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Chimneys - Accessories - Part 1: Chimney silencers - Requirements and test methods

Abgasanlagen - Zubehörteile - Teil 1: Schalldämpfer für Abgasanlagen - Anforderungen
und Prüfverfahren

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Conduits de fumée - Accessoires - Partie 1 : Silencieux pour conduits de fumée -
Exigences et méthodes d'essai

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d'essai

Abgasanlagen - Zubehörteile - Teil 1: Schalldämpfer für
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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EN 16475-1:2020 (E)**European foreword**

This document (EN 16475-1:2020) has been prepared by Technical Committee CEN/TC 166 “Chimneys”, the secretariat of which is held by ASI.

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of an identical text or by endorsement, at the latest by October 2020, and conflicting national standards shall be withdrawn at the latest by January 2022.

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.

This document on “Chimneys — Accessories” consists of the following parts:

- *Part 1: Chimney Silencers — Requirements and test methods (this part)*
- *Part 2: Chimney fans — Requirements and test methods*
- *Part 3: Draught regulators, standstill opening devices and combined secondary air devices — Requirements and test methods*
- *Part 4: Flue dampers — Requirements and test methods*
- *Part 6: Access components — Requirements and test methods*
- *Part 7: Rain caps — Requirements and test methods*

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Introduction

In November 2009 CEN/TC 166 assigned TG 1 of CEN/TC 166/WG 1 the task to develop this document for chimney accessories and issued a preliminary work item.

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EN 16475-1:2020 (E)**1 Scope**

This document specifies requirements and test methods for flue gas silencers made of metal that are used as accessories in order to reduce the noise level of combustion appliances.

The document covers silencers in the connecting flue pipes and on top of chimneys.

This document does not cover silencers installed as chimney sections. This document excludes active silencers.

Components tested together with the liner or system chimney are not covered by this document.

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 1443, *Chimneys - General requirements*

EN 1602, *Thermal insulating products for building applications - Determination of the apparent density*

EN 1856-1:2009, *Chimneys - Requirements for metal chimneys - Part 1: System chimney products*

EN 1856-2:2009, *Chimneys - Requirements for metal chimneys - Part 2: Metal flue liners and connecting flue pipes*

EN 1859:2009+A1:2013, *Chimneys - Metal chimneys - Test methods*

EN 10088-1, *Stainless steels - Part 1: List of stainless steels*

EN 13470, *Thermal insulating products for building equipment and industrial installations - Determination of the apparent density of preformed pipe insulation*

EN 14303:2015, *Thermal insulation products for building equipment and industrial installations - Factory made mineral wool (MW) products - Specification*

EN 15287-1:2007+A1:2010, *Chimneys - Design, installation and commissioning of chimneys - Part 1: Chimneys for non-roomsealed heating appliances*

EN ISO 7235:2009, *Acoustics - Laboratory measurement procedures for ducted silencers and air-terminal units - Insertion loss, flow noise and total pressure loss (ISO 7235:2003)*

EN ISO 11691, *Acoustics - Measurement of insertion loss of ducted silencers without flow - Laboratory survey method (ISO 11691)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1443, EN 1856-1, EN 1856-2, EN 1859 and the following 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 <http://www.iso.org/obp>

3.1

silencer

product used in connecting flue pipes or on top of chimney for reducing noise emission caused by heating appliances and emergency generators

3.2

flow resistance of a silencer

pressure loss in a silencer due to the flow of the flue gas at a given temperature and velocity

3.3

coefficient of flow resistance

coefficient due to directional and/or cross sectional and/or mass flow change in the flue

3.4

sootfire safe accessory

As

accessory that may not perform its intended function during and after a sootfire but does not prevent the safe operation or change the designation "G" of the chimney or connecting flue pipe

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Note 1 to entry: "As" is used only for accessories and not for chimneys, flue liners and connecting flue pipes.

Note 2 to entry: Sootfire safe accessories are considered as replaceable without dismantling the chimney.

Note 3 to entry: Measures to be taken after the event of a sootfire are found in 8.3.2.

3.5

insertion loss

noise reduction expressed as the reduction level of sound power propagating through a duct due to the insertion of a silencer

3.6

nominal diameter (size)

numerical designation of size which is a convenient round number equal to or approximately equal to the inner diameter in millimetres of the circular flue liner

3.7

nominal flow rate

amount of air which flows at the nominal velocity through a duct with nominal diameter

EN 16475-1:2020 (E)**3.8****nominal velocity**

velocity in a duct which characterises the velocity used in the test

Note 1 to entry: The actual test velocity can differ from the nominal velocity, because the actual inside diameter differs from the nominal diameter.

3.9**continuously welded silencer**

housing is welded according to a continuous welding procedure that allows get at least H1 leakage class

3.10**non-continuously welded silencer**

silencer not manufactured in accordance with 3.9

EXAMPLE An example for a non-continuously welded silencer is a modular silencer.

4 Product characteristics**4.1 General**

The silencer shall fulfil the following requirements against temperature, condensate, corrosion resistance and soot fire resistance capability appropriate to the designation.

4.2 Dimensions and tolerances

The thickness of material of the silencer shall be not less than that declared.

The declared internal dimensions of the flue connection shall not vary by more than ± 5 mm from the nominal size. The measured internal dimension of the flue connection shall be not less than the declared dimension.

