BS EN 50514:2014

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Audio, video and information technology equipment — Routine electrical safety testing in production

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National foreword

This British Standard is the UK implementation of EN 50514:2014. It supersedes BS EN 50514:2008 which will be withdrawn on 21 July 2017.

The UK participation in its preparation was entrusted to Technical Committee EPL/108, Safety of electronic equipment within the field of audio/video, information technology and communication technology.

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

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

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

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English Version

Audio, video and information technology equipment - Routine electrical safety testing in production

Appareils audio, vidéo et matériel de traitement de l'information - Essais individuels de série, en production, pour la vérification de la sécurité électrique

Audio- und Video- Geräte und Einrichtungen der Informationstechnik - Stückprüfungen der elektrischen Sicherheit in der Fertigung

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 50514:2014) has been prepared by CLC/TC 108X, Safety of electronic equipment within the fields of audio/video, information technology and communication technology.

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2015-07-21
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2017-07-21

This document supersedes EN 50514:2008.

In comparison with EN 50514:2008, the technical change in this document is the addition of requirements for equipment operating on a d.c. mains.

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

This European Standard applies to equipment that complies with EN 60065 or EN 60950-1. Most of the tests specified in those standards are TYPE TESTS. For ROUTINE TESTS, to be carried out during or after manufacture, TYPE TESTS may not be suitable. Nevertheless, it is recognized that some tests are necessary in order to guarantee an acceptable level of safety.

This European Standard defines ROUTINE TESTS to measure the resistance of the earthing path and to check the insulation between the PRIMARY CIRCUIT and accessible conductive parts. In addition, this European Standard defines the documentation to be maintained by the manufacturer in respect of these tests.

This standard is complementary to the product safety standards (EN 60065 or EN 60950-1) and is to be considered only as a tool for voluntary application by manufacturers.

This European Standard can be used in association with Permanent Document CIG 021, *Factory inspection procedures - Harmonised requirements,* of the European Electrical Products Certification Association.

Permanent Document CIG 021 can be obtained from signatory bodies (certification bodies).

In this European Standard, the following print types are used:

— normative text: roman type;

— *test specifications: italic type;*

— terms which are defined in EN 60065 or EN 60950-1: SMALL CAPITALS.

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1 Scope

This European Standard defines routine test procedures for use during or after manufacturing of complete equipment, sub-assemblies or components, certified or declared as complying with EN 60065 or EN 60950-1 and powered by an a.c. or d.c. mains supply. It defines the ROUTINE ELECTRICAL SAFETY TEST and their procedures to be applied during or at the end of the manufacturing process of apparatus certified or declared as complying with EN 60065 or EN 60950-1.

The application of the tests detailed in this European Standard is design dependent and needs to be defined by the manufacturer.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 60065, *Audio, video and similar electronic apparatus - Safety requirements (IEC 60065)*

EN 60950-1, *Information technology equipment - Safety - Part 1: General requirements (IEC 60950-1)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 60065 or EN 60950-1 and the following apply.

3.1
routine electrical safety test
test to which each individual device is subjected during or at the end of manufacture, to detect manufacturing failures and unacceptable tolerances in manufacturing and materials

4 Conformance

In order to conform to this European Standard, equipment shall pass the tests of Clause 5 where applicable and the results of these tests shall be recorded according to Clause 6.

5 Routine tests

5.1 Resistance of protective earthing paths

For CLASS I apparatus, the continuity of the protective earthing connection shall be checked between the protective earth contact of the MAINS plug or appliance inlet, or the PROTECTIVE EARTHING TERMINAL in case of a PERMANENTLY CONNECTED APPARATUS, and

— the ACCESSIBLE conductive parts, including TERMINALS regarded as ACCESSIBLE, which shall be connected to the PROTECTIVE EARTHING TERMINAL, and

— the protective earth contact of the socket-outlets respectively, if provided to deliver power to other apparatus.

The test current is 150 % of the rating of the overcurrent device protecting the PROTECTIVE BONDING CONDUCTOR, but not less than 10 A and not more than 25 A (a.c. or d.c.) and is applied for any duration between 1 s and 4 s. The source shall have a no-load voltage not exceeding 12 V.

The measured resistance shall not exceed 0,1 Ω.

