D+H EURO-SHEV:

Smoke ventilation according to DIN EN 12101-2

INTRODUCTION

Since September 2006, all natural smoke and heat exhaust ventilators (NSHEVs) must provide usability certification in accordance with DIN EN 12101-2 or be individually authorised by means of approval. Only tested complete solutions (consisting of a window or dome light and drive) may be used that in the case of standard units have a CE mark and in the case of custom-designed facades and roof designs have individual approval. DIN EN 12101-2 is a mandated and harmonised standard which falls into the field of application of the Construction Products Directive and soon of the Construction Products Regulation.

In Germany, for example, an NSHEV must always be used when a natural smoke vent is required by building regulations. It is stipulated that the NSHEV must have an aerodynamically effective smoke vent area. If only a certain geometric opening area (smoke extraction openings) is required for smoke extraction, an NSHEV is not required.

Put your confidence in the expertise of D+H Mechatronic AG to plan and install NSHEVs! Our wide range of certified systems from leading system suppliers give you great flexibility when planning NSHEVs and guaranteed implementation reliability for planning and functionality across all phases of your projects. Benefit from the incredible variety of our tested NSHEV solutions! Extremely high weights in the roof area (up to 330 kg), extremely high snow loads (up to 3,000 pa) or wind loads (up to 2,000 pa) are not a problem for the NSHEVs either.

In this D+H basic module you will find a large amount of information on the subject of DIN EN 12101-2. We hope this provides you with effective support when working with NSHEVs and helps you to keep track of the bigger picture. Visit our website www.dh-partner.com as well to find out even more about our complete EURO-SHEV system solutions!

Do you still have any questions? Our team of experts will be happy to give you advice in person.

www.dh-partner.com

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THE D+H MECHATRONIC AG COMPANY

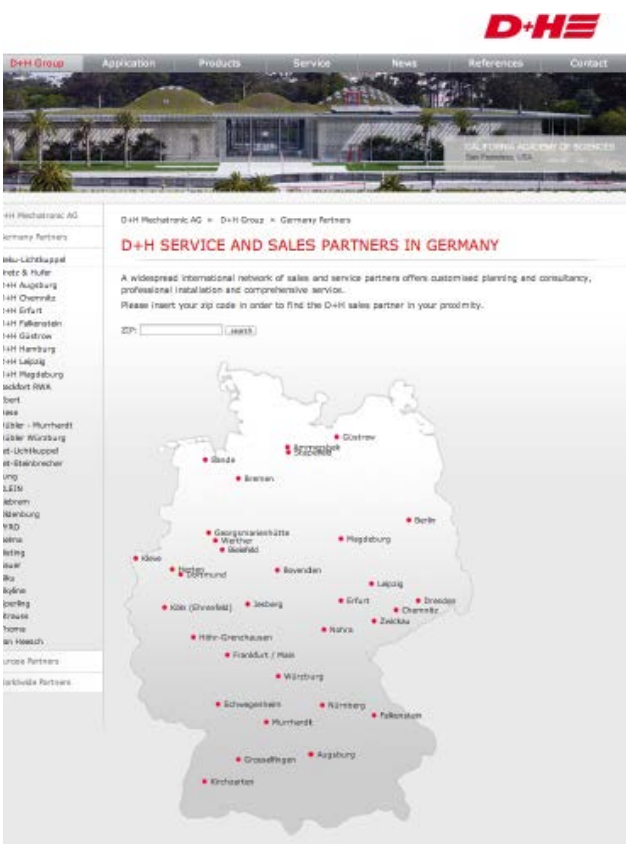
D+H Mechatronic AG was one of the first companies to develop natural, electric motor-driven smoke and heat exhaust ventilation (SHEV). Later, D+H became the first producer of electric SHEV systems to be certified in accordance with DIN EN ISO 9001 and launched the first electric SHEV system with VdS approval. D+H therefore exerted its influence as a pioneer in the field of smoke and heat exhaust ventilation and today has more experience and expertise than any other supplier.

With a dense network of D+H service and sales partners – 30 in Germany and over 100 globally – D+H provides expertise and complete services from a single source. From product development to production, installation and property services, D+H guarantees a consistent quality process in all phases of performance.

From the very beginning, D+H has orientated its products towards both customer and market requirements. At D+H, innovation traditionally means more than simply delivering the latest technology: we are constantly developing new solutions in the fields of smoke and natural ventilation.

With over 100,000 buildings completed worldwide, D+H offers you the maximum in experience and expertise.

Contact addresses for D+H service and sales partners can be found at: www.dh-partner.com



A USEFUL INFORMATION ABOUT EN 12101

The objective of the European series of standards EN 12101 is to ensure free trade in goods whilst at the same time defining minimum product requirements and standardising test methods in Europe.

SHEV products may only be marked with a CE marking once:

- the product has passed a test at a notified test centre and
- an inspection of the manufacturer's factory has been carried out.

Notified test centres in Germany are, for example:

- VdS Schadenverhütung GmbH (German loss prevention council), Cologne
- Materialprüfungsamt Nordrhein-Westfalen (MPA NRW) (material testing office, North-Rhine Westfalia), Erwitte branch
- Institut für Industrieaerodynamik GmbH (I.F.I. – Institute for Industrial Aerodynamics), Aachen

The standardisation organisations of the following countries are members of the CEN (Comité Européen de Nominalisation):

- Belgium, Bulgaria, Denmark, Germany, Estonia, Finland, France, Greece, United Kingdom, Ireland, Italy, Iceland, Croatia, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Austria, Poland, Portugal, Romania, Switzerland, Sweden, Slovakia, Slovenia, Spain, the Czech Republic, Turkey, Hungary and Cyprus.

1 THE EN 12101 SERIES OF STANDARDS USING THE EXAMPLE OF GERMANY

The EN 12101 series of standards currently consists of ten sections, which have been adopted in German standards (EN 12101-xx) or published as technical reports (TR 12101-xx).

PREVIOUS DIN STANDARD	PREVIOUS VDS GUIDELINE	CONTENTS DIN STANDARD	FUTURE
		Smoke and heat control systems Part 1: Specification for smoke barriers	DIN EN 12101-1
DIN 18232-3 *		Structural fire protection in industrial buildings Smoke and heat exhaust ventilation systems Smoke vents, tests	DIN EN 12101-2
		Smoke and heat control systems Part 3: Specification for powered smoke and heat exhaust ventilators	DIN EN 12101-3
		Systems (kits)	EN 12101-4
DIN 18232-2		Smoke and heat control systems Part 2: Natural smoke vent systems (NSV) Dimensioning, requirements and installation	TR 12101-5
		Differential pressure systems	DIN EN 12101-6
		Smoke duct sections	DIN EN 12101-7
		Smoke control dampers	DIN EN 12101-8
	VdS 2581	VdS Guidelines for natural smoke vent systems - Electrical control devices - Requirements and test methods	prEN 12101-9
	VdS 2593	Guidelines for natural smoke vent systems - Electrical power supply units - Requirements and test methods	DIN EN 12101-10

Table 1: Overview of the EN 12101 series of standards: *already withdrawn

The standards for prEN 12101-9 (control units), which are not only used in natural smoke and heat exhaust ventilation systems (NSVs) but in all smoke and heat exhaust ventilation systems, do not currently have to be implemented. The technical guidelines (Technical Reports, TR) are provided for information purposes only. EN 12101-10 (power supply) is used in Europe as a test standard.

1.1. FIELDS OF APPLICATION FOR EN 12101-2

EN 12101-2 applies to natural smoke and heat exhaust ventilators (NSHEVs). This standard specifies the requirements and test methods for NSHEVs, both for horizontally (roof exhaust systems) and vertically (facade exhaust systems) installed NSHEVs. DIN EN 12101-2 supersedes the German predecessor standard DIN 18232-3.

Current version of EN 12101-2

DEUTSCHE NORM **September 2003**

Rauch- und Wärmefreihaltung
Teil 2: Festlegungen für natürliche Rauch- und Wärmeabzugsgeräte
Deutsche Fassung EN 12101-2:2003

DIN
EN 12101-2

ICS 13.220.99

Ersatz für
DIN 18232-3:1984-09

Smoke and heat control systems —
Part 2: Specification for natural smoke and heat exhaust ventilators;
German version EN 12101-2:2003

Systèmes pour le contrôle des fumées et de la chaleur —
Partie 2: Spécifications pour les exutoires de fumées et de chaleur;
Version allemande EN 12101-2:2003

Die Europäische Norm EN 12101-2:2003 hat den Status einer Deutschen Norm.

Nationales Vorwort

Diese Europäische Norm wurde im Technischen Komitee CEN/TC 191/SC 1 „Anlagen zur Rauch- und Wärmefreihaltung und deren Bestandteile" unter deutscher Mitwirkung erarbeitet.

Im DIN Deutsches Institut für Normung e. V. war hierfür der Arbeitsausschuss 00.35.00 „Rauch- und Wärmeabzug bei Bränden" des Normenausschusses Bauwesen (NABau) zuständig.

Änderungen

Gegenüber DIN 18232-3:1984-09 wurden folgende Änderungen vorgenommen:

— allgemeine Festlegungen überarbeitet.

Frühere Ausgaben

DIN 18232-3: 1984-09

Fortsetzung 38 Seiten EN

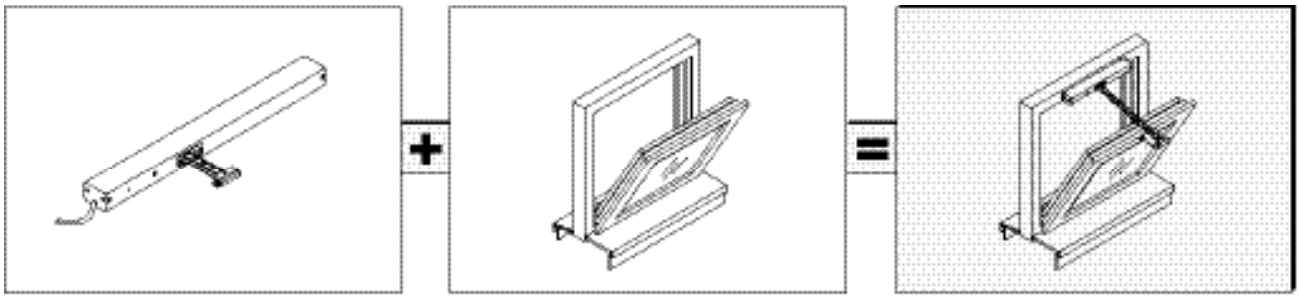
Normenausschuss Bauwesen (NABau) im DIN Deutsches Institut für Normung e. V.

Ref. Nr. DIN EN 12101-2:2003-09
Preisgr. 14 *Vertr.-Nr. 2314*

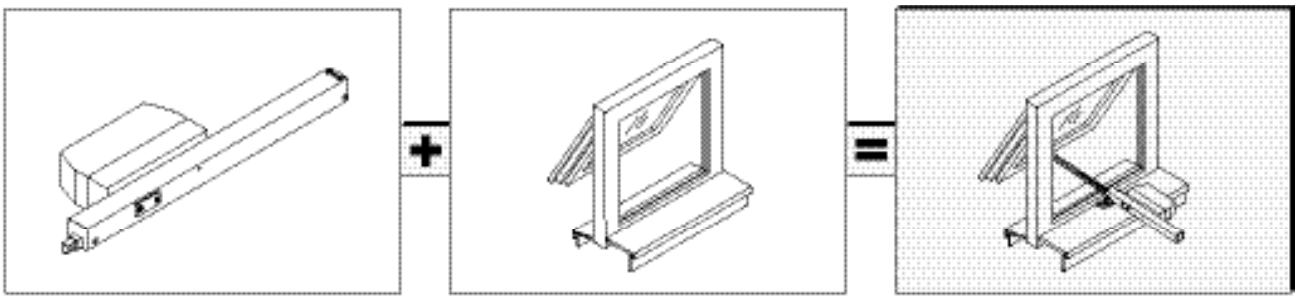
1.1.1. FACADE EXHAUST SYSTEM (VERTICAL FACADE)

An NSHEV consisting of electromotive drive and the SHEV opening in the facade can, for example, be installed with a chain drive or rack and pinion drive:

Chain drive SHEV opening NSHEV



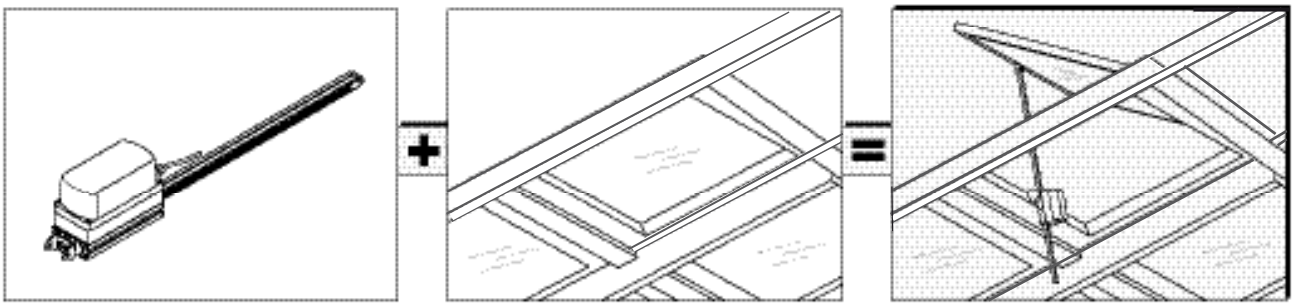
Rack and pinion drive SHEV opening NSHEV



1.1.2. ROOF EXHAUST SYSTEM

An NSHEV consisting of electromotive drive and the SHEV opening in the roof can, for example, be installed with a rack and pinion drive:

Rack and pinion drive SHEV opening NSHEV



NSHEVs in the roof are subject to special installation conditions. These conditions are specified in Section 1.2.

