BS EN 17840:2023

BSI Standards Publication

Performance and condition assessment for buildings and civil engineering works — Framework for assessment within physical asset management

Documents
Document Sharing Hub

Full document details: BS EN 17840:2023

National foreword

This British Standard is the UK implementation of EN 17840:2023.

The UK participation in its preparation was entrusted to Technical Committee DS/1, Dependability.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2023
Published by BSI Standards Limited 2023

ISBN 978 0 539 17966 8

ICS 91.010.99

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2023.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS EN 17840:2023

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 17840

September 2023

ICS 91.010.99

English Version

Performance and condition assessment for buildings and civil engineering works - Framework for assessment within physical asset management

Évaluation de la performance et de l'état des bâtiments et des ouvrages de génie civil - Cadre de l'évaluation dans le cadre de la gestion d'actifs physiques

Leistungs- und Zustandsbewertung für Immobilien - Bewertungsrahmen für das Anlagenmanagement

This European Standard was approved by CEN on 9 July 2023.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2023 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 17840:2023 E

Documents
Document Sharing Hub

Full document details: BS EN 17840:2023

Contents

Page

European foreword 4
Introduction 5
1 Scope 6
2 Normative references 6
3 Terms and definitions 6
3.1 Asset management 6
3.2 Assessment 8
3.3 Maintenance 9
3.4 Objectives and requirements 11
3.5 Observation 13
4 Essential elements of assessment 14
4.1 Introduction to assessment 14
4.2 Asset portfolio decisions 15
4.3 Validating the set requirements and objectives 15
4.4 Verifying the requirements 16
4.4.1 Short-term measures: Performance and condition 16
4.4.2 Short-term measures: Compliance 18
4.4.3 Long term asset planning 18
5 Assessment process 19
5.1 General 19
5.2 Assessment process steps 19
5.3 Identifying the requirements 20
5.3.1 General 20
5.3.2 Requirements for an asset portfolio 21
5.3.3 Strategic guidance 21
5.3.4 Requirements for assets and aggregated assets 21
5.4 Specifying the assessment strategy 21
5.4.1 General 21
5.4.2 Level of assessment 24
5.4.3 Purpose of the assessment 24
5.4.4 Maintenance approaches 24
5.4.5 Results 24
5.4.6 Classification 25
5.4.7 Planning 25
5.4.8 Observation category 26
5.4.9 Observation techniques 27
5.5 Gathering additional information 28
5.6 Assessment 29
5.6.1 General 29
5.6.2 Asset portfolio assessment 29
5.6.3 Aggregated assets assessment 30
5.6.4 Asset assessment 31
5.7 Validation 31
6 The observation process 32
6.1 General 32
6.2 Planning 33

Documents
Document Sharing Hub
Full document details: BS EN 17840:2023

6.2.1 Scope: Specifying the task 33
6.2.2 Preparation: Determining operational conditions 34
6.3 Observation 35
6.3.1 Detection: Acquiring asset status data and reporting 35
6.3.2 Ranking: Analysing and valuing detection data 36
6.4 Quality control, evaluation and rectifications 38

Annex A (informative) **References** 39

A.1 References for requirements 39

A.2 References for guidelines for assessment planning 41

A.3 References for observation methods and techniques 41

A.4 References for assessment method 41

Annex B (informative) **Inventory list plans and reports** 42

Bibliography 47

Documents
Document Sharing Hub

Full document details: BS EN 17840:2023

European foreword

This document (EN 17840:2023) has been prepared by Technical Committee CEN/TC 319 “Maintenance”, the secretariat of which is held by UNI.

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 March 2024, and conflicting national standards shall be withdrawn at the latest by March 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Documents
Document Sharing Hub
Full document details: BS EN 17840:2023

Introduction

There are various standards available about monitoring, inspection and assessment of physical assets. All these standards have their own purpose and place in the field of assessment. This document for performance and condition assessment is an umbrella standard for physical assets and refers to other standards for detailed methods.

The scope of this document is buildings and civil engineering works. The intended audience for this document is asset owners (small and large, public and private), asset managers, facility managers, property managers, observers and consultants.

This document consists of two parts:

— the assessment process: The steps that are needed to perform an assessment;

— the observation process: The steps that are needed for acquiring and analysing the asset status data to give recommendations as part of the assessment process.

In both cases, the purpose is to enhance the quality of the assessment and to provide information for the asset owner/manager to support the decision making process.

The document assists asset and facility managers in selecting the appropriate technique and determining the quality of the work that has been done.

Documents
Document Sharing Hub
Full document details: BS EN 17840:2023

1 Scope

This document specifies and gives guidance on the performance and condition assessment process of existing physical assets in the utilization stage (from commissioning to the end of life).

