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Method for condition assessment of immobile constructed assets

Condition-Assessment-Verfahren

Méthode pour l'évaluation de l'état des biens immeubles construits

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Method for condition assessment of immobile constructed assets

Méthode pour l'évaluation de l'état des biens immeubles construits

Condition-Assessment-Verfahren

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (CEN/TS 17385:2019) has been prepared by Technical Committee CEN/TC 319 “Maintenance”, the secretariat of which is held by UNI.

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Introduction

The condition of an immobile constructed asset is one of the factors which determine the value of the asset. The asset value is also influenced by the quality of the maintenance performed. As maintenance costs are a significant part of the total cost of ownership of a constructed asset, maintenance actions will be carefully weighed against their benefit.

The method in this standard provides an objective evaluation of the physical condition of an asset and is based on that by NEN for the Dutch market in 2006 and may be used to identify and justify a maintenance plan for the asset.

Condition assessment can be applied to all immobile constructed assets, including infrastructure assets such as buildings and bridges. However, this method is less suitable for assets such as electrical and mechanical equipment. It offers a specific survey methodology to evaluate and record defects, which can be ascertained by any means necessary.

A condition assessment is based on non-destructive surveys to identify quantitative and qualitative aspects of defects in an item and hence determine its condition class. Dismantling, sampling and drilling inspection holes can be included in the assessment. The condition class shall deliver fact-based data to managers, whom should be enabled to distinguish between medium- and long-term maintenance measures in relationship to the desired level of maintenance. Alternative maintenance scenarios can thus be developed and evaluated against the value of the asset, which in turn may lead to a change in asset management policy.

A condition assessment has an explicit technical approach and is one of many influential aspects playing a role in supporting property management. Aspects like safety, compliance with legislation, quality of use, social quality, location, flexibility, breakdown risks may play a significant role too, but are all excluded from the scope of this Technical Specification. Condition assessment is just one aspect for evaluating and supporting organization policy. The organization policy therefore defines how and where the condition class is relevant within the set maintenance plans.

This document has the following objectives:

- to deliver uniformity in the condition assessment of assets, systems and elements, expressed by a condition class. The condition class is a measure of the degradation of the asset and a rating based on objectively registered defects;
- to deliver unity and insight into the sorts of defects. Each defect is weighted against the parameters severity, level of degradation and extent;
- to deliver fact-based input data to enable a priority proposition for maintenance action when weighted against all relevant aspects;
- to deliver a method to set out maintenance plans and evaluating the functioning of maintenance management on different organization levels.

1 Scope

This document describes a method to assess the physical condition of all types of immobile constructed assets in a uniform and objective way. The assessment results in a condition class, which expresses the technical state of maintenance of an asset at any certain moment in time on a six-point scale. It therefore can represent either the deterioration of an asset or part thereof or the physical condition at the time of commissioning. By repeating the assessment at regular intervals, it is possible to monitor the degradation of the asset over time.

This document offers a uniform, objective and reproducible method with traceable results. It describes how to achieve the condition class, based on non-destructive observation of defects off any asset or part thereof by using a predefined breakdown structure. The appropriate breakdown structure of an asset is dependent upon the asset concerned and guidance for defining a uniform breakdown structure is given in Annex C.

