

DRAFT
RECOMMENDATION

DR 4

43rd CIML Meeting

Sydney 2008 (Item 6.3)

**SUBMITTED
FOR CIML
APPROVAL**

Revision of R 85

Automatic level gauges for measuring the level of liquid in
stationary storage tanks

Part 3: Report format for type evaluation

DR 4 - Automatic level gauges for measuring the level of
liquid in stationary storage tanks - Part 3
43rd CIML Meeting - Sydney 2008



ORGANISATION INTERNATIONALE
DE MÉTROLOGIE LÉGALE

INTERNATIONAL ORGANIZATION
OF LEGAL METROLOGY

Explanatory note

[Will be deleted in the final text]

As part of an inquiry in July 2000 the secretariat of OIML TC8/SC1 (Austria) investigated the need for revision of OIML Recommendation R 71, Edition 1985.

From this inquiry, it could be concluded that a majority of the voters was in favor for the confirmation of that Recommendation. A revision should not to be necessary. But further action should be taken considering the inclusion of OIML R 71 in the OIML Certificate System.

To include a category of measuring instruments in the OIML Certificate System, the Recommendation concerned must contain the following elements: metrological requirements, test procedures, and a format for the evaluation report. The metrological requirements should already be fixed in the existing Recommendation R 71. A working group should be established to develop the test procedures and the test report format.

To establish the working group, a TC8/SC1 meeting was held in October 2003 in Vienna. 6 P-Member countries and 1 O-Member country attended this meeting.

Contrary to the outcome of the inquiry in 2000, the delegates attending the meeting in Vienna advised the P-Members to reconsider there vote and to agree with the terms of reference of a new working group OIML TC8/SC1/WG2, to be convened by Mr. Aart Kooiman from the Netherlands, i.e.

- Revision of OIML R 71, in connection with R 85;
- Revision of OIML R 85.

In January 2004, the secretariat OIML TC8/SC1 distributed a new enquiry for agreement of the decisions, the result being distributed in March 2004. It was agreed by 11 out of 12 votes to accept the terms of reference of OIML TC8/SC1/WG2 “Revision of OIML R 71 and R 85” and the working group could start work.

The first meeting of this WG was held 14 – 17 June 2004 in Delft (The Netherlands). During this meeting the work program was presented. The first task would be to prepare revised documents for OIML R 71 and R 85, in accordance with the terms of reference of the WG. But soon after this meeting, the convener of the WG (Mr. Aart Kooiman) sadly passed away, and it took some time until the work was resumed.

In 2005 - 2007 several drafts have been discussed by correspondence and in the meetings of TC8/SC1 and the WG, resulting in 4CD for Parts 1 and 2, and 1CD for Part 3 distributed to TC8/SC1 for vote in August 2007 with a deadline 15 November 2007 (later extended to 3 December).

The meeting of CIML approved the proposal to submit the draft Recommendation for on-line voting.

Compared to the edition 1998, this Recommendation has not only been updated from a technical point of view, the draft has also been brought in better compliance with the OIML Directives for the Technical Work, Part 2 (in particular clause 3 and 4), and with the horizontal document OIML D 11. Doing so, the convener of TC8/SC1/WG2 observed that there were many more changes to make in Part 2 (in particular with respect to the proper implementation of OIML D 11).

In particular, both the concepts of “Checking Facilities” (the checking facilities as mentioned in OIML D 11, as well as the facilities checking the integrity of data storage and data communication) have been combined. See definition 3.10 and sub clause 7.8.

In this respect, it should be emphasized that the application of the checking facilities intended to prevent significant faults are not mandatory: the choice to apply these is clearly left to the manufacturer (see 7.8.2.4).

The severity levels for all tests have been assessed and, in general, the levels for “industrial environment” have been applied for the tests.

A very clear distinction is made between the requirements in Part 1, the metrological control and tests in Part 2, and the evaluation report in Part 3.

By mistake, the 1CD for Part 3 was immediately distributed for vote among the P-members of TC8/SC1.

In the meantime it became clear that BIML prefers to have Part 1 and Part 2 together in one booklet (file) and Part 3 in a separate one. This DR reflects that structure.