4.3 Mechanical resistance and stability**4.3.1 Compressive strength**

The silencer shall withstand a load of at least four times the declared design load. If declared, the silencer shall be tested in accordance with 5.3.1.

If the design load is not declared and the silencer is used in vertical position, a support shall be used on top of the silencer.

If used in horizontal position or on top of the chimney, the design load does not have to be declared.

4.3.2 Wind load

When the silencer is declared for outside installation, it shall be tested for wind loads in accordance with 5.3.2.2. The silencer shall withstand a minimum wind load of $1,5 \text{ kN/m}^2$ of the projected surface area.

4.3.3 Non-vertical installation

When the silencer is declared for non-vertical installation, it shall be tested in accordance with 5.3.2.1.

4.4 Thermal performance

4.4.1 Reaction to fire

The reaction to fire shall be declared. It shall be assessed on basis of EN 13501-1.

NOTE Materials which are by default classified A1 (see Commission Decision [96/603/EC (2)]) need no further testing.

4.4.2 Fire resistance (internal to external)

4.4.2.1 General

The distance to combustible material, the gas tightness and the insertion loss of the silencer shall be declared.

4.4.2.2 Heat stress

The silencer shall be tested in accordance with 5.4.1 for the designated temperature class, see Table 3.

The silencer shall be designated O, if the requirements of 4.5.1 and 4.10 are met.

4.4.2.3 Sootfire resistance

The silencer shall be tested in accordance with 5.4.2.

The silencer shall be designated G, if the requirements of 4.5.1 and 4.10 are met.

The silencer shall be designated As, if it is tested in accordance with 5.4.2 and only the declared insertion loss of 4.10 is no longer fulfilled.

4.4.2.4 Distance to combustible

The minimum distance xx in mm of the silencer to combustible material shall be declared:

- a) O(xx)M stands for “measured value” as determined in accordance with the test method in EN 1856-2:2009, A.7.3.3. When related to ambient temperature of 20° C, the maximum surface temperature of combustible materials adjacent to the test silencer shall not exceed 85° C at the distance declared.
- b) As(xx)M, G(xx)M stands for “measured value” as determined in accordance with the test method in EN 1856-2:2009, A.7.3.3. When related to ambient temperature of 20 °C, the maximum surface temperature of combustible materials adjacent to the test silencer shall not exceed 85 °C during heat stress test and shall not exceed 100 °C during the heat shock test, both at the distance declared.
- c) O(xx)NM, As(xx)NM, G(xx)NM stands for “not measured value” calculated as at least three times their nominal diameter but not less than 375 mm (as specified in EN 15287-1:2007+A1:2010, 4.3.9.3, paragraph 3, first sentence for connecting flue pipes naturally ventilated).

4.5 Hygiene, health and environment

4.5.1 Gas tightness

The gas tightness shall be tested in accordance with 5.5.1 and the class declared in accordance with Table 1. If the jointing method is taken from a chimney/connecting flue pipe in accordance with EN 1856-1 or EN 1856-2 the gas tightness of the connection is deemed to be satisfied.

The gas tightness of the housing for not continuously welded silencer shall be tested in accordance with the test methods described in EN 1859. The leakage rate shall not be greater than that given in Table 1.

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The gas tightness of continuously welded silencers is deemed to satisfying the leakage class up to H1.
For gas tightness testing all condensate drains should be closed.

Table 1 — Leakage rate

Pressure class	Test pressure <i>Pa</i>	Leakage rate/Flue surface area <i>l · s⁻¹ · m⁻²</i>
N1	40	< 2,0
P1	200	< 0,006
P2	200	< 0,120
M1	1 500	< 0,006
M2	1 500	< 0,120
H1	5 000	< 0,006
H2	5 000	< 0,120

4.5.2 Condensate penetration resistance (liquid phase)

When tested in accordance with 5.5.2 no condensate shall appear on the outer surface of the silencer.

The silencer shall be installed according to the instructions in the thermal test assembly of EN 1856-2:2009, Figure A.5, attaching the spray assembly to the top of the test chimney, and providing a drain for the condensate at the bottom.

The declaration of condensate resistance does not refer to any noise reduction performance.

4.5.3 Water vapour penetration test (vapour phase)

Silencer can be designated W (wet) without undertaking the water vapour diffusion test, provided that the product passes the condensate penetration resistance requirement of 4.5.2.

4.5.4 Corrosion resistance

The corrosion resistance of the silencer shall be equivalent to the corrosion resistance of the chimney/connecting flue pipe to which it is connected.

4.6 Materials**4.6.1 Metal parts in contact with combustion products or condensate**

The silencers in contact with combustion products shall have a specification for steel in accordance with EN 10088-1. Material L50 or higher in accordance with EN 1856-1:2009, Table 4, is deemed to fulfil V2 for dry and for wet applications. For other materials L99 according to EN 1856-1:2009, Table 4, the corrosion test in accordance with EN 1856-1 shall be performed.

4.6.2 Material for reducing noise level

The product characteristics shall meet the requirements of EN 14303:2015, 4.3, for the following characteristics:

- maximum service temperature (equal to maximum service temperature of the silencer);
- water absorption shall not exceed 1,0 kg/m²;