
	If more than one relay or contactor operates in clause 11, they are short-circuited in turn.		N/A
	If the appliance has several modes of operation, the tests are carried out with the appliance operating in each mode, if necessary.		N/A
19.15	For appliances with a mains voltage selector switch, the switch is set to the lowest rated voltage position and the highest value of rated voltage is applied.	Test voltage = Frequency =	N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
19.16	Appliances having mains connection and replaceable batteries supplied at rated voltage and operated under normal operation but with batteries removed or in any position allowed by construction.	Test voltage =	N/A
19.17	For battery-operated appliances incorporating a battery using metal-ion chemistry, the battery system is operated according to the instructions and tested under the following conditions, duration as specified		N/A
	a) series configured battery:		N/A
	- imbalance introduced into fully discharged battery by charging one cell to the percentage of being fully charged applied during the test of Clause 12;		N/A
	- single cell or parallel only configured battery: fully discharged		N/A
	b) series configured battery: imbalance introduced as specified and fully charged, if the test of clause 12 was conducted with an imbalance of less than 50 % and if a single fault in the circuitry results in the loss of maintaining balance		N/A
	c) series configured battery: cells at 50 % of full charge, except one which is shortened, battery then fully charged		N/A
	d) fully charged battery connected to the charging system: short circuit introduced to the charging system as specified to produce the most unfavourable results, and for a charging system with a cord connecting to the battery, short circuit introduced at a point producing the most adverse effects; resistance of short circuit not exceeding 10 mΩ		N/A
	No explosion or ignition of the battery during or after the test.		N/A
	Voltage on any cell not exceeding upper limit charging voltage by more than 150 mV, unless		N/A
	charging system permanently disabled from re-charging battery, checked as specified.		N/A
	Recharging considered to be permanently disabled, if:		N/A
	- battery discharged to approximately 50 % of full charge, by using the battery-operated appliance tested (in case of an integral battery), or		N/A
	by using a new sample of the battery-operated appliance (in case of a detachable and separable battery).		N/A
	- attempt made to recharge battery normally		N/A
	- no charging current after 10 min or after 25 % of the nominal capacity has been delivered, whichever occurs first		N/A
19.101	Test are supplied at rated voltage and as described acc.19.101.		P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
<b>20</b>	<b>STABILITY AND MECHANICAL HAZARDS</b>		<b>P</b>
20.1	Appliances having adequate stability.		N/A
	Tilting test through an angle of 10°, appliance placed on an inclined plane/horizontal support, not connected to the supply mains; appliance does not overturn.		N/A
	Tilting test repeated on appliances with heating elements, angle of inclination increased to 15°.		N/A
	Possible heating test in overturned position; temperature rise does not exceed values shown in Table 9.		N/A
20.2	Moving parts adequately arranged or enclosed as to provide protection against personal injury.		P
	Protective enclosures, guards and similar parts are non-detachable, and		P
	have adequate mechanical strength.		P
	Enclosures that can be opened by overriding an interlock are considered to be detachable parts.		N/A
	Self-resetting thermal cut outs and overcurrent protective devices not causing a hazard by unexpected closure.		N/A
	Not possible to touch dangerous moving parts with the test probes, checked by		N/A
	- inspection		N/A
	- test of 21.1		N/A
	- applying a force not exceeding 5 N by means of a test probe similar to test probe B of IEC 61032 but having a circular stop face with a diameter of 50 mm, instead of the noncircular face		N/A
	- applying test probe 18 of IEC 61032 with a force not exceeding 2,5 N, if appliance intended for non-commercial use or to be installed in an open to the public		N/A
	For appliances provided with movable devices such as those intended for varying the tension of belts, the test with the test probe is carried out with these devices adjusted to the most unfavourable position within their range of adjustment. If necessary, belts are removed.		N/A
	It is not possible to touch dangerous moving parts with the test probes.		N/A
<b>21</b>	<b>MECHANICAL STRENGTH</b>		<b>P</b>
21.1	Appliance has adequate mechanical strength and is constructed as to withstand rough handling.		P
	Checked by applying 3 blows to every point of the enclosure likely to be weak, in accordance with test Ehb of IEC 60068-2-75, spring hammer test, with an impact energy of 0,5 J.	(See appended table)	P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Appliances and parts of appliances having pins for insertion into mains socket-outlets subjected to the test, Free fall repeated, procedure 2, of IEC 60068-2-31, under the specified conditions.		P
	The appliance shows no damage impairing compliance with this standard, and		P
	compliance with 8.1, 15.1 and clause 29 not impaired.		P
	If doubt, supplementary or reinforced insulation subjected to the electric strength test of 16.3 .		N/A
	If necessary, repetition of groups of three blows on a new sample.		N/A
21.2	Accessible parts of solid insulation having strength to prevent penetration by sharp implements.		N/A
	Test not applicable if the thickness of supplementary insulation is at least 1 mm and reinforced insulation at least 2 mm.		N/A
	The insulation is tested as specified, and does withstand the electric strength test of 16.3.		N/A
21.3	Appliances with pins for insertion into socket-outlets with a rotating plug part are provided with a mechanical stop to prevent rotation having adequate mechanical strength and constructed to withstand rough handling.		N/A
	Application of a torque of 2 Nm for 1 min does not result in rotation of the plug part after rotating it until the mechanical stop prevents further rotation, both directions checked.		N/A
<b>22</b>	<b>CONSTRUCTION</b>		P
22.1	Appliance marked with the first numeral or any of the additional letters of the IP system.	IP44	P
22.2	Stationary appliance: means to ensure disconnection from the supply being provided:		N/A
	- a supply cord fitted with a plug, or		N/A
	- a switch providing all-pole disconnection complying with 24.3, or		N/A
	- an appliance inlet		N/A
	Single-pole switches and single-pole protective devices for the disconnection of heating elements in single-phase, permanently connected class 0I and class I appliances, connected to the line conductor.		N/A
22.3	Appliance provided with pins: no undue strain on socket-outlets.		N/A
	Means for retaining pins withstand the forces to which the pins are like to be subjected in normal use.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Applied torque not exceeding 0,25 Nm, torque to keep the socket-outlet itself in the vertical plane not included in this value.		N/A
	Pull force of 50 N for 1 min to each pin after the appliance has being placed in the heating cabinet; when cooled to room temperature the pins are not displaced by more than 1 mm.		N/A
	Each pin subjected to a torque of 0,4 Nm; the pins are not rotating, unless		N/A
	rotating does not impair compliance with this standard.		N/A
22.4	Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets.		N/A
22.5	No risk of electric shock from charged capacitors resulting in a capacitance equal or greater than 0,1 $\mu$ F when touching pins, the appliance being disconnected from the supply at the instant of voltage peak		P
	Appliance supplied at rated voltage (V)..... :	Test voltage =254.4V	P
	Voltage not exceeding 34 V (V)..... :	GPD25-4S:12V GPS65-12F:14V	P
	If compliance relies on the operation of an electronic circuit, the electromagnetic phenomena tests of 19.11.4.3 and 19.11.4.4 are applied		N/A
	The test for measuring the voltage between the pins of the plug is then repeated three times, voltage not exceeding 34 V (V)..... :		N/A
22.6	Electrical insulation not affected by condensing water or leaking liquid.		P
	Electrical insulation of class II appliances not affected if a hose ruptures or seal leaks.		N/A
	In case of doubt, test as described.		N/A
22.7	Adequate safeguards against the risk of excessive pressure in appliances containing liquid or gases or having steam-producing devices.		N/A
22.8	Electrical connections not subject to pulling during cleaning of compartments to which access can be gained without the aid of a tool, and that are likely to be cleaned in normal use.		N/A
22.9	Insulation, internal wiring, windings, commutators and slip rings not exposed to oil, grease or similar substances, unless		P
	the substance has adequate insulating properties.		N/A
22.10	Not possible to reset voltage-maintained non-self-resetting thermal cut-outs by the operation of an automatic switching device incorporated within the appliance, if:		N/A



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- a non-self-resetting thermal cut-out is required by the standard, and		N/A
	- a voltage maintained non-self-resetting thermal cut-out is used to meet it		N/A
	Non-self-resetting thermal motor protectors have a trip-free action, unless		N/A
	they are voltage maintained.		N/A
	Reset buttons of non-self-resetting controls so located or protected that accidental resetting is unlikely.		N/A
22.11	Reliable fixing of non-detachable parts that provide the necessary degree of protection against electric shock, moisture or contact with moving parts.		P
	Obvious locked position of snap-in devices used for fixing such parts.		N/A
	No deterioration of the fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing.		N/A
	Tests as described.		P
22.12	Handles, knobs, etc. fixed in a reliable manner, if loosening could result in a hazard, including a choking hazard.		N/A
	Requirement concerning the choking hazard does not apply to commercial appliances.		N/A
	Removing or fixing in wrong position of handles, knobs, etc. indicating position of switches or similar components not possible, if resulting in a hazard.		N/A
	No use of sealing compound and similar materials, other than self-hardening resins, to prevent loosening.		N/A
	Axial force of 15 N applied for 1 min to parts unlikely to be subjected to axial pull in normal use.		N/A
	Axial force of 30 N applied for 1 min to parts likely to be subjected to axial pull in normal use.		N/A
	Loosening of removed parts not resulting in a choking hazard, checked with small parts cylinder.		N/A
22.13	Unlikely that handles, when gripped as in normal use, make the operator's hand touch parts having a temperature rise exceeding the value specified for handles which are held for short periods only.		N/A
22.14	No ragged or sharp edges creating a hazard for the user in normal use or during user maintenance.		P
	No exposed pointed ends of self-tapping screws or other fasteners likely to be touched by the user in normal use or during user maintenance.		P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
22.15	Storage hooks and the like for flexible cords smooth and well rounded.		N/A
22.16	Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductor strands and no undue wear of contacts.		N/A
	Cord reel tested with 6 000 operations, as specified.		N/A
	Electric strength test of 16.3, voltage of 1 000 V applied.		N/A
22.17	Spacers not removable from the outside by hand or by means of a screwdriver or a spanner.		N/A
22.18	Current-carrying parts and other metal parts resistant to corrosion, unless		P
	made from stainless steel, plated steel or similar corrosion-resistant alloys.		N/A
22.19	Driving belts not relied upon to provide the required level of insulation, unless		N/A
	constructed to prevent inappropriate replacement.		N/A
22.20	Direct contact between live parts and thermal insulation effectively prevented, unless		N/A
	material used is non-corrosive, non-hygroscopic and non-combustible, or thermal insulation is glass-wool.		N/A
22.21	Wood, cotton, silk, ordinary paper and fibrous or hygroscopic material not used as insulation, unless		P
	Impregnated.		N/A
	Requirement not applicable to magnesium oxide and mineral ceramic fibres electrically insulating heating elements and insulating material where fibre interstices are filled with a suitable insulant.		N/A
22.22	Appliances not containing asbestos.		P
22.23	Oils containing polychlorinated biphenyl (PCB) not used.		P
22.24	Bare heating elements, except in class III appliances or class III constructions that do not contain live parts, adequately supported.		N/A
	In case of rupture, the heating conductor is unlikely to come into contact with accessible metal parts.		N/A
22.25	Sagging heating conductors cannot come into contact with accessible metal parts.		N/A
	Requirement not applicable to class III appliances or class III constructions without live parts, appliances where a core effectively prevents sagging, or where supplementary insulation prevents contact		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
22.26	For class III constructions, the insulation between parts operating at safety extra-low voltage and other live parts complies with the requirements for double or reinforced insulation		N/A
22.27	Parts connected by protective impedance separated by double or reinforced insulation		N/A
22.28	Metal parts of class II appliances conductively connected to gas pipes or in contact with water separated from live parts by double or reinforced insulation.		N/A
22.29	Class II appliances permanently connected to fixed wiring constructed so that the required degree of access to live parts is maintained after installation.		N/A
22.30	Parts serving as supplementary or reinforced insulation fixed so that they cannot be removed without being seriously damaged, or		P
	constructed so that they cannot be replaced in an incorrect position and if omitted, the appliance is rendered inoperable or manifestly incomplete.		P
22.31	Neither clearances nor creepage distances over supplementary and reinforced insulation reduced below values in clause 29 as a result of wear.		P
	Neither clearances nor creepage distances between live parts and accessible parts reduced below values for supplementary insulation if wires, screws, etc. become loose.		P
22.32	Supplementary and reinforced insulation constructed or protected against pollution so that clearances or creepage distances are not reduced below the values in clause 29.		P
	Supplementary insulation of natural or synthetic rubber resistant to ageing, or arranged and dimensioned so that creepage distances are not reduced below values specified in 29.2		N/A
	Ceramic material not tightly sintered, similar materials or beads alone not used as supplementary or reinforced insulation.		N/A
	Ceramic and similar porous material in which heating conductors are embedded is considered to be basic insulation, not reinforced insulation.		N/A
	No visible cracks after oxygen bomb test at 70 °C for 96 h and 16 h at room temperature.		N/A
22.33	Conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts are not in direct contact with live parts, or		P
	unearthed metal parts separated from live parts by basic insulation only.		N/A
	Electrodes not used for heating liquids.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	For class II constructions, conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with un-earthed accessible metal parts are not in direct contact with basic or reinforced insulation, unless		P
	the reinforced insulation consists of at least 3 layers.		N/A
	For class II constructions, conductive liquids which are in contact with live parts are not in direct contact with reinforced insulation, unless		N/A
	the reinforced insulation consists of at least 3 layers.		N/A
	An air layer not used as basic or supplementary insulation in a double insulation system if likely to be bridged by leaking liquid.		N/A
22.34	Shafts of operating knobs, handles, levers etc. not live, unless		N/A
	the shaft is not accessible when the part is removed.		N/A
22.35	For other than class III constructions, handles, levers and knobs, held or actuated in normal use, not becoming live in the event of a failure of basic insulation.		N/A
	Such parts being of metal, and their shafts or fixings are likely to become live in the event of a failure of basic insulation, are either adequately covered by insulation material or their accessible parts are separated from their shafts or fixings by supplementary insulation.		N/A
	This requirement does not apply to handles, levers and knobs on stationary appliances and cordless appliances, other than those of electrical components, provided they are reliably connected to an earthing terminal or earthing contact, or separated from live parts by earthed metal.		N/A
	Insulating material covering metal handles, levers and knobs withstands the electric strength test of 16.3 for supplementary insulation.		N/A
22.36	For appliances other than class III appliances, handles continuously held in the hand in normal use so constructed that when gripped as in normal use, the operator's hand is not likely to touch metal parts, unless		N/A
	they are separated from live parts by double or reinforced insulation		N/A
22.37	Capacitors in class II appliances not connected to accessible metal parts and their casings, if of metal, separated from accessible metal parts by supplementary insulation, unless		N/A
	the capacitors comply with 22.42.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
22.38	Capacitors not connected between the contacts of a thermal cut-out.		N/A
22.39	Lampholders used only for the connection of lamps.		N/A
22.40	Not applicable.		N/A
22.41	No components, other than lamps, containing mercury.		P
22.42	Protective impedance consisting of at least two separate components.		N/A
	Values specified in 8.1.4 not exceeded if any one of the components are short-circuited or open-circuited.		N/A
	Resistors checked by the test of 14.2 a) in IEC 60065:2014.		N/A
	Capacitors checked by the tests for class Y capacitors in IEC 60384-14:2013 including IEC 60384-14:2013/AMD1:2016 for rated voltage of the appliance (V) .....	Test voltage =	N/A
22.43	Appliances adjustable for different voltages, accidental changing of the setting of the voltage unlikely to occur.		N/A
22.44	Appliances not having an enclosure that is shaped or decorated like a toy, unless		P
	a toy is shaped like the appliance.		P
22.45	When air is used as reinforced insulation, clearances not reduced below the values in 29.1.3 due to deformation of the enclosure, applying a force of 30 N to accessible surfaces.		N/A
22.46	For programmable protective electronic circuits used to ensure compliance with the standard, the software contains measures to control the fault/error conditions in Table R.1.		N/A
	These requirements are not applicable to software used for functional purpose or compliance with clause 11.		N/A
	Compliance checked by evaluating the software in accordance with the relevant requirements of normative Annex R.		N/A
	If the software is modified, the evaluation and relevant tests are repeated if the modification influences the results of the test involving protective electronic circuits.		N/A
22.47	Appliances connected to the water mains withstand the water pressure expected in normal use.		P
	No leakage from any part, including any inlet water hose.		P
22.48	Appliances connected to the water mains constructed to prevent back-siphonage of non-potable water.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
22.49	Not applicable.		N/A
	the appliance switches off automatically or can operate continuously without hazard.		N/A
22.50	Controls incorporated in the appliance take priority over controls actuated by remote operation.		N/A
22.51	Not applicable.		N/A
	There is a visual indication showing that the appliance is adjusted for remote operation.		N/A
	These requirements are not necessary on appliances that can operate as follows, without giving rise to a hazard:		N/A
	- continuously, or		N/A
	- automatically, or		N/A
	Remotely.		N/A
22.52	Socket-outlets on appliances accessible to the user in accordance with the socket-outlet system used in the country in which the appliance is sold.		N/A
22.53	Class II appliances and class III appliances that incorporate functionally earthed parts have at least double insulation or reinforced insulation between live parts and the functionally earthed parts.		N/A
22.54	Button cells and batteries designated R1 not accessible without the aid of a tool, unless		N/A
	the cover of their compartment can only be opened after at least two independent movements have been applied simultaneously.		N/A
22.55	Devices operated to stop the intended function of the appliance, if any, are being distinguished from other manual devices by means of shape, size, surface texture, or position .....		N/A
	The requirement concerning position does not preclude use of a push on push off switch.		N/A
	An indication when the device has been operated is given by:		N/A
	- tactile feedback from the actuator or from the appliance, or		N/A
	- reduction in heat output, or		N/A
	- audible and visible feedback		N/A
22.56	Detachable power supply part provided with the part of class III construction.		N/A
22.57	The properties of non-metallic materials do not degrade from exposure to UV-C radiation, as specified in normative Annex T.		N/A
	This requirement does not apply to glass, ceramics or similar materials.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
22.58	Appliances connected to the supply mains by an appliance inlet are provided with a cord set or a connector for attachment to a suitable flexible cord, except from		N/A
	- appliances complying with IEC 60320-3, or		N/A
	- single phase appliances having a rated current exceeding 16 A, connected to mains by an appliance inlet complying with IEC 60309-2, or		N/A
	- multi-phase appliances connected to mains by an appliance inlet complying with IEC 60309-2		N/A
22.59	Protective extra-low voltage circuits separated by at least supplementary insulation from circuits operating at safety extra-low voltage.		N/A
22.60	Functional earthing terminals and functional earthing contacts not connected to the neutral terminal.		N/A
22.61	Appliance outlets complying with the standard sheets in IEC 60320-3 accessible to the user and socket outlets accessible to the user are single phase, if:		N/A
	- they are incorporated in appliances connected to the supply mains, and		N/A
	- they operate at rated voltage		N/A
	Current rating not exceeding 16 A (A)..... :		N/A
	Appliance outlets accessible to the user, other than those supplying accessories, and socket-outlets accessible to the user are protected by one of the following:		N/A
	- a circuit breaker for equipment complying with IEC 60934, or		N/A
	- a non-user replaceable fuse-link		N/A
	Current rating of protective device not exceeding current rating of the appliance outlet or socket-outlet (A) ..... :		N/A
	Protective device placed behind a non-detachable cover.		N/A
	Current rating of appliance outlets and socket-outlets marked with the outlet load in watts, obtained from the market outlet load divided by the rated voltage (A) ..... :		N/A
22.62	Remote communication through public networks does not impair compliance with this standard.		N/A
	The requirement does only apply to remote communication where the download of software or the transmission of data:		N/A
	a) includes measures according to normative Annex R necessary for compliance with 22.46, or		N/A
	Includes means necessary for compliance with Clauses 8 to 32		N/A
	b) only affects the software part that is not covered by a), but where compliance might be impaired due to improper separation of partitioning from the software or data in a)		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	The requirement does not apply to appliances:		N/A
	- where all measures to comply with this standards are independent of software,		N/A
	- using remote communication through public networks for the send-only transmission of data, or		N/A
	- that only provide event driven messages or push remote monitoring		N/A
	Compliance checked by inspection of the product and the technical documentation, and by the requirements and tests in normative Annex U		N/A
22.101	Circulation pumps withstand the water pressure occurring in normal use.		P
22.102	Circulation pumps intended for permanent connection to fixed wiring may be delivered with a separate connector to ease the installation and establish the supply connection. Such a connector become a non-detachable part once engaged.		N/A
	Such a connector shall not be interchangeable with plugs and socket-outlets listed in IEC TR 60083 or IEC 60906-1 or with appliance couplers complying with the standard sheets of IEC 60320-3.		N/A
<b>23</b>	<b>INTERNAL WIRING</b>		P
23.1	Wireways smooth and free from sharp edges		P
	Wires protected against contact with burrs, cooling fins, etc.		P
	Wire holes in metal well-rounded or provided with bushings.		P
	Wiring effectively prevented from coming into contact with moving parts.		P
23.2	Beads etc. on live wires cannot change their position, and are not resting on sharp edges.		N/A
	Beads inside flexible metal conduits contained within an insulating sleeve.		N/A
23.3	Electrical connections and internal conductors movable relatively to each other not exposed to undue stress.		N/A
	Flexible metallic tubes not causing damage to insulation of conductors.		N/A
	Open-coil springs not used.		N/A
	Adequate insulating lining provided inside a coiled spring, the turns of which touch one another.		N/A
	Appliance supplied at rated voltage ..... :	Test voltage =	N/A
	No damage after 10 000 flexings for conductors flexed during normal use, or		N/A
	100 flexings for conductors flexed during user maintenance.		N/A