This document relates to assessment of physical assets within the building and civil engineering sector; however, it can also be used in other sectors where applicable.

This document specifies a generic framework for assessment, specification of requirements, the observation process and gathering of the required information in order to sustain informed asset management decision making.

This document is an umbrella standard and refers to other standards for detailed methods. It does not replace any other standard, but is an addition to provide a system for the assessment work.

NOTE 1 The references to other standards only relate to building and civil engineering works. There are no references for production machinery and equipment, offshore, electrical and mechanical assets, mobile assets and non-tangible assets.

NOTE 2 In this document the physical assets will be referred to as assets, except in the Clause Terms and definitions.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

NOTE Several terms have multiple definitions in different standards, depending on the context. All definitions in this document are fitted for performance and condition assessment.

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

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1 Asset management

3.1.1
aggregated assets
set of assets that interact or are interrelated

Note 1 to entry: A sewage system, tunnel, building, bridge, network of motorways are typical examples of aggregated assets.

Note 2 to entry: Aggregated assets can also be referred to as an asset system.

Documents
Document Sharing Hub
Full document details: BS EN 17840:2023

3.1.2
asset management
coordinated activity of an organization to realize value from assets

Note 1 to entry: Realization of value will normally involve a balancing of costs, risks, opportunities and performance benefits.

Note 2 to entry: Activity can also refer to the application of the elements of the asset management system.

Note 3 to entry: The term "activity" has a broad meaning and can include, for example, the approach, the planning, the plans and their implementation.

[SOURCE: ISO 55000:2014, 3.3.1]

3.1.3
asset portfolio
assets that are within the scope of the asset management system

Note 1 to entry: A portfolio is typically established and assigned for managerial control purposes. Portfolios for physical hardware might be defined by category (e.g. properties, civil infrastructure, road network, plant, equipment, tools, land). Software portfolios might be defined by software publisher, or by platform (e.g. PC, server, mainframe).

Note 2 to entry: An asset management system can encompass multiple asset portfolios. Where multiple asset portfolios and asset management systems are employed, asset management activities should be coordinated between the portfolios and systems.

[SOURCE: ISO 55000:2014, 3.2.4, modified – Note 1 to entry: examples of physical asset portfolios have been added]

3.1.4
asset
item, thing or entity that has potential or actual value to an organization

Note 1 to entry: Value can be tangible or intangible, financial or non-financial, and includes consideration of risks and liabilities. It can be positive or negative at different stages of the asset life.

Note 2 to entry: Physical assets usually refer to facilities, civil engineering works, street furniture, technical installations, equipment, inventory and properties owned by the organization. Physical assets are the opposite of intangible assets, which are non-physical assets such as leases, brands, digital assets, use rights, licences, intellectual property rights, reputation or agreements.

Note 3 to entry: A grouping of assets referred to as aggregated assets (3.1.1) could also be considered as an asset.

Note 4 to entry: In this document the term 'asset' means physical asset (3.1.7).

[SOURCE: ISO 55000:2014, 3.2.1, modified – Note 2 to entry: examples of physical assets have been added; Note 4 to entry has been added]

3.1.5
interoperability
ability of systems to provide services to and accept services from other systems and to use these services to enable them to operate effectively together

[SOURCE: ISO 37153:2017, 3.8, modified – Notes 1 and 2 to entry have been deleted]

AVA Documents
Document Sharing Hub

Full document details: BS EN 17840:2023

3.1.6
item
part, component, device, subsystem, functional unit, equipment or system that can be individually described and considered

Note 1 to entry: A number of items e.g. a population of items, or a sample, may itself be considered as an item.

Note 2 to entry: An item may consist of hardware, software or both.

Note 3 to entry: Software consists of programs, procedures, rules, documentation and data of an information processing system.

[SOURCE: EN 13306:2017, 3.1]

3.1.7
physical asset
item that has potential or actual value to an organization

Note 1 to entry: Examples of physical assets are components, machines, plants, buildings, infrastructures etc.

[SOURCE: EN 13306:2017, 3.2]

3.1.8
physical asset management
coordinated activities of an organization to realize value from physical assets

Note 1 to entry: Realization of value will normally involve a balancing of costs, risks, opportunities and benefits.

Note 2 to entry: In the life cycle context, physical asset management is the optimal life cycle management of physical assets to sustainably achieve the stated business objectives.

[SOURCE: EN 16646:2014, 3.1.13]

3.2 Assessment

3.2.1
assessment
systematic process of collecting and analysing data to determine the current status of a product, a process, a system, a person or an organization

[SOURCE: ISO 10795:2019, 3.24]

3.2.2
assessment strategy
outline plan that includes a coordinated set of activities and the allocation of resources necessary to perform the assessment

3.2.3
condition
physical state of an asset or item at a particular time compared to state at the time of commissioning

Note 1 to entry: That assumes that the asset condition is sound at the commissioning.

