
Oprema za merjenje električne energije - Težavnostni nivoji, zahteve za odpornost in preskusne metode za motnje po vodnikih v frekvenčnem območju 2-150 kHz

Electricity metering equipment - Severity levels, immunity requirements and test methods for conducted disturbances in the frequency range 2 -150 kHz

Wechselstrom-Elektrizitätszähler - Prüfschärfe, Störfestigkeit und Prüfverfahren für leitungsgeführte Störgrößen im Frequenzbereich von 2 kHz bis 150 kHz

Équipement de comptage d'électricité (c.a.) – Niveaux de sévérité, prescriptions d'immunité et méthodes d'essai pour les perturbations conduites dans le domaine de fréquence de 2 kHz à 150 kHz

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Ta slovenski standard je istoveten z: CLC/TR 50579:2012

ICS:

17.220.20	Merjenje električnih in magnetnih veličin	Measurement of electrical and magnetic quantities
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SIST-TP CLC/TR 50579:2012

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TECHNICAL REPORT
RAPPORT TECHNIQUE
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CLC/TR 50579

June 2012

ICS 91.140.50

English version

**Electricity metering equipment (a.c.) -
Severity levels, immunity requirements and test methods for conducted
disturbances in the frequency range 2 kHz -
150 kHz**

Équipement de comptage d'électricité
(c.a.) – Niveaux de sévérité, prescriptions
d'immunité et méthodes d'essai pour les
perturbations conduites dans le domaine
de fréquence de 2 kHz à 150 kHz

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Prüfschärfe, Störfestigkeit und
Prüfverfahren für leitungsgeführte
Störgrößen im Frequenzbereich von 2 kHz
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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This document (CLC/TR 50579:2012) has been prepared by CLC/TC 13 "Equipment for electrical energy measurement and load control".

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.

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Introduction

This Technical Report specifies immunity levels and standard testing procedure for the immunity against symmetric currents in the frequency range from 2 kHz to 150 kHz as an extension of the harmonised standards EN 50470-1 and EN 50470-3 until the basic standards IEC 61000-x-x are in force.

This Technical Report was requested by various approval bodies and utilities as a temporary solution, since accuracy problems with electricity meters were observed in presence of disturbing currents in the frequency range from 2 kHz to 150 kHz. Up to date no standards are available for this frequency range.

The testing against symmetrical currents is not yet a part of the actual basic standards or product standards in EMC. However for some electricity meters an influence of symmetric currents has been shown in various investigations. The source of these currents in a frequency range from 2 kHz to 150 kHz can be a photovoltaic inverter or other switched mode power supplies.

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1 Scope

This European Technical Report applies to newly manufactured static watt-hour meters intended for residential, commercial and light industrial use, of class indexes A, B and C, for the measurement of alternating current electrical active energy in 50 Hz networks. It specifies particular requirements and immunity test for direct connected and transformer connected electricity meters as an extension for EN 50470-1 and EN 50470-3. The tests are designed to achieve immunity against disturbing currents of up to 2 A (2 kHz-30 kHz) and up to 1 A (30 KHz-150 kHz) for direct connected meters and 2 % I_{max} (2 kHz-30 kHz) and 1 % I_{max} (30 KHz-150 kHz) for transformer connected meters.

It applies to static watt-hour meters for indoor and outdoor application, consisting of a measuring element and register(s) enclosed together in a meter case.

If the meter has (a) measuring element(s) for more than one type of energy (multi-energy meters), or when other functional elements, like maximum demand indicators, electronic tariff registers, time switches, ripple control receivers, data communication interfaces etc. are enclosed in the meter case (multi-function meters) then this Technical Report applies only for the active energy metering part.

This Technical Report distinguishes between:

- meters of class indexes A, B and C;
- direct connected and transformer operated meters;

It does not apply to:

- watt-hour meters where the voltage across the connection terminals exceeds 600 V (line-to-line voltage for meters for polyphase systems);
- portable meters;
- reference meters.

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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 50470-1, *Electricity metering equipment (a.c.) — Part 1: General requirements, tests and test conditions — Metering equipment (class indexes A, B and C)*

EN 50470-3:2006, *Electricity metering equipment (a.c.) — Part 3: Particular requirements — Static meters for active energy (class indexes A, B and C)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

equipment under test (EUT)

electricity meter or other instrumentation for the measurement of energy which is tested against the disturbing current described in this Technical Report

3.2 load current

 $I_{50\text{Hz}}$

50 Hz current flowing through the current path of the equipment under test. Typically the current is flowing through the live wires LIN to LOU_T of the electricity meter

3.3 disturbing current

 I_{Dist}

current in the frequency range from 2 kHz to 150 kHz flowing through the current path of an electricity meter or other instrumentation for the measurement of energy

4 General

The test is done with two currents flowing through the electricity meter. One current is the 50 Hz load current $I_{50\text{Hz}}$ second is the disturbing current I_{Dist} in the frequency range from 2 kHz to 150 kHz flowing only through the current path of the electricity meter. Both currents $I_{50\text{Hz}}$ and I_{Dist} are generated independently from each other.

