IEC 62586-2

Edition 2.0 2021-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

AMENDMENT 1
AMENDEMENT 1

Power quality measurement in power supply systems –
Part 2: Functional tests and uncertainty requirements

Mesure de la qualité de l'alimentation dans les réseaux d'alimentation –
Partie 2: Essais fonctionnels et exigences d'incertitude

IEC 62586-2:2017-03/AMD1:2021-09(en-fr)

IEC 62586-2

Edition 2.0 2021-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

AMENDMENT 1
AMENDEMENT 1

Power quality measurement in power supply systems – Part 2: Functional tests and uncertainty requirements

Mesure de la qualité de l'alimentation dans les réseaux d'alimentation – Partie 2: Essais fonctionnels et exigences d'incertitude

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 17.220.20

ISBN 978-2-8322-9930-2

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

____

POWER QUALITY MEASUREMENT IN POWER SUPPLY SYSTEMS –

Part 2: Functional tests and uncertainty requirements

AMENDMENT 1

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to IEC 62586-2:2017 has been prepared by IEC technical committee 85: Measuring equipment for electrical and electromagnetic quantities.

The text of this amendment is based on the following documents:

FDIS	Report on voting
85/770/FDIS	85/795/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Amendment is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications/.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

5.1.4 Single "power-system influence quantities"

Replace in Table 4 the footnotes [c] *and* [d] *with:*

[c] This signal represents a crest factor of 2 and applies to voltage signals.

[d] This signal represents a crest factor of 3 and applies to current signals.

6.2.2.2 Variations due to single influence quantities

Replace Subclause 6.2.2.2 by the following:

Each test shall last at least 1 s.

No.	Target of the test	Testing points according to Table 3	Complementary test conditions according to Table 4	Test criterion (if test is applicable)
A2.3.1	Measure influence of frequency on measurement uncertainty (for further calculations as required in 8)	P3 for voltage magnitude	S1 for frequency	TC10/12(unc)
			S3 for frequency	
A2.3.2	Measure influence of harmonics on measurement uncertainty (for further calculations as required in 8)	P3 for voltage magnitude	S1 for harmonics	TC10/12(unc) on ch1 compared to a reference voltage

6.4.1 General

Clarification about units of y axis; replace Figure 1 by the following:

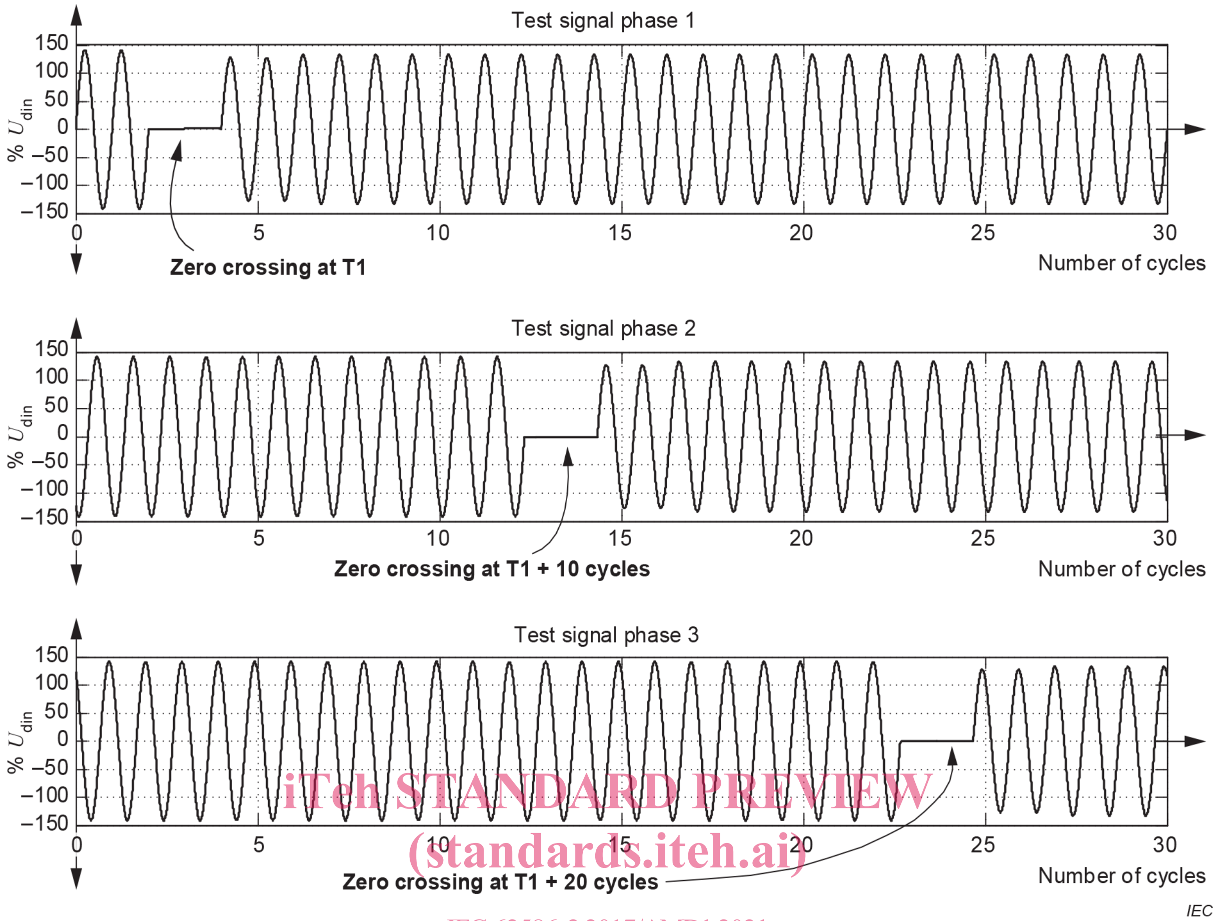

Figure 1 – Overview of test for dips according to test A4.1.1

Clarification about units of y axis; replace Figure 2 by the following:

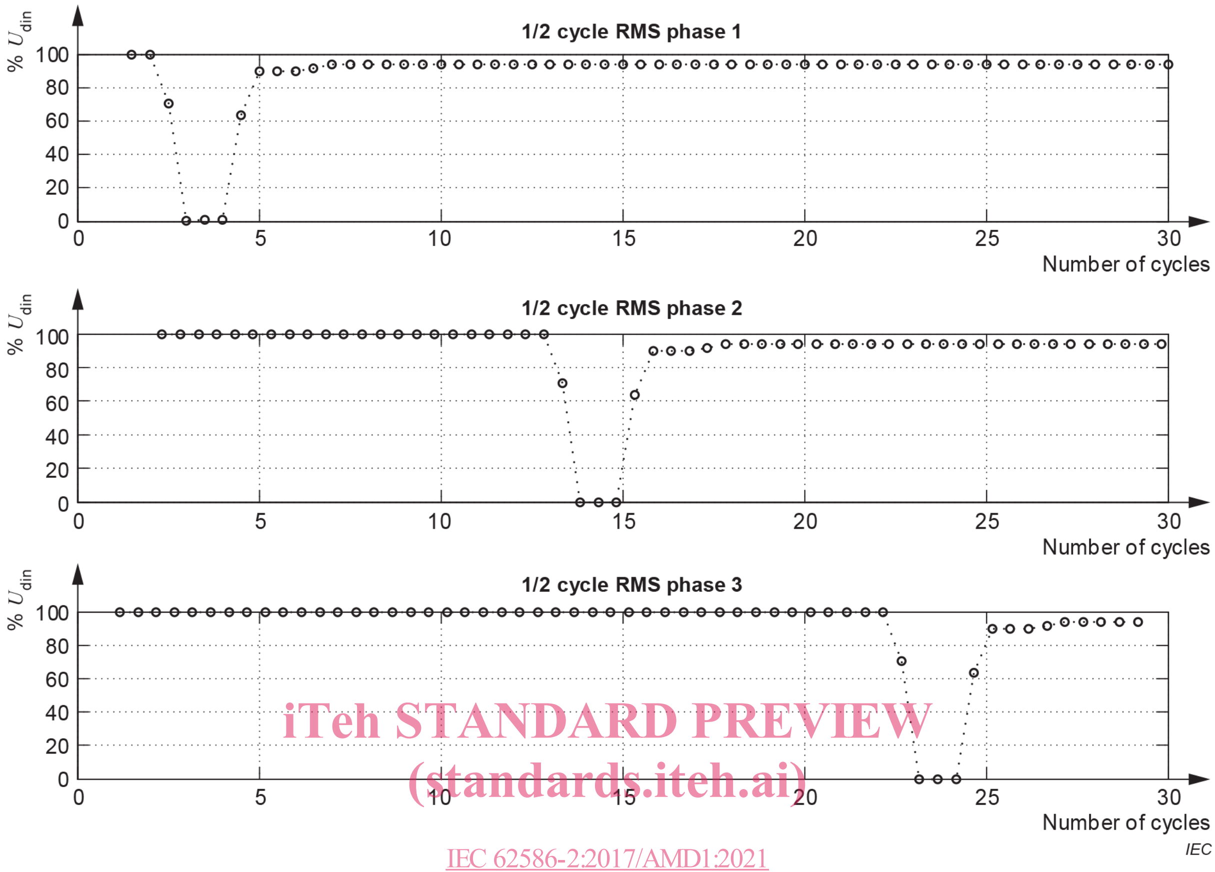

Figure 2 – Detail 1 of waveform for test of dips according to test A4.1.1

Replace Figure 3 by the following (clarification about hysteresis):