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Electric strength test of 16.3, 1 000 V between live parts and accessible metal parts.		N/A
	Not more than 10 % of the strands of any conductor broken, and		N/A
	not more than 30 % for wiring supplying circuits that consume no more than 15 W.		N/A
23.4	Bare internal wiring sufficiently rigid and fixed.		N/A
23.5	No use of a single layer of internal wiring insulation to provide reinforced insulation.		P
	For class II construction, the sheath of a cord complying with IEC 60227 or IEC 60245 or IEC 62821 may provide supplementary insulation.		N/A
	Insulation of single layer internal wiring subjected to the supply mains voltage withstands the electrical stress likely to occur in normal use, if:		P
	- insulation of single layer internal wiring electrically equivalent to the basic insulation of cords complying with IEC 60227 or IEC 60245 or IEC 62821, or		N/A
	- no breakdown when a voltage of 2 000 V is applied for 15 min between the conductor and metal foil wrapped around the insulation		P
23.6	Sleeving used as supplementary insulation on internal wiring retained in position by clamping at both ends, or		N/A
	be such that it can only be removed by breaking or cutting.		N/A
23.7	The colour combination green/yellow only used for earthing conductors.		P
23.8	Aluminium wires not used for internal wiring.		P
	The requirement does not apply to windings.		P
23.9	Stranded conductors not consolidated by soldering where they are subjected to contact pressure, unless		P
	the contact pressure is provided by spring terminals.		N/A
	The requirement does not apply to the soldered tip of a stranded conductor.		N/A
23.10	The insulation and sheath of internal wiring, incorporated in external hoses for the connection of an appliance to the water mains, at least equivalent to that of light polyvinyl chloride sheathed flexible cord (60227 IEC 52), checked as specified.		N/A
<b>24</b>	<b>COMPONENTS</b>		P
24.1	Components comply with safety requirements in relevant IEC standards.		P
	List of components ..... :	(See appended table)	P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Motors not required to comply with IEC 60034-1, they are tested as part of the appliance.		P
	Relays tested as part of the appliance, or		N/A
	alternatively, acc. to IEC 60730-1:2013 including IEC 60730-1:2013/AMD1:2015, and meeting the additional requirements in IEC 60335-1.		N/A
	The requirements of Clause 29 apply between live parts of components and accessible parts of the appliance.		P
	Components can comply with the requirements for clearances and creepage distances for functional insulation in the relevant component standard.		P
	30.2 of this standard applies to parts of non-metallic material in components including parts of non-metallic material supporting current-carrying connections.		P
	Components that have not been previously tested to comply with the IEC standard for the relevant component are tested according to the requirements of 30.2.		P
	Components that have been previously tested to comply with the resistance to fire requirements in the IEC standard for the relevant component need not be retested provided that the specified conditions are met.		P
	If these conditions are not satisfied, the component is tested as part of the appliance		P
	Power electronic converter circuits not required to comply with IEC 62477-1, they are tested as part of the appliance.		N/A
	If components have not been tested and found to comply with relevant IEC standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9.		P
	For components mentioned in 24.1.1 to 24.1.9 no additional tests specified in the relevant component standard are necessary other than those specified in 24.1.1 to 24.1.9.		P
	Components not tested and found to comply with relevant IEC standard and components not marked or not used according to their marking, tested under the conditions occurring in the appliance.		P
	Lampholders and starterholders not being previously tested and found to comply with the relevant IEC standard, tested as a part of the appliance and additionally complying with the gauging and interchangeability requirements of the relevant IEC standard under the conditions occurring in the appliance.		N/A

IEC 60335-2-51			
Clause	Requirement - Test		Verdict
	No additional tests specified for nationally standardized plugs such as those detailed in IEC TR 60083 or connectors or plug connectors complying with the standard sheets of IEC 60320-3 or connectors complying with the standard sheets of IEC 60309-2.		P
24.1.1	Capacitors likely to be permanently subjected to the supply voltage and used for radio interference suppression or for voltage dividing comply with IEC 60384-14:2013 including IEC 60384-14:2013/AMD1:2016.		N/A
	If the capacitors have to be tested, they are tested according to normative Annex F		N/A
24.1.2	Transformers in associated switch mode power supplies comply with Annex BB of IEC 61558-2-16:2009 including IEC 61558-2-16:2009/AMD1:2013.		N/A
	Safety isolating transformers comply with IEC 61558-2-6:2009.		N/A
	If they have to be tested, they are tested according to normative Annex G.		N/A
24.1.3	Switches comply with IEC 61058-1:2016, number of cycles of operation being at least 10 000, unless		N/A
	the appliance meets the requirements of this standard when they are rendered inoperative, then the number of cycles need not to be declared for 7.4 of IEC 61058-1:2016.		N/A
	If they have to be tested, they are tested according to normative Annex H.		N/A
	If the switch operates a relay or contactor, the complete switching system is subjected to the test.		N/A
	If the switch only operates a motor starting relay complying with IEC 60730-2-10 with the number of cycles of a least 10 000 as specified, the complete switching system need not be tested.		N/A
24.1.3	Switches that are only intended to be operated during installation of the pump are subjected to 100 cycles of operation. (IEC 60335-2-51)		N/A
24.1.4.	Automatic controls comply with IEC 60730-1:2013 including IEC 60730-1:2013/AMD1:2015 together with the relevant part 2. The number of cycles of operation being at least:		N/A
	- thermostats:	10 000	N/A
	- temperature limiters:	1 000	N/A
	- self-resetting thermal cut-outs:	300	N/A
	- voltage maintained non-self-resetting thermal cut-outs:	1 000	N/A
	- other non-self-resetting thermal cut-outs:	30	N/A
	- timers:	3 000	N/A

IEC 60335-2-51				
Clause	Requirement - Test		Result - Remark	Verdict
	- energy regulators:	10 000		N/A
	The number of cycles for controls operating during clause 11 need not be declared, if the appliance meets the requirements of this standard when they are short-circuited or rendered inoperative.			N/A
	If automatic controls have to be tested, additionally tested in accordance with 11.3.5 to 11.3.8 and Clause 17 of IEC 60730-1:2013 including IEC 60730-1:2013/AMD1:2015 as type 1 controls, tests of Clauses 12, 13 and 14 not carried out before the test of Clause 17.			N/A
	Thermal motor protectors are tested in combination with their motor under the conditions specified in normative Annex D.			N/A
	For water valves containing live parts and that are incorporated in external hoses for connection of an appliance to the water mains, degree of protection declared for 6.5.2 of IEC 60730-2-8:2018 is IPX7.			N/A
	Thermal cut-outs of the capillary type comply with the requirements for type 2.K controls in IEC 60730-2-9:2015 including 60730-2-9:2015/AMD1:2018.			N/A
24.1.5	Appliance couplers comply with IEC 60320-1.			N/A
	However, for appliances classified higher than IPX0, the appliance couplers comply with IEC 60320-2-3.			N/A
24.1.6	Small lampholders similar to E10 lampholders comply with IEC 60238, the requirements for E10 lampholders being applicable.			N/A
24.1.7	For remote operation of the appliance via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is IEC 62151.			N/A
24.1.8	Thermal links comply with IEC 60691.			N/A
24.1.9	Contactors and relays, other than motor starting relays, tested as part of the appliance.			N/A
	They are also tested in accordance with Clause 17 of IEC 60730-1:2013 including IEC 60730-1:2013/AMD:2015, the number of cycles of operations in 24.1.4 selected according to the contactor or relay function in the appliance..... :			N/A
24.1.10	Lamps and lamp systems that have not been previously tested and found to comply with the exempt group classification of IEC 62471:2006 GLS regarding E <sub>s</sub> and E <sub>UVA</sub> :			N/A
	- tested as part of the appliance			N/A
	- comply with the requirements of Clause 32 under the conditions occurring in the appliance			N/A
	Unless otherwise specified, the following components are considered to comply with the specified GLS classification:			N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- visible light indicators		N/A
	- infrared sources used for signalling or communication		N/A
	- seven-segment indicators		N/A
	- liquid crystal displays		N/A
	- organic LED displays (OLED)		N/A
	- plasma displays		N/A
24.1.11	Cord sets required to be provided with the appliance comply with IEC 60799.		N/A
	Cord sets with cords complying to IEC 62821-3 allowed.		N/A
24.1.101	The relevant standard for a connector as referenced in 22.102 is IEC 61984:2008. Classification and ratings used for the tests of IEC 61984:2008 correspond to the ratings of the circulation pump and its intended use.		N/A
24.2	Appliances not fitted with:		P
	- switches, automatic controls, power supplies and the like in flexible cords		N/A
	- devices causing the protective device in the fixed wiring to operate in the event of a fault in the appliance		N/A
	- thermal cut-outs that can be reset by soldering, unless		N/A
	the solder has a melting point of at least 230 °C		N/A
24.3	Switches intended for all-pole disconnection of stationary appliances are directly connected to the supply terminals and have a contact separation in all poles, providing full disconnection under over-voltage category III conditions.		N/A
24.4	Plugs and socket-outlets for extra-low voltage circuits and heating elements, not interchangeable with plugs and socket-outlets listed in IEC TR 60083 or IEC 60906-1 or with connectors, appliance inlets, plug connectors and appliance outlets complying with the standard sheets of IEC 60320-3.		N/A
24.5	Capacitors in auxiliary windings of motors marked with their voltage rating and their rated capacitance, and used accordingly.		P
	Voltage across capacitors in series with a motor winding does not exceed 1,1 times its voltage rating, when the appliance is supplied at 1,1 times rated voltage under minimum load (V) ..... :		P
24.6	Working voltage of motors connected to the supply mains and having basic insulation that is inadequate for the rated voltage of the appliance, not exceeding 42 V (V) ..... :	Working voltage =	N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	In addition, the motors comply with the requirements of normative Annex I		N/A
24.7	Detachable hose-sets for connection of appliances to the water mains comply with IEC 61770.		N/A
	They are supplied with the appliance.		N/A
	Appliances intended to be permanently connected to the water mains not connected by a detachable hose-set.		P
24.8	Motor running capacitors in appliances for which 30.2.3 is applicable and that are permanently connected in series with a motor winding, not causing a hazard in event of a failure.		N/A
	One or more of the following conditions are met:		N/A
	- the capacitors are of class S2 or S3 according to IEC 60252-1:2010 including IEC 60252-1:2010/AMD1:2013		N/A
	- the capacitors are housed within a metallic or ceramic enclosure		N/A
	- the distance of separation of the outer surface to adjacent non-metallic parts exceeds 50 mm		N/A
	- adjacent non-metallic parts within 50 mm withstand the needle-flame test of normative Annex E		N/A
	- adjacent non-metallic parts within 50 mm classified as at least V-1 according to IEC 60695-11-10		N/A
	For capacitors complying with IEC 60252-1:2010 including IEC 60252-1:2010/AMD1:2013, damp heat test for 5.14 of that standard with severity parameters as specified.		N/A
<b>25</b>	<b>SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS</b>		P
25.1	Appliance not intended for permanent connection to fixed wiring, means for connection to the supply:		P
	- supply cord fitted with a plug, the current rating and voltage rating of the plug being not less than the corresponding ratings of its associated appliance		P
	- an appliance inlet having at least the same degree of protection against moisture as required for the appliance, or		N/A
	- pins for insertion into socket-outlets		N/A
25.2	Appliance not provided with more than one means of connection to the supply mains		N/A
	Stationary appliance for multiple supply may be provided with more than one means of connection, provided electric strength test of 1 250 V for 1 min between each means of connection causes no breakdown.		N/A
25.3	Appliance intended to be permanently connected to fixed wiring provided with one of the following means for connection to the supply mains		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- cord anchorage and a set of terminals allowing the connection of a flexible cord		N/A
	- a fitted supply cord		N/A
	a set of supply leads accommodated in a suitable compartment		N/A
	- a set of terminals for the connection of cables of fixed wiring, cross-sectional areas specified in 26.6, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support		N/A
	- a set of terminals and cable entries, conduit entries, knock-outs or glands, allowing connection of appropriate types of cable or conduit, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support		N/A
25.4	Cable and conduit entries, rated current of appliance not exceeding 16 A, dimension according to Table 10 (mm) :		N/A
	Introduction of conduit or cable does not reduce clearances or creepage distances below values specified in clause 29.		N/A
25.5	Method for assembling the supply cord to the appliance:		P
	- type X attachment		N/A
	- type Y attachment		P
	- type Z attachment, if allowed in relevant part 2		N/A
	Type X attachment, other than those with a specially prepared cord, not used for flat twin tinsel cords.		N/A
	For multi-phase appliances supplied with a supply cord and that are intended to be permanently connected to fixed wiring, the supply cord is assembled to the appliance by type Y attachment.		N/A
	Type Z attachment is allowed. (IEC 60335-2-51)		N/A
25.6	Plugs fitted with only one flexible cord		P
25.7	Supply cords, other than for class III appliances, being one of the following types:		P
	- rubber sheathed (at least 60245 IEC 53), unless		N/A
	The appliance is intended to be used outdoors or is liable to being exposed to ultraviolet radiation		N/A
	- polychloroprene sheathed (at least 60245 IEC 57),		N/A
	supply cords being allowed to be connected to appliances intended for use in low temperature		N/A
	- polyvinyl chloride sheathed. Not used if they are likely to touch metal parts having a temperature rise exceeding 75 K during the test of clause 11		N/A
	•light polyvinyl chloride sheathed cord (60227 IEC 52), for appliances not exceeding 3 kg		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	• ordinary polyvinyl chloride sheathed cord (60227 IEC 53), for other appliances		P
	- heat resistant polyvinyl chloride sheathed. Not used for type X attachment other than specially prepared cords		N/A
	•... heat-resistant light polyvinyl chloride sheathed cord (60227 IEC 56), for appliances not exceeding 3 kg cord (60227 IEC 56), for appliances not exceeding 3 kg		N/A
	•....heat-resistant polyvinyl chloride sheathed cord (60227 IEC 57), for other appliances		N/A
	- halogen-free, low smoke, thermoplastic insulated and sheathed		N/A
	• light duty halogen-free low smoke flexible cable (62821 IEC 101) for circular cable and (62821 IEC 101f) for flat cable		N/A
	• Ordinary duty halogen-free low smoke flexible cable (62821 IEC 102) for circular cable and (62821 IEC 102f) for flat cable		N/A
	Supply cords for class III appliances adequately insulated.		N/A
	Test with 500 V for 2 min for supply cords of class III appliances that contain live parts.		N/A
25.8	Nominal cross-sectional area of supply cords not less than Table 11; rated current (A); cross-sectional area (mm <sup>2</sup> )..... :	Min. 0.75mm <sup>2</sup>	P
25.9	Supply cords for class III appliances adequately insulated.		P
25.10	Supply cord of class I appliances have a green/yellow core for earthing.		P
	In multi-phase appliances, the colour of the neutral conductor of the supply cord is blue		N/A
	Where additional neutral conductors are provided in the supply cord:		N/A
	- other colours may be used for these additional neutral conductors;		N/A
	- all of the neutral conductors and line conductors are identified by marking using the alphanumeric notation specified in IEC 60445		N/A
	- the supply cord is fitted to the appliance		N/A
25.11	Conductors of supply cords not consolidated by soldering where they are subject to contact pressure, unless		P
	the contact pressure is provided by spring terminals.		N/A
	The requirement does not apply to the soldered tip of a stranded conductor.		N/A
25.12	Insulation of the supply cord not damaged when moulding the cord to part of the enclosure.		N/A



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
25.13	Inlet openings so constructed as to prevent damage to the supply cord.		P
	If it is not evident that the supply cord can be introduced without risk of damage, a non-detachable lining or bushing complying with 29.3 for supplementary insulation provided.		P
	If unsheathed supply cord, a similar additional bushing or lining is required, unless the appliance is:		N/A
	- a class 0 appliance, or		N/A
	- a class III appliance not containing live parts		N/A
25.14	Supply cords moved while in operation adequately protected against excessive flexing, unless		N/A
	appliance is fitted with automatic cord reels complying with the requirement and test of 22.16.		N/A
	Flexing test, as described:		N/A
	Conductors supplied at rated voltage (V) ..... :	Test voltage =	N/A
	Conductors loaded with rated current (A):..... :	Test current =	N/A
	- applied force (N)..... :		N/A
	- number of flexings :		N/A
	The test does not result in		N/A
	- short-circuit between the conductors, such that the current exceeds a value of twice the rated current		N/A
	- breakage of more than 10 % of the strands of any conductor		N/A
	- separation of the conductor from its terminal		N/A
	- loosening of any cord guard		N/A
	- broken strands piercing the insulation and becoming accessible		N/A
25.15	For appliances with supply cord and appliances to be permanently connected to fixed wiring by a flexible cord, conductors of the supply cord relieved from strain, twisting and abrasion by use of cord anchorage.		P
	The cord cannot be pushed into the appliance to such an extent that the cord or internal parts of the appliance can be damaged.		P
	Pull and torque test of supply cord:		P
	- fixed appliances: pull 100 N; torque (not on automatic cord reel) (Nm)..... :	100N0.35Nm	P
	- other appliances: values shown in Table 12: mass (kg); pull (N); torque (not on automatic cord reel) (Nm)..... :		N/A
	Cord not damaged and max. 2 mm displacement of the cord.	0.5mm	N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
25.16	Cord anchorages for type X attachments constructed and located so that:		N/A
	- replacement of the cord is easily possible		N/A
	- it is clear how the relief from strain and the prevention of twisting are obtained		N/A
	- they are suitable for different types of supply cord		N/A
	- cord cannot touch the clamping screws of cord anchorage if these screws are accessible, unless		N/A
	they are separated from accessible metal parts by supplementary insulation		N/A
	- the cord is not clamped by a metal screw which bears directly on the cord		N/A
	- at least one part of the cord anchorage securely fixed to the appliance, unless		N/A
	it is part of a specially prepared cord		N/A
	Not applicable if the cord anchorage comprises one or more clamping members subjected to pressure by means of nuts engaging with securely attached studs, even if removal possible, or if		N/A
	one clamping member is fixed to the appliance or obviously shaped insulating material is used as the surface of the appliance.		N/A
	- screws which have to be operated when replacing the cord do not fix any other component, unless		N/A
	The appliance becomes inoperative or incomplete or the parts cannot be removed without a tool.		N/A
	- if labyrinths can be bypassed, the test of 25.15 is nevertheless withstood		N/A
	- for class 0, 0I and I appliances, they are of insulating material or are provided with an insulating lining, unless		N/A
	failure of the insulation of the cord does not make accessible metal parts live		N/A
	- for class II appliances, they are of insulating material, or		N/A
	if of metal, they are insulated from accessible metal parts by supplementary insulation		N/A
	Compliance checked by inspection and by the test of 25.15 under the following conditions:		N/A
	- carried out with lightest permissible type of cord of the smallest cross-sectional area specified in Table 13, then with next heavier type cord having the largest cross-sectional area specified, however	(See appended table)	N/A
	if the appliance is fitted with a specially prepared cord, test carried out with this cord		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- conductors placed in the terminals and any terminal screws tightened to prevent the conductors from easily changing their position		N/A
	- clamping screws of the cord anchorage tightened with two-thirds of the torque specified in 28.1		N/A
	- screws of insulating material bearing directly on the cord fastened with two-thirds of the torque specified in column I of Table 14, the length of the slot in the screw head being taken as the nominal diameter of the screw		N/A
	After the test, the conductors have not moved by more than 1 mm in the terminals.		N/A
25.17	Adequate cord anchorages for type Y and Z attachment, test with the cord supplied with the appliance.	Attachment Type = type Y	P
	For Type Z attachment compliance checked by the test of 25.15 with the cord supplied with the appliance.		N/A
	For Type Y attachment compliance checked by the test of 25.15 with the cord supplied with the appliance and designated alternative types (if any)		P
25.18	Cord anchorages only accessible with the aid of a tool, or		P
	constructed so that the cord can only be fitted with the aid of a tool.		P
25.19	Type X attachment, glands not used as cord anchorage in portable appliances.		N/A
	Tying the cord into a knot or tying the cord with string not used.		N/A
	The conductors of the supply cord for type Y and Z attachment insulated from accessible metal parts.		N/A
25.21	Space for supply cord for type X attachment or for connection of fixed wiring constructed:		N/A
	- to permit checking of conductors with respect to correct positioning and connection before fitting any cover		N/A
	- so there is no risk of damage to the conductors or their insulation when fitting the cover		N/A
	- for portable appliances, so that the uninsulated end of a conductor, if it becomes free from the terminal, prevented from contact with accessible metal parts		N/A
	2 N test to the conductor for portable appliances; no contact with accessible metal parts		N/A
25.22	Appliance inlets:		N/A
	- live parts not accessible during insertion or removal		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Requirement not applicable to appliance inlets complying with IEC 60320-1.		N/A
	- connector can be inserted without difficulty		N/A
	- the appliance is not supported by the connector		N/A
	- not for cold conditions if temp. rise of external metal parts exceeds 75 K during clause 11, unless		N/A
	The flexible cord of the cord set is unlikely to touch such metal parts.		N/A
25.23	Interconnection cords comply with the requirements for the supply cord, except that:		N/A
	- the cross-sectional area of the conductors is determined based on the maximum current during clause 10, and		N/A
	- the thickness of the insulation may be reduced		N/A
	For class I or class II appliance with class III construction, the cross-sectional areas of the conductors need not comply with 25.8 if specified conditions are met.		N/A
	If necessary, electric strength test of 16.3		N/A
25.24	Interconnection cords not detachable without the aid of a tool if compliance with this standard is impaired when they are disconnected.		N/A
25.25	Dimensions of pins that are inserted into socket-outlets compatible with the dimensions of the relevant socket-outlet.		N/A
	Dimensions of pins and engagement face in accordance with the dimensions of the relevant plug in IEC TR 60083.		N/A
<b>26</b>	<b>TERMINALS FOR EXTERNAL CONDUCTORS</b>		P
26.1	Appliances provided with terminals or equally effective devices, such as male tabs of flat quick-connect terminations (IEC 61210), screw type terminals (IEC 60998-2-1), screwless terminals (IEC 60998-2-2) and clamping units (IEC 60999-1:1999), for connection of external conductors.		P
	Terminals only accessible after removal of a non-detachable cover, except		P
	for class III appliances that do not contain live parts.		N/A
	Earthing terminals and functional earthing terminals may be accessible if a tool is required to make the connections and means are provided to clamp the wire independently from its connection.		N/A
26.2	Appliances with type X attachment and appliances for the connection of cables of fixed wiring provided with terminals in which connections are made by means of screws, nuts or similar devices, unless		N/A
	the connections are soldered.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Screws and nuts not used to fix any other component, except		N/A
	internal conductors, if so arranged that they are unlikely to be displaced when fitting the supply conductors.		N/A
	If soldered connections used, the conductor so positioned or fixed that reliance is not placed on soldering alone, unless		N/A
	barriers provided so that neither clearances nor creepage distances between live parts and other metal parts reduced below the values for supplementary insulation if the conductor becomes free at the soldered joint.		N/A
26.3	Terminals for type X attachment and for connection of cables of fixed wiring constructed so that the conductor is clamped between metal surfaces with sufficient contact pressure but without damaging the conductor.		N/A
	Terminals fixed so that when the clamping means is tightened or loosened:		N/A
	- the terminal does not become loose		N/A
	- internal wiring is not subjected to stress		N/A
	- neither clearances nor creepage distances are reduced below the values in clause 29		N/A
	Compliance checked by inspection and by the test of subclause 9.6 of IEC 60999-1:1999, the torque applied being equal to two-thirds of the torque specified (Nm)..... :		N/A
	No deep or sharp indentations of the conductors.		N/A
26.4	Terminals for type X attachment, except those having a specially prepared cord and those for the connection of cables of fixed wiring, no special preparation of conductors such as by soldering, use of cable lugs, eyelets or similar,		N/A
	Reshaping of the conductor before its introduction into the terminal or twisting a stranded conductor to consolidate the end is not considered special preparation.		N/A
	Terminals constructed or placed so that conductors prevented from slipping out when clamping screws or nuts are tightened.		N/A
26.5	Terminals for type X attachment so located or shielded that if a wire of a stranded conductor escapes, no risk of accidental connection to other parts that result in a hazard.		N/A
	Stranded conductor test, 8 mm insulation removed.		N/A
	No contact between live parts and accessible metal parts and,		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	for class II constructions, between live parts and metal parts separated from accessible metal parts by supplementary insulation only.		N/A
26.6	Terminals for type X attachment and for connection of cables of fixed wiring suitable for connection of conductors with cross-sectional area according to Table 13; rated current (A); nominal cross-sectional area (mm <sup>2</sup> )..... :		N/A
	If a specially prepared cord is used, terminals need only be suitable for that cord.		N/A
26.7	Terminals for type X attachment, except in class III appliances not containing live parts, accessible after removal of a cover or part of the enclosure.		N/A
26.8	Terminals for the connection of fixed wiring, including the earthing terminal, located close to each other.		N/A
26.9	Terminals of the pillar type constructed and located as specified.		N/A
26.10	Terminals with screw clamping and screwless terminals not used for flat twin tinsel cords, unless		P
	ends of conductors fitted with means suitable for screw terminals.		N/A
	Pull test of 5 N to the connection.		P
26.11	For type Y and Z attachment, soldered, welded, crimped or similar connections be used.		P
	For class II appliances, the conductor so positioned or fixed that reliance is not placed on soldering, welding or crimping alone.		N/A
	If soldering, welding or crimping alone used, barriers provided so that clearances and creepage distances between live parts and other metal parts are not reduced below the values for supplementary insulation if the conductor becomes free.		N/A
<b>27</b>	<b>PROVISION FOR EARTHING</b>		P
27.1	Accessible metal parts, including metal parts behind a decorative cover that does not withstand the test of 21.1, of class 0I and I appliances permanently and reliably connected to an earthing terminal or earthing contact of the appliance inlet.		P
	Earthing terminals and earthing contacts not connected to the neutral terminal.		P
	Class 0, II and III appliances have no provision for protective earthing.		N/A
	Safety extra-low voltage circuits not earthed, unless		N/A
	protective extra-low voltage circuits.		N/A
27.2	Clamping means of earthing terminals adequately secured against accidental loosening.		P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Terminals for the connection of external equipotential bonding conductors allow connection of conductors of 2,5 mm <sup>2</sup> to 6 mm <sup>2</sup> , and		N/A
	- do not provide earthing continuity between different parts of the appliance, and		N/A
	- conductors cannot be loosened without the aid of a tool		N/A
27.3	For a detachable part having an earth connection and being plugged into another part of the appliance, the earth connection is made before and separated after current-carrying connections when removing the part.		N/A
	For appliances with supply cords, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage.		P
27.4	No risk of corrosion resulting from contact between parts of the earthing terminal and the copper of the earthing conductor or other metal.		P
	Parts providing earthing continuity, other than parts of a metal frame or enclosure, have adequate resistance to corrosion.		P
	If of steel, these parts provided with an electroplated coating, thickness of at least 5 µm.		P
	Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure.		P
	In the body of the earthing terminal is a part of a frame or enclosure of aluminium or aluminium alloys, precautions taken to avoid risk of corrosion.		N/A
	In case of doubt, thickness of coating measured as described in ISO 2178 or in ISO 1463.		N/A
27.5	Low resistance of connection between earthing terminal and earthed metal parts.		P
	This requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit, provided the clearances of basic insulation are based on the rated voltage of the appliance(V) ..... :		N/A
	Resistance not exceeding 0,1 Ω at the specified low-resistance test (Ω)..... :		P
	The printed conductors of printed circuit boards not used to provide earthing continuity in hand-held appliances.		N/A
	They may be used to provide earthing continuity in other appliances if at least two tracks are used with independent soldering points and the appliance complies with 27.5 for each circuit.		N/A
<b>28</b>	<b>SCREWS AND CONNECTIONS</b>		P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
28.1	Fixings, electrical connections and connections providing earthing continuity withstand mechanical stresses.		P
	Screws not of soft metal liable to creep, such as zinc or aluminium.		P
	Diameter of screws of insulating material min. 3 mm.		N/A
	Screws of insulating material not used for any electrical connections or connections providing earthing continuity.		N/A
	Screws used for electrical connections or connections providing earthing continuity screwed into metal.		P
	Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation.		N/A
	For type X attachment, screws to be removed for replacement of supply cord or for user maintenance, not of insulating material if their replacement by a metal screw impairs basic insulation.		N/A
	For screws and nuts; torque-test as specified in Table 14..... :	(See appended table)	P
28.2	Electrical connections and connections providing earthing continuity constructed so that contact pressure is not transmitted through non-ceramic insulating material liable to shrink or distort, unless		P
	there is resiliency in the metallic parts to compensate for shrinkage or distortion of the insulating material.		N/A
	This requirement does not apply to electrical connections in circuits of appliances for which:		N/A
	- 30.2.2 is applicable and that carry a current not exceeding 0,5 A		N/A
	- 30.2.3 is applicable and that carry a current not exceeding 0,2 A		N/A
28.3	Space-threaded (sheet metal) screws only used for electrical connections if they clamp the parts together.		N/A
	Thread-cutting (self-tapping) screws and thread rolling screws only used for electrical connections if they generate a full form standard machine screw thread.		N/A
	Thread-cutting (self-tapping) screws not used if they are likely to be operated by the user or installer.		N/A
	Thread-cutting, thread rolling and space threaded screws may be used in connections providing earthing continuity provided it is not necessary to disturb the connection:		N/A
	- in normal use,		N/A