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Foreword

The International Organization of Legal Metrology (OIML) is a worldwide, intergovernmental organization whose primary aim is to harmonize the regulations and metrological controls applied by the national metrological services, or related organizations, of its Member States. The main categories of OIML publications are:

- **International Recommendations (OIML R)**, which are model regulations that establish the metrological characteristics required of certain measuring instruments and which specify methods and equipment for checking their conformity. OIML Member States shall implement these Recommendations to the greatest possible extent;
- **International Documents (OIML D)**, which are informative in nature and which are intended to harmonize and improve work in the field of legal metrology;
- **International Guides (OIML G)**, which are also informative in nature and which are intended to give guidelines for the application of certain requirements to legal metrology; and
- **International Basic Publications (OIML B)**, which define the operating rules of the various OIML structures and systems.

OIML Draft Recommendations, Documents and Guides are developed by Technical Committees or Subcommittees which comprise representatives from the Member States. Certain international and regional institutions also participate on a consultation basis. Cooperative agreements have been established between the OIML and certain institutions, such as ISO and the IEC, with the objective of avoiding contradictory requirements. Consequently, manufacturers and users of measuring instruments, test laboratories, etc. may simultaneously apply OIML publications and those of other institutions.

International Recommendations, Documents, Guides and Basic Publications are published in English (E) and translated into French (F) and are subject to periodic revision.

Additionally, the OIML publishes or participates in the publication of **Vocabularies (OIML V)** and periodically commissions legal metrology experts to write **Expert Reports (OIML E)**. Expert Reports are intended to provide information and advice, and are written solely from the viewpoint of their author, without the involvement of a Technical Committee or Subcommittee, nor that of the CIML. Thus, they do not necessarily represent the views of the OIML.

This publication - reference OIML R 85-3, edition 2008 (E) - was developed by the OIML Technical Subcommittee TC 8/SC 1 *Static volume and mass measurement*. It was approved for final publication by the International Conference of Legal Metrology in 2008. Together with R 85-1-2, edition 2008 (E), this Edition supersedes the previous edition of OIML R 85 (Edition 1998).

OIML Publications may be downloaded from the OIML web site in the form of PDF files. Additional information on OIML Publications may be obtained from the Organization's headquarters:

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Automatic level gauges for measuring the level of liquid in fixed storage tanks

Part 3: Report Format for type evaluation

1 INTRODUCTION

This *report format* applies for any kind of electric or electronic level gauge (independent of its technology), but purely mechanical level gauges are excluded. It presents a standardized format for the results of the various tests and examinations, described in Part 2 of this Recommendation, to which a type of an automatic level gauge shall be submitted with a view to its approval based on the International recommendation OIML R 85 (2008).

It is recommended that all metrology services or laboratories evaluating and/or testing types of automatic level gauges according to OIML R 85 or to national or regional regulations based on OIML R 85 use this *report format*, directly or after translation into a language other than English or French. In case of a translation, it is highly recommended to leave the structure and the numbers of the clauses unchanged: in this case most of the contents is also understandable for those who can not read the language of the translation.

It is also recommended that this *report format* in English or in French (or in both languages) be transmitted by the country performing the tests to the relevant authorities of another country, under bi- or multi-lateral cooperation agreements.

In the practical application of the *report format*, it is not necessary to include the Foreword and clauses 1 and 2 (pages 1-5). They can be replaced by a cover page of the Issuing Authority and/or in accordance with national custom or legislation. So only the clauses A - F shall be included.

2 APPLICABILITY OF THIS REPORT FORMAT

In the framework of the OIML Certificate system for Measuring Instruments, and the OIML Mutual Acceptance Arrangement (MAA) applicable to automatic level gauges in conformity with OIML R 85, use of this Report Format is mandatory.

Implementation of this Report Format is informative with regard to the implementation of OIML R 85-1 in national regulations.

3 GUIDANCE FOR THE APPLICATION OF THIS REPORT FORMAT

In case a prescribed test is not relevant for the type of instrument to be tested, the reason why the test is omitted shall be clearly stated in the field “Remarks” (for instance tests related to AC mains supply in case of an instrument powered by DC mains) or partial testing after modification of a previously tested type.

