# Ventilation standards and regulation upgraded due to new insights on IEQ supporting innovative ventilation technics in the Netherlands

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Dutch standards NEN 1087 and NEN 8087 for ventilation of buildings will change. Both standards will be merged into one standard which has been published as draft earlier this year: prNEN1087:2019[1]. In contrast with current versions, the new version of NEN 1087 will be applicable to all buildings: new or existing residential and non-residential buildings, and is expected to be anchored in the Dutch building regulations from the beginning of 2021.

Current standards for determining ventilation capacity of buildings, NEN 1087/8087, date from 2001. On many points their content is no longer in line with current insights of a healthy indoor climate and newly installed building ventilation systems. This is the main reason why NEN 1087 and NEN 8078 have thoroughly been redesigned in the past years.

Buildings have to provide protection against factors that can harm people's health in a negative way. When it comes to good air quality not all 'danger' comes from outside. Recent research in the Netherlands, among others from TNO, show that it is mainly the indoor air quality that can cause health problems. The indoor air is often more polluted with more particulate matter and higher $CO_2$ concentration than the outside air. This is relevant because people live most of their time in buildings. However, the regulations on ventilation have been unchanged for many decades in the Building Act in the Netherlands. In more recent years, when it comes to regulation, more attention is still paid to the energy performance of buildings.

The Dutch Building Act[2], once established to guarantee safety and health of people in buildings, urgently needs to be revised with regard to a healthy indoor environment. The NEN standards committee "Ventilation and air tightness of buildings" has therefore been working in the past years to renew the standards 1087/8087 which are required to follow according to the Dutch Building Act. A draft version of the new standard was presented

to the market this spring. The responses received are currently being processed. The new standard is expected to be delivered at the end of 2019, after which it is expected to come into force by the beginning of 2021 via the building regulations.

*What are some major changes in standard prNEN1087:2019 as well in future regulation?*

## Merging NEN 1087 and 8087 with EU standards as basis

To begin with, the scope of the NEN 1087 standard will change. In the existing situation there are two standards with determination methods for building ventilation: NEN 8087 (for ventilation capacity in existing buildings) and NEN 1087 (for newly built construction). Both standards are primarily developed and defined for residential buildings but are also declared applicable to other buildings in the Building Act. In the new situation the two standards will be integrated: the new NEN 1087 will apply to all buildings: new and existing. Within the standard, specific requirements are formulated for the various building types: residential and non-residential buildings, and for low-rise and high-rise buildings. Compared to the previous versions, the emphasis has shifted more to the application of building regulations in projects than to the specific testing of ventilation components, like grilles in residential ventilation. Looking at ventilation in a building as a whole (the complete ventilation system) has become the central starting point in the new standard. This is logical due to coordination and development of many CEN standards with determination methods of ventilation systems and components. These have been accepted and published in the Netherlands as NEN-EN standards and are used as reference for the new NEN 1087.

## New ventilation classification type

Secondly, the classification type of the various ventilation systems is changed. The existing classification of systems in A, B, C and D was primarily based on available techniques.

Due to technical innovations, this classification has become increasingly complex and less transparent over the years. The division is replaced by a division into seven numbers indicated with VST, Ventilation System Type. This is based on all possible ways in which fresh air can be supplied, flow through and be extracted from the building. This makes the layout robust for technical innovations. The new classification is also in line with the European nomenclature which is currently being used by the European Ventilation Industry Association (EVIA[3]).

