
**Information technology — Data
centres key performance indicators —**

**Part 9:
Water usage effectiveness (WUE)**

*Technologies de l'information — Indicateurs de performance clés des
centres de données —*

Partie 9: Efficacité dans l'utilisation de l'eau (WUE)

This document is a preview generated by EUS



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms, definitions, abbreviated terms and symbols	1
3.1 Terms and definitions	1
3.2 Abbreviated terms	3
3.3 Symbols	3
4 Applicable area of the data centre	4
5 Determination of WUE	5
6 Measurement of WUE	5
6.1 General	5
6.2 Measuring actual water usage	5
6.2.1 Calculation, measurement period and frequency	5
6.2.2 Categories of WUE	5
7 Application of WUE	8
8 Reporting of WUE	8
8.1 Requirements	8
8.1.1 Standard construct for communicating WUE data	8
8.1.2 Data for public reporting of WUE	9
8.2 Recommendations	9
8.3 Example of reporting WUE values	10
8.4 WUE derivatives	10
8.4.1 Purpose of WUE derivatives	10
8.4.2 Interim WUE	11
8.4.3 Partial WUE	11
8.4.4 Design WUE	11
8.4.5 Quality WUE	11
8.4.6 Peak WUE	12
8.5 Water reuse factor (WRF)	12
Annex A (informative) Examples of use	13
Annex B (normative) Water significance	15
Annex C (informative) Energy water intensity factor	16
Annex D (normative) Land consumption	17
Bibliography	19

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see <https://patents.iec.ch>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 39, *Sustainability, IT and data centres*.

A list of all parts in the ISO/IEC 30134 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

The global economy is today reliant on information and communication technologies and the associated generation, transmission, dissemination, computation and storage of digital data. All markets have experienced exponential growth in that data, for social, educational and business sectors and while the internet backbone carries the traffic, there are a wide variety of data centres at nodes and hubs within both private enterprise and shared/collocation facilities.

The historical data generation growth rate exceeds the capacity growth rate of information and communications technology hardware. In addition, with many governments having “digital agendas” to provide both citizens and businesses with ever-faster broadband access, the very increase in network speed and capacity will, by itself, generate ever more usage (Jevons Paradox). Data generation and the consequential increase in data processing and storage are directly linked to increasing power consumption.

With this background, data centre growth, and power consumption in particular, is an inevitable consequence; this growth will demand increasing power consumption despite the most stringent energy efficiency strategies. This makes the need for key performance indicators (KPIs) that cover the effective use of resources (including but not limited to energy and water) and the reduction of CO₂ emissions essential.

Within the ISO/IEC 30134 series, the term “resource usage effectiveness” is more generally used for KPIs in preference to “resource usage efficiency”, which is restricted to situations where the input and output parameters used to define the KPI have the same units.

Water usage effectiveness (WUE) is intended to support data centre practitioners in obtaining an in depth understanding of the performance of the data centre’s cooling installation in comparison with similar systems, thereby creating a tool for improving the sustainability of the data centre. The impact of operational water usage is emerging as being extremely important in the design, location and operation of current and future data centres.

In order to determine the overall resource efficiency of a data centre, a holistic suite of metrics is required. This document is one of a series of International Standards for such KPIs and has been produced in accordance with ISO/IEC 30134-1, which defines common requirements for a holistic suite of KPIs for data centre resource efficiency. This document does not specify limits or targets for the KPI and does not describe or imply, unless specifically stated, any form of aggregation of this KPI into a combination with other KPIs for data centre resource efficiency. This document presents specific rules on WUE’s use, along with its theoretical and mathematical development. This document concludes with several examples of site concepts that could employ the WUE metric.

Information technology — Data centres key performance indicators —

Part 9: Water usage effectiveness (WUE)

1 Scope

This document specifies water usage effectiveness (WUE) as a key performance indicator (KPI) for quantifying the water consumption of a data centre during the use phase of the data centre life cycle.

WUE is a simple method for reporting the water intensity of the data centre operating. By reporting water consumption, it is possible to present the data centre's resource effectiveness.

This document:

- a) defines the WUE of a data centre;
- b) introduces WUE measurement categories;
- c) describes the relationship of this KPI to a data centre's infrastructure, information technology equipment and information technology operations;
- d) defines the measurement, the calculation and the reporting of the parameter; and
- e) provides information on the correct interpretation of the WUE.

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.

ISO/IEC 30134-1, *Information technology — Data centres — Key performance indicators — Part 1: Overview and general requirements*

ISO 8601-1, *Date and time — Representations for information interchange — Part 1: Basic rules*

3 Terms, definitions, abbreviated terms and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 30134-1 and the following apply.

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/>