A wind sensitive control system is NOT required!

The entire NSHEV must pass all individual tests in the facade and roof area. The tested components such as the electromotive drive must not be replaced with other components.

1.2. INSTALLATION CONDITIONS FOR ROOF NSHEVS

We differentiate in general between two types of NSHEV in the roof:

1. Single flaps with or without wind deflectors
2. Dual single flaps with wind deflectors

NSHEVs as a single flap in the roof can be installed with and without wind deflectors and are subject to special installation conditions. Single flaps can only be used in the roofs depicted. Minimum clearances are defined to ensure that the NSHEV functions correctly. If these distances are not observed, the NSHEV no longer achieves the specified aerodynamic efficiency.

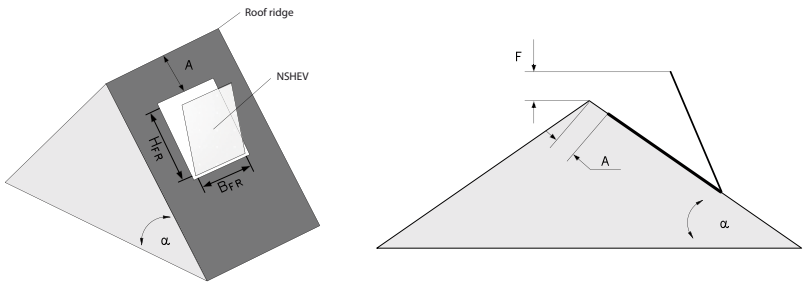
1.2.1. SINGLE FLAP WITHOUT WIND DEFLECTORS

<u>At an angle of installation of [α] 30° to 45°</u>

Distance of the NSHEV to the roof ridge [dimension A]:	750 mm ≤ A ≤ 1500 mm
Distance of the upper edge of the flap to the roof ridge [dimension F]:	≤ 250 mm

<u>At an angle of installation of [α] 46° to 60°</u>

Distance of the NSHEV to the roof ridge [dimension A]:	500 mm ≤ A ≤ 1500 mm
Distance of the upper edge of the flap to the roof ridge [dimension F]:	≤ 500 mm



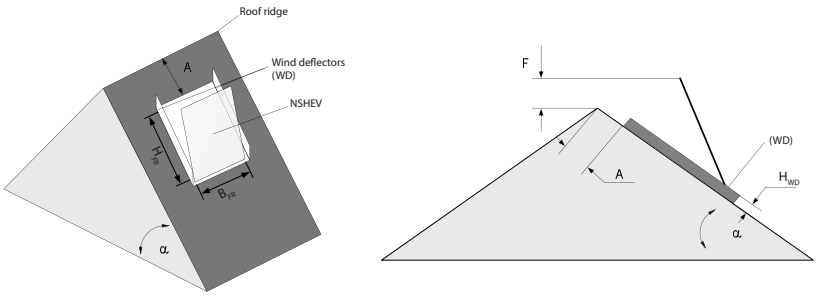
1.2.2. SINGLE FLAP WITH WIND DEFLECTORS

<u>At an angle of installation of [α] 25° to 45°</u>

Distance of the NSHEV to the roof ridge [dimension A]:	750 mm ≤ A ≤ 1500 mm
Distance of the upper edge of the flap to the roof ridge [dimension F]:	≤ 250 mm

<u>At an angle of installation of [α] 46° to 60°</u>

Distance of the NSHEV to the roof ridge [dimension A]:	500 mm ≤ A ≤ 1500 mm
Distance of the upper edge of the flap to the roof ridge [dimension F]:	≤ 500 mm

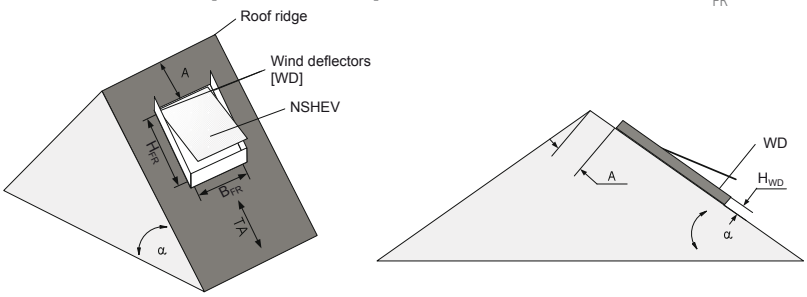


1.2.3. SINGLE FLAP AS TOP-HUNG VENT WITH THREE-SIDED WIND DEFLECTORS

At an installation orientation of [α] 2° to 50°

Distance from NSHEV to ridge [Dimension A]: ≤ 800 mm

Distance from NSHEV to eave [Dimension tA]: TA ≥ H_{FR}



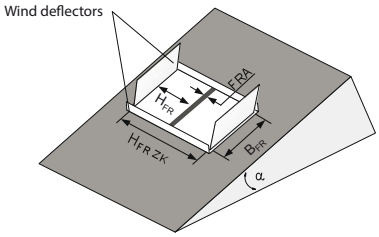
Please note that the opening angles of the top-hung window depend on the geometry and installation orientation!

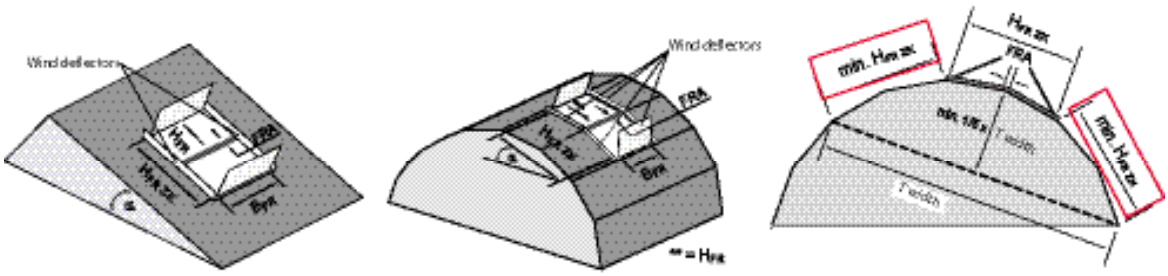
1.2.4. DUAL SINGLE FLAP WHEN INSTALLED AT AN ANGLE OF 0-30°

The dual single flap can be used in monopitch, barrel and gable roofs. The wind deflectors, which are always required, protect the NSHEV from side wind influences so that no wind sensitive control system is required.

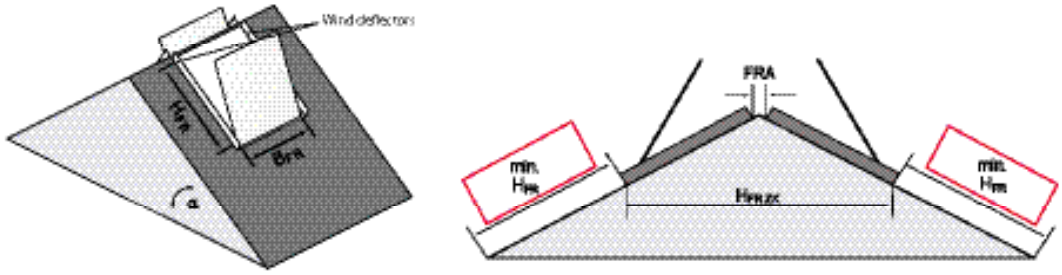
Minimum clearances are defined for applications in barrel and gable roofs to guarantee that the NSHEV functions correctly. If these distances are not observed, the NSHEV no longer achieves the specified aerodynamic efficiency.

Range of application 0-20° - Lean-to roof





Roof inclination 2-30° - gable roof



These installation conditions are only general limitations. Additional system specific information is provided in the profile system-related system modules.

1.3. PERFORMANCE CLASSES

In addition to some functional properties such as the opening time ≤ 60 s and requirements in accordance with EN 12101-2 para. 4, the aerodynamic free area (see EN 12101-2, para. 6) and specific performance classes in accordance with EN 12101-2, para. 7 are also tested.

These performance classes are defined by the NSHEV manufacturer. The manufacturer may choose between predefined values and the undefined class A. This chosen value is then tested by the notified test centre.

The following list provides an overview of the performance classes that can be selected and the values predefined by the standard.

1.3.1. RELIABILITY: RE CLASS (RE 50, RE 1000, RE A) IN ACCORDANCE WITH ANNEX C

The reliability Re indicates how often the NSHEV can be opened to fully opened SHEV position. If the NSHEV is also intended for day to day ventilation, it must be possible to open the NSHEV at least 10,000 times to the ventilation comfort position (Le 10,000). The comfort position is defined by the NSHEV manufacturer.

1.3.2. SNOW LOAD: SL CLASS (SL 0, 125, 250, 500, 1000 N/M², SL A) IN ACCORDANCE WITH ANNEX D

The snow load class SL indicates under what snow load the NSHEV can still be opened safely at ambient temperature. The snow load class is only relevant for NSHEVs in the roof. Above an angle of installation of ≥ 60°, it can be assumed that snow loads slip off the NSHEV. Hence, snow load class SL 0 can be applied.

1.3.3. WIND LOAD: WL CLASS (WL 0, 1500, 3000 N/M², WL A) IN ACCORDANCE WITH ANNEX F

The wind load class WL indicates the suction load which may operate on the NSHEV without the NSHEV opening. For example, in dome light elements or in skylights, this should prevent the NSHEVs being opened unintentionally by suction forces occurring on the roof. In facade exhaust systems, this is particularly important in the case of outward opening sashes, as the suction forces may similarly cause the NSHEVs to open unintentionally.

1.3.4. LOW AMBIENT TEMPERATURES: T CLASS (T(-25), T(-15), TA) IN ACCORDANCE WITH ANNEX E

The performance class T (temperature class) represents the temperature in °C at which the NSHEV has been tested and may be used. The designation T(00) indicates that the NSHEV may only be used in construction works at temperatures above 0°C. If class T(00) applies, the NSHEV does not have to undergo a low ambient temperature test; in all other classes, however, this is required.

1.3.5. RESISTANCE TO HEAT: B CLASS (B 300, 600 °C, B A) IN ACCORDANCE WITH ANNEX G

The resistance to heat class B indicates up to what expected fire temperatures the NSHEV may be used.

1.4. DETERMINING THE AERODYNAMIC FREE OPENING AREA IN ACCORDANCE WITH EN 12101- 2, ANNEX B

EN 12101-2 requires the specification of the aerodynamic free opening area for smoke extraction from the building for each NSHEV in the roof or facade.

The aerodynamic free area A_a is calculated by multiplying the clear geometric area of the NSHEV with the coefficient of discharge. The coefficient of discharge Cv (with side wind influence) or Cv0 (without side wind influence) is determined by the notified test centre while testing the NSHEV.

1.5. SUMMARY: BASIC REQUIREMENTS FOR D+H EURO-SHEVS

In summary, the following are the basic requirements for a D+H NSHEV in accordance with EN 12101-2:

- Drive and window are a single unit
- No replacement with non-D+H products
- Opening time ≤ 60 seconds
- Only tested and certified components are used

If an NSHEV deviates from the values given in the test and certification reports, the certificate becomes invalid.

2 THE PATH TO THE CE MARKING AND TO THE EC CERTIFICATE OF CONFORMITY FOR NSHEVS

The harmonised standards of the EN 12101 series of standards generally require implementation of initial type testing (see Section 2.1) and an initial inspection (see Section 2.2). Only if both tests have been passed successfully may the manufacturer – upon receipt of the EC certificate of conformity – affix the type plate with the CE marking (see Section 2.4).