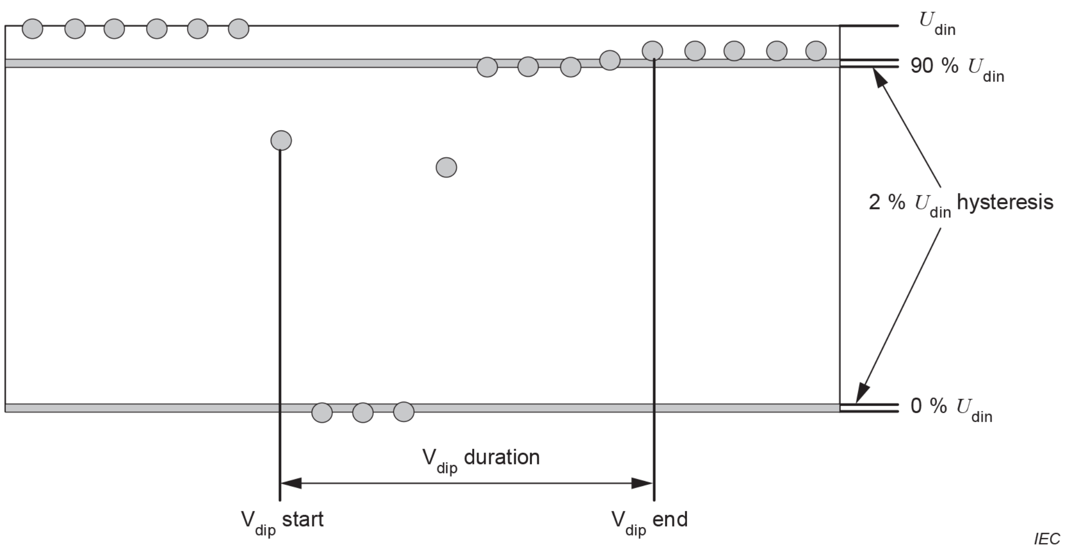

Figure 3 – Detail 2 of waveform for tests of dips according to A4.1.1

In Figure 4, correction of values, by expressing them in % of U_{din} and by adding a significant digit. Replace Figure 4 by the following:

$U_{rms(½)}$ N	$U_{rms(½)}$ $N + 1$	$U_{rms(½)}$ $N + 2$	$U_{rms(½)}$ $N + 3$	$U_{rms(½)}$ $N + 4$	$U_{rms(½)}$ $N + 5$	$U_{rms(½)}$ $N + 6$	$U_{rms(½)}$ $N + 7$
100 % U_{din}	70,7 % U_{din}	0 % U_{din}	0 % U_{din}	0 % U_{din}	63,6 % U_{din}	90 % U_{din}	90 % U_{din}

$U_{rms(½)}$ $N + 8$	$U_{rms(½)}$ $N + 9$	$U_{rms(½)}$ $N + 10$	$U_{rms(½)}$ $N + 11$	$U_{rms(½)}$ $N + 12$	$U_{rms(½)}$ $N + 13$	$U_{rms(½)}$ $N + 14$	$U_{rms(½)}$ $N + 15$
90 % U_{din}	92 % U_{din}	94 % U_{din}	94 % U_{din}	94 % U_{din}	94 % U_{din}	94 % U_{din}	94 % U_{din}

Figure 4 – Detail 3 of waveform for tests of dips according to test A4.1.1

In Figure 5, correction of signal level to match test point P3 for dips/interruptions, and correction of scale now expressed in % of U_{din}. Replace Figure 5 by the following:

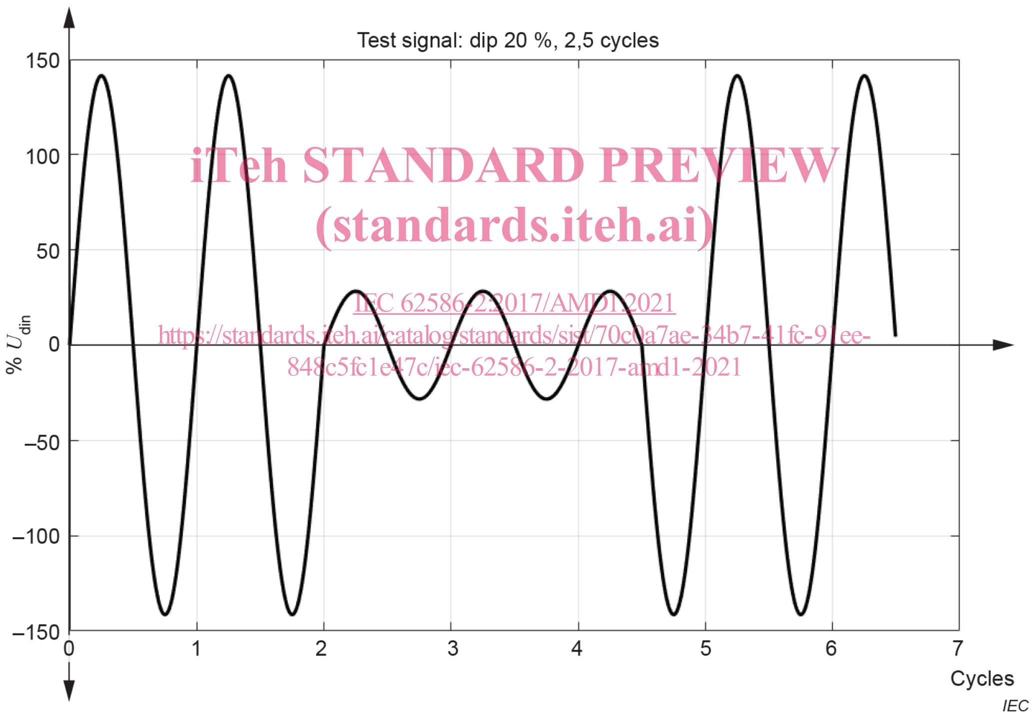

Figure 5 – Detail 1 of waveform for test of dips according to test A4.1.2

In Figure 6, correction of signal level to match test point P3 for dips/interruptions, and correction of scale now expressed in % of U_{din}. Replace Figure 6 by the following:

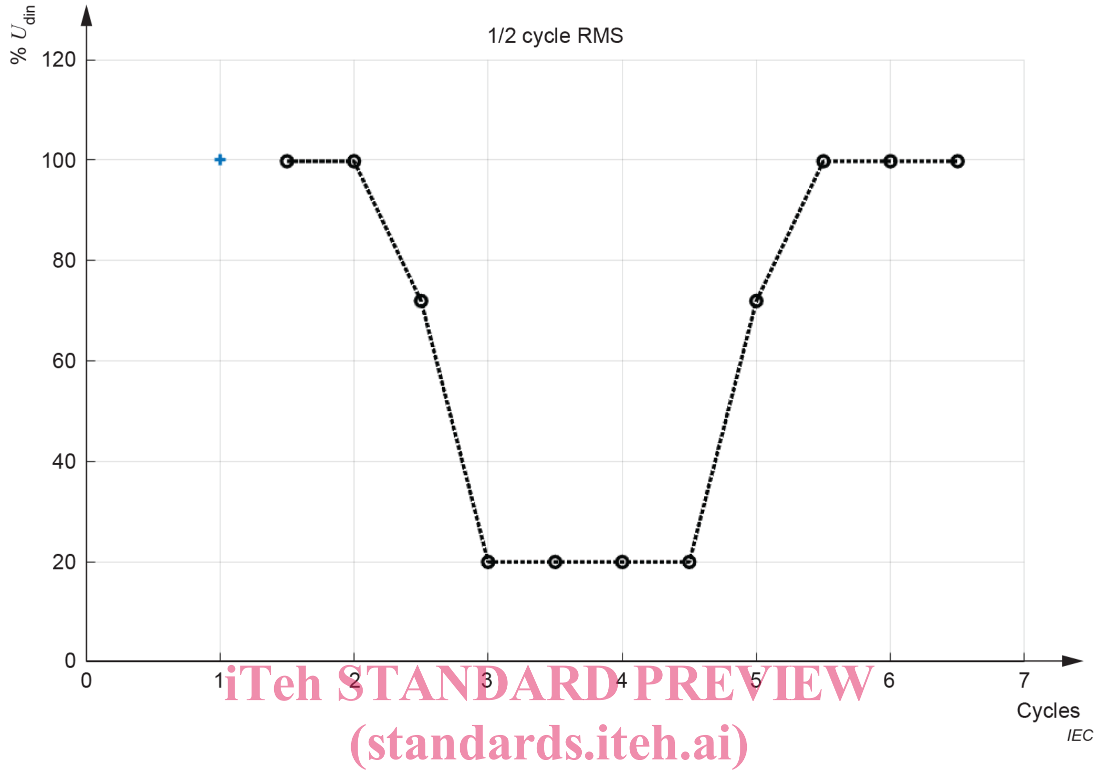

Figure 6 – Detail 2 of waveform for tests of dips according to test A4.1.2

In Figure 7, correction of the scale, now expressed in % of U_{din}. Replace Figure 7 by the following:

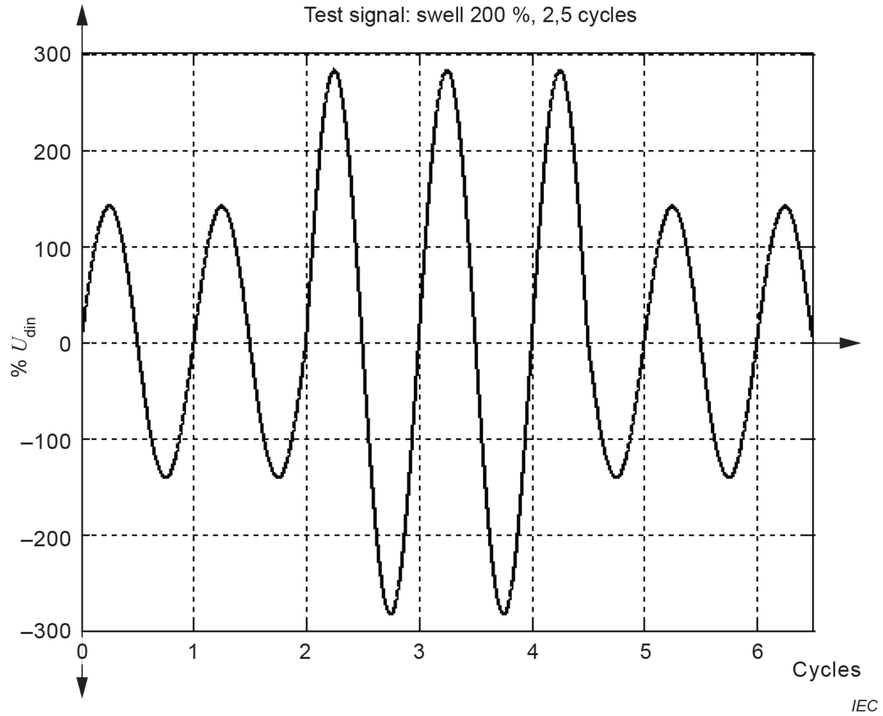

Figure 7 – Detail 1 of waveform for test of swells according to test A4.1.2

In Figure 8, correction of the scale, now expressed in % of U_{din}. Replace Figure 8 by the following:

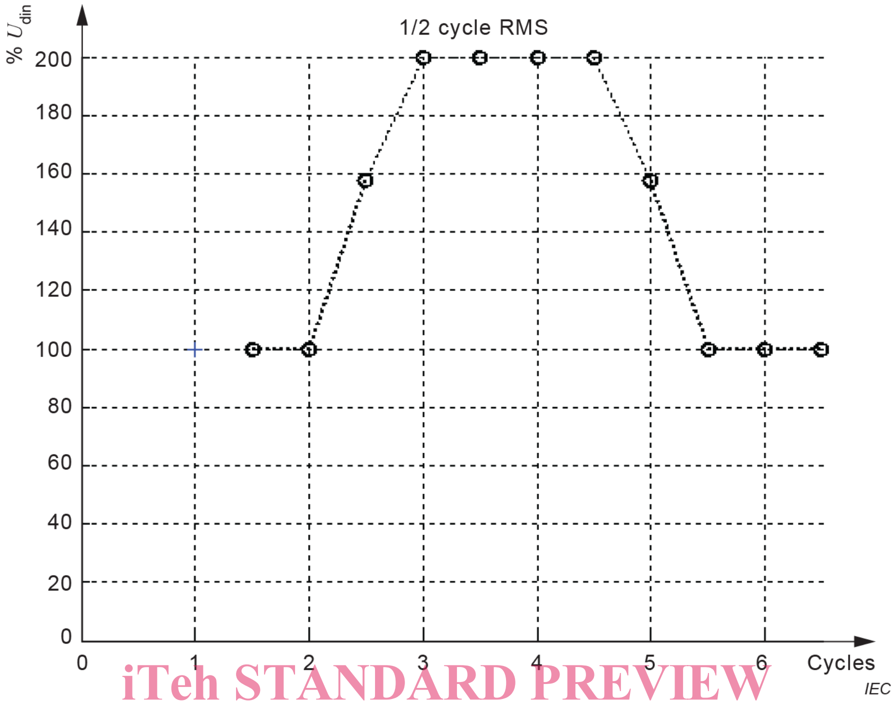

Figure 8 – Detail 2 of waveform for tests of swells according to test A4.1.2

Update of the scale in Figure 9 as follows:

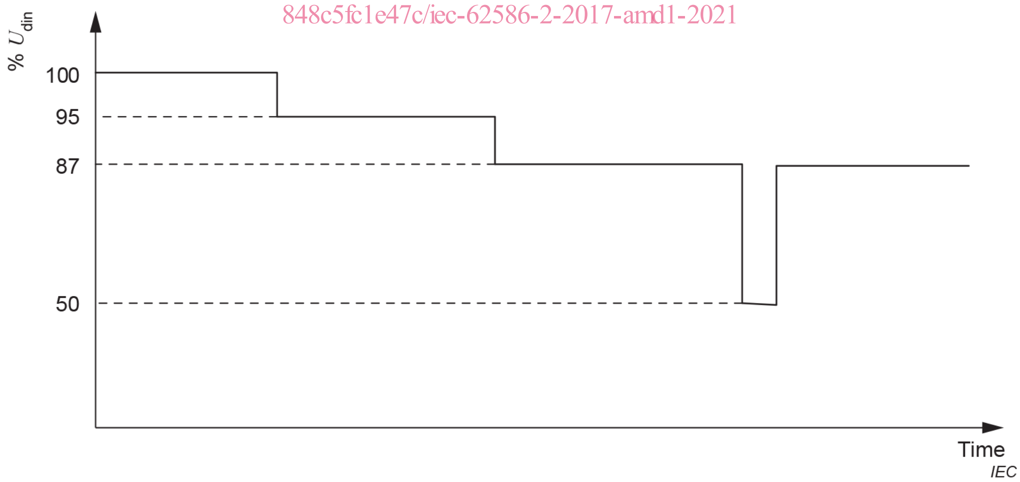

Figure 9 – Sliding reference voltage test

6.13 Rapid voltage changes (RVC)

Replace the entire Subclause 6.13 by the following:

6.13 Rapid voltage changes (RVC)

6.13.1 RVC parameters and evaluation

An RVC event is characterized by four parameters:

- start time,
- duration,
- ΔU_{max},
- ΔU_{ss}.

The start time of an RVC event shall be time-stamped with the time that the "voltage-is-steady-state" logic signal became false and initiated the RVC event.

The event duration of an RVC event is 100/120 half cycles shorter than the duration that the "voltage-is-steady-state" logic signal is false.

The ΔU_{max} of one RVC event is the maximum absolute difference between any of the $U_{rms(½)}$ values during the RVC event, and the final arithmetic mean 100/120 $U_{rms(½)}$ value just prior to the RVC event. For polyphase systems, the ΔU_{max} is the largest ΔU_{max} on any channel.

The ΔU_{ss} of one RVC event is the absolute difference between the final arithmetic mean 100/120 $U_{rms(½)}$ value just prior to the RVC event, and the first arithmetic mean 100/120 $U_{rms(½)}$ value after the RVC event (at the time where the "voltage-is-steady-state" signal becomes true). For polyphase systems, the ΔU_{ss} is the largest ΔU_{ss} on any channel.

