DENIS WINDOWS

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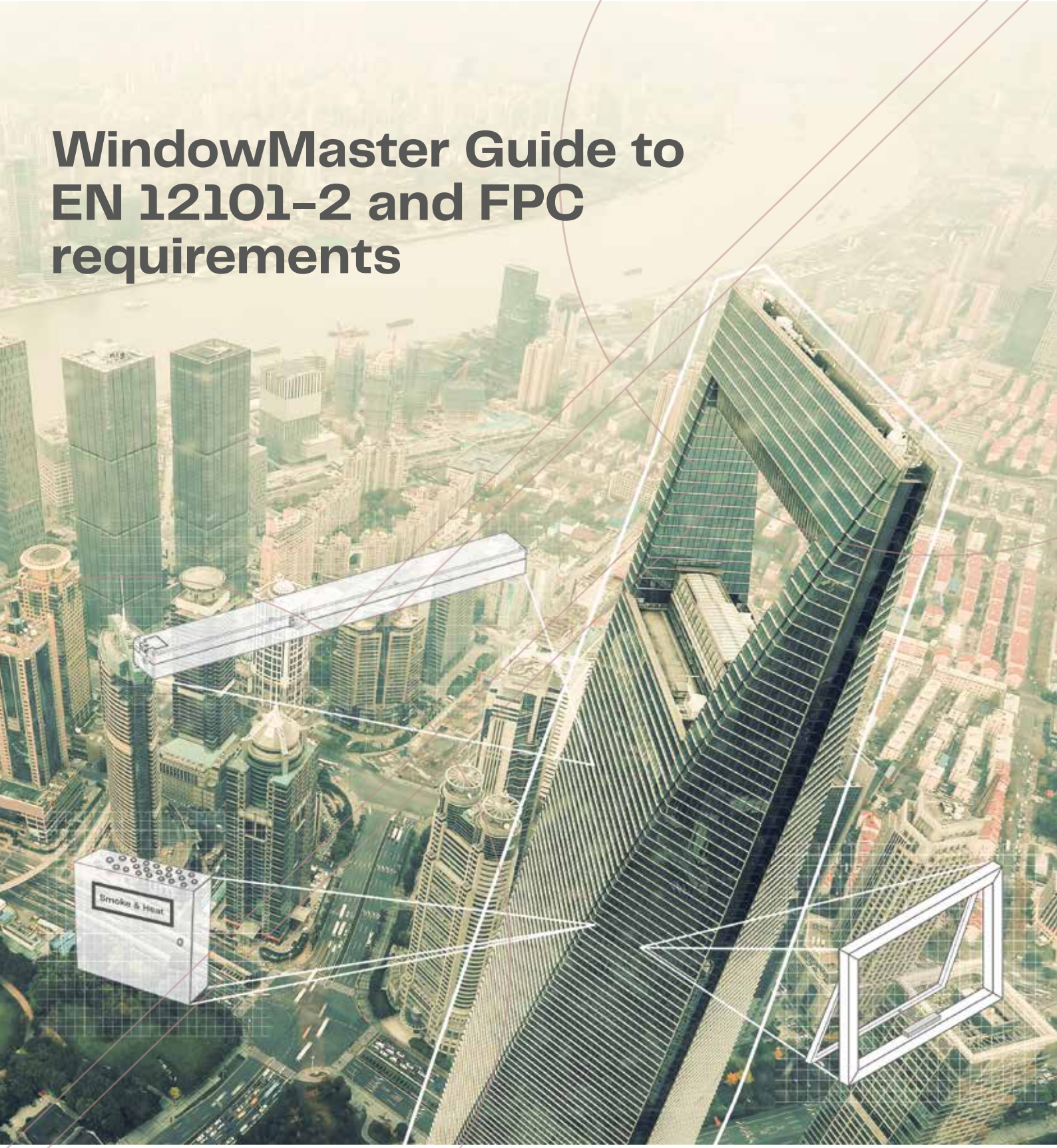
WindowMaster Guide to EN 12101-2 and FPC requirements



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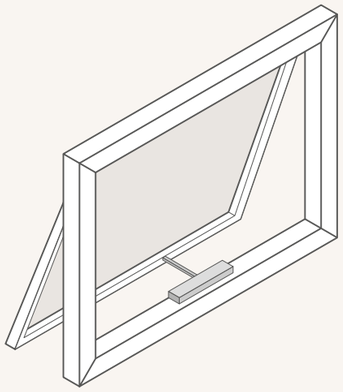
In this guide we will explore



What is EN 12101-2 for Smoke Vents

Photo: Factory Tøyen

Smoke ventilation systems are used in buildings for a number of reasons, one of those is to clear smoke from core areas like stairwells and corridors to help people escape safely from buildings in the event of a fire. In order to try and ensure the system operates as intended every time, it is important that the equipment used has proven levels of reliability under demanding conditions and is built to sufficient quality standards and CE marked accordingly.

