
Prostostoječi dimniki - 9. del: Upravljanje življenjske dobe - Nadzorovanje, inšpekcijski pregled, vzdrževanje, sanacijski ukrepi in poročanje - Zahtevani ukrepi in postopki

Free-standing chimneys - Part 9: Lifetime management - Monitoring, inspection, maintenance, remedial and reporting - Operations and actions required

Freistehende Industrieschornsteine - Teil 9: Lebensdauermanagement - Überwachung, Inspektion, Wartung, Sanierungsmaßnahmen und Dokumentation; Erforderliche Maßnahmen und Verfahren

Cheminées autoportantes - Partie 9 : Gestion du cycle de vie - Surveillance, inspection, maintenance, mesures correctives et établissement de rapports ; opérations et actions requises

Ta slovenski standard je istoveten z: prEN 13084-9

ICS:

13.020.60	Življenjski ciklusi izdelkov	Product life-cycles
91.060.40	Dimniki, jaški, kanali	Chimneys, shafts, ducts

oSIST prEN 13084-9:2021

en,fr,de

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN 13084-9:2021](https://standards.iteh.ai/catalog/standards/sist/2958cf71-6360-42f7-989c-43e79bb433c3/osist-pren-13084-9-2021)

<https://standards.iteh.ai/catalog/standards/sist/2958cf71-6360-42f7-989c-43e79bb433c3/osist-pren-13084-9-2021>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 13084-9

April 2021

ICS 91.060.40

English Version

**Free-standing chimneys - Part 9: Lifetime management -
Monitoring, inspection, maintenance, remedial and
reporting; Operations and actions required**

Cheminées autoportantes - Partie 9 : Gestion du cycle de vie - Surveillance, inspection, maintenance, mesures correctives et établissement de rapports ; opérations et actions requises

Freistehende Industrieschornsteine - Teil 9: Lebensdauermanagement - Überwachung, Inspektion, Wartung, Sanierungsmaßnahmen und Dokumentation; Erforderliche Maßnahmen und Verfahren

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 297.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

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

Contents

Page

European foreword	3
Introduction	4
1 Scope.....	5
2 Normative references.....	5
3 Terms and definitions.....	5
4 Maintenance and inspection.....	7
4.1 General structure of the maintenance operations.....	7
4.2 Maintenance and inspection plan by the manufacturer.....	7
4.3 Maintenance and inspection plan by the owner/operator.....	8
4.4 General Inspection	10
5 Repair works	19
5.1 General.....	19
5.2 The competence of the company carrying out the repair works.....	20
5.3 Result expected from repair works.....	20
5.4 Description and preparation of repair works.....	20
5.5 Execution of repair works and security.....	20
5.6 Record of works completed, and results obtained	22
Annex A (informative) Provisions concerning the use of work equipment provided for temporary work at a height.....	23
Annex B (informative) Examples of damages with associated level of criticality	27
Bibliography	28

European foreword

This document (prEN 13084-9:2021) has been prepared by Technical Committee CEN/TC 297 “Free-standing industrial chimneys”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document is Part 9 in a series of standards and as such is not a stand-alone document. The requirements in Parts 1 to 8 of this series are integral to Part 9.

EN 13084, *Free-standing chimneys* consists of the following parts:

- *Part 1: General requirements*
- *Part 2: Concrete chimneys*
- *Part 4: Brick liners — Design and execution*
- *Part 5: Material for brick liners — Product specifications*
- *Part 6: Steel liners — Design and execution*
- *Part 7: Product specifications of cylindrical steel fabrications for use in single wall steel chimneys and steel liners*
- *Part 8: Design and execution of mast construction with satellite components*
- *Part 9: Life-Time Management — Monitoring, Inspection, Maintenance, Remedial and Reporting; operations and actions*

The following documents additionally apply:

- EN 1993-3-1, *Eurocode 3 — Design of steel structures — Part 3-1: Towers, masts and chimneys — Towers and masts*
- EN 1993-3-2, *Eurocode 3 — Design of steel structures — Part 3-2: Towers, masts and chimneys — Chimneys*

Introduction

The standard EN 1990 indicates as a principle that in order to ensure adequate durability of the structure, several factors should be taken into account including the expected maintenance during the period of project use.