Initial type testing is commissioned by a manufacturer from a notified test centre, e.g. for electromotive drives. Initial type testing checks whether the NSHEV exhibits the performance classes (see Section 1.3) specified by the manufacturer.

The results of initial type testing are the test and classification reports. Whereas only the tests actually performed and the results are documented in the test reports, in the classification reports these test reports are extended to cover NSHEVs of the same product family and the NSHEVs are classified by performance classes.

An application is then made to a notified test centre for an EC certificate of conformity. The manufacturer of NSHEVs for smoke extraction must establish factory production control and create a product-specific quality plan (see Section 2.2).

After the factory inspection has been performed by the notified test centre, the EC certificate of conformity is issued, on the basis of which the type plate may be affixed with the CE marking.

EN 12101 provides that all NSHEVs brought into circulation after 1 September 2006 must be CE-certified.

The following consequences arise for window manufacturer and/or window and facade manufacturers (hereafter referred to collectively as window manufacturer): they may only continue to use systems that conform to the requirements and are tested and marked. Window manufacturer must therefore now choose one of two options:

A. IN-HOUSE MANUFACTURER CERTIFICATION

The window manufacturer must commission manufacturer certification from a notified body in accordance with EN 12101-2. The centre then performs a factory inspection of the window manufacturer. Factory production control must be guaranteed and a product-specific quality plan must be submitted. Operation will continue to be monitored by the notified centre.

The following problems arise in this case: Most window manufacturer do not have the expertise to secure the necessary certification in the short term. In addition, the internal expenditure and the costs of the process are significant, in particular for SMEs.

B. EXTERNAL PROCUREMENT OF COMPLETE NSHEVS

In this case, the window manufacturer purchases complete NSHEVs (i.e. window element including opening mechanism) from a certified manufacturer. As the company is not authorised to produce the window elements itself, the added value for the user is reduced. The consequences for the company are limitation of its core competencies and profit setbacks.

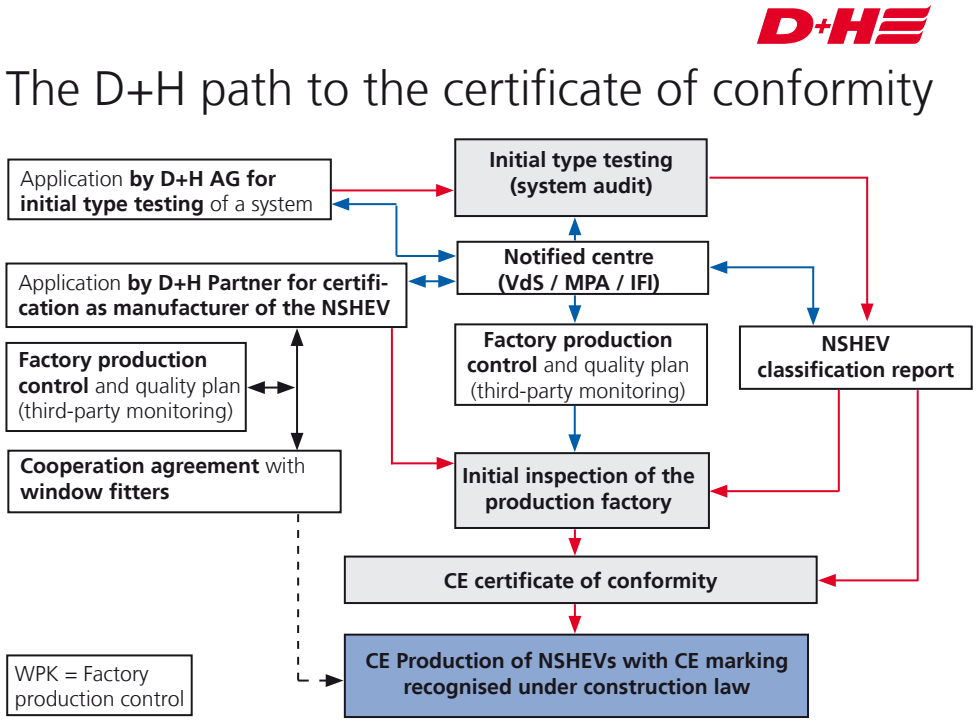
As these two options are not really satisfactory for the customer (window manufacturer etc.), D+H has developed a procedure that makes it possible to use Euro-SHEV system solutions without separate manufacturer certificate. The D+H partners obtain a manufacturer certificate that is used to manufacture NSHEVs jointly in cooperation with the window manufacturer.

D+H EURO-SHEV MANUFACTURER COOPERATION

D+H Euro-SHEV is an optimum solution for NSHEVs that are recognised under building regulations and produced specifically for facades and skylights. The profile system is tested and certified in conjunction with the D+H drive systems in this process. These system tests can be used by the window manufacturer to implement economical SHEV standard solutions.

If NSHEVs are produced in accordance with EN 12101-2 collaboratively, the D+H partner agrees the following procedure with the window manufacturer within the framework of a cooperation agreement.

1. The D+H partner defines the specifications for the NSHEV on the basis of the valid certificate of conformity (NSHEV specification from myCalc (formerly EN-Tool). See Section 3.1.
2. The window manufacturer produces the window observing and complying with these specifications and the applicable valid manufacturer guidelines and processing instructions for the profile system that is used. See Section 3.1.
3. The window manufacturer guarantees factory production control that includes at least the following steps: acceptance of order, incoming goods inspection, factory inspection and final inspection. Compliance with the test steps is documented in writing (Euro-SHEV test specification).
4. The window is installed by the window manufacturer in accordance with the processing instructions of the profile system manufacturer. If some NSHEV components, e.g. glazing or drives, are installed first, the necessary test steps must be performed and documented on site.
5. The window manufacturer affixes the CE marking issued by the D+H partner to the NSHEV.
6. The D+H partner checks the window manufacturer's factory production control processes annually and draws up an audit report.



Manufacturer cooperation offers competitive advantages for both the window manufacturer and the D+H partner.

Window manufacturer
- Ability to procure Euro-SHEV solutions independent of the profile manufacturer
- Large number of usable profile systems
- Cost savings
- Planning certainty and application reliability
- The Euro-SHEV partner is responsible for the SHEV
- No mark-up on D+H products
- Euro-SHEV partner with extensive EN/SHEV expertise

D+H Partner
- Sales of drives and control systems
- Installation and service provided
- Development and consolidation of the distribution channel by the window manufacturer

2.1. INITIAL TYPE TESTING OF THE NSHEV

Initial type testing of the product can be performed using one or more NSHEVs of the same product family. Only the test of reliability and the test under load must be performed on the same NSHEV. (see also 1.3.)

2.1.1. TESTING THE RELIABILITY RE

In an initial stage of the test, dual-function NSHEVs are opened and closed 10,000 times to and from the ventilation comfort position. The NSHEV is not otherwise put under load. The performance class Re is then tested (this is the first stage of testing for NSHEVs without dual function). In this stage of the test, the NSHEV is driven to the fully open smoke vent position in accordance with manufacturer data, e.g. 1,000 times for max. 60 seconds.

As the standard does not define a minimum value for performance class Re, NSHEVs must be used that display a minimum value of Re = 50. This value Re = 50 (47+3) was also required in the superseded DIN 18232-3.

2.1.2. TESTING THE SNOW LOAD SL

In the test for the snow load class SL, the NSHEV must be opened to its functional position within 60 s of a load being applied and must then remain in position. This test must be repeated twice if it is successful.

2.1.3. TESTING THE LOW AMBIENT TEMPERATURE

The NSHEV must also open within 60 seconds at low temperatures (e.g. -10°C). The low ambient temperature test therefore also tests in particular the freeze behaviour of seals in addition to the load on the electromotive drive.

In this performance class, the NSHEV must achieve the value T(-05) as a minimum, which guarantees that the NSHEV will continue to function correctly even at this low temperature.

2.1.4. TESTING THE WIND LOAD WL

The wind load class WL is also tested for facade exhaust system units. In this test, a dummy load is applied to the casement to simulate a suction load on the vertical facade. The casement must not open when the load is applied.

The current standard EN 12101-2 does not distinguish between inward and outward opening sashes. An inward opening sash is pressed into the outer frame even further by a load acting from inside to outside. The value of WL = 1500 (from the superseded DIN 18232-3) should be achieved as a minimum.

The electromotive drives and/or an optional locking mechanism are essentially the key components in an outward opening sash that prevent the window opening unintentionally.

2.1.5. TESTING THE RESISTANCE TO HEAT

In the resistance to heat test, the NSHEV is mounted on a test furnace that is heated from room temperature to 300°C within 5 minutes. After this heating-up phase during which optional thermal actuators are deactivated to prevent premature actuation, the NSHEV is actuated and must be driven to the fully open smoke vent position within 60 seconds. The NSHEV must remain in position for a further 25 minutes.

The test is passed if the aerodynamic free area has been reduced by a maximum of 10% after the entire period under load of 30 minutes. If the area has been reduced to a greater extent, the test is not passed, as not enough smoke can be vented from the building in an emergency.

2.1.6. TESTING THE AERODYNAMIC FREE OPENING AREA

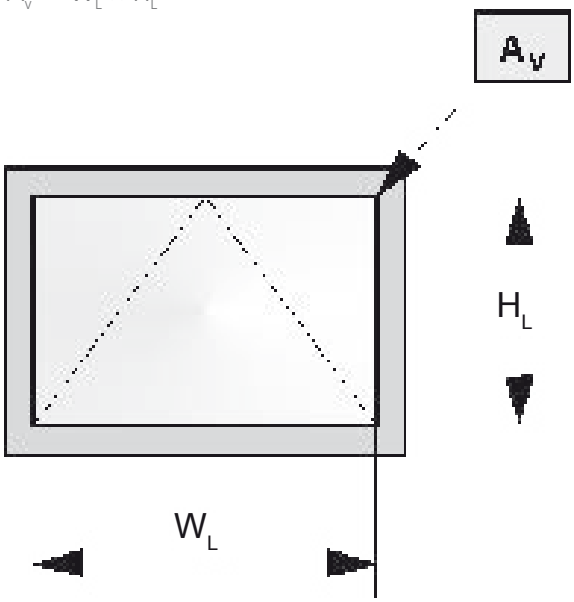
Various measurements are performed on the NSHEV where NSHEVs in the facade are used to extract smoke from the building. In particular, the static pressure and the atmospheric pressure are measured at different pressure ratios (Pa) at different NSHEV opening angles.

The coefficient of discharge Cv or Cv0 required by EN 12101-2 is then determined by means of a formula that takes into account the measurement results for the flow and pressure as well as the geometric area of the NSHEV. The aerodynamic free opening area A_a can then be calculated for the NSHEV.