EN 12101 is a 'European Norm' suite of standards covering Smoke Ventilation equipment including dampers, fans and control equipment. EN 12101-2 specifically covers 'Natural Smoke and Heat Exhaust Ventilators', and this includes automated windows used for Smoke Ventilation, often known as AOVs (Automated Opening Vents).

EN 12101-2 is a European Standard which specifies requirements and gives test methods for natural smoke and heat exhaust ventilators which are intended to be installed as a component of a natural smoke and heat exhaust system.

In order to be effective, AOV systems must undergo a series of rigorous tests which adhere to EN 12101-2.

To comply with Construction Products Regulations, AOV systems must be CE marked against this standard.

The standard is published as BS EN 12101-2:2003.

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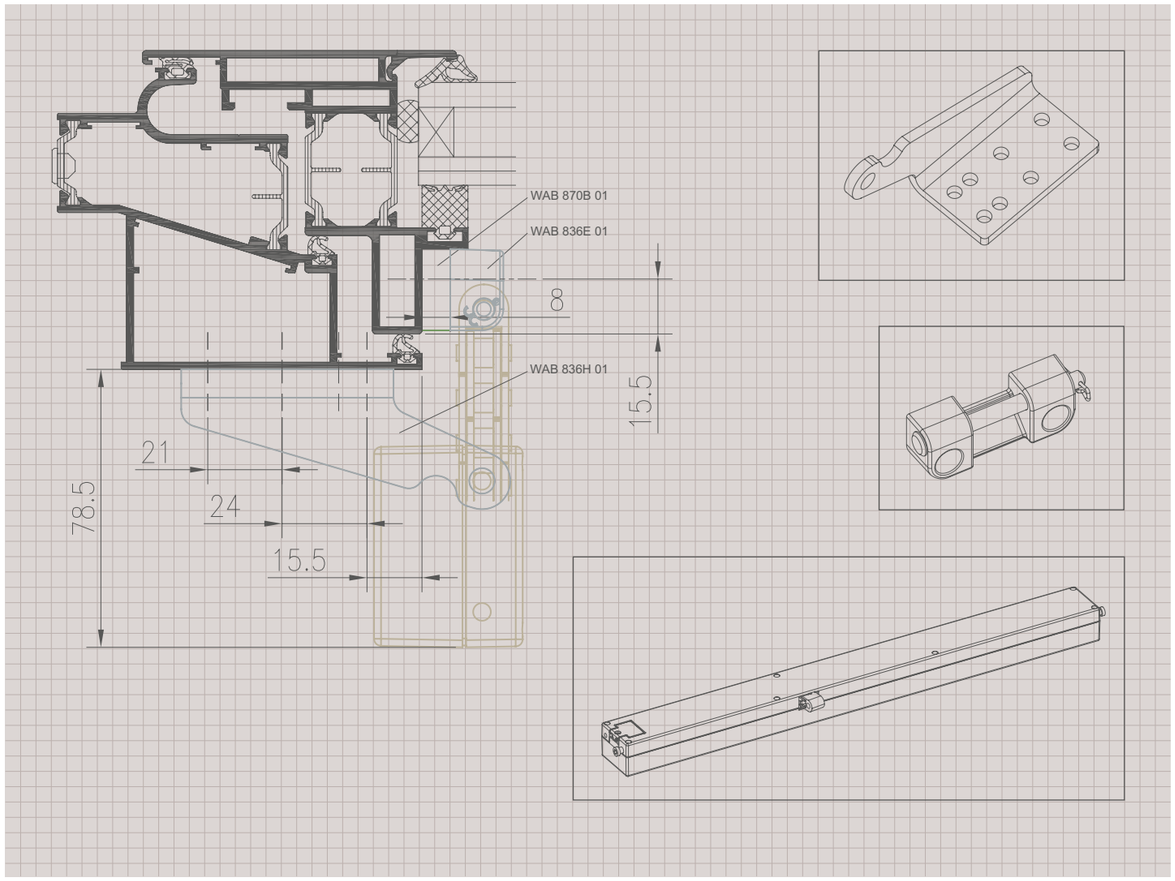
What is needed to build and CE mark an EN 12101-2 Smoke Vent

To be certain that the smoke vent design components and profiles used will perform and be reliable under fire conditions, they must be tested together by an independent and authorised test house.