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- during user maintenance,		N/A
	- when replacing a supply cord having a type X attachment, or		N/A
	- during installation		N/A
	At least two screws being used for each connection providing earthing continuity, unless		N/A
	the screw forms a thread having a length of at least half the diameter of the screw.		N/A
28.4	Screws and nuts that make mechanical connection secured against loosening by means such as spring washer, lock washers and crown type locks, if they also make electrical connections or connections providing earthing continuity.		N/A
	For screw connections not subjected to torsion, sealing compound that softens on heating allowed to be used to provide security against loosening.		N/A
	This requirement does not apply to screws in the earthing circuit if at least two screws are used, or		P
	if an alternative earthing circuit is provided.		N/A
	Rivets for electrical connections or connections providing earthing continuity secured against loosening if the connections are subjected to torsion.		N/A
	If connections subjected to torsion, a rivet having a non-circular shank or an appropriate notch allowed to be used to secure against loosening.		N/A
<b>29</b>	<b>CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION</b>		P
	Clearances, creepage distances and solid insulation withstand electrical stress.		P
	For coatings used on printed circuits boards to protect the microenvironment (type 1) or to provide basic insulation (type 2), normative Annex J applies .....		N/A
	The microenvironment is pollution degree 1 under type 1 protection.		N/A
	For type 2 protection, the spacing between the conductors before the protection is applied is not less than the values specified in Table 1 of IEC 60664-3:2016.		N/A
	These values apply to functional, basic, supplementary and reinforced insulation .....		N/A
29.1	Clearances not less than the values specified in Table 16, taking into account the rated impulse voltage for the overvoltage categories of Table 15, unless .....	(See appended table)	P
	for basic insulation and functional insulation, they comply with the impulse voltage test of clause 14.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	For appliances intended for use at altitudes exceeding 2 000 m, the clearances in Table 16 are increased according to the altitude correction factor in Table A.2 of IEC 60664-1:2007.		N/A
	However, the impulse voltage test is not applicable if the construction is such that the distances could be affected by any of the following:		N/A
	- distortion		N/A
	- movement of parts		N/A
	- assembly of parts		N/A
	- wear of basic insulation		N/A
	- wear of functional insulation		N/A
	In this case, the clearances for rated impulse voltages of 1 500 V and above specified in Table 16 are increased by 0,5 mm.		N/A
	Impulse voltage test is not applicable:		N/A
	- when the microenvironment is pollution degree 3, or		N/A
	- for basic insulation of class 0 and class 0I appliances, or		N/A
	- to appliances intended for use at altitudes exceeding 2 000 m		N/A
	Appliances are in overvoltage category II.		P
	A force of 2 N is applied to bare conductors, other than heating elements.		P
	A force of 30 N is applied to accessible surfaces.		P
29.1.1	Clearances of basic insulation withstand the over-voltages, taking into account the rated impulse voltage.		P
	The values of Table 16 or the impulse voltage test of clause 14 are applicable..... :	(See appended table)	P
	Clearance at the terminals of tubular sheathed heating elements may be reduced to 1,0 mm, if the microenvironment is pollution degree 1.		N/A
	Lacquered conductors of windings considered to be bare conductors.		P
29.1.2	Clearances of supplementary insulation not less than those spec. for basic insulation in Table 16. :	(See appended table)	P
29.1.3	Clearances of reinforced insulation not less than those specified in Table 16, using the next higher step for rated impulse voltage..... :	(See appended table)	P
	For double insulation, with no intermediate conductive part between basic and supplementary insulation, clearances are measured between live parts and the accessible surface, and the insulation system is treated as reinforced insulation.		P
29.1.4	Clearances for functional insulation are the largest values determined from:		P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- Table 16 based on the rated impulse voltage .... :	(See appended table)	P
	- Table F.7a in IEC 60664-1:2007, frequency not exceeding 30 kHz		N/A
	- clause 4 of IEC 60664-4:2005, frequency exceeding 30 kHz		N/A
	If values of Table 16 are largest, the impulse voltage test of clause 14 may be applied instead, unless.		N/A
	the microenvironment is pollution degree 3, or		N/A
	the distances can be affected by wear, distortion, movement of the parts or during assembly.		N/A
	However, clearances are not specified if the appliance complies with clause 19 with the functional insulation short-circuited.		N/A
	Lacquered conductors of windings considered to be bare conductors.		P
	However, clearances at crossover points are not measured.		P
	Clearance between surfaces of PTC heating elements may be reduced to 1 mm.		N/A
29.1.5	Appliances having higher working voltages than rated voltage, clearances for basic insulation are the largest values determined from: Working voltage >.....V		P
	- Table 16 based on the rated impulse voltage .... :		P
	- Table F.7a in IEC 60664-1:2007, frequency not exceeding 30 kHz		N/A
	- clause 4 of IEC 60664-4:2005, frequency exceeding 30 kHz		N/A
	If clearances for basic insulation are selected from Table F.7a of IEC 60664-1:2007 or Clause 4 of IEC 60664-4:2005, the clearances of supplementary insulation are not less than those specified for basic insulation.		N/A
	If clearances for basic insulation are selected from Table F.7a of IEC 60664-1:2007, the clearances of reinforced insulation dimensioned as specified in Table F.7a are to withstand 160 % of the withstand voltage required for basic insulation.		N/A
	If clearances for basic insulation are selected from Clause 4 of IEC 60664-4:2005, the clearances of reinforced insulation are twice the value required for basic insulation.		N/A
	If the secondary winding of a step-down transformer is earthed, or if there is an earthed screen between the primary and secondary windings, clearances of basic insulation on the secondary side not less than those specified in Table 16, but using the next lower step for rated impulse voltage.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Circuits supplied with a voltage lower than rated voltage, clearances of functional insulation are based on the working voltage used as the rated voltage in Table 15.		N/A
29.2	Creepage distances not less than those appropriate for the working voltage, taking into account the material group and the pollution degree..... :	(See appended table)	P
	Pollution degree 2 applies, unless		N/A
	- precautions taken to protect the insulation; pollution degree 1		N/A
	- insulation subjected to conductive pollution; pollution degree 3		P
	A force of 2 N is applied to bare conductors, other than heating elements.		P
	A force of 30 N is applied to accessible surfaces.		P
	In a double insulation system, the working voltage for both the basic and supplementary insulation is taken as the working voltage across the complete double insulation system.		N/A
29.2.1	Creepage distances of basic insulation not less than specified in Table 17..... :	(See appended table)	P
	However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from Table 2 of IEC 60664-4:2005, these values being used if exceeding the values in Table 17..... :		N/A
	Except for pollution degree 1, corresponding creepage distance not less than the minimum specified for the clearance in Table 16, if the clearance has been checked according to the test of clause 14..... :		N/A
	Creepage distances of supplementary insulation at least those specified for basic insulation in Table 17, excluding NOTE 1 and NOTE 2, or..... :	(See appended table)	N/A
	Table 2 of IEC 60664-4:2005, as applicable:		N/A
29.2.3	Creepage distances of reinforced insulation at least double those specified for basic insulation in Table 17, excluding NOTE 1 and NOTE 2, or..... :	(See appended table)	P
	Table 2 of IEC 60664-4:2005, as applicable..... :		N/A
29.2.4	Creepage distances of functional insulation not less than specified in Table 18..... :	(See appended table)	P
	However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from Table 2 of IEC 60664-4:2005, these values being used if exceeding the values in Table 18..... :		N/A
	Creepage distances may be reduced if the appliance complies with clause 19 with the functional insulation short-circuited.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
29.3	Supplementary and reinforced insulation have adequate thickness, or a sufficient number of layers, to withstand the electrical stresses.		P
	Compliance checked:		P
	- by measurement, in accordance with 29.3.1, or		P
	for insulation, other than single layer internal wiring insulation, by an assessment of the thermal quality of the material combined with an electric strength test, in accordance with 29.3.3, and		N/A
	for accessible parts of reinforced insulation consisting of a single layer, by measurement in accordance with 29.3.4, or		N/A
	- by an assessment of the thermal quality of the material according to 29.3.3 combined with an electric strength test in accordance with 23.5, for each single layer internal wiring insulation touching each other, or		N/A
	- as specified in subclause 6.3 of IEC 60664-4:2005 for insulation that is subjected to any periodic voltage having a frequency exceeding 30 kHz		N/A
29.3.1	Supplementary insulation; thickness at least 1 mm.		P
	Reinforced insulation; thickness of at least 2 mm.		P
29.3.2	Each layer of material withstands the electric strength test of 16.3 for supplementary insulation.		N/A
	Supplementary insulation consists of at least 2 layers		N/A
	Reinforced insulation consists of at least 3 layers.		N/A
29.3.3	The insulation is subjected to the dry heat test Bb of IEC 60068-2-2, followed by		N/A
	the electric strength test of 16.3.		N/A
	If the temperature rise during the tests of clause 19 does not exceed the value specified in Table 3, the test of IEC 60068-2-2 is not carried out.		N/A
29.3.4	Thickness of accessible parts of reinforced insulation consisting of a single layer not less than specified in Table 19 .....		N/A
<b>30</b>	<b>RESISTANCE TO HEAT AND FIRE</b>		P
30.1	External parts of non-metallic material,		P
	Parts supporting live parts, and		P
	Parts of thermoplastic material providing supplementary or reinforced insulation.		P
	Sufficiently resistant to heat.		P
	This requirement does not apply to:		P
	- the insulation or sheath of flexible cords or internal wiring		P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- those parts of coil formers that do not support or retain terminals in position		P
	- parts of ceramic material		P
	Ball-pressure test according to IEC 60695-10-2.		P
	External parts tested at 40 °C plus the maximum temperature rise determined during the test of clause 11, or at 75 °C, whichever is the higher; temperature (°C) ..... :	(See appended table 30.1)	P
	Parts of thermoplastic material providing supplementary or reinforced insulation tested at 25 °C plus the maximum temperature rise determined during clause 19, if higher; temperature (°C) ..... :	(See appended table 30.1)	P
30.2	Parts of non-metallic material resistant to ignition and spread of fire.		P
	This requirement does not apply to:		P
	- parts of a mass not exceeding 0,5 g, provided the cumulative effect is unlikely to propagate flames that originate inside the appliance by propagating flames from one part to another, or		P
	- decorative trims, knobs and other parts unlikely to be ignited or to propagate flames that originate inside the appliance		P
	Compliance checked by the test of 30.2.1, and in addition:		P
	- for attended appliances, 30.2.2 applies		N/A
	- for unattended appliances, 30.2.3 applies		P
	For appliances for remote operation, 30.2.3 applies.		N/A
	For parts of appliances connected to the supply mains during charging, 30.2.3 applies.		N/A
	For base material of printed circuit boards, 30.2.4 applies.		N/A
30.2.1	Parts of non-metallic material subjected to the glow-wire test of IEC 60695-2-11:2014 at 550 °C.	(See appended table 30.2)	P
	However, test not carried out if the material is classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 550 °C, or		N/A
	the material is classified at least HB40 according to IEC 60695-11-10.		N/A
	Parts for which the glow-wire test cannot be carried out need to meet the requirements in ISO 9772 for material classified HBF.		N/A
30.2.2	Not applicable. (IEC 60335-2-51)		N/A
30.2.3	Appliances operated while unattended, tested as specified in 30.2.3.1 and 30.2.3.2.		P
	The tests are not applicable to conditions as specified ..... :		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
30.2.3.1	Parts of non-metallic material supporting connections, such as switch contacts and the like in other components, carrying a current exceeding 0,2 A during normal operation,  Note: Appliance supplied at rated voltage (V) ..... : and		P
	parts of non-metallic material, other than small parts, within a distance of 3 mm,		P
	subjected to the glow-wire test of IEC 60695-2-11:2014 with a test severity of 850 °C.	(See appended table 30.2)	P
	Glow-wire applied to a.n interposed shielding material, if relevant		N/A
	The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 850 °C.		N/A
30.2.3.2	Parts of non-metallic material supporting connections, such as switch contacts and the like in other components, and		P
	parts of non-metallic material within a distance of 3 mm,		P
	subjected to the glow-wire test of IEC 60695-2-11:2014 with appropriate severity level:	(See appended table 30.2)	P
	- 750 °C, for connections carrying a current exceeding 0,2 A during normal operation Note: Appliance supplied at rated voltage (V) ..... :	Test voltage = Frequency = (maybe relevant for moa ca and smps)	P
	- 650 °C, for other connections		N/A
	Glow-wire applied to an interposed shielding material, if relevant.		N/A
	However, the glow-wire test of 750 °C or 650 °C as appropriate, is not carried out on parts of material fulfilling both or either of the following classifications:		N/A
	- a glow-wire ignition temperature according to IEC 60695-2-13 of at least:		N/A
	775 °C, for connections carrying a current exceeding 0,2 A during normal operation Note: Appliance supplied at rated voltage (V) ..... :	Test voltage = Frequency = (maybe relevant for moa ca and smps)	N/A
	675 °C, for other connections.		N/A
	- a glow-wire flammability index according to IEC 60695-2-12 of at least:		N/A
	750 °C, for connections carrying a current exceeding 0,2 A during normal operation Note: Appliance supplied at rated voltage (V) ..... :	Test voltage = Frequency = (maybe relevant for moa ca and smps)	N/A
	650 °C, for other connections.		N/A
	The glow-wire test is also not carried out on small parts. These parts are to:		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- comprise material having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or		N/A
	- comprise material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- comply with the needle-flame test of normative Annex E, or		N/A
	- comprise material classified as V-0 or V-1 according to IEC 60695-11-10		N/A
	The consequential needle-flame test of Annex E applied to non-metallic parts that encroach within the vertical cylinder placed above the centre of the connection zone and on top of the non-metallic parts supporting current-carrying connections, and parts of non-metallic material within a distance of 3 mm of such connections if these parts are those:		N/A
	- parts that withstood the glow-wire test of IEC 60695-2-11:2014 of 750 °C or 650 °C as appropriate, but produce a flame that persist longer than 2 s, or		N/A
	- parts that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- small parts, that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- small parts for which the needle-flame test of normative Annex E was applied, or		N/A
	- small parts for which a material classification of V-0 or V-1 was applied		N/A
	However, the consequential needle-flame test is not carried out on non-metallic parts, including small parts, within the cylinder that are:		N/A
	- parts having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or		N/A
	parts comprising material classified as V-0 or V-1 according to IEC 60695-11-10, or		N/A
	- parts shielded by a flame barrier that meets the needle-flame test of normative Annex E or that comprises material classified as V-0 or V-1 according to IEC 60695-11-10.		N/A
	No battery in the area of the vertical cylinder used for the consequential needle flame test, unless		N/A
	battery shielded by a barrier that meets the needle flame test of normative Annex E or that comprises material classified as V-0 or V-1 according to IEC 60695-11-10.		N/A
30.2.4	Base material of printed circuit boards subjected to the needle-flame test of normative Annex E.	(See appended table 30.2/30.2.4)	N/A
	Test not applicable to conditions as specified ..... :		N/A