CLEAR GEOMETRIC AREA

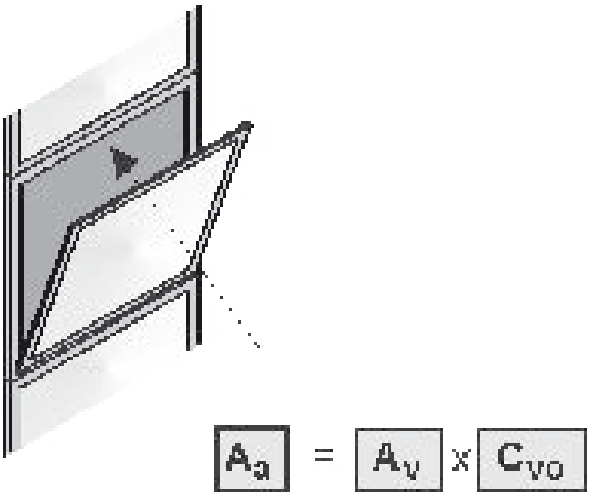
A_v = clear width (W_L) × clear height (H_L)

$A_v = W_L \times H_L$



AERODYNAMIC FREE AREA FOR NSHEVS

$A_a = A_v \times Cv$ (in roof; Cv0 in vertical facade)

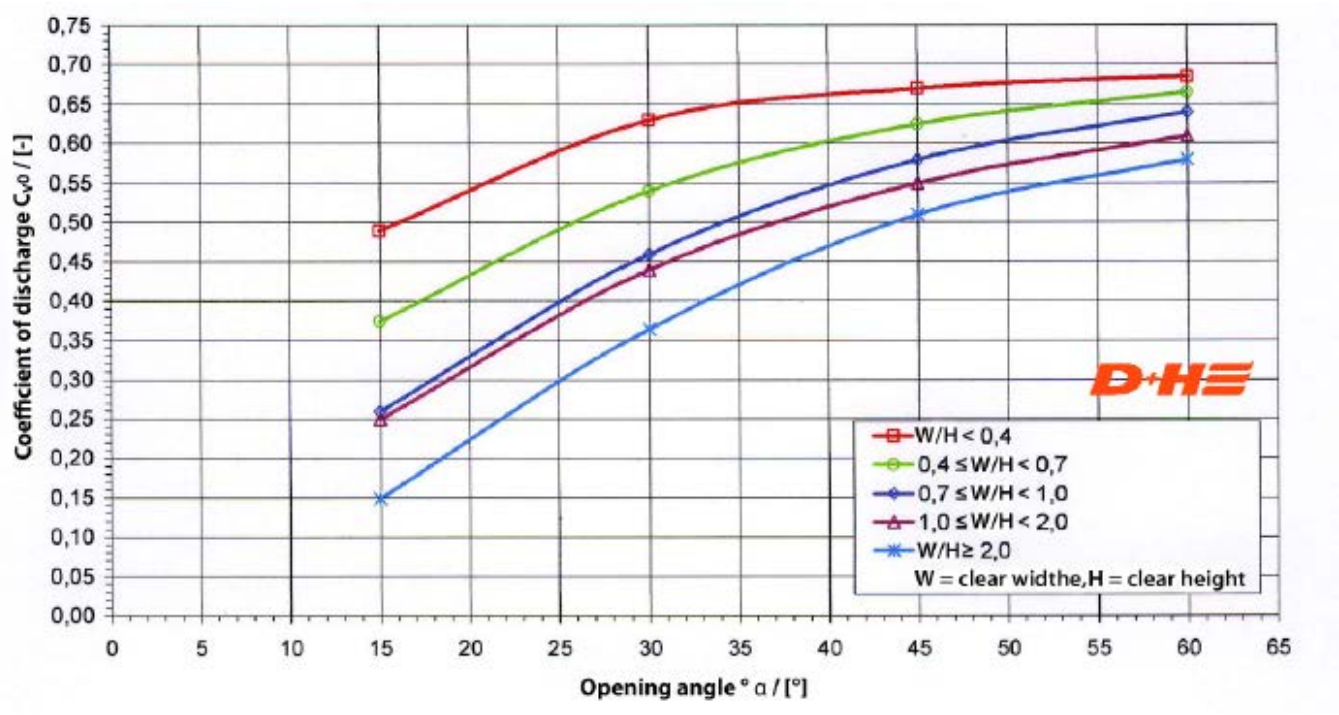


When NSHEVs are installed in a vertical facade a wind sensitive control system is mandatory. For this reason, the aerodynamic coefficient of discharge without side wind influence (Cv0) can be measured in NSHEVs installed for facade smoke extraction.

The influence of the side wind (Cv) must be taken into account in NSHEVs for roof installation.

DETERMINING THE COEFFICIENT OF DISCHARGE

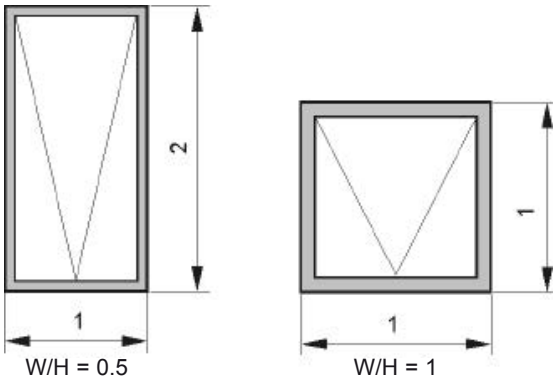
The determined aerodynamic coefficients of discharge are displayed on a graph. The following is an example of this type of graph for bottom hung and top hung vents opening inwards:



If the ratio of width to height of the NSHEV is known, the Cv0 value in the vertical facade and the Cv value in the roof can be read off the array of curves for the desired opening angle.

EFFECT OF THE WIDTH-HEIGHT RATIO ON THE AERODYNAMIC EFFICIENCY

The width-height ratio of an NSHEV in the facade has a decisive impact on the aerodynamic efficiency. The window on the left, for example, with a width-height ratio of 0.5 in our example has a aerodynamic coefficient of discharge Cv0 of 0.63. The window on the right, by comparison, with a width-height ratio of 1 has a Cv0 value of 0.55 at the same opening angle of 45°. The window on the left therefore has an aerodynamic coefficient of discharge that is approx. 14% better than the window on the right. This increase is linear to the aerodynamic free area.



In the NSHEV with W/H ratio = 0.5, the influence of the aerodynamically unfavourable hinge side has a lower impact on the overall result.

Note:
D+H Mechatronic AG has suitable software (e.g. myCalc (formerly EN-Tool)) for determining the aerodynamic free area.

SIMPLIFIED ASSESSMENT PROCEDURE

EN 12101-2, currently under revision, includes the option of a simplified assessment procedure to determine the aerodynamic free area A_v, above and beyond the metrological procedure. In standard draft 2008 prEN 12101-2:2008.2 (First Enquiry), the coefficients of discharge for the simplified procedure are stated in a table as a function of the opening angles.

In the simplified method, the value Cv is read off this table as a function of the opening angle (on the basis of measurements that have already been made) and multiplied by the clear geometric area. As no measurements have to be performed, there is a cost advantage. However, owing to the confidence coefficients saved in these Cv values for other profile geometries, these values are significantly lower than the potential values in the metrological procedure.

In the above example NSHEV with W/H ratio = 0.5, the Cv value at an opening angle of 45° is 0.25 under the simplified procedure in the standard draft. That gives a difference in the Cv value of 0.63 to 0.25. The aerodynamic free area is therefore approx. 2.5 times larger under the metrological assessment method.

As a result, under the metrological procedure significantly fewer NSHEVs have to be used in the building to achieve the aerodynamic free smoke extraction area, therefore reducing the costs of an overall solution.

2.2. INITIAL INSPECTION OF FACTORY PRODUCTION CONTROL AND THE QUALITY PLAN

The NSHEV manufacturer must establish factory production control to ensure that the NSHEV brought into circulation exhibits the specified performance classes. This is tested by the notified test centre.

The factory production control must include processes and procedures to verify the manufacture of the NSHEV in suitable production steps. The production machines and the measuring and testing equipment are also examined.

The manufacturer must also create a product-specific quality plan that defines the frequency with which tests are performed on the NSHEV components or on the finished NSHEV.

2.3. THE EC CERTIFICATE OF CONFORMITY

After all tests have been completed, the NSHEV distributor receives the EC Certificate of constancy of performance and is thereby authorised to mark the NSHEVs accordingly. The second and third pages of the certificate contain the product and classification characteristics.

EXAMPLE EC CERTIFICATE OF CONFORMITY:

VdS Schadenverhütung GmbH • Amsterdamer Straße 172-174 • D-50735 Köln
Notifizierte Produktzertifizierungsstelle für Bauprodukte • Kenn-Nummer 0786
Notified Product Certification Body for Construction Products • Registration No. 0786

Zertifikat der Leistungsbeständigkeit
Certificate of constancy of performance

0786 – CPR – 50632

Gemäß der Verordnung (EU) Nr. 305/2011 des Europäischen Parlaments und des Rates vom 9. März 2011 (Bauproduktenverordnung - CPR), gilt dieses Zertifikat für das Bauprodukt

In compliance with Regulation 305/2011/EU of the European Parliament and of the Council of 9 March 2011 (the Construction Products Regulation or CPR), this certificate applies to the construction product

Natürliches Rauch- und Wärmeabzugsgerät FES SG...
(Produktmerkmale siehe Anlage 1)
(Leistung siehe Anlage 2)

Natural Smoke and Heat Exhaust Ventilator FES SG...
(Product parameters see annex 1)
(Performance see annex 2)

in Verkehr gebracht durch

placed on the market by

D+H Svenska AB
Sallarängsgatan 3
SE 43137 Mölndal

und erzeugt im Herstellwerk

and produced in the manufacturing plant

D+H Svenska AB
Sallarängsgatan 3
SE 43137 Mölndal

Dieses Zertifikat bescheinigt, dass alle Vorschriften über die Bewertung und Überprüfung der Leistungsbeständigkeit und die Leistungen beschrieben im Anhang ZA der harmonisierten Norm(en)

This certificate attests that all provisions concerning the assessment and verification of constancy of performance and the performances described in Annex ZA of the standard(s)

EN 12101-2: 2003

entsprechend System 1 angewendet werden und dass das Produkt alle darin vorgeschriebenen Anforderungen erfüllt.

Dieses Zertifikat wurde erstmals am 01.08.2013 ausgestellt und bleibt gültig, solange sich die in der harmonisierten Norm genannten und zur Bewertung der Leistung der erklärten Merkmale verwendeten Prüfverfahren und/oder Anforderungen der werkseigenen Produktionskontrolle nicht ändern, und das Produkt und die Herstellbedingungen im Werk nicht wesentlich geändert werden.

under system 1 are applied and that the product fulfils all the prescribed requirements set out above.

This certificate was first issued on 01.08.2013 and will remain valid as long as the test methods and/or factory production control requirements included in the harmonised standard, used to assess the performance of the declared characteristics, do not change, and the product, and the manufacturing conditions in the plant are not modified significantly.

Köln, 01.08.2013

(i.V. Hesels)
Leiter der Zertifizierungsstelle
Head of Certification Body

1. CPR No.

2. Type

3. Certified company

1. The CPR number consists of the first four numbers identifying the notified test centre. In this example, 0786 stands for the VdS test centre. The first four digits are followed by the three characters CPR (Construction Products Regulation) and the identification number of the certified company. In this example, the sequential number 50075 stands for D+H Mechatronic AG.

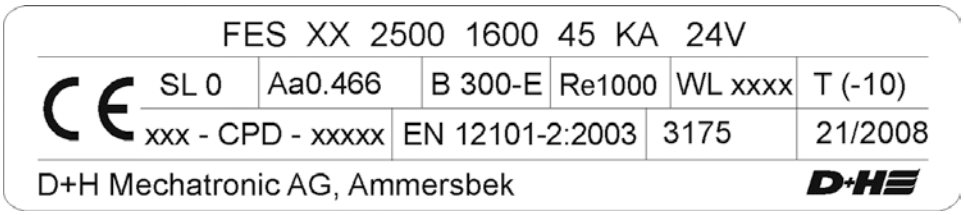
2. The designation "RES…" indicates for what type of smoke and heat exhaust ventilators an EC Certificate of constancy of performance has been issued. Our example is the roof exhaust system, i.e. a roof NSHEV. Type "FES..." stands for facade exhaust system. Further type specifications are provided in Attachment 1 of the EC Certificate of constancy of performance.

3. The certified company with full address is named here. The certified company is the distributor of the NSHEV; the certified company is monitored by a notified centre and is responsible for the conformity of the NSHEV with DIN EN 12101-2.

2.4. MARKING AN NSHEV IN ACCORDANCE WITH EN 12101-2

EN 12101-2 defines what information the CE type plate must contain. In addition to the manufacturer information and the number of the EC certificate of conformity, this includes the performance classes confirmed during initial type testing. You can obtain the CE type plate from your responsible D+H partner (see page 8).