Once designs and components have been tested and approved, an authorised fabricator can produce those smoke vents and sell them as CE marked solutions. Becoming an authorised fabricator allows that company to CE mark the end products and to make a declaration of their performance as per the tested arrangements and documentation. This is achieved by putting in place an approach to quality control known as a 'Factory Production Control' system. A notified body examines the FPC system and audits the factory to ensure the process is acceptable and always followed to help ensure the quality and dependability of the finished products. Once approved the notified body awards the fabricator with the necessary certificate to be able to CE Mark their products under this system.



How to achieve an approved Factory Production Control (FPC) process to allow you to build, CE mark and sell smoke vents

Most companies will have some form of quality control system in place, such as ISO 9001. The majority of fabricators have a quality control system sufficient to support CE marking of Windows and Doors to EN 14351 in relation to their energy performance.

Different products require different levels of factory production control. Eg. Block paving requires a much lower level of control quality than medical devices.

Similarly, Smoke Ventilators built to EN 12101-2 require a higher level of quality control than windows and doors built to EN 14351.

This means the quality system / Factory Production Control system needs reviewing and may require additional steps in the production and quality control process to achieve a higher level of detail and control, known as AVCP Level 1 (Assessment and Verification of Constancy of Performance) for Smoke Vents, compared with that required to manufacture and CE Mark to EN 14351 (AVCP Level 3).

Normally this only means introducing additional steps in the production and record keeping process, as well as an initial inspection and annual audit of the fabricator's FPC by a notified body.

	Smoke Vents EN 12101		Windows and Doors EN 14351		
	1+	1	2+	3	4
					AVCP system
Factory production control (FPC)	✋	✋	✋	✋	✋
↓					
Further testing of samples taken by the fabricator	✋	✋	✋		
↓					
Assessment of the performance	✓	✓	✋	✓	✋
↓					
Initial inspection (plant and FPC)	✓	✓	✓		
↓					
Continous surveillance, assessment and evaluation of FPC	✓	✓	✓		
↓					
Audit – testing of samples taken by the Notified Body	✓				

✋ **Fabricator**
✓ **Notified Body**

Summary of the testing and technical info required to support EN 12101–2 vents

The Window System, Actuators and Common Assembly components will normally have been tested by the manufacturers as a complete system. For example, WindowMaster has conducted testing with Schüco, Hueck and Wicona systems amongst others.

EN 12101–2 sets out specific performance criteria (essential characteristics) that may have been tested according to local regulations and requirements in the markets where the products are being sold.

The results form part of the technical documentation required to make the Declaration of Performance (DOP) and CE Mark by the authorised fabricator.

Aerodynamic free area (Annex B)
Testing and assessment of the achievable aerodynamic free area of the vent, Aa expressed in m^2.

Low Temperature (Annex E)
Testing and classification of the motors ability to operate in rooms with low ambient temperatures expressed as T and min. deg. C temp. e.g. T(–15).

Reaction to Fire (Annex H)
Declaration of the materials class defined by which materials are used in the vents manufacture and their reaction to fire e.g. E.

Reliability (Annex C)
Testing and classification of reliability of the vent to open and close into the fire open position. Expressed as Re and number of openings e.g. Re 1,000 (+ 10,000) = 1,000 times opening for smoke ventilation in addition to 10,000 for comfort ventilation for dual purpose ventilators.

Resistance to Heat (Annex G)
Testing and classification of the vents ability to open within 60 seconds, its resistance to heat, and its mechanical stability to achieve and maintain the vent opening at high temperature for 30 minutes. E.g. B300 = 300 deg. for 30 minutes.

Snow Load (Annex D)
Testing and declaration of the vents ability to open under snow load, expressed in pascal or N/m^2 e.g. SL 500.