The number of the report and the page numbers shall be completed in the heading.

The user is free to change the length of the cells (for instance “Remarks”) as required in a specific case.

4 THE EVALUATION REPORT

The format for the Test Report is given on the following pages

Cover page by the Issuing Authority

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A AUTHORITY, RESPONSIBLE FOR THIS REPORT

Name	
Address	
Report number	
Application number	
Date/period of tests	
Date of issuing this Report	
Name and signature of the responsible person	
Stamp(s) (if applicable)	

B SYNOPSIS OF THE RESULTS OF THE EXAMINATIONS AND TESTS*(To be completed by the Issuing Authority)*

The tested specimen fulfils ALL the applicable requirements in OIML R 85 (200x)	YES	NO
Remarks:		

C SUMMARY OF THE RESULTS OF THE EXAMINATION AND TESTS

(To be completed by the Issuing Authority)

C.1 Examinations

For details, refer to the examination: clause E of this report as indicated in the first column

Sub clause	Test (with reference to requirement in Part 1)	+	-	Remarks	Page
E.1	Constituents (4)				
E.2	Units of measurement (5)				
E.3	Rated operating conditions (6.1)				
E.4	Special conditions (6.1)				
E.5	Indicating device (7.1)				
E.6	Printer(s) (7.1.9)				
E.7	Movable sensor (7.2)				
E.8	Installation (7.3)				
E.9	Ancillary devices (7.4)				
E.10	Markings (7.5)				
E.11	Verification marks (7.6)				
E.12	Mechanical sealing (7.7)				
E.13	Electronic sealing (7.7)				
E.14	Safeguarding integrity (7.8)				

C.2 Performance tests

For details, refer to the tests: clause F in this report as indicated in the first column.

F.1	Accuracy (8.1.5.2)				
F.2	Discrimination (8.1.5.3)				
F.3	Hysteresis (8.1.5.4)				
F.4.1	Temperature test (8.1.6.2)				
F.4.2	Mains voltage variation (8.1.6.3 + 8.1.6.4)				
F.5.1	Damp heat, cyclic (condensing) (8.1.7.1)				
F.5.2	Radiated, radio-frequency, electromagnetic fields (8.1.7.2.1)				
F.5.3	Conducted, radio-frequency, electromagnetic fields (8.1.7.2.2)				
F.5.4	Electrostatic discharge (8.1.7.2.3)				
F.5.5	Bursts on signal, data and control lines (8.1.7.2.4)				
F.5.6	Surges on signal, data and control lines (8.1.7.2.5)				
F.5.7	AC mains voltage dips, short interruptions and voltage variations (8.1.7.2.6)				
F.5.8	Bursts on AC and DC mains (8.1.7.2.7)				
F.5.9	Voltage dips, short interruptions and voltage variations on DC mains power (8.1.7.2.8)				
F.5.10	Ripple on DC mains power (8.1.7.2.9)				
F.5.11	Surges on AC and DC mains power lines (8.1.7.2.10)				

D GENERAL INFORMATION**D.1 Manufacturer**

Company	
Address	

D.2 Applicant

Company	
Representative	
Address	
Reference	
Date of application	

Remarks:

D.3 Testing laboratories involved in the tests*(This table to be completed for each test laboratory)*

Name	
Address	
Application number	
Tests by this laboratory	
Date/period of tests	
Name(s) of test engineer(s)	
Accredited by	
Accreditation includes R 85	<input type="checkbox"/> Yes <input type="checkbox"/> No
Details of relevant peer assessment or assessment by other means	
In case tests have been performed on an other location than the premises of this laboratory, give details here	
Name of the responsible person	
Date of signature	
Stamp (if applicable) and signature of the responsible person	

Remarks:

D.4 General information concerning the type

and the sample(s) submitted for the tests
(as stated on the instrument / provided by the manufacturer)

Manufacturer's trade mark / corporate name		
Year of manufacture		
Type designation		
Model number (if applicable)		
Serial number(s) of the sample(s)		
Measuring range(s)		
Electrical power		
Identification of software	Version number	
	Checksum/identification code	
Remarks:		