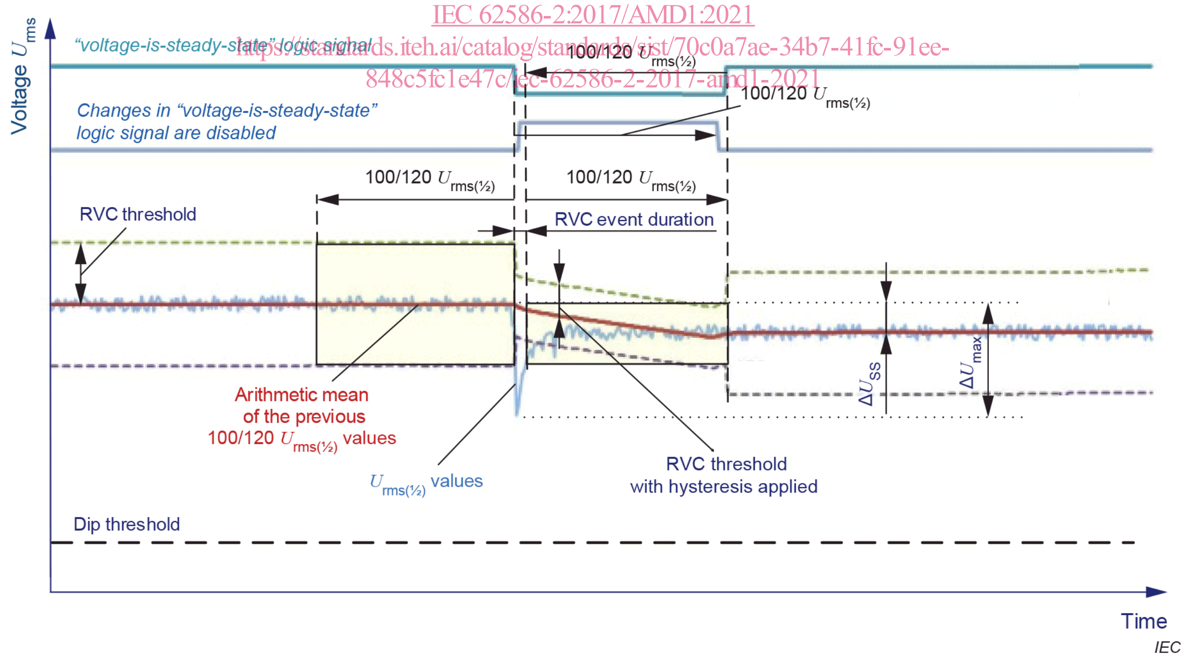

Figure 18 – Example of RVC event

6.13.2 General

6.13.2.1 General intents

The voltage test signals implemented are defined in this Subclause 6.13. The tests focus on showcasing the 5 general scenarios of how RVC events could be detected, whilst placing particular emphasis on the following features: amplitude, duration, start time and end time, poly-phase system, etc.

The test results and the relevant analysis are provided here as well.

The test cases below are designed for both Class A and Class S. If $U_{rms(1)}$ (one cycle) is selected for Class S RVC, then 100/120 half cycles shall be replaced throughout the event evaluation with 50/60 full cycles.

6.13.2.2 Uncertainty of results

Magnitude measurement uncertainty:

– Class A: The measurement uncertainty shall not exceed ±0,2 % U_{din};
– Class S: The measurement uncertainty shall not exceed ±1,0 % U_{din}.

Duration measurement uncertainty:

– Class A: ±1 cycle, commencement uncertainty (half cycle) plus the conclusion uncertainty (half cycle).
– Class S: If $U_{rms(1/2)}$ is used, then the uncertainty is ±1 cycle. If $U_{rms(1)}$ is used, then the uncertainty is ±2 cycles.

6.13.2.3 Setup values

– RVC threshold (5,0 %)
– RVC hysteresis (2,5 %)
– U_{dip} threshold = 90,0 % U_{din}
– U_{swell} threshold = 110,0 % U_{din}

6.13.2.4 Type of functional tests

The following types of tests are specified hereafter:

– No RVC tests (slow change, small change, big change-dips/swells);
– RVC setup test (threshold, hysteresis);
– RVC parameters test (start time, $\Delta U_{max,}$ ΔU_{ss}, duration);
– RVC polyphase test (start time, $\Delta U_{max,}$ ΔU_{ss}, duration);
– VSS voltage-is-steady-state test rule: all the immediately preceding 100/120 $U_{rms(½)}$ values (1 s) remain within an RVC threshold, reduced by hysteresis, from the arithmetic mean of those 100/120 $U_{rms(½)}$ values.

NOTE Only negative RVC events and only when the initial VSS = 100 % U_{din} have been specified in these tests. However, the same results should be achieved also for positive RVC events and initial VSS is different from 100 % U_{din}.

All tests are rather quality than quantity tests. Due to uncertainty in simulation and measurements, uncertainty of ±2 half cycles are accepted.

6.13.3 "No RVC" tests

6.13.3.1 Test 1

No.	Target of the test	Testing points according to Table 3	Complementary test conditions	Test criterion (if test is applicable)
A13.1.1	To verify that no RVC event will be detected if the voltage magnitude changes too slowly. See NOTE	P4 for frequency	Test shall be conducted according to Table 8	No RVC shall be detected
NOTE An RMS voltage is in a steady-state condition if all the immediately preceding 100 $U_{rms(½)}$ values (1 s) remain within RVC threshold from the arithmetic mean of those 100 $U_{rms(½)}$ values. The validity of this test for 60 Hz networks is under consideration.				

Table 8 – Specification of test A13.1.1

Test definition [a]	t_0 = 0 (start test)	t_1 = 100 half cycles (start ramp down)	t_2 = 300 half cycles	t_3 = 400 half cycles (start ramp up)	t_4 = 600 half cycles	t_{end}
U_{vss}	100 % U_{din}	100 % U_{din}	92 % U_{din}	92 % U_{din}	100 % U_{din}	100 % U_{din}
[a] This sequence of test is described in Figure 19; theoretical limits are described in Figure 20.						