The same standard also states as a principle that proper inspections and maintenance according to the procedures specified in the project documentation should be stated to insure the required level of reliability.

The standard EN 13084-1 requires in Clause 7 that the chimneys be checked at regular intervals by an expert. The interval should not exceed two years between any checks. A written report should include recommendations for maintenance and repair.

When planning new-build or refurbishment projects, architects, designers, manufacturers and contractors have duties under European Directive 92/57/EEC 24th June 1992 on the implementation of minimum safety and health requirements at constructions sites (The Construction Design and Management Regulations), to consider the need for work to be carried out at height over the lifespan of a building, e.g. to clean, maintain and repair it, and they should design out the need to work at height if possible.

It is therefore necessary to specify the various operations to be carried out both in inspection and maintenance so as to clarify the various points of intervention in order to prolong the duration of use and reliability of the structure. The summary of this standard is as detailed in contents below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 13084-9:2021](https://standards.iteh.ai/catalog/standards/sist/2958cf71-6360-42f7-989c-43e79bb433c3/osist-pren-13084-9-2021)

<https://standards.iteh.ai/catalog/standards/sist/2958cf71-6360-42f7-989c-43e79bb433c3/osist-pren-13084-9-2021>

1 Scope

This document deals with the general requirements and the basic performance inspection, maintenance and reporting criteria for the *Lifetime management, Monitoring, Inspection, Maintenance, Cleaning, Repair and Remedial work including the Reporting; Operations and Actions Required* of all types of structurally independent chimneys. This document applies to any windshield, single stack, tower, mast and liners covered by the EN 13084 series.

The Lifetime management takes into account the original structural and operating design of the structurally independent chimneys under operational conditions and other actions to verify that mechanical resistance and stability and safety in use are continued at the designed for level as expected and/or adapted to changes in the operational requirements of the structure and/or its environment.

NOTE In other parts of the EN 13084 series, rules will be given where chimney products in accordance with EN 1443 (and the relating product standards) may be used in structurally independent chimneys.

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 365, *Personal protective equipment against falls from a height - General requirements for instructions for use, maintenance, periodic examination, repair, marking and packaging*

EN 1990, *Eurocode - Basis of structural and geotechnical design*

EN 1993-1-11, *Eurocode 3 - Design of steel structures - Part 1-11: Design of structures with tension components*

<https://standards.iteh.ai/catalog/standards/sist/2958cf71-6360-42f7-989c-1270144233/iso-pr-en-13084-9:2021>

EN 62305-1, *Protection against lightning - Part 1: General principles*

EN 62305-2, *Protection against lightning - Part 2: Risk management*

EN 62305-3, *Protection against lightning - Part 3: Physical damage to structures and life hazard*

EN 62305-4, *Protection against lightning - Part 4: Electrical and electronic systems within structures*

EN ISO 14122-4:2016, *Safety of machinery - Permanent means of access to machinery - Part 4: Fixed ladders (ISO 14122-4:2016)*

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

accessible space

space between windshield and liner that is designed for entry by personnel

prEN 13084-9:2021 (E)**3.2****condition monitoring**

visual inspection, on a regular basis, of the structure and its components in order to identify any significant change

3.3**criticality level**

priority, quality and/or state of the required maintenance of the chimney and of all the components of the flue ducts as a hierarchical level of importance defined as three different categories of criticality (high, medium, and low)

3.4**design working life**

period for which a structure is expected to be used for its intended purpose to ensure durability against environmental actions and fatigue

3.5**expert**

person who has scientific and technical theoretical knowledge in a field of activity validated by approved education certificates and / or as well as in-depth knowledge and practical skills validated by a recognized experience of a professional activity of several years in the field of activity concerned