It is permitted to include the power cord (if any) in the resistance measurement and, if the result exceeds 0,1 Ω, to subtract the resistance of the PROTECTIVE EARTHING CONDUCTOR of the power cord.

Care should be taken that the contact resistance between the tip of the measuring probe and the conductive part under test does not influence the test result.

5.2 Electric strength test

ROUTINE TESTS for electric strength shall be carried out between the PRIMARY CIRCUIT and ACCESSIBLE conductive parts. For ACCESSIBLE SECONDARY CIRCUITS, it is permitted to test separately, before final assembly, subassemblies and components, such as transformers, if the relevant insulation cannot be tested in the complete equipment, provided that the complete equipment complies with EN 60065 or EN 60950-1 as appropriate.

The insulation of the apparatus shall be checked by the following test.

— For an apparatus supplied by an a.c. MAINS, an a.c. test voltage of substantially sine-wave form, having MAINS frequency, or a d.c. test voltage or a combination of both with a peak value as specified in Table 1 is applied.

— For an apparatus supplied by a d.c. mains, a d.c. voltage according to Table 2 is applied.

The test voltage is applied between the supply TERMINALs connected in parallel and

— TERMINALs regarded as ACCESSIBLE, and

— ACCESSIBLE conductive parts respectively,

which may become HAZARDOUS LIVE in the event of an insulation fault as a result of incorrect assembly.

TERMINALS regarded as ACCESSIBLE and ACCESSIBLE conductive parts may be connected together during the electric strength test.

Table 1 — A.C. test voltage

Application of test voltage	**Test voltage** [V (peak) a.c. or d.c.]
BASIC INSULATION	2 120 (1 500 r.m.s.)
DOUBLE OR REINFORCED INSULATION	3 540 (2 500 r.m.s.)
NOTE The test voltages given are the minimum test voltages to be applied. Higher voltages are allowed at the discretion of the manufacturer.	

Table 2 — D.C. test voltage

Application of test voltage	**Test voltage** V d.c.	
	Up to and including 42,4 V peak or 60 V d.c.	Over 42,4 V peak or 60 V d.c. up to and including 10KV peak or d.c.
BASIC INSULATION	No test	see V_a in Table 3
DOUBLE OR REINFORCED INSULATION	No test	see V_b in Table 3