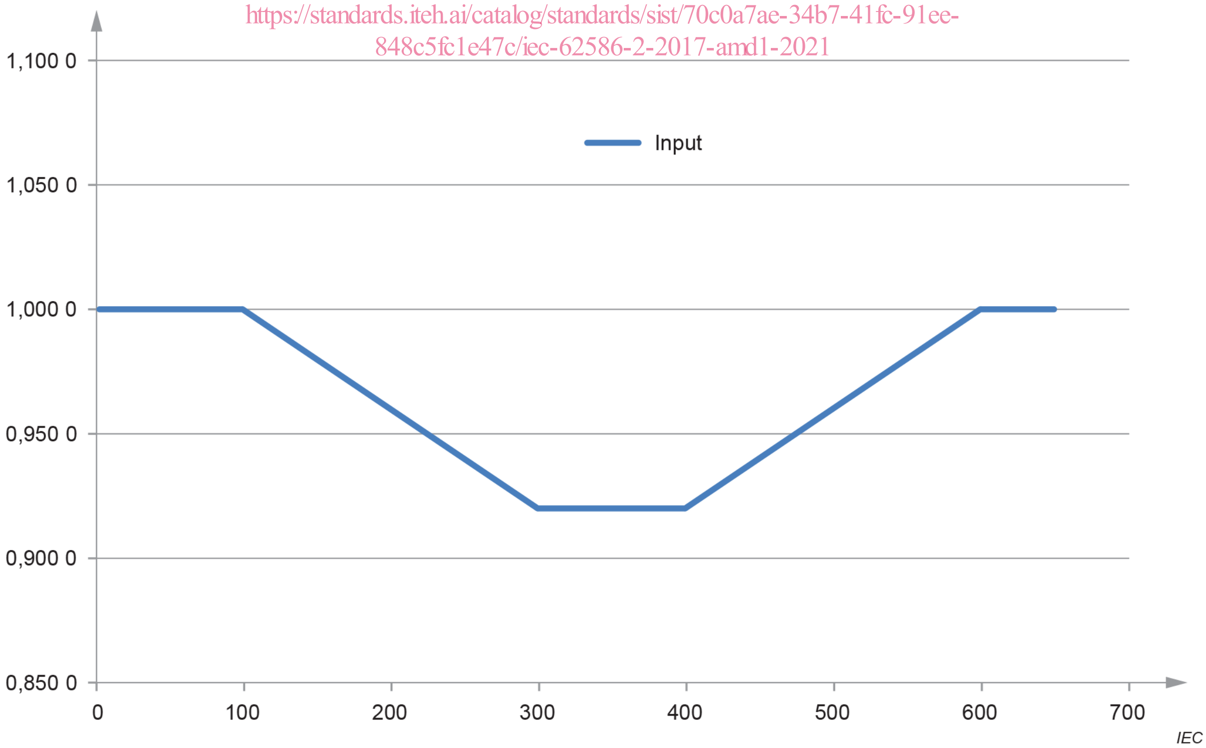

Figure 19 – Test A13.1.1 waveform

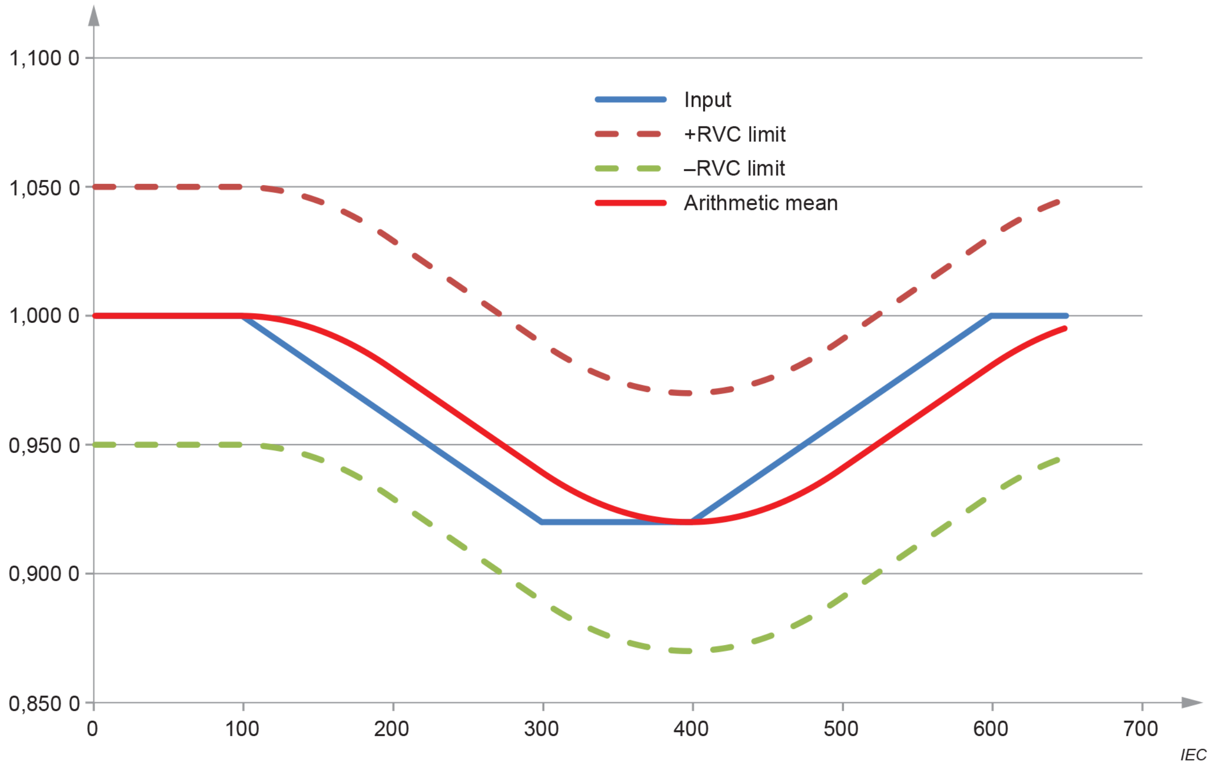

Figure 20 – Test A13.1.1 waveform with RVC limits and arithmetic mean at 50 Hz

6.13.3.2 Test 2

No.	Target of the test	Testing points according to Table 3	Complementary test conditions	Test criterion (if test is applicable)
A13.1.2	To verify that no RVC event will be detected if the voltage magnitude changes less than the threshold. See NOTE	P4 for frequency	Test shall be conducted according to Table 9	No RVC shall be detected
NOTE An RMS voltage is in a steady-state condition if all the immediately preceding 100 $U_{rms(½)}$ values (1 