[SOURCE: CEN/TS 17385:2019, 3.4, modified – Note 1 to entry has been added]

Documents
Document Sharing Hub
Full document details: BS EN 17840:2023

3.2.4
condition assessment
objective method for determining the physical condition of a constructed asset or a part of it

[SOURCE: CEN/TS 17385:2019, 3.5, modified – Note 1 to entry has been deleted]

3.2.5
function
intended effect of a system, subsystem, product or part

[SOURCE: ISO 21351:2005, 3.1.5, modified – Notes to entry have been deleted]

3.2.6
performance
ability to fulfil required functions under intended use conditions or behaviour when in use

Note 1 to entry: Derived from the definition of performance in ISO 6707-1.

Note 2 to entry: The required functions address both the functionality requirements as well as the design requirements.

EXAMPLES Flood protection, conservation of nature, to provide shelter, to provide security, to provide a healthy environment, group accommodation, to provide residence or work environment, lifting.

[SOURCE: ISO/TS 21929-2:2015, 3.28, modified – Examples have been added]

3.2.7
performance assessment
objective method for determining the performance of a constructed asset or a part of it

3.3 Maintenance

3.3.1
improvement
combination of all technical, administrative and managerial actions, intended to ameliorate the intrinsic reliability and/or the maintainability and/or the safety of an item, without changing the original function

Note 1 to entry: An improvement may also be introduced to prevent misuse in operation and to avoid failures.

Note 2 to entry: Improvement may also encompass aesthetics, comfort, health, environment, etc.

[SOURCE: EN 13306:2017, 7.6, modified – Note 2 to entry added]

3.3.2
modernization
modification or improvement of the item, taking into account technological advances, to meet new or changed requirements

[SOURCE: EN 13306:2017, 7.8]

Documents
Document Sharing Hub
Full document details: BS EN 17840:2023

3.3.3
modification
combination of all technical, administrative and managerial actions intended to change one or more functions of an item

Note 1 to entry: Modification is not a maintenance action, but has to do with changing the required function of an item to a new required function. The changes may have an influence on the dependability characteristics.

Note 2 to entry: Modification may involve the maintenance organization.

Note 3 to entry: The change of an item where a different version is replacing the original item without changing the function or ameliorating the dependability of the item is called a replacement and is not a modification.

[SOURCE: EN 13306:2017, 7.7]

3.3.4
operational mode
configuration in which an item is operated and utilized during a given period characterized by units of use (hours, loads, number of starts/stops, number of transients, etc.)

Note 1 to entry: Operational mode determines the frequency, load, continuity and performance rate of utilization.

Note 2 to entry: Operational mode may, or may not, comply with the inherent item specifications as defined.

[SOURCE: EN 13306:2017, 4.20]

3.3.5
operating constraints
characteristics of the item, which set limits for the use of the item and may determine requirements for maintenance activities

Note 1 to entry: These characteristics are the results of design and construction of the item.

[SOURCE: EN 13306:2017, 4.21]

3.3.6
operating conditions
physical loads and environmental conditions experienced by the item during a given period

Note 1 to entry: Operating conditions can vary during the item's life cycle.

[SOURCE: EN 13306:2017, 4.22]

3.3.7
predetermined maintenance
preventive maintenance carried out in accordance with established intervals of time or number of units of use but without previous condition investigation

Note 1 to entry: Intervals of times or number of unit of use may be established from knowledge of the failure mechanisms of the item.

[SOURCE: EN 13306:2017, 7.2]

Documents
Document Sharing Hub
Full document details: BS EN 17840:2023

3.3.8
preventive maintenance
maintenance carried out intended to assess and/or to mitigate degradation and reduce the probability of failure of an item

[SOURCE: EN 13306:2017, 7.1]

3.3.9
conventional service life
period, based on statistics of the profession, at the end of which the renewal of asset is deemed necessary

3.3.10
utilization stage
life cycle phase at which safe exploitation for the intended use (or uses) of a physical asset is possible, within specified as-built properties

Note 1 to entry: Derived from ISO 2394: revised.

Note 2 to entry: Stage may include: Operation, modernization, renovation, maintenance and other utilization support.

3.4 Objectives and requirements

3.4.1
condition requirements
specification of a required physical state of an asset or item

3.4.2
conformity
fulfilment of a requirement

[SOURCE: EN 13306:2017, 4.11]

3.4.3
compliance
meeting all the organization's compliance obligations

Note 1 to entry: Compliance is made sustained by embedding it in the culture of an organization and in the behaviour and attitude of people working for it.