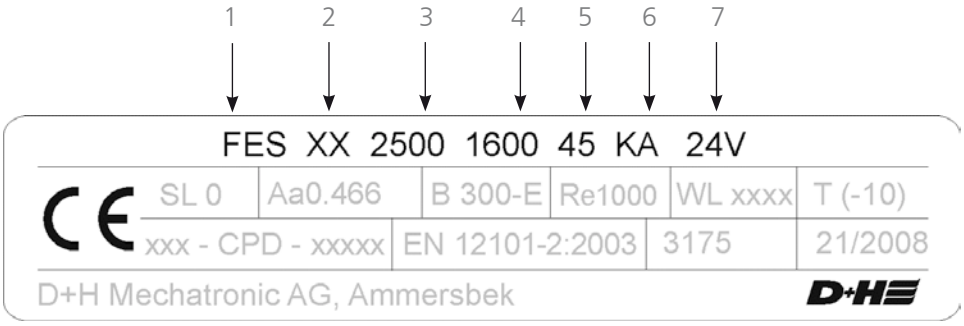
The following is a general example of a CE type plate:



Dimensions of the CE label Width: 104 mm Height: 20 mm

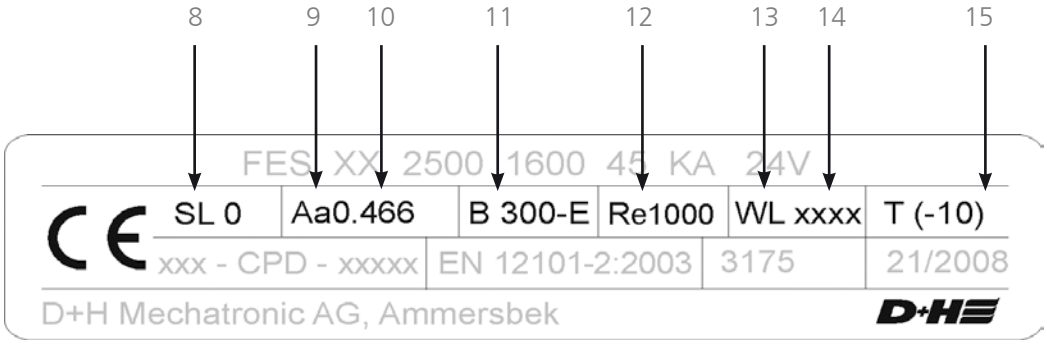
2.4.1. DESCRIPTION OF THE CE TYPE PLATE

The individual entries in the first line of the type plate:



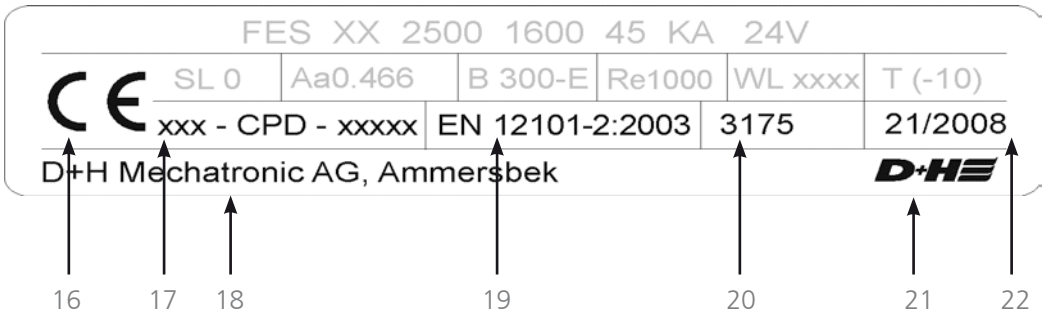
1:	FES	Vertical facade (field of application)
2:	XX	Profile manufacturer (must be entered)
3:	W_C	Casement width: 2,500 mm
4:	H_C	Casement height: 1,600 mm
5:	45	Opening angle in degrees
6:	KA	Drive type (in this case chain drive)
7:	24 V	Power supply

The entries in the middle line of the type plate:



8:	SL	Snow load classification (not required for vertical facade)
9:	Aa	Aerodynamic free opening area of the NSHEV
10:		Value of Aa, in this case 0.466 m^2
11:	B 300-E	Classification of resistance to heat (in this case 300°C)
12:	Re1000	Classification of reliability with SHEV dual function (1,000 strokes)
13:	WL	Wind load classification
14:		Value of WL in Pa
15:	T (-10)	Classification of reliability at low temperatures (in this case, -10°C)

The entries in the bottom line of the type plate:



16:	CE	The CE marking is a marking under EU law for specific products relating to product safety. By affixing the CE marking, the manufacturer confirms that the product conforms to the valid European directives.
17:		CPD No.
18:		Euro-SHEV partner (certified)
19:		Current valid version of EN 12101-2, 09/2003
20:		Unique NSHEV manufacturer number (located bottom left on the NSHEV specification)
21:		D+H logo (optional)
22:		Calendar week/year

2.5. DECLARATION OF CONFORMITY

In the declaration of conformity, the manufacturer (certificate holder) declares that the product marked with the CE type plate conforms to the listed directives and standards. Following certification, it is possible to generate the declaration of conformity for an NSHEV using the myCalc software (formerly the EN-Tool). You can obtain the declaration of conformity from your responsible Euro-SHEV partner (see page 8).

The declaration of conformity must be signed by the certified company of the listed product (signature 1) and by the owner/managing director or authorised representative of the certified Euro-SHEV partner (signature 2).

Membre dans ZVEI

Déclaration de performance
Declaration of performance
Nr. 219-90

1	**Désignation du type de NRWG** Type designation of NSHEV	FES SC 1600 2500 - KA 24 V	
	Numéro du type ou de série Type or serial number	219-90	
	Site d'implantation prévu Intended place of installation	Extraction en façade; Position de montage 90°	
2	**Nom du fabricant** Name of the producer	D+H Mechatronic AG	
	Adresse du fabricant Address of the producer	George-Sasse-Strasse 28-32 D-22949 Ammersbek	
	L'organisme notifié/numéro d'identification The notified body/identification number	VdS Schadenverhütung GmbH / 786	

a établi le certificat de constance des performances selon le système 1 0786-CPD-50036 .
has issued the certificate of constancy of performance 0786-CPD-50036 according to the System 1

3	**Performance déclarée** Declared performance		
	Sécurité de fonctionnement Re Reliability	Re1000+Le10.000	EN 12101-2, 2003:09
	NRWG à double fonction Dual purpose NSHEV	oui yes	EN 12101-2, 2003:09
	Classe charge de neige SL [Pa] Snow load SL [Pa]	SL = 0	EN 12101-2, 2003:09
	Températures basses T [°C] Low ambient temperature T [°C]	T = -15	EN 12101-2, 2003:09
	Charge au vent WL [Pa] Wind load WL [Pa]	WL = 3100	EN 12101-2, 2003:09
	Surface aérodynamique effective (Aa) [m²] Aerodynamic free area (Aa) [m²]	Aa = 1.759	EN 12101-2, 2003:09
	Résistance à la chaleur avec tenue au feu Heat and fire resistance	B300-E	EN 12101-2, 2003:09

La performance du 1 produit désigné au point correspond à la puissance déclarée selon le point . 3 .
The performance of the product identified in point 1 is in conformity with the declared performance in point 3 .

Le fabricant est l'unique responsable de l'établissement de cette déclaration de performance conformément au point. 2 .
This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 2 .

1st signature

Nom et fonction
Name and position

3 USING NSHEVS IN THE BUILDING

Owing to the different requirements and safety levels in European countries, no minimum value is defined in EN 12101-2 for the performance classes. This has the disadvantage for planners that NSHEVs can be offered for sale on the German market that do not conform to the previous German minimum values. Particular attention must be paid when selecting NSHEVs.

Requests for information to the Deutsches Institut für Bautechnik (DIBt), Berlin, and the planning authorities of the federal states have revealed that the German legislature does not intend to define minimum values in an environment of deregulation of German building regulations. The values for the performance classes when planning buildings may be – but do not have to be – defined by the state-level building regulations. Planners and specialist companies will therefore have greater responsibility in the future.

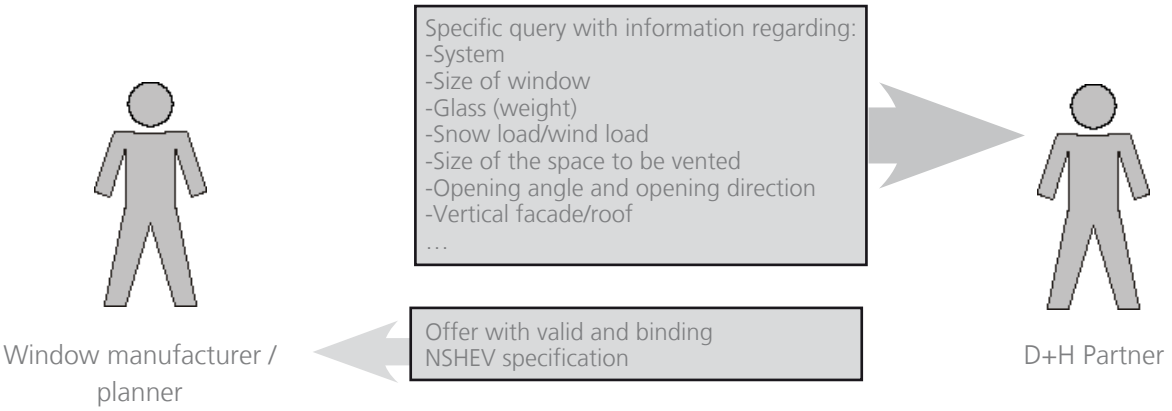
When selecting an NSHEV, it must be ensured that the performance specifications of the manufacturer are at least equal to the performance specifications required by the location of the building. This will in future be the responsibility of experts, as well as specialist planners and companies.

3.1. THE RIGHT PATH TO AN NSHEV

In practice, further limitations must be observed when using NSHEV systems other than the specifications of the state-level building regulations; such limitations can be very different depending on the building project. Irrespective of the valid standards and directives, the following processing instructions must be observed:

- the processing directives of profile system manufacturers
- the processing directives of metal fitting suppliers
- the processing directives of the glass industry
- other standards and directives such as pinch protection, fall protection and driving rain impermeability

The Euro-SHEV partner requires additional specific information from the window manufacturer/planner before an offer of a standard-compliant NSHEV system with valid and binding NSHEV specification can be made:



4 OTHER PRODUCT STANDARDS FOR SMOKE AND HEAT EXTRACTION SYSTEMS

Standards are also available or under development for testing control units and the energy supply of SHEV systems (see 4.1, 4.2 and 4.3).

All components used to set up a complete SHEV system must be purchased from D+H Mechatronic AG. Please contact your D+H partner (see page 8).

4.1. PREN 12101-9 (CONTROL UNITS)

prEN 12101-9 describes the requirements and test methods for control units. This standard is valid for electrical, pneumatic and other systems.

4.2. EN 12101-10 (ENERGY SUPPLY)

EN 12101-10 defines the requirements and test methods for the energy supply and was published in January 2006.

As part 9, this standard is also valid for electrical and pneumatic systems.

After the coexistence period has expired, the energy supplies and control units for all smoke extraction methods must conform to standards prEN 12101-9 and EN 12101-10 and a CE marking must be affixed, for example, to:

- Natural smoke and heat exhaust ventilation systems (NSHEVs)
- Powered exhaust ventilation systems
- Smoke barriers
- Pressure differential systems
- ...

4.3. TR 12101-5: DIMENSIONING NATURAL SMOKE AND HEAT EXHAUST VENTILATION SYSTEMS

The current design standard DIN 18232-2 (2003) is not superseded by European TR 12101-5, as this standard is only provided for information purposes as a "Technical Report".

The reasons for this are the differences between the protection objectives of European states and the maintenance of the high level of safety in Germany.

B CALCULATION AIDS

This section is divided into the following subsections:

- Section 1 "Sample calculation in the roof: specification of the stroke"
- Section 2 "Sample calculation in the vertical facade: specification of the stroke"

Maximum aerodynamics are determined by, among other things, the maximum stroke of the drive and the maximum opening angle of the window. In addition, the aerodynamics are also influenced by a favourable width-height ratio.

The sample calculations provide an overview of what calculations are required by the standard in addition to the typical calculation of forces for NSHEVs. The calculations are performed by D+H myCalc (formerly EN-Tool) after all the required information has been entered.

1 SAMPLE CALCULATION IN THE ROOF: SPECIFICATION OF THE STROKE

This sample calculation is based on the following classification:

- WL 2000
- SL 1000
- T(00)
- B 300-E

1.1. OBJECTIVE

The objective is to calculate the total aerodynamic smoke extraction cross section for this smoke section ($A_{a\ target\ total}$) and to calculate the number of required windows.