Wind Load (Annex F)
Testing and classification of the vents stability under wind load, expressed as WL and rating in pascal or N/m^2, e.g. WL 500.

In some instances where the application and local regulations allow, it may be acceptable to make a declaration of 'No Performance Determined' (NPD) against certain essential performance characteristics.

> for the listed essential characteristics for which no performance is declared, the letters 'NPD' (No Performance Determined) is stated,or in other words local authority can decide to either bypass, comply or raise the requirements."
>
> – CPR article 6.2 (f)

General rules and helpful tips

- It's important to note that the CE Label on the window actuator (Machinery Directive etc.) is completely independent of the CE Label applied to the finished vent by the Vent Fabricator which declares performance and compliance to EN 12101–2.
- The finished vent must be **identical** to that produced during the Initial Type Test.
- As Natural Smoke and Heat Exhaust Ventilators are a **life safety** product, the CPR does not allow alternative materials to be utilized unless they have been subjected to an Initial Type Test.
- WindowMaster can provide you with a template to create your own CE Label.

Photo: Hufton+Crow

Appendix

What does a CE Mark and DOP look like

Example with explanation of CE marking content

Official CE mark logo	CE	
	20	Last two digits of the year in which the CE marking was affixed
Unique reference number of the DoP	12345-ABCDE	
	NSHEV model XYZ 1a2b3c	Unique identification code of the product type
Intended use incl restrictions to be aware of	For fire safety use in a Natural smoke and heat exhaust systems. Dual purpose	
	EN 12101-2:2003 Notified Body: 0402	Harmonised standard and notified body
Aerodynamic free area in m^2	Aa: 0.64	
Reliability	RE50+10000 / T (-05)	Temperature classification
Resistance to heat	B300 / E	Reaction to fire
Snowload in Pascal or N/m^2	SL 750 / WL 1500	Wind load in Pascal or N/m^2
Name and registered address of the fabricator	Façade Builder International Production Boulevard Fresh Air City	

Example of the correlation Declaration of Performance DoP

	Declaration of performance	
Unique reference number of the DoP	12345-ABCDE	
	NSHEV model XYZ 1a2b3c	Unique identification code of the product type
Intended use incl restrictions to be aware of	For fire safety use in a Natural smoke and heat exhaust systems. Dual purpose	
	System 1	AVCP system
	EN 12101-2:2003 Notified Body: 0402	Harmonised standard and notified body
Aerodynamic free area in m^2	Aa: 0.64	
Reliability	RE50+10000 / T (-05)	Temperature classification
Resistance to heat	B300 / E	Reaction to fire
Snowload in Pascal or N/m^2	SL 750 / WL 1500	Wind load in Pascal or N/m^2
Name and registered address of the fabricator	Façade Builder International Production Boulevard Fresh Air City	
	Signature, place and date	Signature

Applying the CE mark

The CE Mark must be applied to the finished vent and must be visible, legible and indelible.

The official identification number of the notified body who conducted the conformity assessment and issued the Certificate of Conformity of Performance (CCP) to the fabricator must be detailed.

The CE Mark must be affixed **before** the product can be placed on the European market.

Without a label clearly affixed to the finished vent, it cannot be considered an EN 12101-2 compliant vent. It should also be accompanied by a matching 'Declaration of Performance' normally a signed certificate submitted as part of the building approval process and kept in the building O&M manuals.