D.5 Accessories, supplied by the applicant

Operating instructions	
Data printer	
Cables	
Ancillary facilities	
Power supply unit	
Other accessories / remarks:	

D.6 Selection of sample(s) tested

In case the tests and examination are valid for more versions, give full details of the types, versions, measuring ranges etc.:

Justification of the selection of the samples:

D.7 Adjustments and modifications

Adjustments, modifications, and repairs made to the samples during the testing:

D.8 Choice of the manufacturer concerning the severity levels

Influence	Severity level
Dry heat	(1, 2, 3, 4):
Cold	(1, 2, 3, 4):
DC mains voltage variation	High level: Low level:

D.9 Full details about the electrical power requirements**D.10 Additional information concerning the type**

Additional remarks and/or information (connection equipment, interfaces, etc.):
Remarks:

D.11 Documentation supplied by the applicant

Diagrams, results of previous tests etc.:

D.12 Information concerning the test equipment used for the type evaluation

(including details of simulations)

If applicable, the laboratory is free to provide this information, instead of a complete overview here, in the appropriate chapter F.x in an extra field below the 1st table (with “Date” etc.).

In that case, a statement shall be made in this field.

E EXAMINATION*(to be completed by the Examining authority)***E.1 Constituents (4)**

Date:	Observer:	Serial number:
Liquid level sensor		
Transducer		
Correction sensor		
Calculator		
Indicating device(s)		
Printer		
Ancillary devices		
Checking facilities		
Others		
Remarks:		

E.2 Units of measurement (5)

Date:	Observer:	Serial number:
	Display	Print
Dip		
Ullage		
Other indication(s)		
Remarks:		

E.3 Rated operating conditions (6.1)

Date:	Observer:	Serial number:
Temperature extreme values	Liquid	
	Medium above liquid	
Pressure extreme values		
Liquid characteristics		
Liquid density extreme values		
Medium characteristics		
Medium density extreme values		
Remarks:		

E.4 Special conditions (6.1)

Date:	Observer:	Serial number:
--------------	------------------	-----------------------

Remarks:	

E.5 Indicating device (7.1)

Date:	Observer:	Serial number:
--------------	------------------	-----------------------

Sub clause	Requirement	Remarks	+	-
7.1.1	Distance between analogue scale marks			
7.1.2	Number of indicating devices			
7.1.3	Common indicating device			
7.1.4	Remote indication duly identified			
7.1.2-3-4	Other indicating devices			
7.1.2	Alarm when outside limits			
7.1.5	Default display of dip / ullage			
7.1.6	Display of measurement			
7.1.7	Symbol or name of unit present			
	Scale interval			
7.1.8	Digital display			
Remarks:				

E.6 Printer(s) (7.1.9)

Date:	Observer:	Serial number:
--------------	------------------	-----------------------

Sub clause	Requirement	Remarks	+	-
7.1.2	Number of printers			
7.1.4	Printer duly identified to ALG			
7.1.5	Default print of dip/ullage			
7.1.6	Print of measurement			
7.1.7	Symbol or name of unit present			
	Scale interval			
Remarks:				

E.7 Movable sensor (7.2)

Date:	Observer:	Serial number:
--------------	------------------	-----------------------

Sub clause	Requirement	Remarks	+	-
7.2.1	Suspension mechanism			
7.2.2	Static position			
Remarks:				

E.8 Installation (7.3)

Date:	Observer:	Serial number:
--------------	------------------	-----------------------

Sub clause	Requirement	Remarks	+	-
7.3.1.1	Accessible and legible			
7.2.1.2	Verification possible			
7.3.1.3	Gauge hatch			
7.3.1.3	No obstacles			
7.3.1.4	Affect ALG Measurement			
7.3.1.5	Influence eddies, etc.			
7.3.1.6	Compensation movement tank			
7.3.1.7	Location correction sensor(s)			
7.3.1.8	Thermal expansion			
Remarks:				

E.9 Ancillary devices (7.4)

Date:	Observer:	Serial number:
--------------	------------------	-----------------------

Description	Remarks	+	-
Remarks:			