3.6**general inspection**

assessment of the complete structure by an expert to ensure that it is still in serviceable condition or to indicate necessary maintenance or repairs

3.7**lining system (lining)**

total system, if any, which separates the exhaust or flue gases from the windshield, comprising a liner and its supports, the space between liner and windshield and insulation, where existing

3.8**liner**

structural or non-structural membrane of the lining system

3.9**maintenance operations**

combination of all planned 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

3.10**repair operations**

operations carried out to restore or preserve the function of an element that are not part of the planned and implemented maintenance

3.11**windshield**

structural independent shell designed for load bearing purposes and to protect the flue from wind actions

iTeh STANDARD PREVIEW
(standards.iteh.ai)

<https://standards.iteh.ai/catalog/standards/sist/2958cf71-6360-42f7-989c-43e79bf433e3/osist-pr-en-13084-9-2021>

4 Maintenance and inspection

4.1 General structure of the maintenance operations

Eurocode EN 1990 requires that the structures shall be designed such that deterioration over its design working life does not impair the performance of the structure below that intended, having due regard to its environment and the anticipated level of maintenance. The following should be taken into account:

- the intended or foreseeable use of the structure;
- the required design criteria;
- the expected environmental conditions;
- the composition, properties and performance of the materials and products;
- the properties of soil;
- the choice of the structural system;
- the shape members and the structural detailing;
- the quality of workmanship and the level of control;
- the particular protective measures;
- the intended maintenance during the design working life.

For all types of structurally independent chimneys structures, the maintenance operations shall be done according to the following steps to preserve durability and performances:

- maintenance required by the chimney manufacturer (see 4.2);
- survey and maintenance to be done by the owner/operator (see 4.3);
- general inspection of the installation (see 4.4).

4.2 Maintenance and inspection plan by the manufacturer

As required by EN 1990, the manufacturer should include the inspection and maintenance plans in the project documentation (Operating and Maintenance manual) delivered at the commissioning and handover phase of a new project, in order to insure the required level of reliability as per the structure and plant design and calculations.

The manufacturers maintenance and inspection plan shall at least include all relevant points of 4.3 for chimney and equipment.

If necessary, depending on the project specifications, manufacturers can provide more restrictive recommendations for some or all parts and equipment.

4.3 Maintenance and inspection plan by the owner/operator

4.3.1 General

It is the responsibility of the owner to maintain the installation in a good state. To guarantee the good operation of the installation and to spot any deterioration which could lead to a fault, the owner shall ensure all the maintenance and inspection operations detailed in the Operating and Maintenance manual provided by the manufacturer.

Without any other recommendations, the following operations shall be carried out:

- regular maintenance operations listed under 4.3.2;
- regular monitoring conditions listed under 4.3.3.

The maintenance operations and inspection plan shall be fulfilled by the owner/operator himself or by a third-party company competent for this type of work.

4.3.2 Maintenance operations

4.3.2.1 General

Without any other recommendations, the following maintenance operations shall be carried out.

4.3.2.2 Safety valves

If the installation includes explosion or implosion relief valves, these safety systems shall be dismantled and sent back to the manufacturer at least once a year in order to be recalibrated and reconditioned (note. a spare new set can be kept on site to allow for continuous use of the plant).

4.3.2.3 Cleaning operations

The following cleaning operations shall be carried out:

- cleaning of base drains;
- cleaning of condensate drain-pipes;
- cleaning of rainwater drain-pipes;
- sweeping of flue liners and connecting flue pipes with appropriate brushes, plastic-based for stainless steel flues and metallic-based for mild steel flues;
- if a silencer is installed, cleaning of the condensate pipes and the baffles if applicable.

4.3.2.4 Coating system

To achieve the stated coat life span and increase the life span of the finish, it is necessary to provide on-going site maintenance / repair and/or overcoating of the paint finish. This operation shall be carried out as per the paint manufacturers recommendations and requirements for site application with the objective to provide the same level of protection (where possible taking into full account the conditions of on-site application and environment) in durability and time as per the original factory finished coating specification.