Table 3 — Additional D.C. test voltages

U peak or d.c.	V_a	V_b	*U* peak or d.c.	V_a	V_b	*U* peak or d.c.	V_a	V_b
34	500	800	250	1 261	2 018	1 750	3 257	3 257
35	507	811	260	1 285	2 055	1 800	3 320	3 320
36	513	821	270	1 307	2 092	1 900	3 444	3 444
38	526	842	280	1 330	2 127	2 000	3 566	3 566
40	539	863	290	1 351	2 162	2 100	3 685	3 685
42	551	882	300	1 373	2 196	2 200	3 803	3 803
44	564	902	310	1 394	2 230	2 300	3 920	3 920
46	575	920	320	1 414	2 263	2 400	4 034	4 034
48	587	939	330	1 435	2 296	2 500	4 147	4 147
50	598	957	340	1 455	2 328	2 600	4 259	4 259
52	609	974	350	1 474	2 359	2 700	4 369	4 369
54	620	991	360	1 494	2 390	2 800	4 478	4 478
56	630	1 008	380	1 532	2 451	2 900	4 586	4 586
58	641	1 025	400	1 569	2 510	3 000	4 693	4 693
60	651	1 041	420	1 605	2 567	3 100	4 798	4 798
62	661	1 057	440	1 640	2 623	3 200	4 902	4 902
64	670	1 073	460	1 674	2 678	3 300	5 006	5 006
66	680	1 088	480	1 707	2 731	3 400	5 108	5 108
68	690	1 103	500	1 740	2 784	3 500	5 209	5 209
70	699	1 118	520	1 772	2 835	3 600	5 309	5 309
72	708	1 133	540	1 803	2 885	3 800	5 507	5 507
74	717	1 147	560	1 834	2 934	4 000	5 702	5 702
76	726	1 162	580	1 864	2 982	4 200	5 894	5 894
78	735	1 176	588	1 875	3 000	4 400	6 082	6 082
80	744	1 190	600	1 893	3 000	4 600	6 268	6 268
85	765	1 224	620	1 922	3 000	4 800	6 452	6 452
90	785	1 257	640	1 951	3 000	5 000	6 633	6 633
95	805	1 288	660	1 979	3 000	5 200	6 811	6 811
100	825	1 319	680	2 006	3 000	5 400	6 987	6 987
105	844	1 350	700	2 034	3 000	5 600	7 162	7 162
110	862	1 379	720	2 060	3 000	5 800	7 334	7 334
115	880	1 408	740	2 087	3 000	6 000	7 504	7 504
120	897	1 436	760	2 113	3 000	6 200	7 673	7 673
125	915	1 463	780	2 138	3 000	6 400	7 840	7 840
130	931	1 490	800	2 164	3 000	6 600	8 005	8 005
135	948	1 517	850	2 225	3 000	6 800	8 168	8 168
140	964	1 542	900	2 285	3 000	7 000	8 330	8 330
145	980	1 568	950	2 343	3 000	7 200	8 491	8 491
150	995	1 593	1 000	2 399	3 000	7 400	8 650	8 650
152	1 000	1 600	1 050	2 454	3 000	7 600	8 807	8 807
[a] 155	1 000	1 617	1 100	2 508	3 000	7 800	8 964	8 964
[a] 160	1 000	1 641	1 150	2 560	3 000	8 000	9 119	9 119
[a] 165	1 000	1 664	1 200	2 611	3 000	8 200	9 273	9 273
[a] 170	1 000	1 688	1 250	2 661	3 000	8 400	9 425	9 425
[a] 175	1 000	1 711	1 300	2 710	3 000	8 600	9 577	9 577
[a] 180	1 000	1 733	1 350	2 758	3 000	8 800	9 727	9 727
[a] 184	1 000	1 751	1 400	2 805	3 000	9 000	9 876	9 876
185	1 097	1 755	1 410	2 814	3 000	9 200	10 024	10 024
190	1 111	1 777	1 450	2 868	3 000	9 400	10 171	10 171
200	1 137	1 820	1 500	2 934	3 000	9 600	10 317	10 317
210	1 163	1 861	1 550	3 000	3 000	9 800	10 463	10 463
220	1 189	1 902	1 600	3 065	3 065	10 000	10 607	10 607
230	1 214	1 942	1 650	3 130	3 130			
240	1 238	1 980	1 700	3 194	3 194			

NOTE Linear interpolation is permitted between the nearest two points.

[a] At these voltages, the values of V_b are determined by the general curve $V_b = 155{,}86\ U^{0{,}4638}$ and are not $1{,}6\ V_a$.

Before the test voltage is applied, intimate contact shall be made between the specimen and the connection devices.

Initially it is allowed to apply not more than half of the prescribed test voltage, then it is raised with a steepness not exceeding 1 560 V/ms to the full value which is held for 1 s to 4 s.

NOTE A steepness of 1 560 V/ms corresponds to the steepness of a sine-wave with a MAINS frequency of 60 Hz.

During the test, MAINS switches and functional switches CONDUCTIVELY CONNECTED TO THE MAINS, if any, shall be in the on-position and it shall be ensured by suitable means that the test voltage is effectively connected to the specimen.

No flash-over or breakdown shall occur during the test. The test voltage source shall be provided with a current sensing (over-current) device which, when activated, gives an indication "unacceptable". When loaded up to and including the tripping current, the voltage source shall still deliver the prescribed voltage.

Tripping of the current sensing device is regarded as a flash-over or breakdown.

6 Records of tests

All test results shall be kept available. The choice of support and format for reports is left to the manufacturer; separate forms (one for each apparatus) or lists of apparatus, grouped according to the most suitable parameters (periods of time, model, etc.) are equally acceptable.

The only obligation is the availability of data and their immediate interpretability for all apparatus leaving the production line.

The following data shall be retrievable and/or be derived from factory procedures for each test:

— date of test,

— model of the apparatus,

— serial number of the equipment or another identifier permitting the identification without ambiguity,

— location of the point tested,

— value of earthing circuit resistance with the corresponding current value (*),

— value of voltage applied during the electric strength test (*),

— quick-reference information that the whole set of tests has/has not been successful.

As an alternative to the values marked with an asterisk (*) above, a record of the result of each test (pass or fail) is permitted.

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