



BSI Standards Publication

Hydrometry — Measurement of precipitation intensity — Metrological requirements and test methods for non-catching type rain gauges

National foreword

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The UK participation in its preparation was entrusted to Technical Committee CPI/113, Hydrometry.

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Published by BSI Standards Limited 2025

ISBN 978 0 539 21611 0

ICS 07.060

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2025.

Amendments/corrigenda issued since publication

Date	Text affected
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English Version

Hydrometry - Measurement of precipitation intensity - Metrological requirements and test methods for non- catching type rain gauges

Hydrométrie - Mesurage de l'intensité des
précipitations - Exigences métrologiques et méthodes
d'essai relatives aux pluviomètres non collecteurs

Hydrometrie - Messung der Niederschlagsintensität -
Metrologische Anforderungen und Prüfverfahren für
nicht auffangende Niederschlagsmessgeräte

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European foreword

This document (EN 18097:2025) has been prepared by Technical Committee CEN/TC 318 “Hydrometry”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2026, and conflicting national standards shall be withdrawn at the latest by June 2026.

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Introduction

According to CEN/TR 17993:2023 “*Calibration and accuracy of non-catching precipitation measurement instruments*” [10], although many attempts have been made and various approaches have been tested, no fully traceable calibration procedure exists for most of the non-catching gauges (NCGs) available on the market.

The document was prepared following a request for research development submitted by CEN/TC 318 to EURAMET, the European Association of National Metrology Institutes in October 2017, through the cooperation programme between STAIR (the joint CEN-CENELEC strategic Working Group supporting standardisation in research and innovation) and EMPIR (the EURAMET’s European Metrology Programme for Innovation and Research). This led to the approval and funding of the EURAMET pre-normative Research Project “EMPIR 18NRM03 - INCIPIT *Calibration and accuracy of non-catching instruments to measure liquid/solid atmospheric precipitation*” (Merlone et al., 2022 [1]), in which a calibration procedure was developed and proposed for consideration as a basis for standardisation.

1 Scope

This document considers liquid atmospheric precipitation (rain) and defines the procedures and equipment to perform laboratory tests, in steady-state conditions, for the calibration, check and metrological confirmation of non-catching rainfall measurement instruments. This document is not applicable to field performance.

It provides a classification of non-catching measurement instruments based on their laboratory performance. The classification does not relate to the physical principle used for the measurement, nor does it refer to the technical characteristics of the instrument assembly but is solely based on the instrument calibration.

Attribution of a given class to an instrument is not intended as a high/low ranking of its quality but rather as a quantitative standardized method to declare the achievable measurement accuracy to provide guidance on the suitability for a particular purpose, while meeting the user's requirements.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 17277:2019, *Hydrometry — Measurement requirements and classification of rainfall intensity measuring instruments*

3 Terms, definitions and symbols

3.1 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.2 Symbols

RI	mm h^{-1}	rainfall intensity
C_R		numerical factor for the conversion of the rate of rainfall from $[\text{m s}^{-1}]$ to $[\text{mm h}^{-1}]$, equal to $3,6 \cdot 10^6$
D	mm	nominal/generic diameter of the sphere having the same volume of the drop (equivolumetric spherical drop)
D_{min}	mm	minimum diameter of the equivolumetric spherical drop
D_{max}	mm	maximum diameter of the equivolumetric spherical drop
N	$\text{m}^{-3} \text{mm}^{-1}$	number of drops per unit volume of air and unit drop size interval
V	m^3	drop volume
W_T	m s^{-1}	terminal velocity of the falling drop
W	m s^{-1}	generic fall velocity of the drop

D_{ref}	mm	equivolumetric spherical diameter of the generated reference drop
D_{meas}	mm	equivolumetric spherical diameter of the drop as measured by the instrument under test
W_{ref}	m s ⁻¹	reference fall velocity of the generated drop
W_{meas}	m s ⁻¹	fall velocity of the generated drop as measured by the instrument under test
μ_{Dref}	mm	mean value of the equivolumetric spherical diameter of a set of generated reference drops
σ_{Dref}	mm	standard deviation of the equivolumetric spherical diameter of a set of generated reference drops
μ_{Wref}	m s ⁻¹	mean value of the fall velocity of a set of generated reference drops
σ_{Wref}	m s ⁻¹	standard deviation of the fall velocity of a set of generated reference drops
μ_{Dmeas}	mm	mean value of the equivolumetric spherical diameter of a set of generated drops as measured by the instrument under test
σ_{Dmeas}	mm	standard deviation of the equivolumetric spherical diameter of a set of generated drops as measured by the instrument under test
μ_{Wmeas}	m s ⁻¹	mean value of the fall velocity of a set of generated drops as measured by the instrument under test
σ_{Wmeas}	m s ⁻¹	standard deviation of the fall velocity of a set of generated drops as measured by the instrument under test
N_0	m ⁻³ mm ⁻¹	scale parameter of the exponential form of the drop size distribution
Λ	mm ⁻¹	slope parameter of the exponential form of the drop size distribution
RI_{ref}	mm h ⁻¹	rainfall intensity of the reconstructed target (reference) event
$\mu_{D_{i,ref}}$	mm	i-th mean reference diameter chosen for the discretisation of the target event
$\Delta\mu_{D_{i,ref}}$	mm	i-th reference drop size bin
RI_{meas}	mm h ⁻¹	rainfall intensity of the target event as measured by the instrument under test
e	%	generic percentage relative deviation
R	%	interval embracing 80% of the percentage relative deviations calculated on a set of generated drops
q_{10}^e	%	10° percentile of the percentage relative deviations calculated on a set of generated drops
q_{90}^e	%	90° percentile of the percentage relative deviations calculated on a set of generated drops
k		coverage factor, assumed equal to 1,28
$\mu_{e(D)}$	%	mean value of the percentage relative deviations of the equivolumetric drop diameter of a set of measured and generated reference drops