1.2. KNOWN DATA

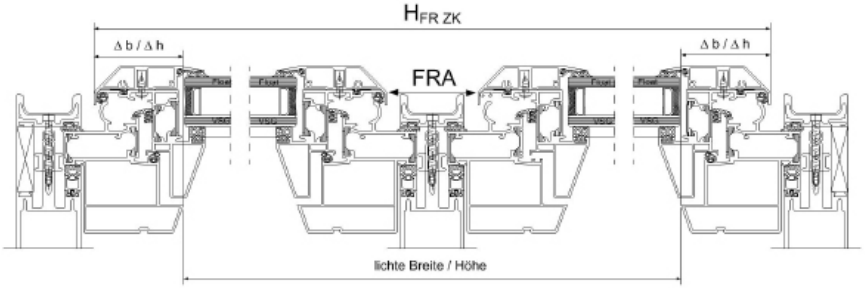
The following data are known from the specifications or the customer:

- Profile system: xxx
- Series: xx
- Installation area: monopitch roof
- angle of installation: 9°
- Casement width (W_{CM}): 1200 mm
- Casement height (H_{CM}): 1600 mm
- Casement clearance: 80 mm
- Unit height (H_{FRZK}): 3280 mm
- Clearance width Δ w: 2 × 30 mm (series-dependent)
- Clearance height Δ h: 2 × 30 mm (series-dependent)
- Type of opening and opening direction: Dual single flap 0-15°, outward
- Fill: glass, 8/12/8 mm (glass thicknesses: individual pane / space between panes / individual pane)
- Installation position of the drives: on the side opposite to the hinges
- Drive: rack and pinion drive, the same for all windows
- Stroke: 1000 mm
- Required aerodynamic free opening area: $A_{a\ target\ total} \geq 3.00\ m^2$

1.3. APPROACH

1.3.1. DETERMINING THE GEOMETRIC OPENING AREA A_V FOR A WINDOW

The geometric opening area is calculated by multiplying the vent outer dimension width and the vent outer dimension height, in each case deducting the clearance width or height (Δ w and Δ h):



A_v = clear width (RLB) × clear height (RLH)
$A_v = (W_{CM} - 2\,\Delta\,w) \times (H_{FRZK} - 2\,\Delta\,h)$
$A_v = (1200 - 60) \times (3280 - 60)$
$A_v = 1140 \times 3220$
$\underline{A_v = 3.67\ m^2}$

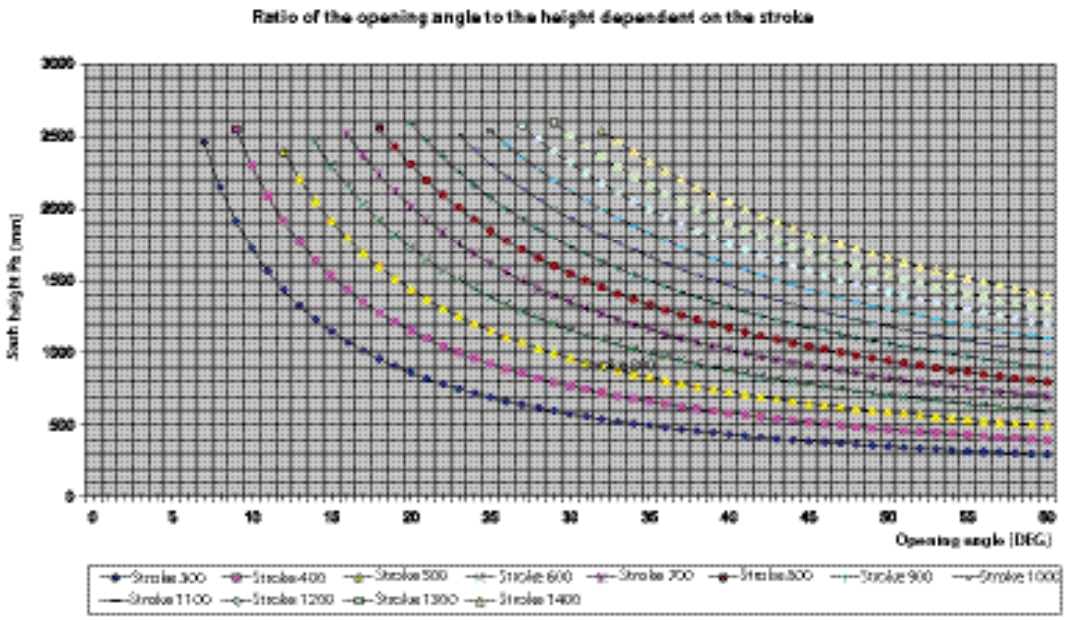
1.3.2. DETERMINING THE WIDTH/HEIGHT RATIO OF A CASEMENT

The width-height ratio is calculated from the ratio of clear width and clear height:

W/H = clear width (RLB): clear height (RLH)
W/H = 1 140: 3 220
<u>W/H = 0.35</u>

1.3.3. DETERMINING THE OPENING ANGLE

The opening angle is read off the following graph as a function of the stroke and the height. The values displayed on this graph are based on a simple sine trigonometric function. The graph is universally applicable across all systems:



In this sample calculation, an opening angle of 37° is calculated at a vent height of 1,600 mm and a stroke of 1,000 mm.

1.3.4. DETERMINING THE COEFFICIENT OF DISCHARGE CV

Using the width-height ratio determined under 1.3.2., the coefficient of discharge Cv required for the next calculation can now be read off the corresponding table for the system:

Opening as	Frame clear dimensions	Opening angle°															
		15	20	25	30	35	40	50	55	60	65	70	75	80	85	90
Cv value: pulverz bottom/top hing	W/H < 0.17	0.43	0.47	0.50	0.53	0.55	0									0.80
	0.17 ≤ W/H < 0.29	0.36	0.41	0.46	0.49	0.50	0									
	0.26 ≤ W/H < 0.50	0.28	0.34	0.39	0.43	0.46	0									
	0.50 ≤ W/H < 1.00	0.20	0.25	0.29	0.33	0.37	0									0.55
	W/H ≥ 1.00	0.14	0.18	0.21	0.25	0.28	0.33	0.37	0.40	0.43	0.45	0.48	0.50	[illegible]	0.53	0.53	0.54

Example

At a width-height ratio of 0.35 and an opening angle of 35°, the coefficient of discharge Cv is 0.46. As the opening angle of 37° calculated in 1.3.3. and the associated Cv value are not yet reached, the next lowest opening angle must be applied. (The Cv values can easily become worse as the width-height ratio increases and at low opening angles from the influence of jambs and latches.)

In general: the lower the width-height ratio, the better the Cv value. The tables used to determine the opening angle per series are provided in the "Technical Information" part of the D+H Euro-SHEV system module.

1.3.5. DETERMINING THE AERODYNAMIC FREE OPENING AREA FOR AN NSHEV

The aerodynamic free opening area for a window/NSHEV is calculated by multiplying the geometric opening area A_v calculated in 1.3.1. with the coefficient of discharge Cv from 1.3.3.:

$A_a = A_v \times Cv$
$A_a = 3.67\ m^2 \times 0.46$
$A_a = 1.68\ m^2/NSHEV$

1.3.6. DETERMINING THE NUMBER OF WINDOWS REQUIRED FOR THIS SMOKE SECTION

In this sample calculation, it is assumed the windows are the same. If windows are different, this calculation must be repeated per window. The sum of the aerodynamic free opening area of the individual windows then provides the value for the total smoke extraction area.

$A_{a\ target\ total} : A_a$ = number of windows required for this smoke section
$3.00\ m^2 : 1.68\ m^2 = 2$

1.4. RESULT

Two dual single flaps are required to achieve the aerodynamic total smoke extraction cross section for this smoke section at a stroke of 1,000 mm and a unit size of 1,200 × 3,280 mm.

2 SAMPLE CALCULATION IN THE VERTICAL FACADE: SPECIFICATION OF THE STROKE

This sample calculation is based on the following classification:

- WL 3000
- SL 0
- T(00)
- B 300-E

2.1. OBJECTIVE

The objective is to calculate the total aerodynamic smoke extraction cross section for this smoke section ($A_{a\ target\ total}$) and to calculate the number of required windows.

2.2. KNOWN DATA

The following data are known from the specifications or the customer:

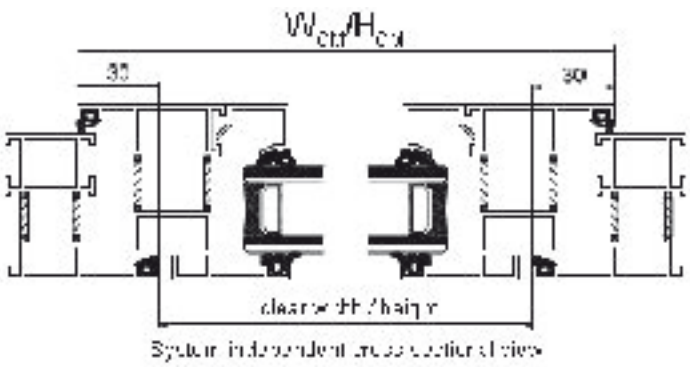
- Profile system: xxx
- Series: xx
- Installation area: vertical facade
- Casement width (W_{CM}): 1200 mm
- Casement height (H_{CM}): 1600 mm
- Clearance width Δ w: 2 × 30 mm (series-dependent)
- Clearance height Δ h: 2 × 30 mm (series-dependent)
- Type of opening and opening direction: Bottom hung vent, inward
- Fill: glass, 6/12/6 mm (glass thicknesses: individual pane / space between panes / individual pane)
- Installation position of the drives: on the side opposite to the hinges
- Drive: chain drive, the same for all windows
- Stroke: 1000 mm
- Required aerodynamic free opening area: $A_{a\ target\ total} \geq 3.50\ m^2$

2.3. APPROACH

2.3.1. DETERMINING THE GEOMETRIC OPENING AREA A_V FOR A WINDOW

The geometric opening area is calculated by multiplying the vent outer dimension width and the vent outer dimension height, in each case deducting the clearance width or height (Δ w and Δ h):

A_v = clear width (RLB) × clear height (RLH)
$A_v = (W_{CM} - 2\ \Delta\ w) \times (H_{CM} - 2\ \Delta\ h)$
$A_v = (1200 - 60) \times (1600 - 60)$
$A_v = 1140 \times 1540$
$\underline{A_v = 1.76\ m^2}$



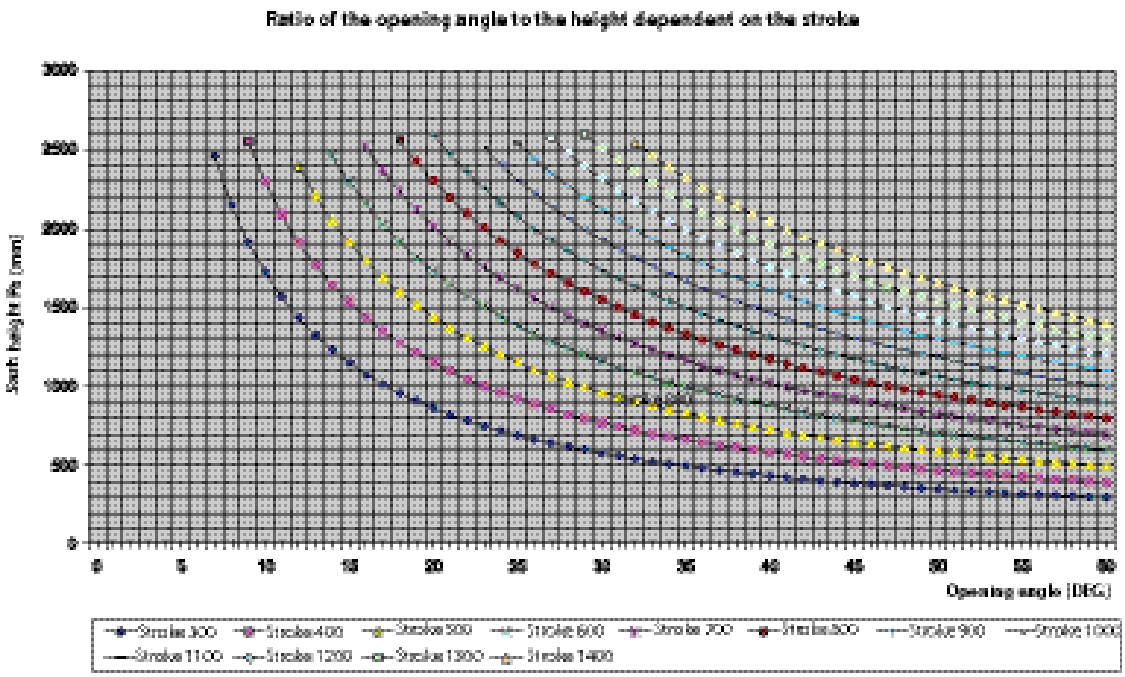
2.3.2. DETERMINING THE WIDTH/HEIGHT RATIO OF A CASEMENT

The width-height ratio is calculated from the ratio of clear width and clear height:

W/H = clear width (RLB): clear height (RLH)
W/H = (1200 - 60) : (1600 – 60)
W/H = 1 140 : 1 540
W/H = 0.74 → W/H < 1.00

2.3.3. DETERMINING THE OPENING ANGLE

The opening angle is read off the following graph as a function of the stroke and the height. The values displayed on this graph are based on a simple sine trigonometric function. The graph is universally applicable across all systems:



In this sample calculation, an opening angle of 37° is calculated at a vent height of 1,600 mm and a stroke of 1,000 mm.