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
<b>31</b>	<b>RESISTANCE TO RUSTING</b>		P
	Relevant ferrous parts adequately protected against rusting.		P
	Tests specified in part 2 when necessary.		N/A
<b>32</b>	<b>RADIATION, TOXICITY AND SIMILAR HAZARDS</b>		P
32.1	Appliance does not emit harmful radiation or present a toxic or similar hazard due to their operation in normal use.		P
	Compliance is checked by the limits or tests specified in part 2, if relevant.		N/A
32.2	Appliance do not present an optical radiation hazard due to their operation in normal use.		N/A
	Requirement does not apply to lamps and lamp systems that comply with 24.1.10.		N/A
	Compliance checked as follows		N/A
	appliance supplied at rated voltage (V) ..... : Note: Generally 50 Hz is the most unfavourable frequency.	Test voltage = Frequency =	N/A
	- Radiation assessment at or recalculated to 200 mm distance or at fixed use distance, measurement as described in IEC 62471:2006		N/A
	- For lamps or lamp systems intended to illuminate objects, tested at the GLS assessment distance producing 500 lux as described in IEC 62471:2006		N/A
	- Appliance complies with exempt group classification requirements of IEC 62471:2006 regarding actinic ultraviolet hazard ( $E_s$ ) and near-UV hazard ( $E_{UVA}$ )		N/A
<b>A</b>	<b>ANNEX A (INFORMATIVE) ROUTINE TESTS</b>		N/A
	Description of routine tests to be carried out by the manufacturer.		N/A
<b>B</b>	<b>ANNEX B (NORMATIVE) BATTERY-OPERATED APPLIANCES, SEPARABLE BATTERIES AND DETACHABLE BATTERIES FOR BATTERY-OPERATED APPLIANCES</b>		N/A
	The following modifications to this standard are applicable to:		N/A
	- battery-operated appliances and remote controls employing non-rechargeable batteries (primary batteries)		N/A
	- battery-operated appliances and remote controls employing rechargeable batteries (secondary batteries)		N/A
	- detachable and separable batteries for battery-operated appliances		N/A
B.3.1.1	Battery-operated appliance operated under the following conditions:		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- for appliances operated with detachable or separable batteries disconnected from the appliance for charging, appliance operated to perform its intended function with a fully charged battery, the battery being the model or type reference of the battery provided or indicated in the instructions		N/A
	- for appliances operated with integral or separable batteries not disconnected from the appliance for charging, and that cannot perform their intended function while batteries are being charged, appliance operated to perform its intended function with a fully charged battery		N/A
	- for appliances operated with replaceable batteries, including integral replaceable batteries, or non-rechargeable batteries, appliance operated to perform its intended function with the artificial source described in B5.3, upper limit short circuit current capacity specified in Table B.1		N/A
B.3.6.1	Non-rechargeable battery: battery is supplied in a fully charged state and cannot be recharged after.		N/A
5.2	Tests of B.19.1 to B.19.6 carried out on separate samples.		N/A
B.5.1	Before starting a test requiring a fully charged battery, battery fully charged, disconnected from source and allowed to rest between 2 h and 6 h.		N/A
B.5.2	Specification of a rated voltage implies the use of a fully charged battery.		N/A
	For battery-operated appliances, where the supply terminal connecting the battery have no indication of polarity, the more unfavourably polarity applied, unless		N/A
	such a connection unlikely to occur due to the construction of the appliance.		N/A
B.5.3	When specified that a battery provided with or intended for the appliance may be replaced by an artificial source, that source consists of a DC power supply or a specially constructed battery, output of each as described in Table B.1 for the relevant battery type.		N/A
6.1	Battery-operated appliances without a supply connection or a functional earth connection not classified with respect to protection against electric shock.		N/A
7.1	Battery-operated appliances and remote controls containing batteries marked with the:		N/A
	- name, trademark or identification mark of the manufacturer or responsible vendor		N/A
	- model or type reference		N/A
	- IP number according to degree of protection against ingress of water, other than IPX0 ..... :		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- type reference of the battery, if battery either not recharged in the appliance or non-rechargeable		N/A
	Appliances incorporating replaceable batteries marked with:		N/A
	- battery type reference		N/A
	- battery voltage (V) ..... :		N/A
	- polarity of the terminals, unless		N/A
	incorrect insertion of battery by the user unlikely to occur due to the construction of the appliance		N/A
	If more than one battery type can be used with the appliance, appliance marked with the type reference of at least one of the battery types that can be used, together with:		N/A
	- symbol ISO 7000-0790 (2004-01), or		N/A
	- the substance of the following:		
	See instruction manual for additional battery types.		N/A
	If appliances use more than one battery, appliance marked to indicate correct polarity connection of the batteries.		N/A
	If relevant, positive terminal indicated by symbol IEC 60417-5005 (2002-10), and		N/A
	negative terminal indicated by symbol IEC 60417-5006 (2002-10).		N/A
	Detachable and separable batteries marked with:		
	- name, trade mark or identification mark of the manufacturer or responsible vendor		N/A
	- model or type reference		N/A
	- IP number according to degree of protection against ingress of water, other than IPX0 ..... :		N/A
	Detachable and separable batteries disconnected from the appliance for charging the battery marked with:		N/A
	- symbol ISO 7000-0790 (2004-01)		N/A
	- symbol IEC 60417-6413 (2019-05)		N/A
	- model or type reference of the battery charger, or the substance of the following:		N/A
	Use only with <model or type reference> battery charger..... :		N/A
	If more than one battery charger can be used to charge a detachable and separable battery disconnected from the appliance for charging, battery marked with the type reference of at least one of the battery charges that can be used, together with		N/A
	either symbol ISO 7000-0790 (2004-01), or the substance of the following:		N/A
	See instruction manual for additional battery chargers.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Batteries that are user replaceable, other than general purpose batteries, marked with the:		N/A
	- name, trademark or identification mark of the manufacturer or responsible vendor		N/A
	- model or type reference		N/A
	- nominal voltage (V) ..... :		N/A
7.6	Additional symbols.		N/A
7.12	Instructions provided with the appliance.		N/A
	For appliances intended for use at altitudes exceeding 2 000 m, maximum altitude stated.		N/A
	If necessary, appropriate details on precautions during user maintenance stated.		N/A
	The instructions state the substance of the following:		N/A
	This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.  Children should be supervised to ensure that they do not play with the appliance.		N/A
	For appliances incorporating batteries intended to be removed for charging or intended to be replaced by the user and that can be contained in the small parts cylinder, the instructions state the substance of the following:		N/A
	WARNING: Keep out of reach of children. Swallowing can lead to chemical burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion. Seek medical attention immediately.		N/A
	For appliances intended for use with batteries that use metal-ion chemistries, the instructions state the normal temperature range for charging.		N/A
	For battery-operated appliances, the instructions contain the following information, as applicable:		N/A
	- battery type		N/A
	- details regarding safe disposal of used batteries		N/A
	- how to deal with leaking batteries		N/A
	For battery-operated appliances, the instructions contain the substance of the following:		N/A
	- do not expose the appliance or battery to excessive temperatures		N/A
	- be aware of the risk of terminals of the battery-operated appliance or battery being short-circuited by metal objects		N/A
	For battery-operated appliances containing non-rechargeable batteries, the instructions state the substance of the following:		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	This appliance contains non-rechargeable batteries, these batteries are not to be recharged.		N/A
	For battery-operated appliances containing non-user-replaceable batteries, the instructions state the substance of the following:		N/A
	This appliance contains batteries that are only replaceable by skilled persons.		N/A
	For battery-operated appliances containing non-replaceable batteries, the instructions state the substance of the following:		N/A
	This appliance contains batteries that are non-replaceable. When the battery is at end of life, the appliance shall be properly disposed of.		N/A
	For battery-operated appliances incorporating batteries intended to be removed for charging or replaced by the user, the instructions include, as applicable, the substance of the following:		N/A
	- rechargeable batteries are to be removed from the appliance before being charged		N/A
	- different types of batteries or new and used batteries are not to be mixed		N/A
	- exhausted batteries are to be removed from the appliance and safely disposed of		N/A
	- if the appliance is to be stored unused for a long period, the batteries should be removed		N/A
	- do not use non-rechargeable batteries in place of rechargeable batteries		N/A
	- do not use modified or damaged batteries		N/A
	For battery-operated appliances incorporating batteries intended to be removed for charging or replaced by the user, the instructions include, as applicable, the following information:		N/A
	battery type reference		N/A
	- orientation of the battery with regard to polarity		N/A
	- method of replacing batteries including maintaining correct polarity		N/A
	For battery-operated appliances incorporating batteries intended to be removed prior to disposal of the appliance, the instructions include details regarding their safe removal and disposal.		N/A
	For battery-operated appliances that use detachable and separable batteries disconnected from the appliance for charging, the instructions include the model or type reference of the battery charger to be used, along with the substance of the following:		N/A
	WARNING: Use only with <model or type reference> battery charger.		N/A
	If the symbol for battery charger is used, its meaning is explained.		N/A
7.15	Markings specified for batteries intended to be replaced by the user are in or adjacent to the battery compartment.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Marking to indicate correct polarity connection of the batteries specified for appliances using more than one general purpose battery is in or adjacent to the battery compartment.		N/A
	Type reference of battery charger placed next to symbol IEC 60417-6413 (2019-05).		N/A
8	This clause is not applicable to the appliance functional part of a battery-operated appliance and its batteries, providing the battery circuits do not have an earth or mains connection.		N/A
11.1	Battery operated appliances, their surroundings, and batteries not attaining excessive temperatures in normal use.		N/A
	Compliance tested under the conditions specified in B.11.1, 11.2, 11.3, 11.7 and 11.8.		N/A
B.11.1	Battery-operated appliances tested under the conditions of normal operation.		N/A
	For appliances operated with detachable or separable batteries disconnected for charging, appliance operated until depletion of battery and test repeated with fully charged battery until it depletes or until temperature rises have stabilized as specified, whichever occurs first.		N/A
	For appliances incorporating integral or separable batteries not disconnected for charging, and that cannot perform while batteries are being charged, appliance operated until depletion of batteries.		N/A
	For appliances operated with replaceable or non-rechargeable batteries, appliance operated until the minimum capacity of the battery as specified in Table B.1 has been delivered or until steady conditions are established, whichever occurs first.		N/A
19.1	For battery-operated appliances, instead of the tests specified, tests of 19.2, 19.4, 19.7, 19.9, 19.11, 19.12, 19.14, 19.15, B.19.1 to B.19.5.		N/A
	Detachable and separable batteries also subjected to the test of B.19.6.		N/A
	For battery-operated appliances, tests carried out under normal operation.		N/A
19.2	Appliances with heating elements tested under the conditions specified in Clause 11 but with restricted heat dissipation.		N/A
19.7	Battery-operated appliance switched on and operated under stalled conditions by:		N/A
	- locking the rotor of appliances for which the locked rotor torque is smaller than the full load torque		N/A
	- locking moving parts of other appliances		N/A
	If an appliance has more than one motor, test carried out for each motor separately		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Test conducted at both $I_{sc}$ (high) and $I_{sc}$ (low), if testing with the artificial source described in B.5.3.		N/A
	Test conducted:		
	- until the test sample achieves a steady condition, including returning to room temperature, or		N/A
	- until at a time period of at least 3 h has elapsed		N/A
19.11	Electronic circuits checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless they comply with the conditions specified in 19.11.1.		N/A
	Appliances having a device with an off position obtained by electronic disconnection, or a device that can place the appliance in a stand-by mode, subjected to the tests of 19.11.4.		N/A
	If the safety of the appliance under any of the fault conditions depends on the operation of a miniature fuse-link complying with IEC 60127, test of 19.12 carried out, and		N/A
	the appliance complies with the conditions specified in 19.13.		N/A
	If a conductor of a printed circuit board becomes open-circuited, the appliance is considered to have withstood the particular test, provided that the base material of the printed circuit board withstands the test of normative Annex E.		N/A
19.11.2	When any of the fault conditions simulated, duration of test until steady conditions.		N/A
19.11.4	Appliances having a device with an off position obtained by electronic disconnection, or a device that can be placed in the stand-by mode, subjected to the tests of 19.11.4.1 and 19.11.4.2.		N/A
	Tests carried out with the appliance supplied by a fully charged battery, the device being set in the off position or in the stand-by mode.		N/A
	Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.4.1 and 19.11.4.2.		N/A
	Tests carried out after the protective electronic circuit has operated during the relevant tests of Clause 19 except 19.2 and 19.11.3.		N/A
19.11.4.8	Battery operated appliances are supplied with a fully charged battery, operated under normal operation for 60 s, and then subjected to a 60 s interruption of the battery current.		N/A
	When battery current restored, the appliance:		N/A
	- continues to operate normally from the same operation cycle point reached before the battery supply was interrupted, or		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- does not continue operating without requiring manual intervention to restart from the same operating cycle point reached before the battery supply was interrupted, or		N/A
	- does not continue operating without requiring manual intervention to restart from the part of the cycle selected by the user		N/A
19.13	During tests, no flames, molten metal or poisonous or ignitable gas in hazardous amounts and temperature rises not exceeding the values shown in Table 9..... :		N/A
	No explosion or ignition of the battery during or after the test.		N/A
	Venting of cells permitted through their vents.		N/A
	After the tests, and when the appliance has cooled to room temperature, compliance with B.22.3 and B.22.5 not impaired and the appliance complies with 20.2 and Clause 29, if still operable.		N/A
	For appliances immersed in or filled with conducting liquid in normal use, appliance immersed in or filled with water for 24 h before the test of B.22.5.		N/A
	No dangerous malfunction and no failure of protective electronic circuits, if still operable.		N/A
	Appliances tested with an electronic switch in the off position:		N/A
	- do not become operational, or		N/A
	- do not result in a dangerous malfunction during or after the tests of 19.11.4, if they become operational		N/A
	In an appliance containing lids or doors controlled by one or more interlocks, one of the interlocks may be released if both of the following conditions are fulfilled:		N/A
	- no movement to an open position when released		N/A
	- no restart after the cycle in which it was released		N/A
19.15	For battery-operated appliances incorporating a manual voltage selector switch intended to select battery voltage, switch set to lowest voltage position and highest voltage applied.		N/A
B.19.1	Supply terminals of a battery-operated appliance having an indication of polarity connected to the battery terminals of opposite polarity, unless		N/A
	connection by the user unlikely to occur.		N/A
B.19.2	For battery-operated appliances with provision for multiple batteries, one or more of the batteries reversed and appliance operated, if reversal by the user of battery polarity allowed by the construction.		N/A
B.19.3	For battery-operated appliances with motor(s), terminals of each motor short circuited one at a time, where the resistance of the short-circuit does not exceed 10 mΩ and while operated under the conditions of Clause 11.		N/A



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Test conducted until steady conditions are achieved, including returning to room temperature or until a time period of at least 3 h.		N/A
B.19.4	Test conducted with all the cells of the battery fully charged and, for batteries consisting of more than one cell, one cell fully discharged on a detachable or separable battery connected to the appliance or on an appliance containing an integral battery.		N/A
	Main discharge connections of the battery shorted with a resistance not to exceed 10 mΩ, conducted until a non-self-resetting protection device operates or an intentionally weak part becomes permanently open-circuited or until the test sample returns to room temperature.		N/A
B.19.5	Battery-operated appliance and any cords except supply cords, as appropriate, tested with the battery connected, under the following fault conditions applied one at a time:		N/A
	- any cord provided between the battery-operated appliance and a separable battery is short-circuited at the point along its length likely to produce the most adverse effects		N/A
	- for appliances having replaceable batteries that are replaceable and that can be removed without the aid of a tool, and having terminals that can be short-circuited by a thin straight bar, the terminals of the battery are short-circuited		N/A
	- charging terminals of the battery-operated appliance that are simultaneously accessible with the test probe 13 of IEC 61032 are short circuited so as to produce the most unfavourable result		N/A
	Battery-operated appliance switched on and no additional mechanical load applied.		N/A
	Tests conducted until the test sample achieves a steady condition, including returning to room temperature or, until a time period of at least 3 h.		N/A
	Resistance of short circuit not exceeding 10 mΩ.		N/A
B.19.6	For detachable and separable batteries, combinations of terminals simultaneously accessible by applying the test probe 13 of IEC 61032 short circuited so as to produce the most unfavourable result.		N/A
B.20.1	The enclosure of a battery-operated appliance incorporating an integral battery that uses metal-ion chemistry withstands the pressure generated when a cell vents during failure.		N/A
	Compliance checked by inspection after the tests of Clause 19 for batteries with a capacity less than 0,2 Ah, and measurement or test as specified.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
B.20.2	The enclosure of detachable and separable batteries that use metal-ion chemistries withstands the pressure generated when a cell vents during failure; tests as specified.		N/A
	Compliance checked by inspection after the tests of Clause 19 for batteries with a capacity less than 0,2 Ah, and measurement or test as specified.		N/A
21.1	Battery-operated appliances have adequate mechanical strength and are constructed to withstand rough handling expected in normal use.		N/A
	Appliance fitted with fully charged batteries and rigidly supported subjected to test Ehb of IEC 60068-2-75, three blows of 0,5 J applied to every point of the appliance enclosure likely to be weak.		N/A
	If necessary, blows also applied to handles, levers, knobs and similar parts and to signal lamps and their covers, but only if the lamps or covers protrude from the enclosure by more than 10 mm or if their surface area exceeds 4 cm <sup>2</sup> .		N/A
	Lamps within the appliance and their covers only tested if likely to be damaged in normal use.		N/A
	When applying the release cone to the guard of a visibly glowing heating element, the hammer head passing through the guard does not strike the heating element.		N/A
	In case of doubt, defect neglected and the group of three blows applied to the same place on a new sample which then withstands the test.		N/A
	Hand-held battery-operated appliances also subjected to test free-fall - procedure 1, of IEC 60068-2-31, under the specified conditions.		N/A
	Free-fall test does not cause the appliance to catch fire, leak fluid visible from the outside or explode and meets the requirements of Clause 20, Clause 29, B.22.3 and B.22.5 where short circuit of functional insulation will impair compliance with this standard.		N/A
B.21.1	Separable and detachable batteries, when not connected to the appliance, have adequate mechanical strength and are constructed to withstand rough handling expected in normal use.		N/A
	Fully charged battery, rigidly supported, subject to test Ehb of IEC 60068-2-75, three blows of 0,5 J applied to every point of the battery enclosure likely to be weak.		N/A
	In case of doubt, defect neglected and the group of three blows applied to the same place on a new sample which then withstands the test.		N/A
	Detachable and separable batteries subjected to the test free-fall - procedure 1, of IEC 60068-2-31, under the conditions as specified.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Free-fall test does not damage the battery or cause it to catch fire, leak fluid visible from the outside or explode and meets the requirements of Clause 20, Clause 29, B.22.4 and B.22.5 where short circuit of functional insulation will impair compliance with this standard.		N/A
	For batteries using metal-ion chemistry:		N/A
	- open circuit voltage of the battery 24 h after the tests not less than 90 % of the voltage measured immediately prior to the tests		N/A
	- cells only vented through their vents		N/A
22.11	Non-detachable parts that protect against electric shock, moisture or contact with moving parts reliably are fixed and withstand the mechanical stress occurring during normal use.		N/A
	Snap-in devices used for fixing such parts have an obvious locked position.		N/A
	Fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing reliable.		N/A
22.20	Direct contact between current carrying parts and thermal insulation that would impair compliance with this standard effectively prevented, unless		N/A
	such material is noncorrosive, non-hygroscopic and non-combustible.		N/A
	Not applicable to glass-wool thermal insulation.		N/A
22.24	Not applicable to battery-operated appliances that do not contain parts requiring protection against simultaneous contact according to B.22.3.		N/A
22.25	Not applicable to battery-operated appliances that do not contain parts requiring protection against simultaneous contact according to B.22.3.		N/A
22.33	Conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with accessible metal parts are not in direct contact with current carrying parts or un-earthed metal parts that are separated from current carrying parts by basic insulation only or with other current carrying parts such that compliance with B.22.3 and B.22.4 would be impaired.		N/A
B.22.1	User accessible interfaces between elements of a battery system (not mains connections) do not employ appliance couplers according to IEC 60320 (all parts) or IEC 60309-2.		N/A
	User accessible interfaces between elements of a battery system (not mains connections) do not employ connectors of the following types unless the battery system is adequately protected against the use of an incorrect supply:		N/A
	- barrel connectors with outside diameters of 6,5 mm or less		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	- concentric connectors with a diameter of 3,5 mm or less according to IEC 60603-11		N/A
	Compliance checked by inspection, measurement and for determining adequacy of protection against use of an incorrect supply, by the test as specified.		N/A
	Source selected such that its current capability does not limit the charging of the battery.		N/A
	During the application of incremental voltages, the appliance is either operating normally or, if not, does not emit flames, molten metal, or poisonous or ignitable gas in hazardous amounts and temperature rises do not exceed the values shown in Table 9.		N/A
	No explosion or ignition of the battery during or after the test.		N/A
	Venting of cells permitted through their vents.		N/A
B.22.2	External surfaces of detachable and separable batteries protected against excessive heat from heat sources (directly or via heated discharge air) present during operation of the appliance.		N/A
B.22.3	Battery-operated appliances so constructed and enclosed that there is adequate protection against simultaneous contact with two or more conductive parts where the:		N/A
	- voltage between them exceeds 42,4 V		N/A
	- current between the conductive parts exceeds 2 mA for DC or 0,7 mA peak for when ripple exceeds 10 %		N/A
	Compliance checked with test probe B and test probe 18 of IEC 61032 as described.		N/A
	Detachable parts except lamps behind a detachable cover removed during the tests with test probe B, however		N/A
	during insertion or removal of lamps located behind a detachable cover, protection against simultaneous contact with parts having a voltage between them exceeding 42,4 V ensured.		N/A
	During the tests with test probe 18, appliance fully assembled as in normal use, no parts removed.		N/A
	However, test probe 18 not applied to appliances for commercial use, unless		N/A
	intended to be installed in an area open to the public.		N/A
	Not possible to touch two or more conductive parts of opposite polarity with the probes if the voltage between them exceeds 42,4 V and the current between them exceeds 2 mA for DC or 0,7 mA peak for when ripple exceeds 10 %.		N/A
	Current measured using the circuit in Figure 4 of IEC 60990:2016.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
B.22.4	Separable and detachable batteries so constructed and enclosed that there is adequate protection against simultaneous contact with two or more conductive parts where the:		N/A
	- voltage between them exceeds 42,4 V		N/A
	- current between the conductive parts exceeds 2 mA		N/A
	Compliance checked with test probe B and test probe 18 of IEC 61032 as described.		N/A
	During the tests with:		
	- test probe B, all detachable parts removed		N/A
	- test probe 18, no parts removed		N/A
	However, test probe 18 not applied to appliances for commercial use, unless		N/A
	intended to be installed in an area open to the public.		N/A
	Not possible to touch two or more conductive parts of opposite polarity with the probes if the voltage between them exceeds 42,4 V and the current between them exceeds 2 mA.		N/A
	Current measured using the circuit in Figure 4 of IEC 60990:2016.		N/A
B.22.5	Insulating materials providing protection against simultaneous contact with two or more conductive parts are adequate when:		N/A
	- they are within 1,0 mm of the conductive parts		N/A
	- the voltage between the conductive parts exceeds 42,4 V peak		N/A
	- the current between the conductive parts exceeds 2 mA for DC or 0,7 mA peak for when ripple exceeds 10 %		N/A
	Insulating material subjected to voltage test as specified at 750 V or 1,2 times the working voltage plus 700 V, whichever greater, in accordance with IEC 61180 (V)..... :		N/A
	No breakdown during the test.		N/A
	Current measured using the circuit in Figure 4 of IEC 60990:2016.		N/A
B.22.6	Vents of cells not obstructed such that their operation is defeated if venting is relied upon compliance with this standard.		N/A
23.3	Instead of the electric strength test of 16.3, battery-operated appliances comply with B.22.3.		N/A
23.5	For battery-operated appliances compliance is checked by the test of B.22.5.		N/A
24.1	Batteries are not required to comply with IEC 62133-1:2017 or IEC 62133-2:2017, they are tested as part of the appliance according to this standard.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
24.1.3	Switches in battery-operated appliances have adequate breaking capacity and withstand, without excessive wear or other harmful effect, the mechanical, electrical, and thermal stresses occurring in the battery-operated appliance.		N/A
	Tests as described and according to the relevant standard for switches, IEC 61058-1-1:2016 for mechanical switches and IEC 61058-1-2:2016 for electronic switches.		N/A
	Required cycles of operation completed, no electrical or mechanical failure.		N/A
	At the end of the tests:		N/A
	- switch contacts operating properly in the "on" and "off" positions		N/A
	- temperature rise of the switch terminals not increased by more than 30 K above the temperature rise measured in Clause 11		N/A
B.24.1	The relevant standards for non-acid based electrolyte cells employed in batteries are IEC 62133-1:2017 for nickel systems and IEC 62133-2:2017 for lithium systems.		N/A
	A battery that uses metal-ion chemistry is additionally subjected to the tests of subclauses 7.3.8.1 (vibration) and 7.3.8.2 (mechanical shock) of IEC 62133-2:2017.		N/A
25.9	The requirement also applies to interconnection cords of battery-operated appliances.		N/A
25.14	The requirement also applies to interconnection cords of battery-operated appliances.		N/A
25.15	The requirement also applies to interconnection cords of battery-operated appliances.		N/A
B.25.1	Insulated conductors of interconnection cords of battery-operated appliances comply with the requirements for internal wiring and are provided with at least 0,5 mm thick outer sheath made of insulating material equivalent to that of supply cords described in 25.7.		N/A
B.26.1	Terminal devices in an appliance for the connection of the flexible leads or flexible cord connecting a separable battery so located or shielded that there is no risk of incorrect connection.		N/A
27.1	The battery-operated appliance does not have a provision for a protective earth but may incorporate a functional earth.		N/A
29.1	Clearances not less than the values specified in Table 16, taking into account the rated impulse voltage.		N/A
	For battery-operated appliances, the rated impulse voltage is 500 V for working voltages less than 50 V and 1 500 V for all other working voltages.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	However, if the construction, including between parts of opposite polarity for connecting the battery, is such that the distances could be affected by wear, by distortion, by movement of the parts or during assembly, the clearances for rated impulse voltages of 1 500 V are increased by 0,5 mm and the impulse voltage test is not applicable.		N/A
B.29.1.1	For parts requiring protection against simultaneous contact according to B.22.3 and B.22.4, the sum total of the clearances between each of these parts and their nearest accessible surface is not less than two times the Table 16 clearance taking into account the rated impulse voltage.		N/A
	For the purpose of this determination, at least one of the clearances is not less than 1,0 mm.		N/A
B.29.2.1	For parts requiring protection against simultaneous contact according to B.22.3 and B.22.4, the sum total of the creepage distances between each of these parts and their nearest accessible surface is not less than two times the Table 17 creepage distances.		N/A
	For the purpose of this determination, at least one of the creepage distances is not less than 1,0 mm		N/A
30.1	External parts of non-metallic material, the deterioration of which might cause the battery-operated appliance, separable battery or detachable battery to fail to comply with this annex, are sufficiently resistant to heat.		N/A
<b>C</b>	<b>ANNEX C (NORMATIVE) AGEING TEST ON MOTORS</b>		N/A
	Tests, as described, carried out when doubt with regard to the temperature classification of the insulation of a motor winding		N/A
	Test conditions as specified		N/A
<b>D</b>	<b>ANNEX D (NORMATIVE) THERMAL MOTOR PROTECTORS</b>		N/A
	Applicable to appliances having motors that incorporate thermal motor protectors necessary for compliance with the standard.		N/A
	Test conditions as specified with appliance supplied at rated voltage (V) ..... : Induction motors See DSH 543AA	Test voltage = Frequency =	N/A
<b>E</b>	<b>ANNEX E (NORMATIVE) NEEDLE-FLAME TEST</b>		N/A
	Needle-flame test carried out in accordance with IEC 60695-11-5:2016, with the following modifications:		N/A
7	Flame application times.		N/A
	The duration of application of the test flame is 30 s ± 1 s.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
9	Test procedure		N/A
9.2	The specimen so arranged that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 2.		N/A
9.3	The first paragraph does not apply.		N/A
	If possible, the flame is applied at least 10 mm from a corner.		N/A
9.4	The test is carried out on one specimen.		N/A
	If the specimen does not withstand the test, the test may be repeated on two additional specimens, both withstanding the test.		N/A
11	Evaluation of test results		
	The duration of burning not exceeding 30 s.		N/A
	However, for printed circuit boards, the duration of burning not exceeding 15 s.		N/A