E.10 Markings (7.5)

Date:	Observer:	Serial number:
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Requirement	Remarks	+	-
Location of the markings			
Name of the manufacturer / trademark			
Type designation			
Serial number			
Year of manufacture			
Type approval mark (provisions)			
Ranges defining the field of operation			
Visibility			
Additional information (if required)			
Remarks:			

E.11 Verification marks (7.6)

Date:	Observer:	Serial number:
--------------	------------------	-----------------------

	Remarks	+	-
Location			
Fit for easy application			
Impossible to remove without damage			
Remarks:			

E.12 Mechanical sealing (7.7)

Date:	Observer:	Serial number:
--------------	------------------	-----------------------

	Remarks	+	-
Data plate			
Other components			
Impossible to remove without damage			
Remarks:			

E.13 Electronic sealing (7.7)

Date:	Observer:	Serial number:
--------------	------------------	-----------------------

	Remarks	+	-
Access			
Password changeable			
Configuration mode			
Event counter			
Date of change parameter			
Value of parameter			
Identification authorized person			
Traceability last intervention			
Remarks:			

E.14 Safeguarding the integrity of the measurement (7.8)

Date:	Observer:	Serial number:
--------------	------------------	-----------------------

Sub clause	Requirement	Remarks			+	-
7.8.1	Possibility testing checking facility					
	Checking facility type I or P					
7.8.2.1	Checking facility disturbances	YES	NO			
7.8.2.3	Durability protection facility	YES	NO			
7.8.2.5	Action by checking facility					
7.8.3.1	Protection of data					
7.8.3.2	Integrity of permanent stored instructions					
7.8.3.3	Transfer/storage of data					
7.8.3.4	Checking facility calculator					
7.8.3.5	Checking facility indicating device					
7.8.3.6	Checking facility ancillary device					
Remarks:						

F PERFORMANCE TESTS**F.1 Accuracy (8.1.5.2)**

Date of test:	Observer:	Serial number:
----------------------	------------------	-----------------------

Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

Observations in mm: upwards					
Level	Indication	Error	MPE	+	-

Remarks:

Observations in mm: downwards					
Level	Indication	Error	MPE	+	-

Remarks:

F.2 Discrimination (8.1.5.3)

Date of test:	Observer:	Serial number:
----------------------	------------------	-----------------------

Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

Discrimination	Level	Indication	Level change	Indication change	+	-
Upwards						
Downwards						

Remarks:

In case of an ALG without a movable liquid level detecting element, this test can be skipped.
In that case, this justification shall be mentioned here.

F.3 Hysteresis (8.1.5.4)

Date of test:	Observer:	Serial number:
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Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

Upwards	Level 1	Level 2	Level 3	Maximum hysteresis	MPE	+	-
Level up							
Indication							
Level down							
Indication							
Hysteresis							

Downwards	Level 1	Level 2	Level 3	Maximum hysteresis	MPE	+	-
Level down							
Indication							
Level up							
Indication							
Hysteresis							

Remarks:

In case of an ALG without a movable liquid level detecting element, this test can be skipped.
In that case, this justification shall be mentioned here.

F.4 Influence factor tests**F.4.1 Static environmental temperatures (8.1.6.2)**

Date of test:	Observer:	Serial number:
----------------------	------------------	-----------------------

Test conditions	Begin	End
Time:		
Relative humidity	%	%
Atmospheric pressure	hPa	hPa

F.4.1.1 Dry heat (8.1.6.2.1)

Temperature		Level	Indication	Error	MPE	+	-
Reference temperature	°C						
High temperature	°C						
Reference temperature	°C						

F.4.1.2 Cold (8.1.6.2.2)

Temperature		Level	Indication	Error	MPE	+	-
Reference temperature	°C						
Low temperature	°C						
Reference temperature	°C						

Remarks:

F.4.2 Mains voltage variations (8.1.6.3 and 8.1.6.4)

Date of test:	Observer:	Serial number:
----------------------	------------------	-----------------------

Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

☐ DC mains voltage variation (8.1.6.3)

☐ AC main voltage variation (8.1.6.4)