2.3.4. DETERMINING THE COEFFICIENT OF DISCHARGE CV0

Using the width-height ratio determined under 2.3.2., the coefficient of discharge Cv0 required for the next calculation can now be read off the corresponding table for the system:

Opening as	Frame clear dimensions overlap	Opening angle°								
										55
inwards bottom/top hung	W/H < 0.44									2
	W/H < 1.00									4
	W/H < 2.30	0.10	0.19	0.26	0.32	0.36	0.	0.44	0.47	0.50
	W/H < 5.40	0.00	0.09	0.16	0.23	0.28	0.33	0.38	0.41	0.44

At a width-height ratio of 0.74 and an opening angle of 35°, the coefficient of discharge Cv0 is 0.40. As the opening angle of 37° calculated in 2.3.3. and the associated Cv0 value are not yet reached, the next lowest

opening angle must be applied. (The Cv0 values can easily become worse as the width-height ratio increases and at low opening angles from the influence of jambs and latches.)

In general: the lower the width-height ratio, the better the Cv0 value. The tables used to determine the opening angle per series are provided in the "Technical Information" section of the D+H Euro-SHEV system module.

2.3.5. DETERMINING THE AERODYNAMIC FREE OPENING AREA FOR AN NSHEV

The aerodynamic free opening area for a window/NSHEV is calculated by multiplying the geometric opening area A_v calculated in 2.3.1. with the coefficient of discharge Cv0 from 2.3.3.:

$$A_a = A_v \times Cv0$$

$$A_a = 1.76\ m^2 \times 0.40$$

$$\underline{A_a = 0.70\ m^2/NSHEV}$$

2.3.6. DETERMINING THE NUMBER OF WINDOWS REQUIRED FOR THIS SMOKE SECTION

In this sample calculation, it is assumed the windows are the same. If windows are different, this calculation must be repeated per window. The sum of the aerodynamic free opening area of the individual windows then provides the value for the total smoke extraction area.

$A_{a\ target\ total}$: A_a = number of windows required for this smoke section

$$\underline{3.50\ m^2 : 0.70\ m^2 = 5}$$

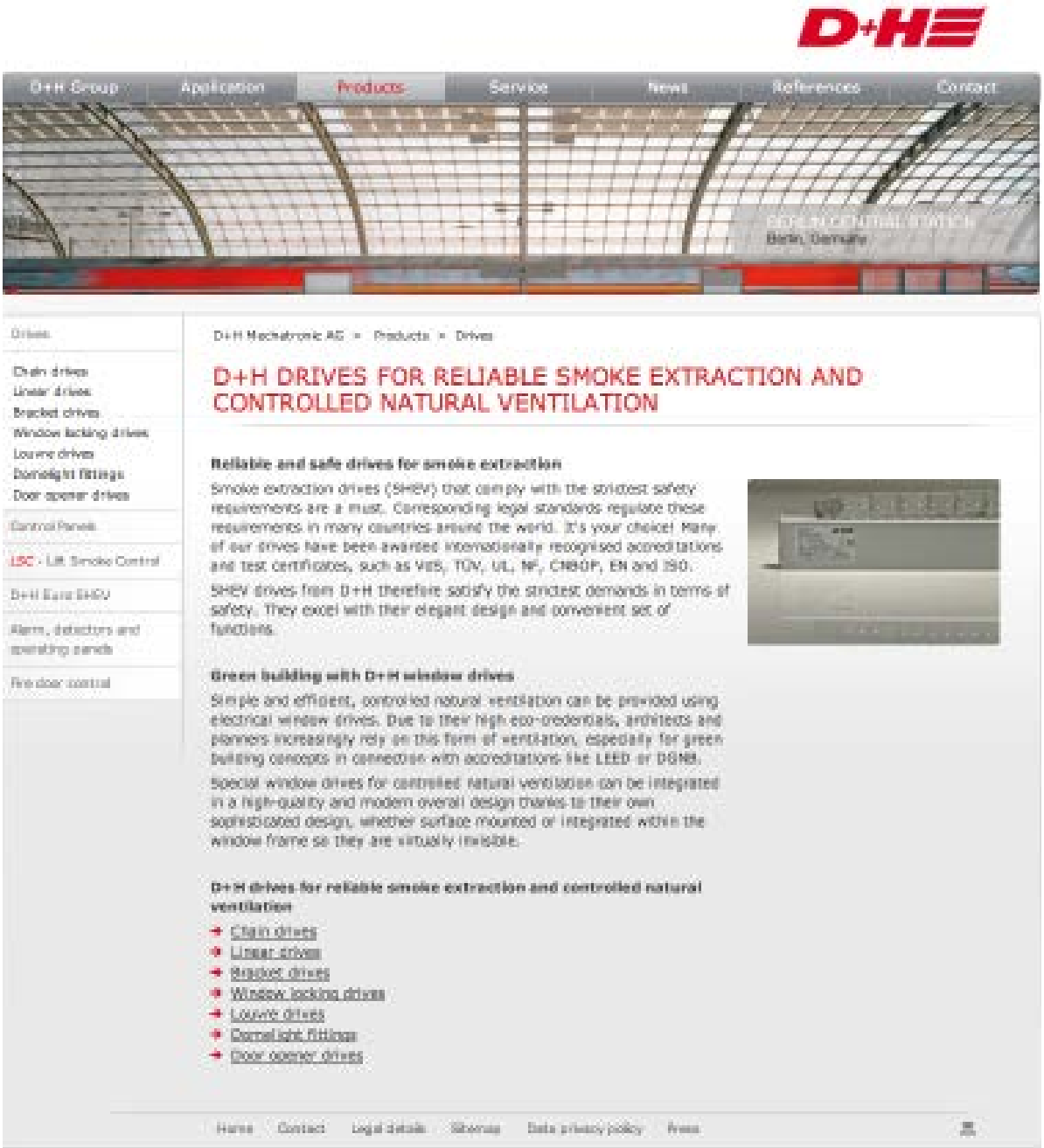
2.4. RESULT

Five windows are required to achieve the aerodynamic total smoke extraction cross section for this smoke section at a stroke of 1,000 mm and a vent size of 1,200 × 1,600 mm.

C INFORMATION ABOUT D+H DRIVES AND BRACKETS

This section provides an overview of the general installation options for D+H drives in vertical facades and skylights.

D+H Mechatronic AG supplies a number of different chain, linear and lock drives. Specific product information is provided in the D+H product information folder and on the internet at www.dh-partner.com/produkte/antriebe.html.



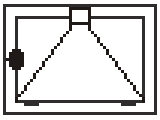
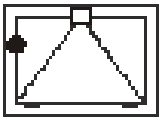
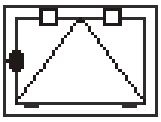
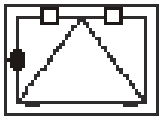
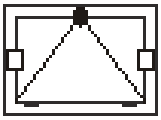
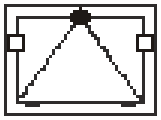
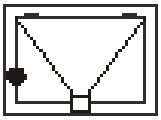
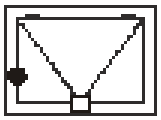
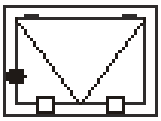
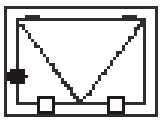
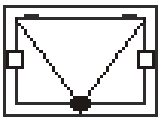
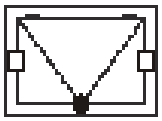
1 INSTALLATION POSITIONS OF D+H DRIVES

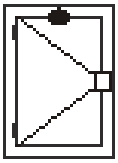
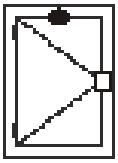
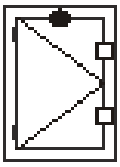
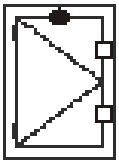
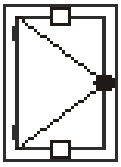
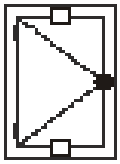
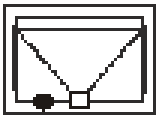
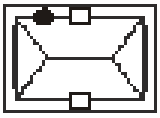
The possible Installation positions for D+H drives and locking mechanisms are outlined below for the different types of window, fields of application and opening directions.

The specific installation options for D+H drives for any profile system are listed in the D+H Euro-SHEV system module.

1.1. INSTALLATION POSITIONS FOR DRIVES ON WINDOWS IN THE VERTICAL FACADE

All diagrams are from the interior:

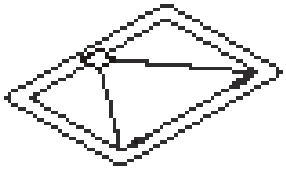
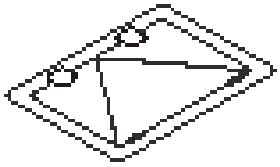
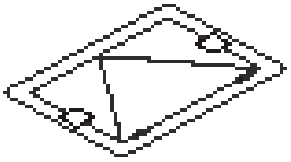
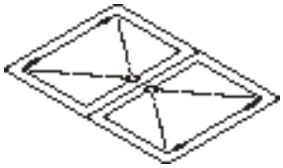
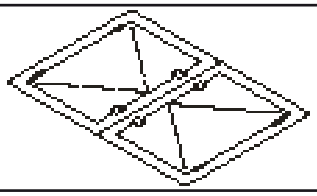
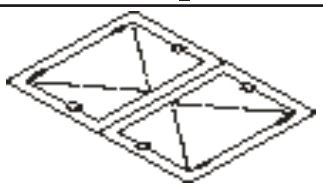
NSHEV in the vertical facade			
Type of opening Drive Lock drive (optional) Turn hinge		Opening direction	
		Inwards	Outward
Bottom hung vent	Side opposite to the hinges One drive		
	Side opposite to the hinges Two drives		
	Side mounted Two drives		
Top hung vent	Side opposite to the hinges One drive		
	Side opposite to the hinges Two drives		
	Side mounted Two drives		

NSHEV in the vertical facade			
Type of opening Drive Lock drive (optional) Turn hinge		Opening direction	
		Inwards	Outward
Side hung vent	Side opposite to the hinges One drive		
	Side opposite to the hinges Two drives		
	Side mounted Two drives		
Top-hung lowering vent	Side opposite to the hinges One drive		
Parallel opening vent	Two drives		

The specific installation options for D+H drives for any profile system are listed in the D+H Euro-SHEV system module.

1.2. INSTALLATION POSITIONS FOR DRIVES ON WINDOWS IN THE SKYLIGHT AREA

All diagrams are from the interior:

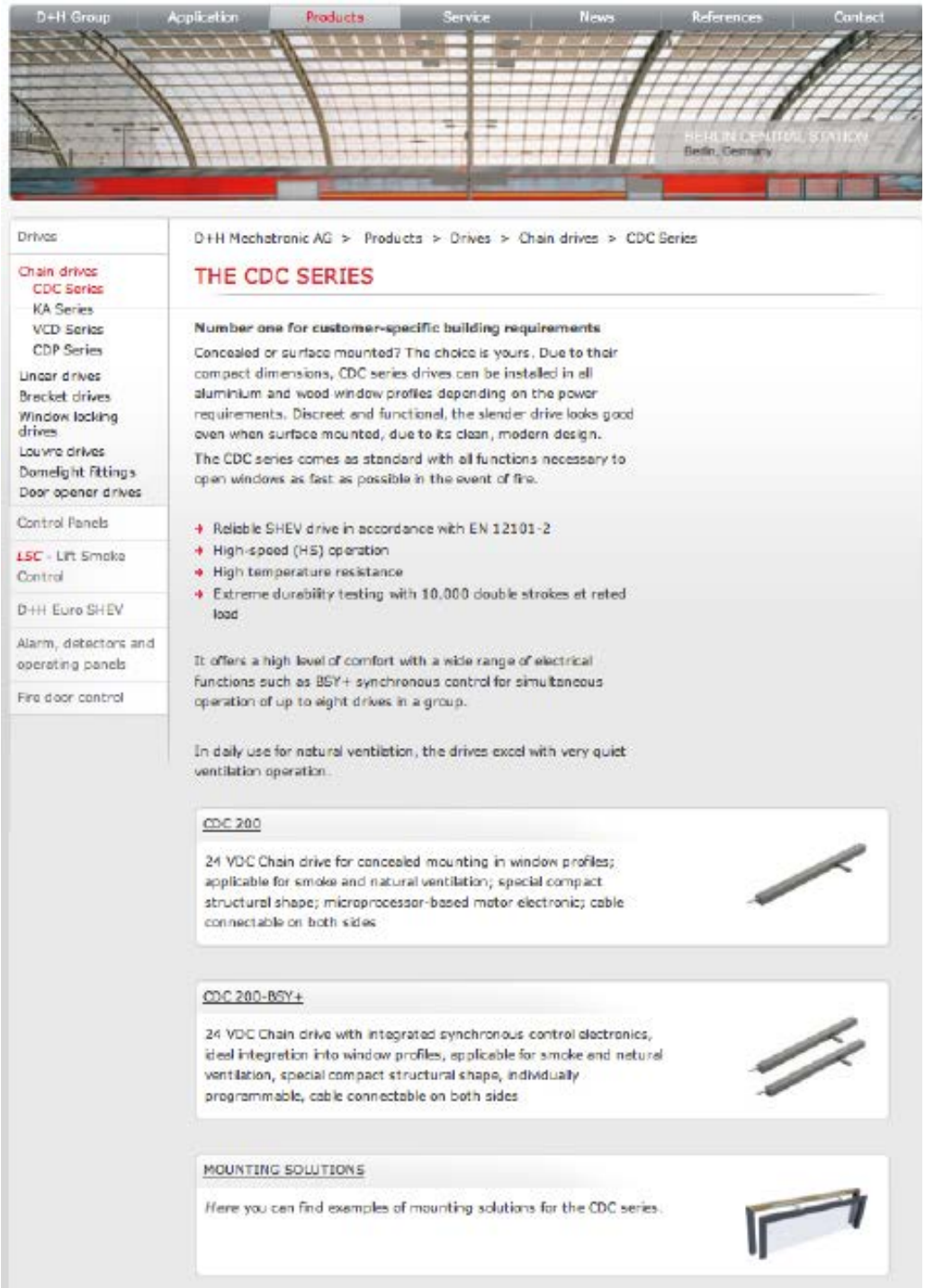
NSHEV in skylights		
Type of opening Drive Turn hinge		Opening direction Outward
Bottom hung vent Angle of installation 25-60°	Side opposite to the hinges One drive	
	Side opposite to the hinges Two or more drives	
	Side mounted Two drives	
Dual single flap Angle of installation 0-30°	Side opposite to the hinges Two drives	
	Side opposite to the hinges Four or more drives	
	Side mounted Four drives	
	With all possible installation positions in gable roof	

The specific installation options for D+H drives for any profile system are listed in the D+H Euro-SHEV system module.