<b>F</b>	<b>ANNEX F (NORMATIVE) CAPACITORS</b>		N/A
	Capacitors likely to be permanently subjected to the supply voltage, and used for radio interference suppression or voltage dividing, comply with the following clauses of IEC 60384-14:2013 including IEC 60384-14:2013/AMD1:2016, with the following modifications:		N/A
1.5	Terms and definitions		N/A
1.5.3	Class X capacitors tested according to subclass X2.		N/A
1.5.4	Class Y capacitors tested according to subclass Y2.		N/A
1.6	Marking		N/A
	Items a) and b) are applicable		N/A
3.4	Approval testing		N/A
3.4.3.2	Table 3 is applicable as described.		N/A
4.1	Visual examination and check of dimensions		N/A
	This subclause is applicable.		N/A
4.2	Electrical tests		N/A
4.2.1	This subclause is applicable.		N/A
4.2.5	This subclause is applicable.		N/A
4.2.5.2	Only Table 11 is applicable.		N/A
	Values for test A apply.		N/A
	However, for capacitors in heating appliances the values for test B or C apply.		N/A
4.12	Damp heat, steady state		N/A
	This subclause is applicable.		N/A



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Only insulation resistance and voltage proof are checked.		N/A
4.13	Impulse voltage		N/A
	This subclause is applicable.		N/A
4.14	Endurance		N/A
	Subclauses 4.14.1, 4.14.3, 4.14.4 and 4.14.7 are applicable.		N/A
4.14.7	Only insulation resistance and voltage proof are checked.		N/A
	No visible damage.		N/A
4.17	Passive flammability test		N/A
	This subclause is applicable.		N/A
4.18	Active flammability test		N/A
	This subclause is applicable.		N/A
<b>G</b>	<b>ANNEX G (NORMATIVE) SAFETY ISOLATING TRANSFORMERS</b>		N/A
	The following modifications to this standard are applicable for safety isolating transformers:		N/A
7	Marking and instructions		N/A
7.1	Transformers for specific use marked with the:		N/A
	- name, trademark or identification mark of the manufacturer or responsible vendor..... :		N/A
	- model or type reference ..... :		N/A
17	Overload protection of transformers and associated circuits		N/A
	Fail-safe transformers comply with subclause 15.5 of IEC 61558-1:2017.		N/A
22	Construction		N/A
	Subclauses 19.1 and 19.1.2 of IEC 61558-2-6:2009 are applicable.		N/A
29	Clearances, creepage distances and solid insulation		N/A
29.1, 29.2, 29.3	The distances specified in Table 20, Table 21 and Table 22 of IEC 61558-1:2017 apply.		N/A
	For insulated winding wires complying with subclause 19.12.3 of IEC 61558-1:2017 there are no requirements for clearances or creepage distances.		N/A
	For windings providing reinforced insulation, the distances specified in Table 20 and Table 21 of IEC 61558-1:2017 are not assessed.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	For safety isolating transformers subjected to periodic voltages with a frequency exceeding 30 kHz, the clearances, creepage distances and solid insulation values specified in IEC 60664-4:2005 are applicable, if greater than the values specified in Table 20, Table 21 and Table 22 of IEC 61558-1:2017.		N/A
<b>H</b>	<b>ANNEX H (NORMATIVE) SWITCHES</b>		N/A
	Switches comply with the following clauses of IEC 61058-1:2016 and IEC 61058-1-1:2016, as modified below:		N/A
	The tests carried out under the conditions occurring in the appliance.		N/A
	Before being tested, switches are operated 20 times without load.		N/A
8	Marking and documentation		N/A
	Switches are not required to be marked.		N/A
	However, a switch that can be tested separately from the appliance marked with the manufacturer's name or trademark and the type reference.		N/A
13	Mechanism		N/A
	The tests can be carried out on a separate sample		N/A
15	Insulation resistance and dielectric strength		N/A
15.3	Applicable for full disconnection and micro-disconnection, test carried out immediately after the humidity test of subclause 15.3 of IEC 60335-1		N/A
17	Endurance		N/A
	Compliance is checked on three separate appliances or switches.		N/A
	For 17.5.4 of IEC 61058-1-1:2016, the number of cycles of actuation declared according to 7.4 is 10 000, unless		N/A
	otherwise specified in 24.1.3 of IEC 60335-1 ..... :		N/A
	Switches for operation under no load and which can be operated only by a tool, and		N/A
	switches operated by hand that are interlocked so that they cannot be operated under load,		N/A
	are not subjected to the tests.		N/A
	However, switches without this interlock are subjected to the test of 17.5.4 of IEC 61058-1-1:2016 for 100 cycles of operation.		N/A
	Subclauses 17.3 and 17.6.2 of IEC 61058-1-1:2016 not applicable.		N/A
	The ambient temperature during the test is that occurring in the appliance during the test of Clause 11 in IEC 60335-1.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	The temperature rise of the terminals not more than 30 K above the temperature rise measured in clause 11 of IEC 60335-1 (K) .....		N/A
20	Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies		N/A
	Clause 20 of IEC 61058-1:2016 is applicable to clearances across full disconnection and micro-disconnection.		N/A
	It is also applicable to creepage distances for functional insulation, across full disconnection and micro-disconnection, as stated in Table 14.		N/A
<b>I</b>	<b>ANNEX I (NORMATIVE) MOTORS HAVING BASIC INSULATION THAT IS INADEQUATE FOR THE RATED VOLTAGE OF THE APPLIANCE</b>		N/A
	The following modifications to this standard are applicable for motors having basic insulation that is inadequate for the rated voltage of the appliance:		N/A
8	Protection against access to live parts		N/A
8.1	Metal parts of the motor are considered to be bare live parts.		N/A
11	Heating		N/A
11.3	The temperature rise of the body of the motor is determined instead of the temperature rise of the windings.		N/A
11.8	The temperature rise of the body of the motor, where in contact with insulating material, not exceeding values in Table 3 for the relevant insulating material.		N/A
16	Leakage current and electric strength		N/A
16.3	Insulation between live parts of the motor and its other metal parts is not subjected to the test.		N/A
19	Abnormal operation		N/A
19.1	The tests of 19.7 to 19.9 are not carried out.		N/A
I.19.1	Appliance operated at rated voltage with each of the following fault conditions:		N/A
	Rated voltage (V).....	Test voltage =	N/A
	- short circuit of the terminals of the motor, including any capacitor incorporated in the motor circuit		N/A
	- short circuit of each diode of the rectifier		N/A
	- open circuit of the supply to the motor		N/A
	- open circuit of any parallel resistor, the motor being in operation		N/A
	Only one fault simulated at a time, the tests carried out consecutively.		N/A
22	Construction		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
1.22.1	For class I appliances incorporating a motor supplied by a rectifier circuit, the DC circuit being insulated from accessible parts of the appliance by double or reinforced insulation.		N/A
	Compliance checked by the tests specified for double and reinforced insulation.		N/A
<b>J</b>	<b>ANNEX J (NORMATIVE) COATED PRINTED CIRCUIT BOARDS</b>		N/A
	Protective coatings of printed circuit boards comply with IEC 60664-3:2016 with the following modifications:		N/A
5.1	General		N/A
	When production samples are used, three samples of the printed circuit board are tested.		N/A
5.7.2	Cold conditioning		N/A
	The test is carried out at -25 °C.		N/A
5.7.4	Rapid change of temperature		N/A
	Severity 1 is specified, the number of cycles is 5.		N/A
5.7.5.2	Additional conditioning with respect to electromigration		N/A
	The test duration is 10 days.		N/A
<b>K</b>	<b>ANNEX K (INFORMATIVE) OVERVOLTAGE CATEGORIES</b>		P
	The information on overvoltage categories is extracted from IEC 60664-1:2007.		P
	Overvoltage category is a numeral defining a transient overvoltage condition.		P
	Equipment of overvoltage category IV is for use at the origin of the installation.		N/A
	Equipment of overvoltage category III is equipment in fixed installations and for cases where the reliability and the availability of the equipment is subject to special requirements.		N/A
	Equipment of overvoltage category II is energy consuming equipment to be supplied from the fixed installation.		P
	If such equipment is subjected to special requirements with regard to reliability and availability, overvoltage category III applies.		N/A
	Equipment of overvoltage category I is equipment for connection to circuits in which measures are taken to limit transient overvoltages to an appropriately low level.		N/A
<b>L</b>	<b>ANNEX L (INFORMATIVE) GUIDANCE FOR THE MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES</b>		P

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Information for the determination of clearances and creepage distances.		P
<b>M</b>	<b>ANNEX M (INFORMATIVE) POLLUTION DEGREE</b>		P
	The information on pollution degrees is extracted from IEC 60664-1:2007.		P
	Pollution		P
	The microenvironment determines the effect of pollution on the insulation, taking into account the macroenvironment.		P
	Means may be provided to reduce pollution at the insulation by effective enclosures or similar.		P
	Minimum clearances specified where pollution may be present in the microenvironment.		P
	Degrees of pollution in the microenvironment		P
	For evaluating creepage distances, the following degrees of pollution in the micro-environment are established:		P
	- pollution degree 1: no pollution or only dry, non-conductive pollution occurs. The pollution has no influence		N/A
	- pollution degree 2: only non-conductive pollution occurs, except that occasionally a temporary conductivity caused by condensation is to be expected		N/A
	- pollution degree 3: conductive pollution occurs or dry non-conductive pollution occurs that becomes conductive due to condensation that is to be expected		P
	- pollution degree 4: the pollution generates persistent conductivity caused by conductive dust or by rain or snow		N/A
<b>N</b>	<b>ANNEX N (NORMATIVE) PROOF TRACKING TEST</b>		P
7	Test apparatus		P
7.3	Test solutions		P
	Test solution A is used.		P
10	Determination of proof tracking index (PTI)		P
10.1	Procedure		P
	Proof voltage of 100 V, 175 V, 400 V or 600 V .... :	175 V	P
	The test is carried out on five specimens.		P
	In case of doubt, additional test with proof voltage reduced by 25 V, the number of drops increased to 100.		N/A
10.2	Report		N/A
	The report states if the PTI value was based on a test using 100 drops with a test voltage of (PTI-25) V.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
<b>O</b>	<b>ANNEX O (INFORMATIVE) SELECTION AND SEQUENCE OF THE TESTS OF CLAUSE 30</b>		P
	Description of tests for determination of resistance to heat and fire.		P
<b>P</b>	<b>ANNEX P (INFORMATIVE) GUIDANCE FOR THE APPLICATION OF THIS STANDARD TO APPLIANCES USED IN TROPICAL CLIMATES</b>		N/A
	Modifications applicable for class 0 and 0I appliances having a rated voltage exceeding 150 V, intended to be used in countries having a tropical climate and that are marked with symbol IEC 60417-6332 (2015-06).		N/A
	Modifications may also be applied to class I appliances having a rated voltage exceeding 150 V, intended to be used in countries having a tropical climate and that are marked with symbol IEC 60417-6332 (2015-06), if liable to be connected to a supply mains that excludes the protective earthing conductor.		N/A
5.7	The ambient temperature for the tests of clauses 11 and 13 is 40 +3/0 °C.		N/A
7.1	The appliance marked with symbol IEC 60417-6332 (2015-06).		N/A
7.6	Symbol IEC 60417-6332 (2015-06).		N/A
7.12	The instructions state that the appliance is to be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.		N/A
	The instructions state that the appliance is considered to be suitable for use in countries having a tropical climate, but may also be used in other countries.		N/A
	If symbol IEC 60417-6332 (2015-06) is used, its meaning is explained.		N/A
11.8	The values of Table 3 are reduced by 15 K.		N/A
13.2	The leakage current for class I appliances not exceeding 0,5 mA.		N/A
15.3	The value of t is 37 °C.		N/A
16.2	The leakage current for class I appliances not exceeding 0,5 mA (mA) .....		N/A
19.13	The leakage current test of 16.2 is applied in addition to the electric strength test of 16.3.		N/A
<b>Q</b>	<b>ANNEX Q (INFORMATIVE) SEQUENCE OF TESTS FOR THE EVALUATION OF ELECTRONIC CIRCUITS</b>		N/A
	Description of tests for appliances incorporating electronic circuits.		N/A
<b>R</b>	<b>ANNEX R (NORMATIVE) SOFTWARE EVALUATION</b>		N/A
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2 validated in accordance with the requirements of this annex.		N/A
R.1	Programmable electronic circuits using software		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2 constructed so that the software does not impair compliance with the requirements of this standard.		N/A
R.2	Requirements for the architecture		N/A
R.2.1	General		N/A
R.2.1.1	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2 use measures to control and avoid software-related faults/errors in safety-related data and safety-related segments of the software.		N/A
R.2.1.2	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.2 have one of the following structures:		N/A
	- single channel with periodic self-test and monitoring		N/A
	- dual channel (homogenous) with comparison		N/A
	- dual channel (diverse) with comparison		N/A
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 have one of the following structures:		N/A
	- single channel with functional test		N/A
	- single channel with periodic self-test		N/A
	- dual channel without comparison		N/A
R.2.2	Measures to control faults/errors		N/A
R.2.2.1	When redundant memory with comparison is provided on two areas of the same component, the data in one area is stored in a different format from that in the other area.		N/A
R.2.2.2	Programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.2 and that use dual channel structures with comparison, have additional fault/error detection means for any fault/errors not detected by the comparison.		N/A
R.2.2.3	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2, means are provided for the recognition and control of errors in transmissions to external safety-related data paths.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
R.2.2.4	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2, the programmable electronic circuits incorporate measures to address the fault/errors in safety-related segments and data indicated in Table R.1 and R.2 as appropriate.		N/A
R.2.2.5	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2, detection of a fault/error occurs before compliance with clause 19 is impaired.		N/A
	For appliances intended for remote communication through public networks, where normative Annex U is applicable as determined by 22.62, detection of a fault/error occurs before compliance with normative Annex U is impaired.		N/A
R.2.2.6	The software is referenced to relevant parts of the operating sequence and the associated hardware functions.		N/A
R.2.2.7	Labels used for memory locations are unique.		N/A
R.2.2.8	The software is protected from user alteration of safety-related segments and data.		N/A
R.2.2.9	Software and safety-related hardware under its control is initialized and terminates before compliance with clause 19 is impaired.		N/A
	For appliances intended for remote communication through public networks where normative Annex U is applicable as determined by 22.62, the software and safety-related hardware under its control is initialized and terminates before compliance with normative Annex U is impaired.		N/A
R.3	Measures to avoid errors		N/A
R.3.1	General		N/A
	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or R.2, the following measures to avoid systematic faults in the software are applied.		N/A
	Software that incorporates measures used to control the fault/error conditions specified in Table R.2 is inherently acceptable for software required to control the fault/error conditions specified in Table R.1.		N/A
R.3.2	Specification		N/A
R.3.2.1	Software safety requirements:	Software Id:	N/A
	The specification of the software safety requirements includes the descriptions listed.		N/A
R.3.2.2	Software architecture		N/A



IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
R.3.2.2.1	<p>The specification of the software architecture includes the aspects listed.</p> <ul style="list-style-type: none"> <li>- techniques and measures to control software faults/errors (refer to R.2.2);</li> <li>- interactions between hardware and software;</li> <li>- partitioning into modules and their allocation to the specified safety functions;</li> <li>- hierarchy and call structure of the modules (control flow);</li> <li>- interrupt handling;</li> <li>- data flow and restrictions on data access;</li> <li>- architecture and storage of data;</li> <li>- time-based dependencies of sequences and data</li> </ul>		N/A
R.3.2.2.2	The architecture specification is validated against the specification of the software safety requirements by static analysis.		N/A
R.3.2.3	Module design and coding		N/A
R.3.2.3.1	Based on the architecture design, software is suitably refined into modules.		N/A
	Software module design and coding is implemented in a way that is traceable to the software architecture and requirements.		N/A
	The module design specifies:		N/A
	- function(s)		N/A
	- interfaces to other modules		N/A
	- data		N/A
R.3.2.3.2	Software code is structured		N/A
R.3.2.3.3	Coded software is validated against the module specification by static analysis.		N/A
	The module specification is validated against the architecture specification by static analysis.		N/A
R.3.3	Software validation		N/A
	The software is validated with reference to the requirements of the software safety requirements specification.		N/A
	Compliance is checked by simulation of:		N/A
	- input signals present during normal operation		N/A
	- anticipated occurrences		N/A
	- undesired conditions requiring system action		N/A
R.3.4	Management items		N/A
R.3.4.1	Management of software versions		N/A
	A software version management system at the module level is put in place.		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
R.3.4.2	Software modification		N/A
R.3.4.2.1	Software modifications are based on a modification request which details the following:		N/A
	- the hazards which may be affected		N/A
	- the proposed change		N/A
	- the reasons for change		N/A
R.3.4.2.2	An analysis is carried out to determine the impact of the proposed modification on functional safety.		N/A
R.3.4.2.3	A detailed specification for the modification is generated including the necessary activities for verification and validation, such as a definition of suitable test cases.		N/A
R.3.4.2.4	The modification is carried out as planned.		N/A
R.3.4.2.5	The assessment of the modification is carried out based on the specified verification and validation activities, which may include:		N/A
	- a reverification of changed software modules		N/A
	- a reverification of affected software modules		N/A
	- a revalidation of the complete system		N/A
	All details of modification activities are documented.		N/A
R.3.4.2.6	- a reverification of changed software modules		N/A

TABLE R.1 – GENERAL FAULT/ERROR CONDITIONS

Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
1 CPU						
1.1 Registers	Stuck at	Functional test, or periodic self-test using either: – static memory test, or – word protection with single bit redundancy	H.2.16.5 H.2.16.6 H.2.19.6 H.2.19.8.2			N/A
1.2 VOID						N/A
1.3 Programme counter	Stuck at	Functional test, or periodic self-test, or independent time-slot monitoring, or logical monitoring of the programme sequence	H.2.16.5 H.2.16.6 H.2.18.10.4 H.2.18.10.2			N/A