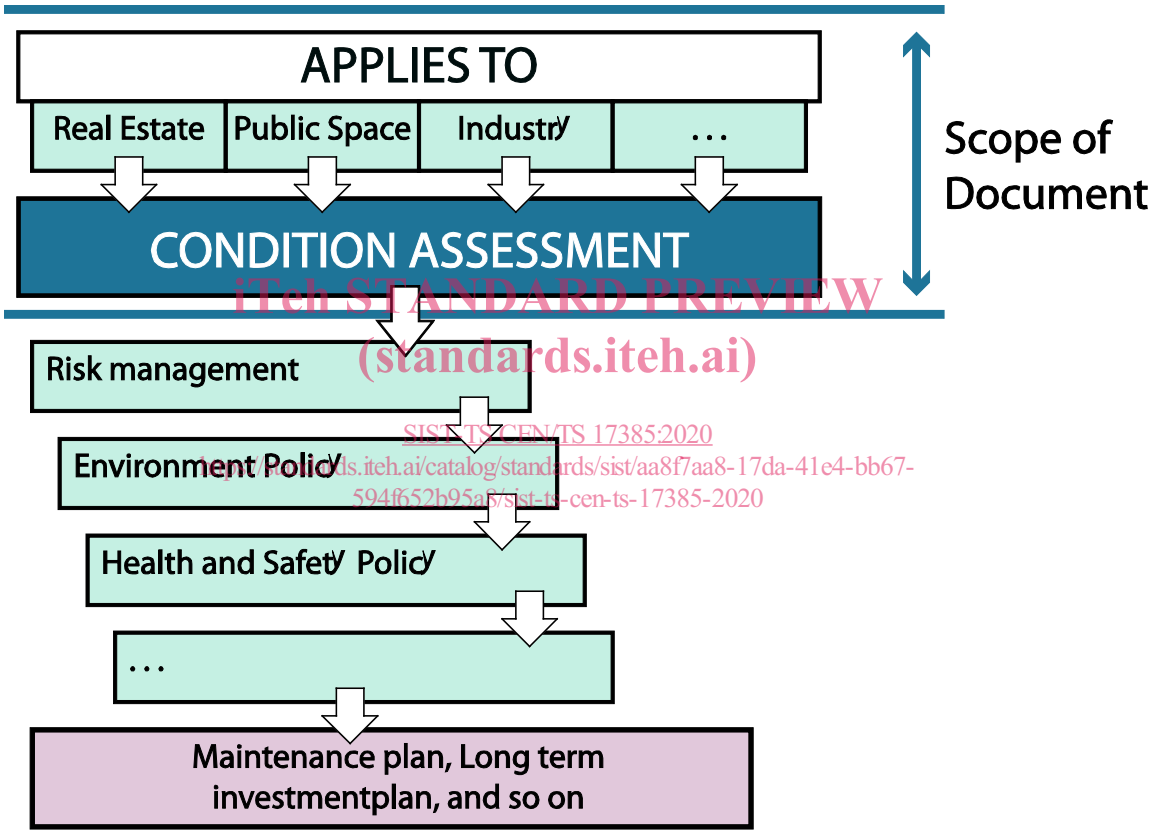

Figure 1 — Applicability of condition assessment

This document as part of an Asset Management plan can be applied to:

a) evaluate the actual physical condition of a single asset or portfolio of assets;

b) establish a maintenance strategy based on the actual condition of the assets;

c) support financial planning;

d) encourage and support communication about the actual condition versus the desired condition.

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.

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

• IEC Electropedia: available at http://www.electropedia.org/

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

3.1
asset owner
any organization or representative thereof that is legally entitled party of an asset portfolio

3.2
breakdown structure
hierarchical decomposition of an asset for assessment purposes

Note 1 to entry: The asset breakdown structure is defined so as to enable assessment and recording of results to be performed for logical and easily identified elements.

3.3
component
constituent part of a system which cannot be physically divided into smaller parts without losing its particular function

[SOURCE: IEV 151-11-21, modified – Word "device" replaced by "system"]

3.4
condition
physical state of an object at a particular time compared to the time of commissioning

[SOURCE: EN 16096:2012, 3.1, modified]

3.5
condition assessment
objective method for determining the physical condition of a constructed asset or a part of it

Note 1 to entry: The condition assessment is based on a survey of defects. In specifying the condition class, three defect parameters are used; severity, level of degradation and extent.

3.6
condition class
categorisation of item condition at a defined point in time

Note 1 to entry: Condition class is the result of three parameters of the defect(s): severity, level of degradation and extent.

Note 2 to entry: An identified level of degradation may continue to deteriorate or remain stable with time.

3.7
condition survey
activity, performed either manually or automatically, intended to measure the characteristics and parameters of the physical actual state of an item

3.8
correction factor
formula which gives the weight of influence according the components in relation with a subsystem

3.9
defect
any degradation of the part compared to the physical condition at the time of commissioning

Note 1 to entry: The definition is different to the one given in ISO 9000

3.10
degradation
detrimental change in physical condition of an item

Note 1 to entry: Degradation may lead to a failure.