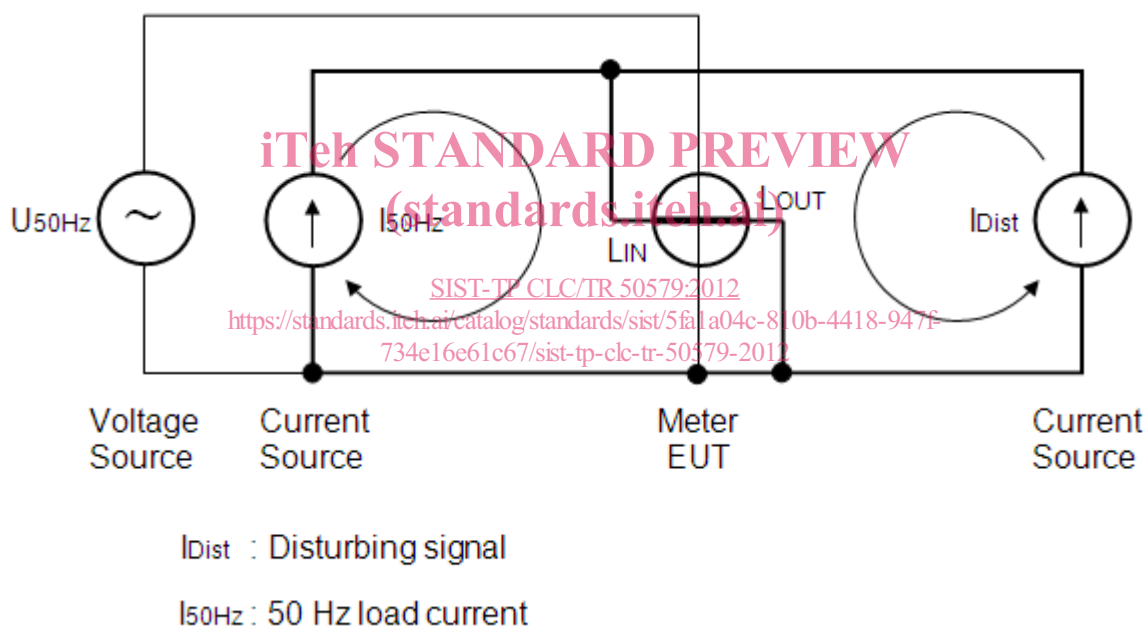


Figure 1 — Simplified diagram of the currents flowing through the current path of the electricity meter

The method to generate the current flowing through the current path of the electricity meter is not given as specification or requirement in detail by this Technical Report. The important parameter is the level of the disturbing current flowing through the current path of the electricity meter. The method to generate both the disturbing current and the 50 Hz load current is not of interest for the result of the test.

5 Test equipment

5.1 Test generator for the disturbing current

5.1.1 General

The test generator includes all equipment necessary to generate the disturbing signal. The disturbing signal is the current through the current path of the EUT. The test generator shall meet the following minimum specifications:

Table 1 — Specifications of the test generator

Parameter	Specification
Frequency range of the disturbing signal:	2 kHz – 150 kHz
Generated wave shape:	Sine wave, unmodulated
Maximum THD of the generated disturbing signal at maximum level:	< 5 %
Output level:	Sufficiently high to generate selected test level
Tolerance of the disturbing signal (current) during the test:	± 5 %
Dwell time:	The dwell time shall be long enough to allow a stable accuracy measurement
Maximum frequency step during the test:	1 %

The generator shall be able to perform frequency steps with variable step size. The step size for the testing shall not be higher than 1 % of the preceding frequency value. Before changing to the next frequency the generator shall reduce the level of the disturbing current in order to avoid that the level of the disturbing current at the new frequency is higher than the test level. The reduction shall be high enough to avoid disturbing currents higher than the test level selected at the new frequency.

The test level (disturbing current) shall be generated with a tolerance of ± 5 % of the selected level.

5.1.2 Example of a test generator for the disturbing current

The basic structure of a test generator is given in Figure 2.