IEC 60335-2-51						
Clause	Requirement - Test			Result - Remark		Verdict
2 Interrupt handling and execution	No interrupt or too frequent interrupt	Functional test, or time-slot monitoring	H.2.16.5 H.2.18.10.4			N/A
3 Clock	Wrong frequency (for quartz synchronized clock: harmonics/sub-harmonics only)	Frequency monitoring, or time slot monitoring	H.2.18.10.1 H.2.18.10.4			N/A
4 Memory 4.1 Invariable memory	All single bit faults	Periodic modified checksum, or multiple checksum, or word protection with single bit redundancy	H.2.19.3.1 H.2.19.3.2 H.2.19.8.2			N/A
4.2 Variable memory	DC fault	Periodic static memory test, or Word protection with single bit redundancy	H.2.19.6 H.2.19.8.2			N/A
4.3 Addressing (relevant to variable and invariable memory)	Stuck at	Word protection with single bit redundancy including the address	H.2.19.8.2			N/A
5 Internal data path	Stuck at	Word protection with single bit redundancy	H.2.19.8.2			N/A
5.1 VOID						N/A
5.2 Addressing	Wrong address	Word protection with single bit redundancy including the address	H.2.19.8.2			N/A
6 External communication 6.1 Data	Data corruption of up to Hamming distance 3	Word protection with multi-bit redundancy, or CRC – single word, or transfer redundancy, or protocol test	H.2.19.8.1 H.2.19.4.1 H.2.18.2.2 H.2.18.14			N/A

IEC 60335-2-51						
Clause	Requirement - Test			Result - Remark		Verdict
6.2 Addressing	Wrong address	Word protection with multi-bit redundancy including the address, or CRC – single word including the address, or transfer redundancy, or protocol test	H.2.19.8.1 H.2.19.4.1 H.2.18.2.2 H.2.18.14			N/A
6.3 Timing	Wrong point in time  Wrong sequence	Time-slot monitoring, or scheduled transmission  Logical monitoring, or time-slot monitoring, or scheduled transmission	H.2.18.10.4 H.2.18.18  H.2.18.10.2 H.2.18.10.4 H.2.18.18			N/A
7 Input/output periphery	Fault conditions specified in 19.11.2	Plausibility check	H.2.18.13			N/A
7.1 VOID						N/A
7.2 Analog I/O						
7.2.1 A/D and D/A converter	Fault conditions specified in 19.11.2	Plausibility check	H.2.18.13			N/A
7.2.2 Analog multiplexer	Wrong addressing	Plausibility check	H.2.18.13			N/A
8 VOID						N/A
9 Custom chips <sup>d</sup> e.g. ASIC, GAL, gate array	Any output outside the static and dynamic functional specification	Periodic self-test	H.2.16.6			N/A
NOTE A Stuck-at fault model denotes a fault model representing an open circuit or a non-varying signal level. A DC fault model denotes a stuck-at fault model incorporating short circuits between signal lines.						
<sup>a</sup> For fault/error assessment, some components are divided into their sub-functions.						
<sup>b</sup> For each sub-function in the table, the Table R.2 measure will cover the software fault/error.						
<sup>c</sup> Where more than one measure is given for a sub-function, these are alternatives.						
<sup>d</sup> To be divided as necessary by the manufacturer into sub-functions.						

TABLE R.2 – SPECIFIC FAULT/ERROR CONDITIONS						
Component <sup>a</sup>	Fault/error	Acceptable measures <sup>b, c</sup>	Definitions	Document reference for applied measure	Document reference for applied test	Verdict

IEC 60335-2-51						
Clause	Requirement - Test			Result - Remark		Verdict
1 CPU 1.1 Registers	DC fault	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or internal error detection, or redundant memory with comparison, or periodic self-tests using either – walkpat memory test – Abraham test – Transparent GALPAT test; or word protection with multi-bit redundancy, or static memory test and word protection with single bit redundancy	H.2.18.15 H.2.18.3 H.2.18.9 H.2.19.5 H.2.19.7 H.2.19.1 H.2.19.2.1 H.2.19.8.1 H.2.19.6 H.2.19.8.2			N/A
1.2 Instruction decoding and execution	Wrong decoding and execution	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or internal error detection, or periodic self-test using equivalence class test	H.2.18.15 H.2.18.3 H.2.18.9 H.2.18.5			N/A
1.3 Programme counter	DC fault	Periodic self-test and monitoring using either: – independent time-slot and logical monitoring – internal error detection, or comparison of redundant functional channels by either: – reciprocal comparison – independent hardware comparator	H.2.16.7 H.2.18.10.3 H.2.18.9 H.2.18.15 H.2.18.3			N/A

IEC 60335-2-51						
Clause	Requirement - Test			Result - Remark		Verdict
1.4 Addressing	DC fault	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator; or internal error detection; or periodic self-test using – a testing pattern of the address lines; or – a full bus redundancy – a multi bus parity including the address	H.2.18.15 H.2.18.3 H.2.18.9 H.2.16.7 H.2.18.22 H.2.18.1.1 H.2.18.1.2			N/A
1.5 Data paths instruction decoding	DC fault and execution	Comparison of redundant CPUs by either: – reciprocal comparison, or – independent hardware comparator, or – internal error detection, or – periodic self-test using a testing pattern, or – data redundancy, or – multi-bit bus parity	H.2.18.15 H.2.18.3 H.2.18.9 H.2.16.7 H.2.18.2.1 H.2.18.1.2			N/A
2 Interrupt handling and execution	No interrupt or too frequent interrupt related to different sources	Comparison of redundant functional channels by either – reciprocal comparison, – independent hardware comparator, or – independent time-slot and logical monitoring	H.2.18.15 H.2.18.3 H.2.18.10.3			N/A
3 Clock	Wrong frequency (for quartz synchronized clock: harmonics/sub-harmonics only)	Frequency monitoring, or time-slot monitoring, or comparison of redundant functional channels by either: – reciprocal comparison – independent hardware comparator	H.2.18.10.1 H.2.18.10.4 H.2.18.15 H.2.18.3			N/A

IEC 60335-2-51						
Clause	Requirement - Test			Result - Remark		Verdict
4 Memory						
4.1 Invariable memory	99,6 % coverage of all in- formation errors	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware com- parator, or redundant memory with com- parison, or periodic cyclic redundancy check, either – single word – double word, or word protection with multi-bit redundancy	H.2.18.15 H.2.18.3 H.2.19.5  H.2.19.4.1 H.2.19.4.2 H.2.19.8.1			N/A
4.2 Variable memory	DC fault and dyn- amic cross links	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware com- parator, or redundant memory with com- parison, or periodic self-tests using either: – walkpat memory test – Abraham test – transparent GALPAT test, or word protection with multi-bit redundancy	H.2.18.15 H.2.18.3 H.2.19.5  H.2.19.7 H.2.19.1 H.2.19.2.1 H.2.19.8.1			N/A
4.3 Addressing (relevant to variable and invariable memory)	DC fault	Comparison of redundant CPUs by either: – reciprocal comparison, or – independent hardware com- parator, or full bus redundancy testing pattern, or periodic cyclic redundancy check, either: – single word – double word, or word protection with multi-bit redundancy including the ad- dress	H.2.18.15 H.2.18.3 H.2.18.1.1 H.2.18.22  H.2.19.4.1 H.2.19.4.2 H.2.19.8.1			N/A

IEC 60335-2-51						
Clause	Requirement - Test			Result - Remark		Verdict
5 Internal data path						
5.1 Data	DC fault	Comparison of redundant CPUs by either – reciprocal comparison – independent hardware comparator, or word protection with multi-bit redundancy including the address, or data redundancy, or testing pattern, or protocol test	H.2.18.15 H.2.18.3 H.2.19.8.1 H.2.18.2.1 H.2.18.22 H.2.18.14			N/A
5.2 Addressing	Wrong address and multiple addressing	Comparison of redundant CPUs by: – reciprocal comparison – independent hardware comparator, or word protection with multi-bit redundancy, including the address, or full bus redundancy; or testing pattern including the address	H.2.18.15 H.2.18.3 H.2.19.8.1 H.2.18.1.1 H.2.18.22			N/A
6 External communication						
6.1 Data	Data corruption of up to Hamming distance 4	CRC – double word, or data redundancy or comparison of redundant functional channels by either – reciprocal comparison; or – independent hardware comparator	H.2.19.4.2 H.2.18.2.1 H.2.18.15 H.2.18.3			N/A
6.2 Addressing	Wrong address and multiple addressing	CRC – double word, including the address, or full bus redundancy of data and address, or comparison of redundant communication channels by either: – reciprocal comparison; or – independent hardware comparator	H.2.19.4.2 H.2.18.1.1 H.2.18.15 H.2.18.3			N/A



IEC 60335-2-51						
Clause	Requirement - Test			Result - Remark		Verdict
6.3 Timing	Wrong point in time	Time-slot and logical monitoring, or comparison of redundant communication channels by either: – reciprocal comparison; or – independent hardware comparator	H.2.18.10.3  H.2.18.15 H.2.18.3			N/A
	Wrong sequence	Time-slot and logical monitoring, or comparison of redundant communication channels by either: – reciprocal comparison; or – independent hardware comparator	H.2.18.10.3  H.2.18.15 H.2.18.3			
7 In-put/output periphery  7.1 Digital I/O	Fault conditions specified in 19.11.2	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or input comparison, or multiple parallel outputs, or output verification, or testing pattern, or code safety	H.2.18.15 H.2.18.3  H.2.18.8 H.2.18.11 H.2.18.12 H.2.18.22 H.2.18.2			N/A
7.2 Analog I/O  7.2.1 A/D and D/A converter	Fault conditions in 19.11.2	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware comparator, or input comparison, or multiple parallel outputs, or output verification, or testing pattern	H.2.18.15 H.2.18.3  H.2.18.8 H.2.18.11 H.2.18.12 H.2.18.22			N/A

IEC 60335-2-51						
Clause	Requirement - Test			Result - Remark		Verdict
7.2.2 Analog mul- tiplexer	Wrong addressing	Comparison of redundant CPUs by either: – reciprocal comparison – independent hardware com- parator, or input comparison or testing pattern	H.2.18.15 H.2.18.3 H.2.18.8 H.2.18.22			N/A
8 Monitoring devices and compara- tors	Any output outside the static and dynamic functional specifica- tion	Tested monitoring, or redundant monitoring and com- parison, or error recognizing means	H.2.18.21 H.2.18.17 H.2.18.6			N/A
9 Custom chips <sup>d</sup> e.g. ASIC, GAL, gate array	Any output outside the static and dynamic functional specifica- tion	Periodic self-test and monitor- ing, dual channel (diverse) with comparison, or error recognizing means	H.2.16.7 H.2.16.2 H.2.18.6			N/A
NOTE A DC fault model denotes a stuck-at fault model incorporating short circuits between signal lines.						
<sup>a</sup> For fault/error assessment, some components are divided into their sub-functions.						
<sup>b</sup> For each sub-function in the table, the software measure will cover the Table R.1 fault/error.						
<sup>c</sup> Where more than one measure is given for a sub-function, these are alternatives.						
<sup>d</sup> To be divided as necessary by the manufacturer into sub-functions.						

<b>S</b>	<b>ANNEX S (INFORMATIVE)</b> <b>GUIDANCE FOR THE APPLICATION OF THIS STANDARD ON</b> <b>MEASUREMENT OF POWER INPUT AND CURRENT BASED ON THE</b> <b>REQUIREMENTS OF 10.1 AND 10.2 CONCERNING THE REPRESENTATIVE</b> <b>PERIOD</b>			N/A
	Flowchart giving guidance on measurement of power input and current concerning the representative period.			N/A
<b>T</b>	<b>ANNEX T (NORMATIVE)</b> <b>UV-C RADIATION EFFECT ON NON-METALLIC MATERIALS</b>			N/A
	This annex provides requirements for non-metallic materials subject to direct or reflected UV-C radiation (100 nm to 280 nm) exposure and whose mechanical and electrical properties are relied upon for compliance with this standard.			N/A
	This annex does not apply to glass, ceramic and similar materials.			N/A
	The conditioning and tests are carried out on non-metallic material specimens prepared according to the relevant standard for the test method.			N/A
	The conditioning apparatus and test procedure are as specified in ISO 4892-1 and ISO 4892-2.			N/A
	<b>Modifications to the clauses of ISO 4892-1:2016:</b>			N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
5.1	Irradiance		N/A
5.1.1	The UV-C emitter is a low pressure mercury lamp with a quartz envelope having a continuous spectral irradiance of 10 W/m <sup>2</sup> at 254 nm.		N/A
5.2	Temperature		N/A
5.2.5	The black-panel temperature is 63 °C ± 3 °C.		N/A
5.3	Humidity and wetting		N/A
5.3.1	Humidification of the chamber air is specified in part 2 when necessary.		N/A
	<b>Modifications to the clauses of ISO 4892-2:2013:</b>		N/A
7	Procedure		N/A
7.1	General		N/A
	At least three test specimens of each non-metallic material providing mechanical support or impact resistance are exposed in each run		N/A
	Ten samples of the insulated internal wiring are exposed in each run		N/A
	When the internal wiring is provided in more than one colour, the colour having the heaviest organic pigment loading is used		N/A
7.2	Mounting the test specimens		N/A
	The specimens are attached to the specimen holders such that they are not subject to any applied stress.		N/A
7.3	Exposure		N/A
	Before placing the specimens in the test chamber, the apparatus is operating under the specified exposure conditions and programmed to operate continuously, conditions are maintained throughout the exposure.		N/A
7.4	Measurement of radiant exposure		N/A
	If used, a radiometer is mounted and calibrated such that it measures the irradiance at the exposed surface of the test specimen.		
7.5	Determination of changes in properties after exposure		N/A
	The non-metallic material properties and test methods for parts providing mechanical support or impact resistance are specified in Table T.1.		N/A
	The non-metallic material properties and test method for electrical insulation of internal wiring are specified in Table T.2.		N/A
<b>U</b>	<b>ANNEX U (NORMATIVE) APPLIANCES INTENDED FOR REMOTE COMMUNICATION THROUGH PUBLIC NETWORKS</b>		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
	The measures given in this annex are intended to avoid unauthorized access and the effects of transmission failures via remote communication through public networks, where compliance with this standard could be impaired.		N/A
	However, in general, it does not cover aspects concerning confidentiality of data and consumer privacy.		N/A
U.1	Terms and definitions		N/A
U.1.1	Definitions relating to remote functionality.		N/A
	Definitions used in this appendix as described.		N/A
U.2	Marking and instructions		N/A
U.2.1	If there is provision for software download, instructions are provided on how or where to obtain the unique name or code given by the manufacturer, that identifies the current version of the software running in the appliance.		N/A
	The instructions also include the necessary steps the user must follow for the software update procedure.		N/A
U.3	Construction		N/A
U.3.1	Software enabling communication with a public network is partitioned into modules separate from software which is necessary to comply with the other requirements of this standard.		N/A
U.3.2	Remote communication is established, implemented and terminated by the appliance via software that provides:		N/A
	- data integrity protection concerning:		N/A
	data corruption		N/A
	address corruption		N/A
	wrong timing or sequence		N/A
	permanent "auto-sending" or repetition		N/A
	interruption of data transfer		N/A
	- means to detect and respond to communication in which, for any reason, a message being communicated is incomplete, truncated, contains errors or has the correct format but delivers information that is outside the range expected for that type of message		N/A
	- means to detect and respond to communication in which, for any reason, a message being communicated is incomplete, truncated, contains errors or has the correct format but delivers information that is outside the range expected for that type of message		N/A
	- measures to control the fault/error conditions specified in Table R.1		N/A

IEC 60335-2-51			
Clause	Requirement - Test	Result - Remark	Verdict
U.3.3	Measures provided to protect against hazards arising from the reception of messages from several sources simultaneously or sequentially.		N/A
U.3.4	Remote communication is not enabled prior to authorization.		N/A
	Authorization is based on authentication using cryptographic techniques to ensure the identity of both parties.		N/A
	For the purposes of this requirement, communication between two entities for preparation of the authentication and authorization process is not considered remote communication.		N/A
U.3.5	Measures are taken to prevent unauthorized access and to detect transmission faults/errors in the remote communication.		N/A
U.3.6	The safe operation of an appliance does not depend on remote communication.		N/A
	In case of doubt, remote communication rendered inoperative for the relevant tests of this standard.		N/A
U.3.7	Cryptographic techniques are implemented to provide data integrity protection once authorization for remote communication is established.		N/A
	Cryptographic techniques employed are part of the appliance including its accessories, do not rely upon part of the router or similar data transmission device, and are performed prior to transmission.		N/A
U.3.8	Provisions are taken to ensure that software updates provided by the manufacturer and transmitted to the appliance via remote communication are verified prior to its installation:		N/A
	- against corruption through communication		N/A
	- that the software version is compatible with the appliance for which the software version was designed		N/A
	The software which performs the above-mentioned checks contains measures to control the fault/error conditions specified in Table R.1.		N/A
U.3.9	Permission for each installation of software in the appliance is given by the person responsible for the appliance.		N/A
	User activation of a mode that enables automatic software updates is permitted.		N/A
U.3.10	The installation of software does not impair compliance with the requirements of this standard during or after installation.		N/A

<b>10.1</b>	<b>TABLE: Power input deviation</b>					<b>P</b>
Input deviation of/at:	P rated (W)	P measured (W)	dP (W, %)	Required dP (W, %)	Remark	
GPD25-4S						
230V50Hz	65	51.8	-20.3%	+20%	/	
GPS65-12F						
230V50Hz	1300	1259	-3.2%	+15%	/	
Supplementary information:						

<b>10.2</b>	<b>TABLE: Current deviation</b>					<b>N/A</b>
Current deviation of/at:	I rated (A)	I measured (A)	dI (A, %)	Required dI (A, %)	Remark	
N/A	N/A	N/A	N/A	N/A	N/A	
Supplementary information:						

11.8	TABLE: Heating Test GPD25-4S			P
	Test voltage (V)..... :		206.8/254.4	—
	Ambient (°C) ..... :		20.5°C~20.8°C	—
	Water temperature(°C).		110	—
Thermocouple Locations		Max. temperature rise measured, Δ T (K)		Max. temperature rise limit, Δ T (K)
		206.8	254.4	
Power cord		13.8	25.9	50
Terminalbox (inside) black		17.2	29.0	Cl.30
Terminalbox (outside) black		10.0	30.6	60
Terminal		16.2	32.2	Cl.30
Motor bracket		26.9	49.4	Cl.30
Motor core		20.4	27.3	Ref
Surface of motor		13.9	27.6	Ref
Bearing		14.0	23.1	90℃
Test corner		3.1	3.8	50
Supplementary information: The temperature rise limit is determined according to DSH 601.				

<b>11.8</b>	<b>TABLE: Heating test, resistance method GPD25-4S</b>					<b>P</b>
	Test voltage (V)..... :			206.8/254.4	—	
	Ambient, t <sub>1</sub> (°C)..... :			20.5	—	
	Ambient, t <sub>2</sub> (°C)..... :			20.8	—	
Temperature rise of winding		R <sub>1</sub> (Ω)	R <sub>2</sub> (Ω)	ΔT (K)	Max. dT (K)	Insulation class

Winding(206.8V)	701.2	941.2	87.0	140	H
Winding(254.4V)	701.2	923.3	87.7	140	H
Supplementary information: The temperature rise limit is determined according to DSH 601.					

<b>11.8</b>	<b>TABLE: Heating Test GPS65-12F</b>			<b>P</b>
	Test voltage (V)..... :	206.8/254.4		—
	Ambient (°C) ..... :	21.5°C~21.8°C		—
	Water temperature(°C).	110		—
Thermocouple Locations		Max. temperature rise measured, $\Delta T$ (K)		Max. temperature rise limit, $\Delta T$ (K)
		206.8	254.4	
Power cord		22.2	28.0	50
Terminalbox (inside) black		24.3	29.7	Cl.30
Terminalbox (outside) black		23.2	33.3	60
Terminal		25.2	36.2	Cl.30
Motor bracket		39.4	50.0	Cl.30
Motor core		24.5	28.1	Ref
Surface of motor		22.0	30.8	Ref
Bearing		19.4	25.1	90°C
Test corner		3.8	4.4	50
Supplementary information: The temperature rise limit is determined according to DSH 601.				

<b>11.8</b>	<b>TABLE: Heating test, resistance method GPS65-12F</b>					<b>P</b>
	Test voltage (V)..... :	206.8/254.4				—
	Ambient, $t_1$ (°C)..... :	21.5				—
	Ambient, $t_2$ (°C)..... :	21.8				—
Temperature rise of winding		$R_1$ ( $\Omega$ )	$R_2$ ( $\Omega$ )	$\Delta T$ (K)	Max. dT (K)	Insulation class
Winding(206.8V)		4.298	5.192	53.0	140	H
Winding(254.4V)		4.298	5.154	50.7	140	H
Supplementary information: The temperature rise limit is determined according to DSH 601.						