Note 2 to entry: Degradation considers also changes in the appearance.

Note 3 to entry: Detrimental change is associated with age, use or external causes on an item and may be progressive or static.

3.11
element
level of sub-division of an item hierarchy of which condition is to be assessed

Note 1 to entry: An item hierarchy is generally defined with the view of achieving a given objective, for example by performing a definite function.

Note 2 to entry: Components of an item hierarchy may be natural or man-made material objects, as well as modes of thinking and the results thereof (for example forms of organization, mathematical methods and programming languages).

Note 3 to entry: The item hierarchy is considered to be separated from the environment and the other external systems by an imaginary surface which cuts the links between them and the system.

Note 4 to entry: The term “item hierarchy” should be qualified when it is not clear from the context to what it refers, for example control item hierarchy, calorimetric item hierarchy, item hierarchy of units, transmission item hierarchy.”

3.12
extent of defect
fraction affected by the defect in relation to the full element

Note 1 to entry: The extent may be expressed as a physical fraction of the element under assessment or as the fraction of the element value compared to that at commissioning.

3.13
immobile constructed asset
item that is constructed or results from construction operations that during its primary use for its functioning is directly or indirectly fixed to the ground

EXAMPLE Railways are included, train is excluded

3.14
indenture level
level of sub-division within an item hierarchy

EXAMPLE Bridge, superstructure, deck, deck beam.

Note 1 to entry: From the maintenance perspective, the indenture level depends on the complexity of the item's construction, the accessibility of sub items, skill level of maintenance personnel, test equipment facilities, and safety considerations.

[SOURCE: EN 13306:2017, 3.7, modified – Examples are tailored to the scope of this standard.]

3.15
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]

3.16
level of degradation
degree of degradation associated with the defect

3.17
maintenance
combination of all technical, administrative and managerial actions during the life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function

Note 1 to entry: Technical maintenance actions include observation and analyses of the item state (e.g. inspection, monitoring, testing, diagnosis, prognosis, etc.) and active maintenance actions (e.g. repair, refurbishment).

[SOURCE: EN 13306:2017, 2.1]

3.18
maintenance plan
structured and documented set of tasks that include the activities, procedures, resources and the time scale required to carry out maintenance

[SOURCE: EN 13306:2017, 2.5]

3.19
severity
<of a failure or a fault> potential or actual detrimental consequences of a failure or a fault

Note 1 to entry: The severity of a failure may be related to safety, availability, costs, quality, environment, etc.

[SOURCE: EN 13306:2017, 5.14]

3.20
system
set of interrelated components considered in a defined context as a whole and separated from their environment

[SOURCE: 151-11-27, IEV 351-42-08, modified – Notes to entry deleted]

4 Condition assessment overview

4.1 General

The assessment methodology described in this document is a structured process intended to provide a consistent and repeatable evaluation of the condition of an immobile constructed asset. The condition assessment should be performed according to the requirements of a defined agreement between the asset owner and the condition assessor or assessing organization. This will normally include the objectives of the assessment with respect to identification of required maintenance or other actions.

The condition assessment should include the following stages:

a) Establish the asset boundaries and identify the asset breakdown structure and indenture levels;

b) Visual and physical surveys to quantify defects and classify defects;

c) Determination of the condition class(es) by interpretation and combination of the identified defects and their classification;

d) Report assessment results.

Each stage is described in the following clauses.

4.2 Identification of asset boundaries and breakdown structure of the asset

4.2.1 General

The condition assessment is based on a survey of the elements of an asset. The definition and documentation of elements for survey is performed in three stages:

a) Identification of the boundaries of the asset to be assessed;

b) Definition of asset breakdown structure;

c) Description of the elements to be assessed and their material(s).

The number of indenture levels in the asset breakdown structure will depend on the size and complexity of the asset. The lowest level in the hierarchy should be the elements which are to be assessed.

NOTE All elements are associated with materials; it is these materials to which defects are related.