INTERNATIONAL STANDARD

ISO 15080

First edition
2001-09-15

AMENDMENT 1
2019-05

Nuclear facilities — Ventilation penetrations for shielded enclosures

AMENDMENT 1

Installations nucléaires — Traversées de ventilation pour enceintes blindées

AMENDEMENT 1

Reference number
ISO 15080:2001/Amd.1:2019(E)

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Published in Switzerland

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This document was prepared by This document was prepared by ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 2, *Radiological protection*.

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AMENDMENT 1

Clause 2

Delete ISO 3452, *Non-destructive testing — Penetrant inspection — General principles*.

4.2, third and fourth paragraph

Replace the paragraphs with the following:

> "Where the ventilation duct penetrates the wall in a zigzag, the duct-mounting appliance shall be enclosed in a material providing the same level of protection as the shielding wall. The material should be at least three times denser than the wall, if it is made in concrete with an usual density (for example between 2,2 t/m^3 and 2,4 t/m^3) (see Figure 2).
>
> Annex C gives other examples of conventional duct penetrations for shielded enclosures.
>
> These rules are applied to cast-iron screws for protection against gamma radiation with an 0,5 MeV < energy < 2,5 MeV (1 MeV = 1,6 10^{-13} J) used for the reconstitution of the shielding properties of the walls.
>
> All these calculations have to be verified by radiological protection calculation, in order to validate the effectiveness of the reconstitution of the shielding properties, in particular to cover other energies or concrete density."

4.3.1, second paragraph

Replace the paragraph with the following:

> "The helixes are made from a metallic material (examples for the helix unit can be the use of a lamellar graphite cast iron or spheroidal graphite cast iron as a result of a preliminary material study, stainless steel,...).

NOTE The consideration of this paragraph doesn't apply for neutron shielding."

4.3.2

Replace the text with the following:

> "Because of their helical shape, these protection helixes can ensure the following:
>
> a) shielding continuity with an attenuation against gamma radiation equivalent to that of the wall to be penetrated;
>
> b) the passage of air or gas through the wall with the creation of a pressure drop as low as possible.
>
> The design of the additional protection in order to reconstitute protection equivalent to straight through passages shall be conducted on a case-by-case basis."

4.3.3, third paragraph

Replace the paragraph with the following:

"The helix is fastened to the housing with pins or by mechanical means (threaded fastenings). The number and the size of the pins are determined according to load calculations (seismic event, fire, overpressure …)."

Figure 4

After subtitle a), add the following text:

"In order to avoid deposit of aerosol contamination, the handling screw hole should be filled".

Subfigure b), replace the figure and the key with the following.

"Key

1 pin
2 housing
3 helix
4 flange
5 blind nuts
6 handling screws"

4.3.4.2, second bullet list

Replace the text with the following:

"whose average density is usually between of 2,2 t/m^3 and 2,4 t/m^3 so that the helix length is greater than the wall thickness."

A.1.1

Replace the text with the following:

"For the essential factors such as mechanical resistance, machining, homogeneity and radiation attenuation behaviour, the use of cast iron with lamellar graphite of grade EN-GJL-200 according to EN 1561 (Europe) or HT200 (China) or FC200 (Japan) or grade 30B for ASTM A-48 (USA) is recommended for the helix unit."

A.1.2, first and second paragraphs

Replace the text with the following:

"The housings and flanges are generally made of non-alloy carbon steel, or of austenitic stainless steel, depending on the gamma radiation level inside the enclosure. The grade shall be resistant to the corrosive characteristics of the air or the gas carried and chosen in accordance with the internal covering of the enclosure.

The housings are produced entirely by a mechanical-welded process. The welds shall be continuous, perfectly penetrated and caulked. The welders shall be trained and qualified professionals in accordance with the jurisdictional requirements of the facility using the components. In the absence of such requirements, ISO 9606-1 may be used."

A.2.2

Replace the text and Table A.1 with the following:

"The normal dimensions of cast iron helixes and recommendation for dimensions of flanges are given in Table A.1.

Table A.1 — Standardized dimensions of cast iron helixes

Description		Type Ø 300	Type Ø 500	Type Ø 750
Helix (in cast iron)	Nominal diameter	300 mm	500 mm	750 mm
	Standard length, multiple of	100 mm	100 mm	100 mm
	Theoretical minimum length to be installed	450 mm[a]	600 mm	800 mm
	Maximum length advised	2 200 mm	2 200 mm	2 200 mm
	Pitch of helix	600 $^{+2}_{0}$ mm	800 $^{+2}_{0}$ mm	1 000 $^{+2}_{0}$ mm
	Number of threads at L_{min}	3	4	5
	Thickness of a thread on axis	60 mm	60 mm	60 mm
	Diameter of core	50 mm	80 mm	110 mm
	Minimum weight of an element per linear metre without housing (relative density: 7)	155 kg	430 kg	950 kg
	Useful cross-section for air flow	0,033 6 m^2	0,104 m^2	0,300 m^2
Housing (in non-alloyed carbon steel or stainless steel)	Recommended thicknesses	2 mm	2 mm	3 mm

Table A.1 *(continued)*

Description		Type Ø 300	Type Ø 500	Type Ø 750
Flanges	Outside diameter	380 mm	580 mm	855 mm
	Drilling diameter	340 mm	540 mm	805 mm
	Number of holes	10 mm	16 mm	24 mm
	Diameter of drilling holes	8 mm	10 mm	10 mm
	Thickness	8 mm	10 mm	>10 mm

[a] This dimension can be obtained from an element of length 500 mm machined to 450 mm

NOTE Dimensional tolerances of helix for machining:

— for the diameter: 0 mm
−0,3 mm

— for the length: 0 mm
−2 mm

Play between helix and housing:

— less than 0,5 mm along the radius

Dimensional tolerances for housings:

— for the length: 0 mm
+2 mm

Table B.1

Replace the line with the following.

331	Lamellar graphite cast iron or spheroidal graphite The helix is made entirely in cast iron: put an X.

Bibliography

Replace the text with the following:

"[1] CEA Document, Guide CETREVE: *Principles of ventilation of nuclear plants, Volume III B: Detailed technical specifications — Protection helix, Code 280, folio 1/4 to 4/4*

[2] IAEA Document, Manual on safety aspects of the design and equipment of Hot Laboratories, N° 30. 1981

[3] ISO 9606-1, *Qualification testing of welders — Fusion welding — Part 1: Steels*

[4] EN 1561, *Founding — Grey cast irons*

[5] ISO 3452-3, *Non-destructive testing — Penetrant testing — Part 3: Reference test blocks*

[6] ASTM A-48, *Standard specification for gray iron castings*"