2 D+H BRACKET SETS

D+H Mechatronic AG provides the right bracket sets for each drive for the different types of installation on different profile systems. The bracket sets include sash brackets and frame brackets. The choice of bracket sets depends on the application.

Suitable bracket sets for the drive series are available on the product pages online.



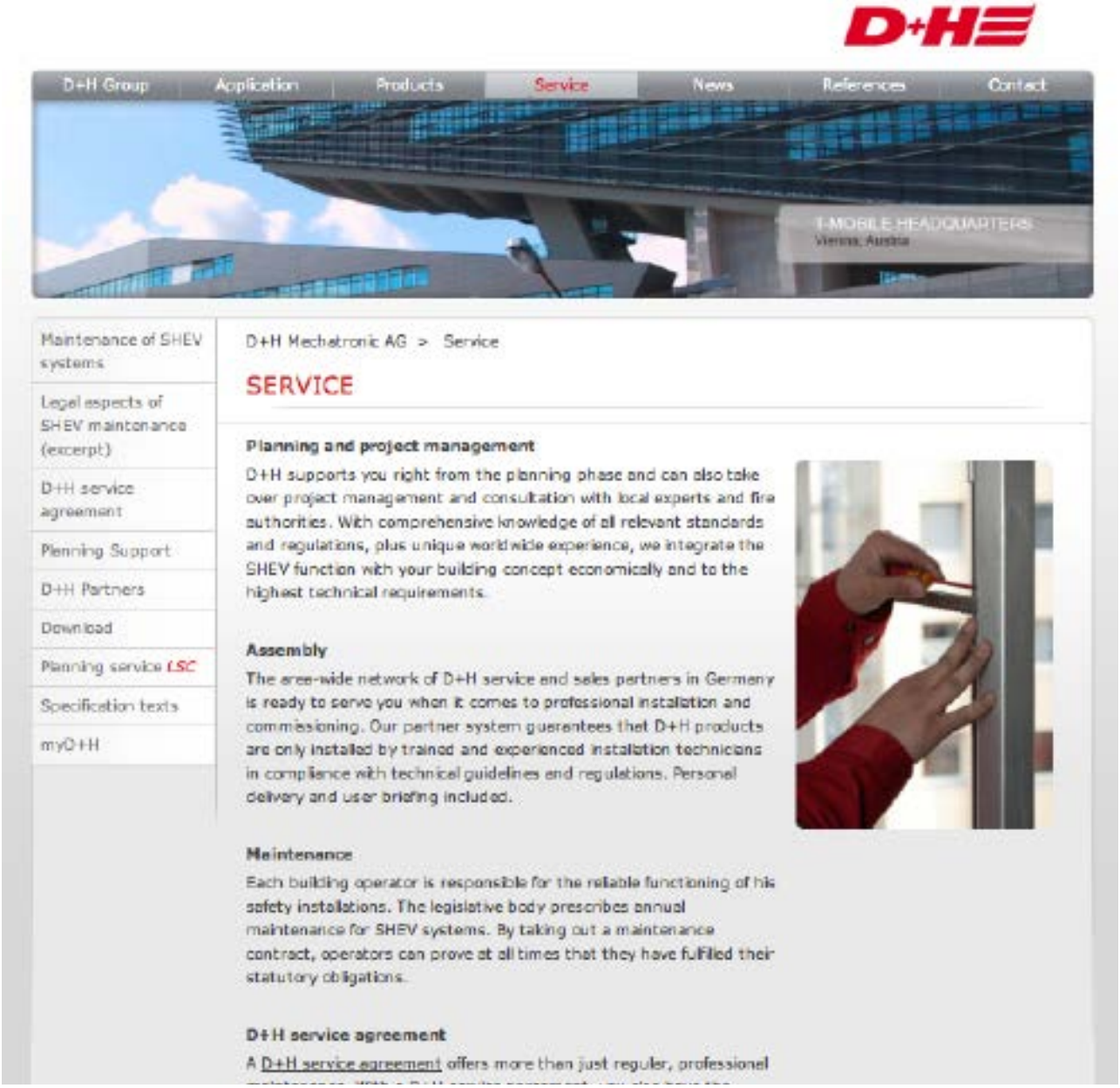
The bracket sets are listed in the sales information.

D+H Mechatronic AG also provides system-specific bracket sets (see the D+H Euro-SHEV system modules as well).

D EURO-SHEVS: WORKING MATERIALS

This section describes the aids and descriptions to identify an NSHEV. D+H Mechatronic AG provides extensive working materials for this purpose via the myD+H website.

You can access the login page for myD+H via the D+H Mechatronic AG website www.dh-partner.com/service.html.



If you are interested in cooperation with D+H Mechatronic AG, we would be delighted to send you access data. You will receive general and specific information about myD+H (infomyD+H), how to log in, how to create an NSHEV specification and how to print a CE type plate in PDF format via myD+H.

E TERMS AND ABBREVIATIONS

1 EXPLANATION OF TERMS IN ACCORDANCE WITH EN 12101-2

Exhaust ventilator

Device to exhaust gases from a building in case of fire.

Aerodynamic free area

Geometric opening area multiplied by the coefficient of discharge.

Aerodynamic efficiency

Another term for coefficient of discharge.

Smoke and heat exhaust system

Smoke and heat control system that exhausts smoke and heat from a fire in a construction works or part of a construction works.

Smoke and heat control system

Arrangement of components in a construction works to limit the effects of smoke and heat from a fire.

Activation device

Device that activates the opening mechanism of the components (e.g. a fire flap or a natural smoke and heat exhaust ventilator) after being triggered by a fire detection element.

Automatic natural smoke and heat exhaust ventilator

Natural smoke and heat exhaust ventilator which opens automatically after the outbreak of fire. Automatic smoke and heat exhaust ventilators can also be fitted with manual actuation or a manual activation device.

Automatic activation

Activation of the opening mechanism by a fire detection element without human intervention.

Range of natural smoke and heat exhaust ventilators

Natural smoke and heat exhaust ventilators of various sizes having the same method of construction (identical number of hinges on a louvre or flap, identical material and thickness, etc.) and identical number and type of opening devices.

Fire detection elements

Elements that respond with a change in state when a fire parameter occurs or changes.

Width-height ratio

Ratio of width to height in bottom hung, top hung, side-hung and dormer windows.

CE marking

By affixing the CE marking, the manufacturer confirms that the product conforms to the applicable EC directives. For further information, go to: http://www.vdi-nachrichten.com/ce-richtlinien/basics/index.asp.

Coefficient of discharge (Cv) (with side wind influence)

Ratio of actual flow rate, measured under specified conditions, to the theoretical flow rate through the natural smoke and heat exhaust ventilator. The coefficient of discharge takes into account any obstructions in the natural smoke and heat exhaust ventilator such as controls, louvres, vanes and the influence of side winds.

Coefficient of discharge (Cv0) (without side wind influence)

Ratio of actual flow rate, measured under specified conditions, to the theoretical flow rate through the natural smoke and heat exhaust ventilator. The coefficient of discharge takes into account any obstructions in the natural smoke and heat exhaust ventilator such as controls, louvres, and vanes without the influence of side winds.

Fire open position

Target opening position of smoke and heat exhaust ventilators to be achieved and sustained while venting smoke and heat.

Geometric area (Av)

Opening area of a natural smoke and heat exhaust ventilator. Controls, louvres and other obstructions are not taken into account.

Geometric free area

Smallest cross sectional area of a ventilator through which flow occurs.

Manual activation

Initiation of the operation of a smoke and heat exhaust ventilator by a human action (e.g. by pressing a button or pulling a handle).

Aspect ratio

Ratio of length to width in side-hung windows.

Natural ventilation

Ventilation caused by buoyancy forces due to differences in the density of the gases because of temperature differences.

Natural smoke and heat exhaust ventilator (NSHEV)

Device to exhaust smoke and hot gases out of a construction works in case of fire.

Dual purpose natural smoke and heat exhaust ventilator

Natural smoke and heat exhaust ventilator that can also be used for day to day ventilation.

Opening time

Period (≤ 60 seconds) between the smoke and heat exhaust ventilator receiving the signal and reaching the functional position (opening position) in case of fire.

Smoke and heat exhaust ventilator (SHEV)

Consists of components selected to exhaust smoke and heat in order to generate a stable layer of warm gases above cooler and cleaner air.

Thermal activation element

Temperature-sensitive activation device

Manually opened smoke and heat exhaust ventilator

Smoke and heat exhaust ventilator that can only be opened manually.

Wind sensitive control system

Control system designed to control two or more banks of natural smoke and heat exhaust ventilators in different building side walls so that only the NSHEVs not subject to positive wind pressures open in case of fire.

2 SYMBOLS AND ABBREVIATIONS

The following mathematical and physical parameters represented by their symbols and units apply to the application of standard EN 12101-2.

SYMBOL/ ABBREVIATION	PARAMETER / DESCRIPTION	UNIT
-	-	
Aa	Aerodynamic free area	m²
A_v	Geometric opening area of the natural smoke and heat exhaust ventilator	m²
W_{CM}	Casement width (maximum sash dimension)	mm
H_{CM}	Casement height (maximum sash dimension)	mm
B 300	Classification of the resistance to heat at 300°C	°C
W/H	Frame clear width to frame clear height quotient (RLB/RLH)	
Cv	Coefficient of discharge with side wind influence	
Cv0	Coefficient of discharge without side wind influence	
E	Classification of the reaction to fire of materials in accordance with EN 1305-1	
FM	Vent mounting	
g	Vent weight	N/m²
KA	Chain drive	
Le 10 000	Classification of the ventilation function (10,000 times open and close to/ from the ventilation comfort position)	
MB	Centre of hinge	
MV	Centre lock	
n	Number of NSHEV elements	
NSHEV	Natural smoke and heat exhaust ventilator	
Pd	Wind stagnation pressure	Pa
RAB	Frame outer dimension width	mm
RAH	Frame outer dimension height	mm
Re 1000	Classification of reliability (1,000 times fully open smoke vent position)	
RLB	Frame clear dimension width	mm
RLH	Frame clear dimension height	mm
RM	Frame mounting	
SL	Snow load classification	Pa
Solo	Single drive	
T	Temperature	°C
T(00)	Functional test classification at above 0°C (room temperature)	TD
TD	Tandem drive	

SYMBOL/ ABBREVIATION	PARAMETER / DESCRIPTION	UNIT
V	Side wind velocity	m/s
VH	Locking motor	
VM	Concealed mounting	
WL	Wind load classification	Pa
ZA	Rack and pinion drive	
Δ w	W_{CM} - clear width (RLB)	mm
Δ h	H_{CM} - clear height (RLH)	mm
α	Opening angle of the NSHEV	Degrees
Θ (Theta)	Angle of installation of natural smoke and heat exhaust ventilators on a roof	Degrees

WWW.DH-PARTNER.COM

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