s) remain within RVC threshold from the arithmetic mean of those 100 $U_{rms(½)}$ values. The validity of this test for 60 Hz networks is under consideration.				

Table 9 – Specification of test A13.1.2

Test definition [a]	t_0 = 0 (start test)	t_1 = 100 half cycles (step down)	t_2 = 150 half cycles (step up)	t_{end}	N.A.	N.A.
U_{vss}	100 % U_{din}	97 % U_{din}	100 % U_{din}	100 % U_{din}	N.A.	N.A.
[a] This sequence of test is described in Figure 21; theoretical limits are described in Figure 22.						

Figure 21 – Test A13.1.2 waveform

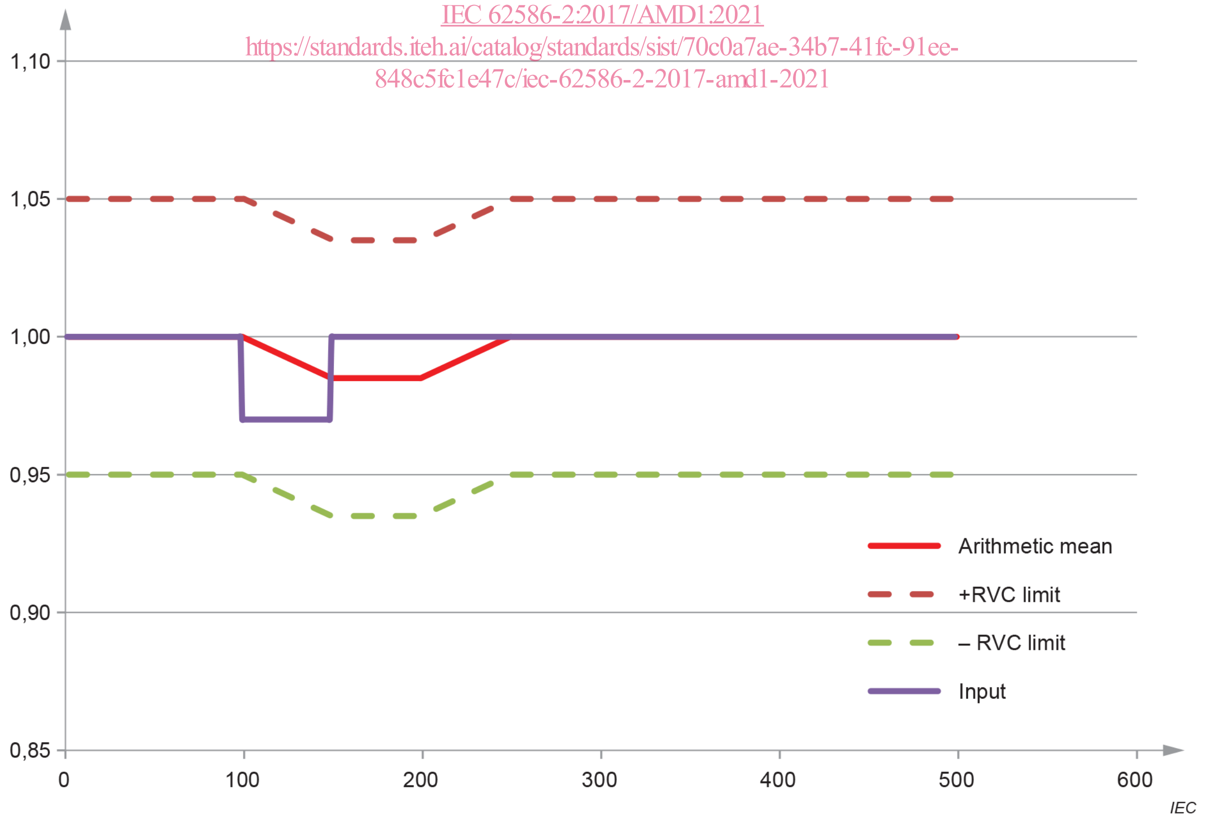

Figure 22 – Test A13.1.2 waveform with RVC limits and arithmetic mean at 50 Hz