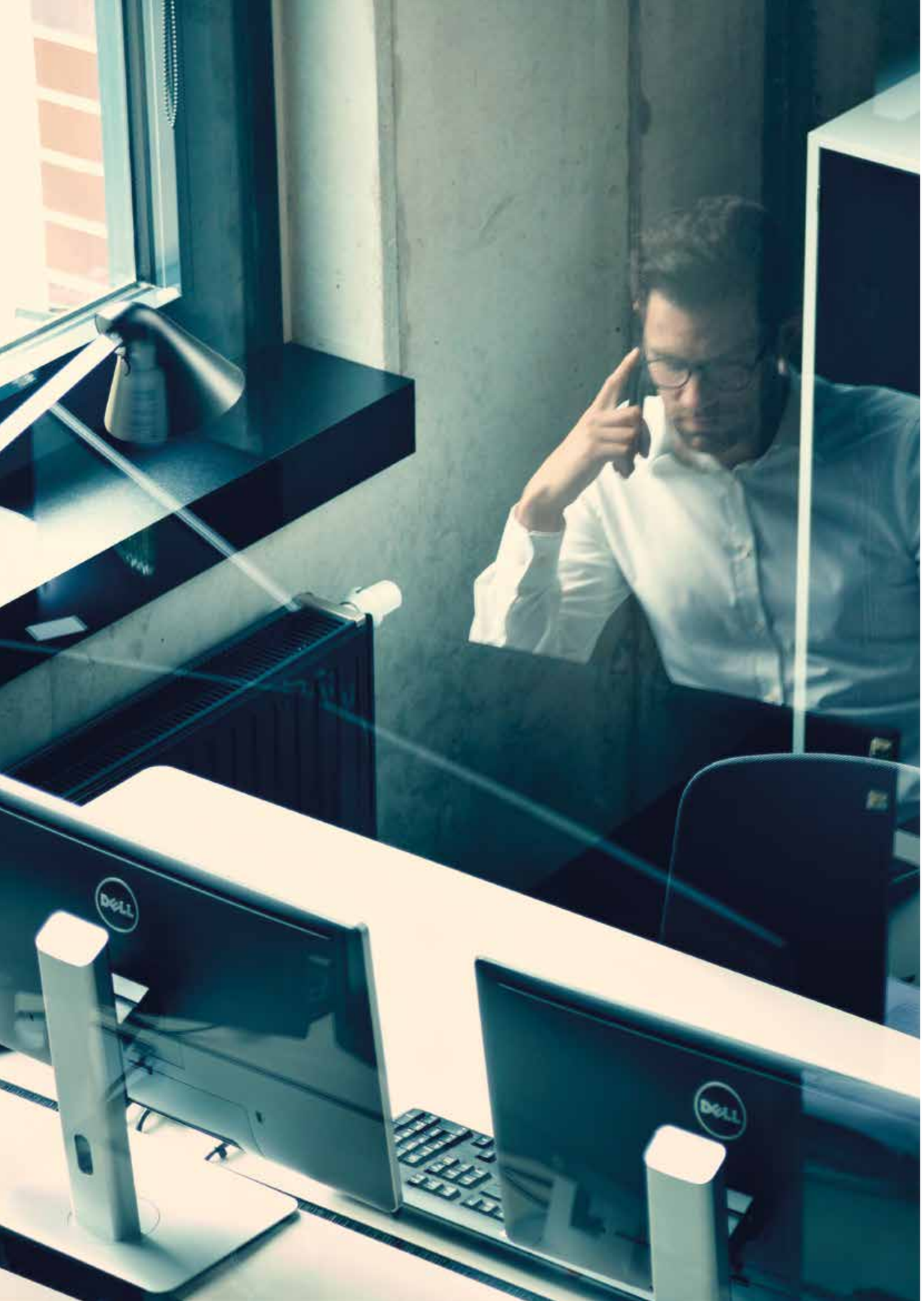
Source: European Commission. 'CE Marking of contruction products, step by step'

How to make the DoP's available online

The Declaration of Performance does not have to follow the product as a printed document and can be made available online instead.

The conditions that must be fulfilled when making DoP's available online

- There must be a clear and unique identification code linking the CE marking on the product with the relevant DoP.
- The content of a DoP must not be altered after publication.
- The website where the DoP's are published must be monitored and maintained so that they are always available.
- DoP's must be available free of charge over a period of 10 years after the product is placed on the market.
- There must be instructions for the recipients of the products on how to access the website and the DoP's.



Let's stay in touch

We can discuss with you how we can support you through the FPC process as well as:

- Free area calculations
- Suitable profiles and applications
- Ongoing support and training
- Technical support and assistance

Please contact WindowMaster who will be able to request a quotation for an FPC on your behalf.

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WindowMaster aspires to protect people and the environment by creating a healthy and safe indoor climate, automatically ventilating spaces with fresh air through facade and roof windows in buildings. We offer the construction industry foresighted, flexible and intelligent window actuators and control systems for natural ventilation, mixed mode ventilation, and smoke ventilation – of the highest quality.

WindowMaster employs highly experienced cleantech specialists in Denmark, Norway, Germany, United Kingdom, Ireland, Switzerland, and the United States of America. In addition, we work with a vast network of certified partners. With our extensive expertise built up since 1990, WindowMaster is ready to help the construction industry meet its green obligations and achieve their architectural and technical ambitions.

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