Voltage		Level	Indication	Error	MPE	+	-
Reference voltage	V						
High voltage	V						
Low voltage	V						
Reference voltage	V						

Remarks

F.5 Disturbance tests**F.5.1 Damp heat, cyclic (condensing) (8.1.7.1)**

Observer:	Serial number:
------------------	-----------------------

Test conditions	Begin	End
Date		
Time		
Atmospheric pressure	hPa	hPa

Cycle no.	Time	Low temp. °C	Humidity % RH	Time	High temp. °C	Humidity % RH
1						
2						

Level	Indication	Error	MPE	Action Checking facility	+	-

Remarks:

F.5.2 Radiated, radio-frequency, electromagnetic fields (8.1.7.2.1)

Date of test:	Observer:	Serial number:
----------------------	------------------	-----------------------

Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

EM field		Level	Indication	Error	MPE	Action Checking facility	+	-
Frequency	Field strength							
MHz	V/m							
MHz	V/m							
MHz	V/m							
MHz	V/m							
MHz	V/m							

Remarks

F.5.3 Conducted, radio-frequency fields (8.1.7.2.2)

Date of test:	Observer:	Serial number:
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Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

Field injected on port(s):	
----------------------------	--

EM field		Level	Indication	Error	MPE	Action Checking facility	+	-
Frequency	Amplitude							
MHz	V							
MHz	V							
MHz	V							
MHz	V							
MHz	V							
MHz	V							
Remarks								

F.5.4 Electrostatic discharge (8.1.7.2.3)

Date of test:	Observer:	Serial number:
----------------------	------------------	-----------------------

Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

<input type="checkbox"/> Contact discharge	<input type="checkbox"/> Direct application	Test voltage:	<input type="text"/> kV
<input type="checkbox"/> Air discharge	<input type="checkbox"/> Indirect application	Number of discharges:	<input type="text"/>

Discharge applied on	Level	Indication	Error	MPE	Action Checking facility	+	-
Remarks							

F.5.5 Bursts on signal, data and control lines (8.1.7.2.4)

Date of test:	Observer:	Serial number:
----------------------	------------------	-----------------------

Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

Repetition rate:	kHz
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[illegible]

Remarks

F.5.7 AC mains voltage dips, short interruptions and voltage variations (8.1.7.2.6)

Date of test:	Observer:	Serial number:
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Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

Mains voltage and frequency	V	Hz
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Test	Reduction to	Duration [cycles]	Level	Indication	Error	MPE	Action Checking facility	+	-
Dips a	V %								
Dips b	V %								
Dips c	V %								
Dips d	V %								
Dips e	V %								
Short interrup- tion	V %								
Remarks									

F.5.8 Bursts (transients) on AC and DC mains (8.1.7.2.7)

Date of test:	Observer:	Serial number:
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Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

Test voltage:	kV
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Repetition rate:	kHz
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[illegible]

Remarks

F.5.9 Voltage dips, short interruptions and voltage variations on DC mains (8.1.7.2.8)

Date of test:	Observer:	Serial number:
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Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

Test	Reduction to	Duration	Level	Indication	Error	MPE	Action Checking facility	+	-
Voltage Dips	40 %	0,1 s							
	70 %	0,1 s							
Short interruption	0 %	0,01 s							
Voltage variations	85 %	10 s							
	120 %	10 s							

Remarks

F.5.10 Ripple on DC mains power (8.1.7.2.9)

Date of test:	Observer:	Serial number:
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Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

Frequency:	Hz
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Test time:	min
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Level	Indication	Error	Diff.	MPE	Action Checking facility	+	-

Remarks

F.5.11 Surges on AC and DC mains power lines (8.1.7.2.10)

Date of test:	Observer:	Serial number:
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Test conditions	Begin	End
Time:		
Environmental temperature	°C	°C
Relative humidity	% RH	% RH
Atmospheric pressure	hPa	hPa

	Angle	Voltage and Polarity	Number of surges	Level	Indication	Error	MPE	Action Checking facility	+	-
Line to line	0 °									
	90 °									
	180 °									
	270 °									
Line to earth	0 °									
	90 °									
	180 °									
	270 °									
Remarks										