4.3.3 Condition Monitoring

4.3.3.1 General

Regular condition monitoring is required and should extend to all visually recognizable changes to the structure and components.

This inspection is carried out from ground level and/or into the chimney' accessible space if any. For installations higher than 20 m, the use of appropriate access and minimum binoculars is required for a correct monitoring.

Visual inspection of the following elements shall be carried out.

4.3.3.2 Windshield and liner(s)

As a minimum, the following points shall be checked on the windshield and liner(s):

- leaning, sinking and loosening of guy wires;
- circular oscillation of the chimney of large amplitude even under low wind speeds;
- cracks, splits, perforations, impacts, and any structural damage;
- loosening and oxidation of nuts and bolts (anchorage, joints, base plate, guy wires);
- jamming of inspection doors and measuring plugs;
- piece of material on the surrounding grounds for a brick or concrete chimney;
- staining, dripping, corrosion marks;
- colouring, stains or runs of condensates on the windshield or liner(s);
- large amount of condensation inside the windshield.

4.3.3.3 Thermal insulation (Liner and/or windshield)

As a minimum, the following points shall be checked on thermal insulations:

- deterioration of the insulation material;
- deterioration of the cladding if any like hole, bump, twisted or missing elements;
- trace of liquid runoff.

An Infrared image examination of hot chimneys could be used to identify hot spots and thermal bridges where insulation' thermal properties are altered or where it has collapsed.

4.3.3.4 Equipment and accessories

As a minimum, the following points shall be checked on equipment and accessories:

- presence of loose elements (platform plates or gratings, ladder parts, cladding plates, lightning protection, cables, etc.);
- discontinuity in the lightning protection system;
- deterioration of the day-time or night-time aircraft warning systems (lights or painting);

prEN 13084-9:2021 (E)

- in silencers, damage to the absorbing material or its casing (tear), obstruction of condensate pipes, issue with general design (impact, perforation, condensate staining)
- physical deterioration/burst or any trace of leakage on the damper if any.

4.3.4 Frequency (Intervals)

Maintenance operations and condition monitoring shall be carried out no later than 3 months after the chimney / exhaust has been commissioned and put into operation in order to detect any potential troubles on the plant.

Afterward, the maintenance operations and condition monitoring shall be performed every 6 months or before restart after a long-term shutdown, or after any extraordinary occurrences like heavy storms, unusually heavy icing.

The frequency may be reduced according to the Operating and Maintenance manual provided by the manufacturer.

For specific cases where installations work continuously for longer than six months, maintenance and inspection of the external parts of the chimney shall be carried out at the normal frequency. The internal parts of flue liners, connecting ducts and specific equipment shall be inspected each time the installation is stopped.

4.3.5 Record and repair actions if necessary

Records of the maintenance operations and condition monitoring shall be recorded in a report which shall be attached to the operating and maintenance manual for future record reviews.

Any anomaly spotted during the condition monitoring shall be reported to the chimney manufacturer or to an expert without delay. The best course of action will then be advised by the chimney manufacturer or by the expert according to the risks presented by the installation.

4.4 General Inspection**4.4.1 General**

The general inspection will assess the performance and the state of the installation as a whole, according to the design operating requirements of the chimney(s) and plant(s).

The objective is to ascertain that the chimney, lining and components are still in serviceable condition and fulfilling their designed requirements and tasks, or to indicate necessary maintenance or repair operations to recover them.

This inspection is to be entrusted to an expert who can also assess the structural conditions of the structures.

4.4.2 Frequency (intervals)

A first general inspection shall be carried out no later than 3 to 12 months after the chimney / exhaust has been commissioned and put into operation. This delay starts at chimney erection when damper is present at the chimney mouth.

At a period as recommended in the operating and maintenance manuals of the manufacturer and at a minimum of every 2 years, the installation shall be inspected by a chimney expert.

For specific cases where installations work continuously for longer than two years, general inspection shall take place each time the installation is stopped. During this period, the operating data to determine the degree of chemical stress should be checked.