13.2	TABLE: Leakage current			P
	Heating appliances: 1.15 x rated input (W)..... :	--		—
	Motor-operated and combined appliances: 1.06 x rated voltage (V) ..... :	254.4		—
Leakage current between		I (mA)	Max. allowed I (mA)	
GPD25-4S				

L/N and earthing metalparts	0.111	3.5
L/N and plastic enclosure	0.052(Peak)	0.35(Peak)
GPS65-12F		
L/N and earthing metalparts	0.112	3.5
L/N and plastic enclosure	0.053(Peak)	0.35(Peak)
Supplementary information:		

<b>13.3</b>	<b>TABLE: Dielectric Strength</b>		<b>P</b>
<b>Test voltage applied between:</b>		<b>Test potential applied (V)</b>	<b>Breakdown / flashover (Yes/No)</b>
Live parts and earthing metal parts		1000	No
Internal wires to plastic enclosure		1750	No
Live parts and plastic enclosure		3000	No
Supplementary information:			

<b>14</b>	<b>TABLE: Transient overvoltages</b>					<b>N/A</b>
Clearance between:		CI (mm)	Required CI (mm)	Rated impulse voltage (V)	Impulse test voltage (V)	Flashover (Yes/No)
N/A		N/A	N/A	N/A	N/A	N/A
Supplementary information:						

<b>16.2</b>	<b>TABLE: Leakage current</b>		<b>P</b>
	Single phase appliances: 1.06 x rated voltage (V):	254.4	—
	Three phase appliances 1.06 x rated voltage divided by $\sqrt{3}$ (V) .....	—	—
Leakage current between		I (mA)	Max. allowed I (mA)
GPD25-4S			
Live parts and earthing metal parts		0.156	3.5
Live parts and plastic enclosure		0.088	3.5
GPS65-12F			
Live parts and earthing metal parts		0.134	3.5
Live parts and plastic enclosure		0.081	3.5
Supplementary information:			

<b>16.3</b>	<b>TABLE: Electric strength</b>		<b>P</b>
Test voltage applied between:		Voltage (V)	Breakdown (Yes/No)
Live parts and earthing metal parts		1250	No



Internal wires to plastic enclosure	1750	No
Live parts and plastic enclosure	3000	No
Supplementary information:		

17	TABLE: Overload protection, thermocouple measurements			N/A
Temperature rise of part/at:		dT (K)	Max. dT (K)	
N/A		N/A	N/A	
Supplementary information:				

<b>19</b>	<b>Abnormal operation conditions</b>						P
Operational characteristics		YES/NO	Operational conditions				
Are there electronic circuits to control the appliance operation?		NO	N/A				
Are there "off" or "stand-by" position?		NO	N/A				
The unintended operation of the appliance results in dangerous malfunction?		NO	N/A				
Sub-clause	Operating conditions description	Test results description	PEC description	EMP 19.11.4	Software type required	19.11.3 PEC	Final result
19.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19.7	Lock the motor	No hazards.	N/A	N/A	N/A	N/A	P
19.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19.10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19.11.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19.11.4.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19.101	half of maximum total head	No hazards.	N/A	N/A	N/A	N/A	P
Supplementary information:							

19.7	TABLE: Abnormal operation, locked rotor/moving parts		P
	Test voltage (V) .....	240	—
	Ambient, t1 (°C) .....	22.8/23.0	—

	Ambient, t2 (°C) .....		23.2/23.5		—
Temperature of winding	R1 (Ω)	R2 (Ω)	dT (K)	T (°C)	Max. T (°C)
Winding (GPD25-4S)	701.2	1122.2	154.1	177.3	210
Winding(GPS65-12F)	4.298	7.167	171.4	194.9	210
Supplementary information:					

<b>19.9</b>	<b>TABLE: Abnormal operation, running overload</b>					N/A
	Test voltage (V) .....		N/A			—
	Ambient, t1 (°C) .....		N/A			—
	Ambient, t2 (°C) .....		N/A			—
Temperature of winding	R1 (Ω)	R2 (Ω)	dT (K)	T (°C)	Max. T (°C)	
N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information:						

<b>19.13</b>	<b>TABLE: Abnormal operation, temperature rises</b>			P
Thermocouple locations		Max. temperature rise measured, Δ T (K)		Max. temperature rise limit, Δ T (K)
		GPD25-4S	GPS65-12F	
Supply cord		27.1	37.3	150
Terminal box (inside)		28.5	31.9	Cl.30
Terminal block		73.8	92.2	Cl.30
Winding bracket		131.8	162.2	Cl.30
Test corner		118.0	143.6	150
Ambient		22.5°C	23.6°C	-
Supplementary information:				

<b>21.1</b>	<b>TABLE: Impact resistance</b>			P
Impacts per surface	Surface tested	Impact energy (Nm)	Comments	
3	Plastic enclosure	1.0	P	
3	Metal enclosure	1.0	P	

<b>24.1</b>	<b>TABLE: Components information</b>					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>	
Power Cord	Changzhou Hong Chang Electronics Co.Ltd	H05VV-F	3G0.75mm <sup>2</sup> 300/500V	DINEN50525 2-11	VDE124978	

-Alternative	Taizhou Zhongxing Electric Co.,Ltd	H03VV-F	3G0.75mm <sup>2</sup> 3G0.5mm <sup>2</sup> 300/500V	DINEN50525 2-11	VDE400028 70
Power plug	Changzhou Hong Chang Electronics Co.Ltd	DTIII-2P-05	16A 250V~	DINVDE0620 2-1	VDE 40015536
-Alternative	Taizhou Zhongxing Electric Co.,Ltd	DIN49441 R2	16A 250V~	DINVDE0620 2-1	VDE 40006532
Running capacitor (for GPDm-4y)	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;2uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V;2uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V;2uF; 40/85/21	EN60252-1	TUVR 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V;2uF; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V;2uF; 25/85/21	EN60252-1	VDE 116769
Running capacitor (for GPDm-5y/6y)	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;2,5uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V;2,5uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V;2,5uF; 40/85/21	EN60252-1	TUVR 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V; 2,5uF;; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V; 2,5uF;; 25/85/21	EN60252-1	VDE 116769
Running capacitor (for 7y/8y/9y)	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;3uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical & Electronic Co., Ltd.	CBB60	AC450V; 3uF; 40/85/21	EN 60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V; 3uF; 40/85/21	EN 60252-1	TUV R 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40RL	AC400V; 3uF; 25/100/21	EN 60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40RL	AC450V; 3uF; 40/085/21	EN 60252-1	VDE 116769

Running capacitor ( GPD32-5F; GPD32-5SF; GPD40-3F; GPD40-3SF )	Wenling Xinghuo Capacitors Factory	CBB60	AC450V; 4uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V; 4uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V; 4uF; 40/85/21	EN60252-1	TUVR 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V; 4uF; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V; 4uF; 25/85/21	EN60252-1	VDE 116769
Running capacitor ( for GPDn-8y )	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;5uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V;5uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V;5uF; 40/85/21	EN60252-1	TUVR 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V;5uF; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V;5uF; 25/85/21	EN60252-1	VDE 116769
Running capacitor ( for GPD15-9y )	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;3uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V;3uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V;3uF; 40/85/21	EN60252-1	TUVR 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V;3uF; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V;3uF; 25/85/21	EN60252-1	VDE 116769
Running capacitor ( for GPDm-12y )	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;6uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V;6uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V;6uF; 40/85/21	EN60252-1	TUVR 50152565

-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V;6uF; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V;6uF; 25/85/21	EN60252-1	VDE 116769
Running capacitor(for GPDm-9y GPDm-15y GPDm-16y)	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;8uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V;8uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V;8uF; 40/85/21	EN60252-1	TUVR 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V;8uF; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V;8uF; 25/85/21	EN60252-1	VDE 116769
Running capacitor (for GPD20/25/32/40/50-12/15/16y)	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;12.5uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V; 12.5uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V; 12.5uF; 40/85/21	EN60252-1	TUVR 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V; 12.5uF; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V; 12.5uF; 25/85/21	EN60252-1	VDE 116769
Running capacitor (for GPD40/50/65 10/12y)	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;15uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V; 15uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V; 15uF; 40/85/21	EN60252-1	TUVR 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V; 15uF; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V; 15uF; 25/85/21	EN60252-1	VDE 116769
Running capacitor (for GPD20/25/32/40/ 50/65/80 10/12/16/20/26y )	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;22uF; 40/070/21	EN60252-1	VDE400176 96

-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V; 22uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V; 22uF; 40/85/21	EN60252-1	TUVR 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V; 22uF; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V; 22uF; 25/85/21	EN60252-1	VDE 116769
Running capacitor (for GPD20/50/65/80 12/16/20/35y)	Wenling Xinghuo Capacitors Factory	CBB60	AC450V;28uF; 40/070/21	EN60252-1	VDE400176 96
-Alternative	Xunde Electrical& Electronic Co.,Ltd.	CBB60	AC450V;28uF; 40/85/21	EN60252-1	VDE 40030458
-Alternative	Taizhou Shuangfeng Electronic Co.,Ltd	CBB60	AC450V;28uF; 40/85/21	EN60252-1	TUVR 50152565
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC400V;28uF; 25/100/21	EN60252-1	VDE 40023787
-Alternative	Seika Electric Co., Ltd.	MK205J40R L	AC450V;28uF; 25/85/21	EN60252-1	VDE 116769
Motor wire	SHANGHAI YUSHENG SPECIAL MAGNETWIRE CO.,LTD	QZY-2/180	Class180	EN60335-1 EN60335-2-51	Testwith appliance
Motor protector	Sensata Technologies Holland B.V.	YS11245-500W	AC250V;7A; 150℃	EN60730-1	KEMA 2014531.17
-Alternative	Jiangsu Changsheng Electric Appliance Co.,Ltd	BR-B6D	AC250V;10A; 140℃	EN60730-1	No.B080719 0001Rev.03
-Alternative	Sensata Technologies Holland B.V.	2MM180W	AC250V;7A; 150℃	EN60730-1	KEMA 2014531.06
-Alternative	Jiangsu Changsheng Electric Appliance Co.,Ltd	16AM	AC250V;5A; 150℃	EN60730-1	No.B080719 0044Rev.01
-Alternative	Sensata Technologies Holland B.V.	9700K700 1300W	AC250V;7A; 150℃	EN60730-1	KEMA 2014531.10
-Alternative	Jiangsu Changsheng Electric Appliance Co.,Ltd	17AM	AC250V;12A; 150℃	EN60730-1	No.B080719 0046Rev.01
-Alternative	Guangzhou Hongtop Electrical Equipment Co.Ltd	TM1	AC250V; 150℃	EN60730-1	VDE 40014467

Motor ( for GPDm-4y)	Hefei Xinhua- Canned Motor Pump Co.,Ltd	65W	AC220-240V; ClassH Main:298,6Ω Aux:279,9Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
-Alternative	Hefei Xinhua- Canned Motor Pump Co.,Ltd	75W	AC220-240V; ClassH Main:216.6Ω Aux:239.4Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
Motor ( for GPDm-5y; GPD20-5SE)	Hefei Xinhua- Canned Motor Pump Co.,Ltd	85W	AC220-240V; ClassH Main:182,0Ω Aux:191,0Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
-Alternative	Hefei Xinhua- Canned Motor Pump Co.,Ltd	90W	AC220-240V; ClassH Main:211.9Ω Aux:234.15Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
Motor ( GPDm 6y)	Hefei Xinhua- Canned Motor Pump Co.,Ltd	100W	AC220-240V; ClassH Main:178,0Ω Aux:188,0Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
Motor ( for GPD15-9; GPD15-9A; GPD15-9AB; GPD15-9S)	Hefei Xinhua- Canned Motor Pump Co.,Ltd	120W	AC220-240V; ClassH Main:156,0Ω Aux:166,0Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
-Alternative	Hefei Xinhua- Canned Motor Pump Co.,Ltd	130W	AC220-240V; ClassH Main:146.3Ω Aux:161.7Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
-Alternative	Hefei Xinhua- Canned Motor Pump Co.,Ltd	140W	AC220-240V; ClassH Main:118.9Ω Aux:131.45Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
Motorfor (GPD32-5F; GPD32-5SF; GPD40-3F; GPD40-3SF)	Hefei Xinhua- Canned Motor Pump Co.,Ltd	145W	AC220-240V; ClassH Main:121,3Ω Aux:112,3Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
-Alternative	Hefei Xinhua- Canned Motor Pump Co.,Ltd	160W	AC220-240V; ClassH Main:132.8Ω Aux:146.8Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance

-Alternative	Hefei Xinhua-Canned Motor Pump Co.,Ltd	180W	AC220-240V; ClassH Main:551.1Ω Aux:60.9Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
-Alternative	Hefei Xinhua-Canned Motor Pump Co.,Ltd	200W	AC220-240V; ClassH Main:72.45Ω Aux:71.4Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
Motor(forGPDn 8y)	Hefei Xinhua-Canned Motor Pump Co.,Ltd	245W	AC220-240V; ClassH Main:65.4Ω Aux:70.3Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
Motor(for GPD15-9; GPD15-9A; GPD15-9AB; GPD15-9S)	Hefei Xinhua-Canned Motor Pump Co.,Ltd	270W	AC220-240V; ClassH Main:44.7 Ω Aux:49.35 Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
Motor(for GPD15-12; GPD25-9; GPD25-9Z; GPD32-9; GPD32-9F; GPD40-4.5F; GPD50-5F)	Hefei Xinhua-Canned Motor Pump Co.,Ltd	300W	AC220-240V; ClassH Main:36.9Ω Aux:37.0Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
-Alternative	Hefei Xinhua-Canned Motor Pump Co.,Ltd	320W	AC220-240V; ClassH Main:35.1Ω Aux:38.77Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
-Alternative	Hefei Xinhua-Canned Motor Pump Co.,Ltd	500W	AC220-240V; ClassH Main:14.7Ω Aux:16.28Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
-Alternative	Hefei Xinhua-Canned Motor Pump Co.,Ltd	700W	AC220-240V; ClassH Main:8.6Ω Aux:9.45Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance
-Alternative	Hefei Xinhua-Canned Motor Pump Co.,Ltd	1000W	AC220-240V; ClassH Main:24.7Ω Aux:27.3Ω (20℃)	EN60335-1 EN60335-2-51	Testwith appliance



-Alternative	Hefei Xinhua-Canned Motor Pump Co.,Ltd	1300W	AC220-240V; ClassH Main:18.1Ω Aux:19.95Ω (20°C)	EN60335-1 EN60335-2-51	Testwith appliance
Controlbox	CHIMEI CORPORATION	ABS	Thickness: 2,4mm	EN60335-1 EN60335-2-41	Testwith appliance
-Alternative	TEIJINLIMITED RESINANDPLAS TIC	PC	Thickness: 2,4mm	EN60335-1 EN60335-2-41	Testwith appliance
Motorbobbin	JandaElectricCo., Ltd.	PBT+30GF	Thickness: 2,4mm	EN60335-1 EN60335-2-41	Testwith appliance
-Alternative	YuyaoJiuliTools Manufacturing Co.,Ltd.	PBT+30GF	Thickness: 2,4mm	EN60335-1 EN60335-2-41	Testwith appliance
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD2039.					

<b>28.1</b>	<b>TABLE: Threaded part torque test</b>			<b>N/A</b>
Threaded part identification		Diameter of thread (mm)	Column number (I, II, or III)	Applied torque (Nm)
N/A		N/A	N/A	N/A
Supplementary information:				

29.1	TABLE: Clearances					P
	Overvoltage category .....		II			—
		Type of insulation:				
Rated impulse voltage (V):	Min. cl (mm)	Basic (mm)	Supplementary (mm)	Reinforced (mm)	Functional (mm)	Verdict / Remark
330	0,2* / 0,5 / 0,8**					N/A
500	0,2* / 0,5 / 0,8**					N/A
800	0,2* / 0,5 / 0,8**					N/A
1 500	0,5 / 0,8** / 1,0***					N/A
2 500	1,5 / 2,0***	2.2	>3,0		>3,0	P
4 000	3,0 / 3,5***			>6,0		P
6 000	5,5 / 6,0***					N/A
8 000	8,0 / 8,5***					N/A
10 000	11,0 / 11,5***					N/A
Supplementary information:						
*) For tracks on printed circuit boards if pollution degree 1 and 2						
**) For pollution degree 3						
***) If the construction is affected by wear, distortion, movement of the parts or during assembly						

29.2	TABLE: Creepage distances, basic, supplementary and reinforced insulation										P
Working voltage (V)	Creepage distance (mm) Pollution degree										
	1	2			3			Type of insulation			
		Material group			Material group						
		I	II	IIIa/IIIb	I	II	IIIa/IIIb*)	B**)	S**)	R**)	Verdict
≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9		—	—	N/A
≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9	—		—	N/A
≤50	0,36	1,2	1,7	2,4	3,0	3,4	3,8	—	—		N/A
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4		—	—	N/A
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4	—		—	N/A
125	0,56	1,5	2,1	3,0	3,8	4,2	4,8	—	—		N/A
250	0,56	1,25	1,8	2,5	3,2	3,6	<u>4,0</u>	4,2	—	—	P
250	0,56	1,25	1,8	2,5	3,2	3,6	<u>4,0</u>	—	>5,0	—	P
250	1,12	2,5	3,6	5,0	6,4	7,2	<u>8,0</u>	—	—	>10	P
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3		—	—	N/A
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3	—		—	N/A
400	2,0	4,0	5,6	8,0	10,0	11,2	12,6	—	—		N/A
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0		—	—	N/A
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0	—		—	N/A
500	2,6	5,0	7,2	10,0	12,6	14,2	16,0	—	—		N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0		—	—	N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	—		—	N/A
>630 and ≤800	3,6	6,4	9,0	12,6	16,0	18,0	20,0	—	—		N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5		—	—	N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	—		—	N/A
>800 and ≤1000	4,8	8,0	11,2	16,0	20,0	22,0	25,0	—	—		N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0		—	—	N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	—		—	N/A
>1000 and ≤1250	6,4	10,0	14,2	20,0	25,0	28,0	32,0	—	—		N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0		—	—	N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	—		—	N/A
>1250 and ≤1600	8,4	12,6	18,0	25,0	32,0	36,0	40,0	—	—		N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0		—	—	N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	—		—	N/A
>1600 and ≤2000	11,2	16,0	22,0	32,0	40,0	44,0	50,0	—	—		N/A

>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0		—	—	N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	—		—	N/A
>2000 and ≤2500	15,0	20,0	28,0	40,0	50,0	56,0	64,0	—	—		N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0		—	—	N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	—		—	N/A
>2500 and ≤3200	20,0	25,0	36,0	50,0	64,0	72,0	80,0	—	—		N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0		—	—	N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	—		—	N/A
>3200 and ≤4000	25,0	32,0	44,0	64,0	80,0	90,0	100,0	—	—		N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0		—	—	N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	—		—	N/A
>4000 and ≤5000	32,0	40,0	56,0	80,0	100,0	112,0	126,0	—	—		N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0		—	—	N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	—		—	N/A
>5000 and ≤6300	40,0	50,0	72,0	100,0	126,0	142,0	160,0	—	—		N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0		—	—	N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	—		—	N/A
>6300 and ≤8000	50,0	64,0	90,0	126,0	160,0	180,0	200,0	—	—		N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0		—	—	N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	—		—	N/A
>8000 and ≤10000	64,0	80,0	112,0	160,0	200,0	220,0	250,0	—	—		N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0		—	—	N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	—		—	N/A
>10000 and ≤12500	80,0	100,0	142,0	200,0	250,0	280,0	320,0	—	—		N/A

Supplementary information:

\*) Material group IIIb is allowed if the working voltage does not exceed 50 V

\*\*) B = Basic insulation, S = Supplementary insulation, R = Reinforced insulation

29.2	TABLE: Creepage distances, functional insulation							P
Working voltage (V)	Creepage distance (mm) Pollution degree							
	1	2			3			
		Material group			Material group			
		I	II	IIIa/IIIb	I	II	IIIa/IIIb <sup>*)</sup>	Verdict / Remark
≤10	0,08	0,4	0,4	0,4	1,0	1,0	1,0	N/A
50	0,16	0,56	0,8	1,0	1,4	1,6	1,8	N/A

125	0,25	0,71	1,0	1,4	1,8	2,0	2,2	N/A
250	0,42	1,0	1,4	2,0	2,5	2,8	<u>3,2</u>	4,2/P
400	0,75	1,6	2,2	3,2	4,0	4,5	5,0	N/A
500	1,0	2,0	2,8	4,0	5,0	5,6	6,3	N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	N/A

Supplementary information:

\*) Material group IIIb is allowed if the working voltage does not exceed 50 V

30.1	TABLE: Ball Pressure Test of Thermoplastics			P
Allowed impression diameter (mm) .....:		≤2mm		—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
Enclosure	Refer to Table 24.1	75	1,2	
Motor cover	Same as above	75	1,8	
Terminal	Same as above	125	1,0	
Supplementary information:				

30.2	TABLE: Resistance to heat and fire - Glow wire tests							P
Object/ Part No./ Material	Manufacturer/ trademark	Glow wire test (GWT); (°C)						Verdict
		550	650		750		850	
			te	ti	te	ti		
Enclosure	Seetable 24.1	NI	/	/	/	/	/	P
Terminal block	Seetable 24.1	/	/	/	NI	NI	NI	P
Motor bobbin	Seetable 24.1	/	/	/	NI	NI	NI	P
Capacitor	Seetable 24.1	/	/	/	NI	NI	NI	P
Object/ Part No./ Material	Manufacturer/ trademark	Glow-wire flammability index (GWFI), °C				GW ignition temp. (GWIT), °C		Verdict
		550	650	750	850	675	775	
--	--	--	--	--	--	--	--	--
The test specimen passed the glow wire test (GWT) with no ignition [(te – ti) ≤ 2s] (Yes/No):								Yes
If no, then surrounding parts passed the needle-flame test of annex E (Yes/No) ..... :								N/A
The test specimen passed the test by virtue of most of the flaming material being withdrawn with the glow-wire (Yes/No)? .....:								No
Ignition of the specified layer placed underneath the test specimen (Yes/No) .....:								No
Supplementary information:								
- 550 °C GWT not relevant (or applicable) to parts of material classified at least HB40 or if relevant HBF								
- The GWIT pre-selection option, the 850 °C GWFI pre-selection option, and the 850 °C GWT are not relevant (or applicable) for attended appliances								

30.2/30.2.4	TABLE: Needle- flame test (NFT)				P
Object/ Part No./ Material	Manufacturer/ trademark	Duration of ap- plication of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Ver- dict
Plasticenclosure	--	--	--	--	--
Supplementary information:					
- NFT not relevant (or applicable) for Parts of material classified as V-0 or V-1					
- NFT not relevant (or applicable) for Base material of PCBs classified as V-0 or if relevant VTM-0					

ATTACHMENT TO TRF IEC60335_2_51J			
Clause	Requirement + Test	Result - Remark	Verdict
<b>ATTACHMENT TO TEST REPORT</b> <b>IEC 60335-2-51:2019</b> <b>IEC 60335-1:2010, IEC 60335-1:2010/AMD1:2013, IEC 60335-1:2010/AMD2:2016</b> <b>EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES</b> Household and similar electrical appliances – Safety – Part 2-51: Particular requirements for stationary circulation pumps for heating and service water installations			
<b>Differences according to .....</b> : EN IEC 60335-2-51:2023 + A11:2023 used in conjunction with EN 60335-1:2012 + A11:2014 + A13:2017 + A1:2019 + A14:2019 + A2:2019 + A15:2021 + A16:2023 EN 62233:2008			
<b>TRF template used.....</b> : IECEE OD-2020-F2:2022, Ed. 1.2			
<b>Attachment Form No. ....</b> : EU_GD_IEC60335_2_51J			
<b>Attachment Originator.....</b> : Nemko Group AS			
<b>Master Attachment.....</b> : Dated 2024-07-15			
<b>Copyright © 2024 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.</b>			
	<b>CENELEC COMMON MODIFICATIONS (EN)</b>		--
6.1	Delete “class 0” and “class 01”		N/A
7.1	Single-phase appliances to be connected to the supply mains: 230 V covered		P
	Multi-phase appliances to be connected to the supply mains: 400 V covered		N/A
7.12	The instructions for stationary circulation pumps include the substance of the following:		--
	- Children shall not use or play with this appliance		P
	- Cleaning and user maintenance shall not be made by children		P
	- This appliance can be used by persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and if they understand the hazards involved		P
8.1.1	Also test probe 18 of EN 61032 is applied		P
	The appliance being in every possible position during the test, except that		P
	appliances normally used on the floor and having a mass exceeding 40 kg are not tilted		N/A
	The force on the probe in the straight position is increased to 10 N when probe 18 is used		P