[SOURCE: ISO 37301:2021, 3.26, modified – Note 1 to entry has been added]

3.4.4
compliance requirement
requirement that an organization has to comply with

3.4.5
legislation
directives, acts, ordinances, and regulations

[SOURCE: ISO 14385-1:2014, 3.10]

AVA Documents
Document Sharing Hub

Full document details: BS EN 17840:2023

3.4.6
objective
result to be achieved

Note 1 to entry: An objective can be strategic, tactical or operational.

Note 2 to entry: Objectives can relate to different disciplines (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process).

Note 3 to entry: An objective can be expressed in other ways, e.g. as an intended outcome, a purpose, an operational criterion, a physical asset objective or by the use of other words with similar meaning (e.g. aim, goal, or target).

Note 4 to entry: In the context of asset management systems, asset management objectives are set by the organization, consistent with the organizational objectives and asset management policy, to achieve specific measurable results.

[SOURCE: ISO 55000:2014, 3.1.12]

3.4.7
performance requirements
performance demanded or expected to be fulfilled

[SOURCE: ISO 6707-1:2020, 3.7.1.12]

3.4.8
requirement
need or expectation that is stated, generally implied or obligatory

Note 1 to entry: "Generally implied" means that it is custom or common practice for the organization and stakeholders that the need or expectation under consideration is implied.

Note 2 to entry: A specified requirement is one that is stated, for example in documented information.

[SOURCE: ISO 55000:2014, 3.1.20]

3.4.9
validation
confirmation, through the provision of objective evidence, that the requirements or objectives for a specific intended use or application have been fulfilled

Note 1 to entry: The objective evidence needed for a validation is the result of a test or other form of determination such as performing alternative calculations or reviewing documents.

Note 2 to entry: The word "validated" is used to designate the corresponding status.

Note 3 to entry: The use conditions for validation can be real or simulated.

[SOURCE: ISO 9000:2015, 3.8.13, modified – "Objectives" has been added to the definition]

Documents
Document Sharing Hub
Full document details: BS EN 17840:2023

3.4.10
verification
confirmation, through the provision of objective evidence, that specified requirements have been fulfilled

Note 1 to entry: The objective evidence needed for a verification can be the result of an inspection or of other forms of determination such as performing alternative calculations or reviewing documents.

Note 2 to entry: The activities carried out for verification are sometimes called a qualification process.

Note 3 to entry: The word "verified" is used to designate the corresponding status.

[SOURCE: ISO 9000:2015, 3.8.12]

3.5 Observation

3.5.1
detection
act of perceiving and interpreting findings of the examined asset by a qualified observer

Note 1 to entry: Detection can include gaining apprehension of properties through sensing, measuring, sampling, surveying, inspecting, testing or otherwise examining an object or subject.

3.5.2
measurement
process to determine a value

Note 1 to entry: In the context of performance and condition assessment, the value is related to performance and condition measurements.

[SOURCE: ISO 55000:2014, 3.1.10, modified – Note 1 to entry has been added]

3.5.3
observation
quantitative or qualitative determination as a result of a detection and valuing process for properties, features or aspects under consideration

3.5.4
observation category
group of various observation types with similar desired output

3.5.5
observation technique
technique that is used to execute the observation

3.5.6
observation method
procedure to perform the observation

3.5.7
observer
person who performs the observation

EXAMPLES Inspector, surveyor, property inspector, construction observer, building inspector.

AVA Documents
Document Sharing Hub

Full document details: BS EN 17840:2023

3.5.8
quality
totality of requirements that bear on the ability to satisfy specific needs

[SOURCE: ISO 6707-1:2020, 3.7.1.10, modified – The term 'characteristics' has been replaced by 'requirements']

3.5.9
ranking
act of attaching importance to findings

Note 1 to entry: The process can include scoring, grading, rating, ranking, weighing, classifying or valuing aspects through verification of explicit requirements or implicit demands.

Note 2 to entry: Aspects can be classified by defining impact categories.

3.5.10
sample
amount of the material, product, or assembly, to be tested, which is representative of the item as a whole

Note 1 to entry: Compare with the term specimen.

[SOURCE: ISO 13943:2017, 3.334]

3.5.11
sampling
selecting items, or portions of material, to produce samples

[SOURCE: ISO 6707-1:2017, 3.5.1.23]

4 Essential elements of assessment

4.1 Introduction to assessment

Assessments are the 'check' in the plan-do-check-act-circle. Assessments can be used:

— as input for asset portfolio investment decisions;

— to validate the set requirements and objectives;

— as input for long term asset planning;

— to verify the performance and condition requirements of assets and aggregated assets.

The different assessments are shown in Figure 1.

Documents
Document Sharing Hub
Full document details: BS EN 17840:2023