ATTACHMENT TO TRF IEC60335_2_51J			
Clause	Requirement + Test	Result - Remark	Verdict
	When using test probe 18 the appliance is fully assembled as in normal use without any parts removed, and		P
	parts intended to be removed for user maintenance are also not removed		P
8.1.3	Instead of test probe B, test probe 18 and test probe 13, for appliances other than those of class II, test probe 41 of IEC 61032 is applied with a force not exceeding 1 N to live parts of visibly glowing heating elements, all poles of which can be disconnected by a single switching action		N/A
8.2	Compliance is checked by inspection and by applying the test probes of EN 61032 in accordance with the conditions specified in 8.1.1		P
	Test probe B and probe 18 of EN 61032 are applied to built-in appliances and fixed appliances only after installation		N/A
15.1.2	Appliances with an automatic cord reel tested with the cord in the most unfavourable position so that the reeling of the wet cord may affect electrical insulation during operation, the cord not being dried before reeling		N/A
20.2	For appliances having hazardous moving parts, due to their working function, e.g. the needle of a sewing machine, tools of kitchen machines or the blade of an electrical knife, full protection is not possible for performing their intended use		P
	When using a test probe similar to test probe B of EN 61032, having a circular stop face and applied with a force of 5N, the accessories and detachable covers are removed		P
	When using test probe 18 it is applied with a force of 2,5N on the appliance fully assembled		P
22.12	Other parts intended to be detached during use, maintenance or cleaning (e.g. batteries, battery covers, lids, attachments, steam nozzles) are not considered as parts providing a similar function as handles, knobs, grips, levers		P
22.17	The requirement is not applicable to built-in appliances		N/A
22.44	An appliance is child-appealing if one of the following criteria is present:		--
	- appliance decorated using faces, cartoon like characters, or similar images		N/A
	- appliance using shapes representing animals, characters, persons or scale models		N/A
	An appliance is child-appealing if more than one of the following criteria are present:		--

ATTACHMENT TO TRF IEC60335_2_51J			
Clause	Requirement + Test	Result - Remark	Verdict
	- using non-functional light (functional light is e.g. illumination of an object or area, signal indicating status of an appliance)		N/A
	- using non-functional sound (e.g. music)		N/A
	- using non-functional movement		N/A
	If the appliance is child-appealing and		--
	- has a mass less than 4 kg, and		N/A
	- is mounted or normally intended for use at a height less than 850 mm,		N/A
	the following conditions are met:		N/A
	- surface temperature rise requirements not exceeded		N/A
	- hazardous moving parts not accessible		N/A
	- live parts not accessible		N/A
	- liquid temperature requirement not exceeded,		N/A
	unless for vessels in which two independent and sequential actions are needed to access the liquid		N/A
	- the requirement of 22.12 is applicable for all accessible parts of the appliance		N/A
24.1	Components comply with the safety requirements specified in the relevant EN standards as far as they reasonably apply		P
	Motors are not required to comply with EN 60034-1, but tested as part of the appliance according to this standard		P
	Relays are tested as part of the appliance according to this standard		N/A
	Relays may be alternatively tested to EN 60730-1 and the additional requirements in EN 60335-1		N/A
	The requirements of Clause 29 of this standard apply between live parts of components and accessible parts of the appliance		P
	Components may comply with the requirements for clearances and creepage distances for functional insulation as specified in the relevant component standard		P
	The requirements of 30.2 of this standard apply to parts of non-metallic material in components including parts of non-metallic material supporting current-carrying connections inside components		P
	Components that have not been tested and shown to comply with the EN standard for the relevant component are tested according to the requirements of 30.2 of this standard		P



ATTACHMENT TO TRF IEC60335_2_51J			
Clause	Requirement + Test	Result - Remark	Verdict
	Components that have been tested and shown to comply with the resistance to fire requirements in the EN standard for the relevant component need not be retested provided that:		--
	- the severity specified in the component standard is not less than the severity specified in 30.2, and		P
	- the test report for the component states the values of $t_e$ and $t_i$ acc. to EN 60695-2-11		P
	If the above two conditions are not satisfied, the component is tested as part of the appliance		P
	Power electronic converter circuits are not required to comply with EN 62477-1, but tested as part of the appliance according to this standard		P
	Unless components have been tested and found to comply with the relevant EN standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9		P
	For components mentioned in 24.1.1 to 24.1.9, no additional tests specified in the relevant EN standard for the component are necessary other than those specified in 24.1.1 to 24.1.9		P
	Components that have not been tested and found to comply with the relevant EN standard, and		P
	components that are not marked or not used in accordance with their marking,		P
	are tested in accordance with the conditions occurring in the appliance, the number of samples being that required by the relevant standard		P
	Lamp-holders and starter-holders that have not been tested and found to comply with the relevant EN standard are tested as a part of the appliance and additionally comply with the gauging and interchangeability requirements of the relevant EN standard under the conditions occurring in the appliance		N/A
	Where the relevant EN standard specifies these gauging and interchangeability requirements at elevated temperatures, the temperatures measured during the tests of Clause 11 are used		N/A
	There are no additional tests specified for nationally standardized plugs such as those detailed in IEC/TR 60083 or connectors complying with the standard sheets of EN 60320-1 and EN 60309, unless they are specifically mentioned in the text of this standard		P
	Plugs and socket-outlets and other connecting devices of interconnection cords are not interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 60906-1, or		P

<b>ATTACHMENT TO TRF IEC60335_2_51J</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	with connectors and appliance inlets complying with the standard sheets of EN 60320-1, if		N/A
	direct supply to these parts from the supply mains gives rise to a hazard		N/A
	For plugs used in CENELEC countries Annex ZH applies		N/A
24.Z1	Type S2 and S3 capacitors according to EN 60252-1 are not required to undergo the testing as required by 30.2.2 and 30.2.3.1		N/A
25.1	Plugs and pins for insertion into socket outlets follow the relevant standards sheets in Annex ZH		N/A
25.7	Rubber sheathed cords (60245 IEC 53) are not suitable for appliances intended to be used outdoors, or		N/A
	when they are liable to be exposed to significant amount of ultraviolet radiation		N/A
25.25	Instead of IEC/TR 60083, dimensions of the pins and engagement face of plugs of appliances that are inserted into socket-outlets are in accordance with the dimensions of the relevant plug standard		N/A
	Common plugs and socket-outlets types in CENELEC countries as shown in Annex ZH		N/A
26.11	Conductors connected by soldering are not considered to be positioned or fixed so that reliance is not placed upon the soldering alone to maintain them in position,		P
	unless they are held in place near the terminals independently of the solder		N/A
29.3.Z1	Appliance constructed so that if there is a possibility of damaging the insulation during installation, the insulation withstands the scratch and penetration test of 21.2		N/A
32	Compliance regarding electromagnetic fields is checked according to EN 62233		P
Annex I, 19.1.101	The appliance is supplied at rated voltage and operated under normal operation with each of the fault conditions specified		N/A
	The duration of any of the tests is as specified in 19.7		N/A

<b>ZA</b>	<b>ANNEX ZA (NORMATIVE) SPECIAL NATIONAL CONDITIONS (EN)</b>	---
	<b>Denmark, Sweden, Norway and Finland</b>	--
7.12.8	The maximum inlet water pressure is at least 1,0 MPa .....	N/A

<b>ATTACHMENT TO TRF IEC60335_2_51J</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	<b>Norway</b>		--
19.5	The test is also applicable to appliances intended to be permanently connected to fixed wiring		N/A
	<b>Norway</b>		--
22.2	The second paragraph of this subclause, dealing with single-phase, permanently connected class I appliances having heating elements, is not applicable due to the supply system		N/A
	<b>Denmark</b>		--
22.47	The maximum inlet water pressure is at least 1,0 MPa .....		N/A
	<b>Ireland, United Kingdom and Cyprus</b>		--
25.8	In the table, the line >10 A and ≤16 A is replaced with:		N/A
	> 10 and ≤ 13 1,25 (1,0) <sup>b</sup>		N/A
	> 13 and ≤ 16 1,5 (1,0) <sup>b</sup>		N/A
<b>ZB</b>	<b>ANNEX ZB (INFORMATIVE) A-DEVIATIONS</b>		--
	<b>Ireland</b>		--
25.1 and 25.25	These regulations apply to all plugs for domestic use at a voltage of not less than 200 V and in general allow only plugs complying with I.S. 401:1997, or equivalent, to be fitted to domestic appliances		N/A
	<b>United Kingdom</b>		--
25.1 and 25.25	These regulations apply to all plugs for domestic use at a voltage of not less than 200 V and in general allow only plugs to BS 1363 to be fitted to domestic appliances.		N/A
	It also allows plugs to BS 4573 and EN 50075 to be fitted to shavers and toothbrushes		N/A

ATTACHMENT TO TRF IEC60335_2_51J			
Clause	Requirement + Test	Result - Remark	Verdict
ZC	<b>ANNEX ZC (NORMATIVE)</b> NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS		--
	A list of documents referred to in the text of this standard in such a way that some or all of their content constitutes requirements of this document		P
ZD	<b>ANNEX ZD (INFORMATIVE)</b> IEC and CENELEC CODE DESIGNATIONS FOR FLEXIBLE CORDS		--
	List of IEC and CENELEC code designations for flexible cords		P
ZE	<b>ANNEX ZE (INFORMATIVE)</b> SPECIFIC ADDITIONAL REQUIREMENTS FOR APPLIANCES AND MACHINES INTENDED FOR COMMERCIAL USE		--
7.1	Business name and full address of the manufacturer and, where applicable, his authorized representative.....:		N/A
	Model or type reference .....		N/A
	Serial number, if any		N/A
	Production year		N/A
	Designation of the circulation pump.....:		N/A
7.12	Instructions provided with the appliance so that the appliance can be used safely		N/A
	The instructions contain at least the following information:		N/A
	- the business name and full address of the manufacturer and, where applicable, his authorized representative		N/A
	- model or type reference of the appliance as marked on the appliance itself, except for the serial number		N/A
	- the designation of the appliance together with its explanation in case it is given by a combination of letters and/or numbers		N/A
	- the general description of the appliance, when needed due to the complexity of the appliance		N/A
	- specific precautions required during installation, operation, adjusting, user maintenance, cleaning, repairing or moving		N/A
	- when needed drawings, diagrams, descriptions and explanations necessary for the safe use and user maintenance of the appliance		N/A
	- the possible reasonably foreseeable misuse and, whenever relevant, a warning against the effects it may have on the safe use of the appliance		N/A

<b>ATTACHMENT TO TRF IEC60335_2_51J</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	The words "Original instructions" appear on the language version(s) verified by the manufacturer or by the authorized representative		N/A
	When a translation of the original instructions has been provided by a person introducing the appliance on the market; the meaning of the sentence "Translation of the original instructions" appear in the relevant instructions delivered with the appliance		N/A
	The instructions for maintenance/service to be done by specialized personnel, mandated by the manufacturer or the authorized representative may be supplied in only one Community language which the specialized personnel understand		N/A
	The instructions indicate the type and frequency of inspections and maintenance required for safe operation including the preventive maintenance measures		N/A
	The instructions indicate the substance of the following:		N/A
	This appliance is designed to be used in commercial areas		N/A
7.12.ZE1	If needed for specific appliances, the following information to be given:		N/A
	- on use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns, if these operations have consequences on stability of the appliance in order to avoid overturning, falling or uncontrolled movements of the appliance or of its component parts		N/A
	- on how to maintain adequate mechanical stability when in use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance		N/A
	- on the protective measures to be taken by the user, including, where appropriate, the personal protective equipment to be provided		N/A
	- on the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur the operating method to safely unblock the appliance		N/A
	- on the specifications on the spare parts to be used, when these affect the health and safety of the operator		N/A
	- for stationary circulation pumps, the instructions indicate that the A-weighted emission sound pressure level is less than or equal to 70 dB(A)		N/A
7.12.ZE2	The instructions include the substance of the following:		N/A
	A warning that the pump shall be disconnected from its power source during cleaning or maintenance and when replacing parts:		N/A

ATTACHMENT TO TRF IEC60335_2_51J			
Clause	Requirement + Test	Result - Remark	Verdict
	- for mains operated pumps by removing the plug from the socket-outlet or;		N/A
	- for battery operated pumps by safely disconnecting at least the non-earthed pole of the battery or by an equivalent method (disconnecting device) or;		N/A
	- for mains operated pumps without a plug, by operating the disconnection device		N/A
	It is clearly indicated that the disconnection has to be such that an operator can check from any of the points to which he has access that the power source remains disconnected		N/A
	If this is not possible, due to the construction of the appliance or its installation, a disconnection with a locking system in the isolated position is provided		N/A
	For pumps other than plug connected or battery-operated pumps, the instructions for use include information on the recommended disconnecting device		N/A
8.1.1	Test probe B of EN 61032 is applied with a force not exceeding 1 N, the appliance being in every possible position, except that appliances normally used on the floor and having a mass exceeding 40 kg are not tilted. Through openings, the test probe is applied to any depth that the probe will permit and is rotated or angled before, during and after insertion to any position. If the opening does not allow the entry of the probe, the force on the probe in the straight position is increased to 20 N. If the probe then enters the opening, the test is repeated with the probe in the angled position		N/A
19.11.4.8	The appliance continues to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage fluctuation occurred, or		N/A
	a manual operation is required to restart it		N/A
20.1	Appliances and their components and fittings have adequate mechanical stability during transportation, assembly, dismantling and any other action involving the appliance		N/A
20.2	Dangerous moving transmission parts safeguarded either by design or guards		N/A
	When guards are used, they are fixed guards, interlocking movable guards or protective devices		N/A
	Moving parts directly involved in the function of the appliance which cannot be made completely inaccessible fitted with:		N/A
	- fixed guards or interlocking movable guards preventing access to those sections of the parts that are not used in the work, and		N/A

ATTACHMENT TO TRF IEC60335_2_51J			
Clause	Requirement + Test	Result - Remark	Verdict
	- adjustable guards restricting access to those sections of the moving parts where access is necessary		N/A
	Interlocking movable guards used where frequent access is required		N/A
21.1	Appliances and their components and fittings have adequate mechanical strength and is constructed to withstand such rough handling that may be expected in normal use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance		N/A
22.ZE.1	For appliances provided with a seat, the seat gives adequate stability		N/A
	The distance between the seat and the control devices capable of being adapted to the operator		N/A
22.ZE.2	For appliances provided with separate devices for the start and the stop functions, the stop function is unambiguously identifiable and does always override the start function		N/A
	For appliances provided with one device performing the start and the stop function, the stop function is unambiguously identifiable and does always override the start function		N/A
22.ZE.3	Appliances designed in such a way that incorrect mounting is avoided, if this can lead to an unsafe situation		N/A
	If this is not possible, information on the correct mounting is given directly on the part and/or the enclosure		N/A
22.ZE.4	Where the weight, size or shape prevents appliances from being moved manually, they are fitted with attachments for lifting gear, or		N/A
	so designed that they can be fitted with such attachments, or		N/A
	be shaped in such a way that standard lifting gear can easily be used		N/A
	Appliances to be moved manually are constructed or equipped so that they can be moved easily and safely		N/A
22.ZE.5	The fixing systems of fixed guards which prevent access to hazardous moving transmission parts only removable with the use of tools		N/A
	If such guards have to be removed by the user for routine cleaning or maintenance their fixing systems remain attached to the fixed guards or to the machine after removal		N/A
	Where possible, guards are incapable of remaining in place without their fixings		N/A

ATTACHMENT TO TRF IEC60335_2_51J			
Clause	Requirement + Test	Result - Remark	Verdict
	This does not apply if, after removal of the screws, or if the component is incorrectly repositioned, the appliance becomes inoperative		N/A
	Movable guards are interlocked		N/A
	The interlocking devices prevent the start of hazardous appliance functions until the guards are fixed in their position, and give a stop command whenever they are no longer closed		N/A
	Where it is possible for an operator to reach the danger zone before the risk due to hazardous appliance functions has ceased, movable guards associated with a guard locking device in addition to an interlocking device that:		N/A
	- prevents the start of hazardous appliance functions until the guard is closed and locked, and		N/A
	- keeps the guard closed and locked until the risk of injury from the hazardous appliance functions has ceased		N/A
	Interlocking movable guards remain attached to the appliance when open, and		N/A
	they are designed and constructed in such a way that they can be adjusted only by means of an intentional action		N/A
22.ZE.6	Interlocking movable guards designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous appliance functions		N/A
	The guard is opened to the extent needed to cause the interlocking to operate and is then closed		N/A
	This operation is carried out for 5000 cycles		N/A
	After this test any defect that may be expected in normal use is applied to the interlock system, including interruption of the supply, only one defect being simulated at a time		N/A
	After these tests the interlock system is fit for further use		N/A
22.ZE.7	Adjustable guards restricting access to areas of the moving parts strictly necessary for the work are:		N/A
	- adjustable manually or automatically, depending on the type of work involved, and		N/A
	- readily adjustable without the use of tools		N/A
22.ZE.8	In case of interruption, re-establishment after an interruption or fluctuation in whatever manner of the power supply, the appliance does not restart		N/A



<b>ATTACHMENT TO TRF IEC60335_2_51J</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	However, automatic restarting of the operation is allowed if the appliance may continue to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage interruption or fluctuation occurred		N/A
22.ZE.9	Appliances fitted with means to isolate them from all energy sources		N/A
	Such isolators are clearly identified, and		N/A
	they are capable of being locked if reconnection endanger persons		N/A
	After the energy source is disconnected, it is possible to dissipate any energy remaining or stored in the circuits of the appliance without risk to persons		N/A
22.ZE.10	Noise reduction is achieved by applying measures at source to control noise, for example EN ISO 11688-1:2009		N/A
	The success of the applied noise reduction measures is assessed based on the actual noise emission values in relation to other machines of the same type with comparable non-acoustical technical data		N/A
	Compliance is checked by the noise test code, if any, given in part 2		N/A
<b>ZF</b>	<b>ANNEX ZF (INFORMATIVE) CRITERIA APPLIED FOR THE ALLOCATION OF PRODUCTS COVERED BY STANDARDS IN THE EN 60335 SERIES UNDER LVD OR MD</b>		--
	List of standards under CENELEC/TC61 with the allocation under the LVD (Low Voltage Directive) or the MD (Machinery Directive) .....		P
<b>ZG</b>	<b>ANNEX ZG (NORMATIVE) UV APPLIANCES</b>		P
	The following modifications to this standard apply to appliances having UV emitters		N/A
	This annex is not applicable to appliances covered by the scopes of IEC 60335-2-27, IEC 60335-2-59 or IEC 60335-2-109		N/A
7.12.ZG	The instructions for appliances incorporating UVC emitters include the substance of the following: WARNING — This appliance contains a UV emitter. Do not stare at the light source		N/A
32	For appliances incorporating UV emitters the manufacturer delivers a declaration providing evidence that the plastic material exposed to the radiation is UV resistant		N/A

ATTACHMENT TO TRF IEC60335_2_51J			
Clause	Requirement + Test	Result - Remark	Verdict
<b>ZH</b>	<b>ANNEX ZH (INFORMATIVE)</b> <b>Common plug and socket-outlet types in CENELEC countries</b>		--
	In general, supply cords of single-phase appliances having a rated current not exceeding 16 A are fitted with a plug complying with the following standard sheets:		--
	- for class I appliances or class II appliances with functional earth, standard sheet EU2, EU3 or EU4 .....:		P
	- for class II appliances, standard sheet EU5, EU6 or EU7 .....:		N/A
	There are exemptions or differences in certain CENELEC countries		P
<b>ZI</b>	<b>ANNEX ZI (INFORMATIVE)</b> <b>Information on the application of A11:2014 to EN 60335-1:2012 CENELEC CLC/TC 61(SEC)2096A</b>		--
	Clarification of the application of parts 2 in conjunction with the 2002 or 2012 version of EN 60335-1		P
<b>ZZA</b>	<b>ANNEX ZZA (INFORMATIVE)</b> <b>RELATIONSHIP BETWEEN THIS EUROPEAN STANDARD AND THE SAFETY OBJECTIVES OF DIRECTIVE 2014/35/EU [2014 OJ L96] AIMED TO BE COVERED</b>		--
	This standard provides one means of conforming to safety objectives of Directive 2014/35/EU		P
	When cited in the Official Journal under that Directive, compliance with the normative clauses of this standard given in Table ZZA.1 confers a presumption of conformity with the safety objectives of that Directive and associated EFTA regulations		P
	Compliance with this Part 2 when used together with the Part 1 provides one means of conformity with the safety objectives		P
<b>ZZB</b>	<b>ANNEX ZZB (INFORMATIVE)</b> <b>RELATIONSHIP BETWEEN THIS EUROPEAN STANDARD AND THE ESSENTIAL REQUIREMENTS OF DIRECTIVE 2006/42/EC AIMED TO BE COVERED</b>		--
	This standard provides one means of conforming to essential requirements of EU Directive 2006/42/EC		N/A

<b>ATTACHMENT TO TRF IEC60335_2_51J</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	When cited in the Official Journal under that Directive, compliance with the normative clauses of this standard given in Table ZZB.1 confers a presumption of conformity with the essential requirements of that Directive and associated EFTA regulations		N/A
	Compliance with this Part 1 when used together with the relevant Part 2 provides one means of conformity with the essential health and safety requirements		N/A
	<b>ANNEX EN 62233:2008 + AC:2008</b> <b>EMF- ELECTROMAGNETICS FIELDS</b>		
	The tested product also complies with the requirements of EN 62233:2008		
	Limit .....100%	Measured max. : <10%	P