***Table 1.*** *Ventilation System Type (VST).*

| VST | Roomtype | Air exchange provision | | Abbrev. |
|---|---|---|---|---|
| 1 | Habitable spaces | Supply | Natural direct supply | NDS |
| | | Extract | Natural indirect extract | NIE |
| | Exhaust spaces | Supply | Natural indirect supply | NIS |
| | | Exhaust | Natural direct exhaust | NDE |
| 2 | Habitable spaces | Supply | Mechanical indirect supply | MIS |
| | | Exhaust | Natural direct exhaust | NDE |
| | Exhaust spaces | Supply | Mechanical indirect suply | MIS |
| | | Exhaust | Natural direct exhaust | NDE |
| 3 | Habitable spaces | Supply | Natural direct supply | NDS |
| | | Extract | Mechanical indirect extract | MIE |
| | Exhaust spaces | Supply | Mechanical indirect supply | MIS |
| | | Exhaust | Mechanical direct exhaust | MDE |
| 4 | Habitable spaces | Supply | Natural direct supply | NDS |
| | | Exhaust | Mechanical direct exhaust | MDE |
| | Exhaust spaces | Supply | Mechanical indirect supply | MIS |
| | | Exhaust | Mechanical exhaust | MDE |
| 5 | Habitable spaces | Supply | Mechanical direct supply | MDS |
| | | Extract | Mechanical indirect extract | MIE |
| | Exhaust spaces | Supply | Mechanical indirect supply | MIS |
| | | Exhaust | Mechanical direct exhaust | MDE |
| 6 | Habitable spaces | Supply | Mechanical indirect supply | MIS |
| | | Exhaust | Mechanical direct exhaust | MDE |
| | Exhaust spaces | Supply | Mechanical indirect supply | MIS |
| | | Exhaust | Mechanical direct exhaust | MDE |
| 7 | Habitable spaces | Supply | Mechanical direct supply | MDS |
| | | Exhaust | Mechanical direct exhaust | MDE |
| | Exhaust spaces | Supply | Mechanical indirect supply | MIS |
| | | Exhaust | Mechanical direct exhaust | MDE |

## Air exchange performance assessment method

Another important change in NEN 1087 is the addition of a completely new chapter which deals with the assessment of the air exchange performance of

the different types of ventilation systems. In addition to only an assessment of the individual components, this Indicative Determination Method for Ventilation Performance (IBVP in Dutch) is now included. The aim is to provide the expected performance of the entire ventilation system with a comparison figure, the so-called Air Exchange Performance (AEP[4]). That makes it possible to compare different ventilation systems and to make results transparent and clear to the customer. Despite the absence of requirements of ventilation system performance in building regulation the complete performance assessment is included in full in the standard. Future regulation can adopt to the performance assessment method.

## Ventilation capacity in master bedroom in future regulation

It is expected that future building regulation will set further requirements for the ventilation of the main bedroom in dwellings. Such a requirement is missing in the current regulations.

As a result, it may happen that a mechanical ventilation system switches to the lowest airflow during the night, after which the air quality in the (master) bedroom is far below standard. This is particularly a risk in modern airtight dwellings and commonly used mechanical ventilation systems which are controlled by only one $CO_2$ sensor, placed in the living room. In the new building regulations, it is proposed by many stakeholders and ventilation research to include a minimum guaranteed ventilation capacity of 50 m³/hour in a bedroom intended for two people.

## More strict requirements for cooking exhaust

For new building regulations it is also proposed to set stricter requirements for cooking exhaust. In the current Building Act, 75 m³/hour is the minimum to be installed capacity for extracting cooking air, damp and gases. The capacity of 75 m³/h is based in particular on the removal of moisture. This does not consider contamination of the indoor air with fine dust. Ventilation research by TNO[5], among others, shows that the concentration of particulate matter in airtight dwellings can be very high after cooking if the removal of cooking fumes is insufficient. In order to not only extract moisturised air, but also particulate matter, an exhaust capacity of at least 300 m³/h is required. Naturally, the same capacity is needed for the supply of fresh air. This must be taken into account in the ventilation design and calculation.

To achieve this high capacity, a cooker hood with a direct exhaust to the outside is considered as most effective. Although these high ventilation rates cost energy, the loss is limited because cooking only happens for a short time a day.

## Higher than minimum ventilation capacity...

Dutch building regulation include minimum ventilation requirements. The installed ventilation systems in buildings are required to meet these minimum requirements. To receive a building permit these requirements have to be met. The new NEN 1087 also offers the possibility to implement ventilation systems with higher ventilation capacity. Ventilation capacities that are not mandatory due to the building regulations, but are advised for ventilation systems referring to European standards, e.g. by EN 16798-1[6].

Market actors that want distinguish themselves by offering higher comfort and indoor air quality levels to their clients have always the possibility to do so, but will now be supported with this new standard to specify the offered comfort and IEQ level. ■

## References


1 https://www.nen.nl/NEN-Shop/Norm/NEN-10872019-Ontw.-nl.htm.

2 Bouwbesluit 2012, (publication date July 2019), Voorschriften met betrekking tot het bouwen, gebruiken en slopen van bouwwerken.

3 https://www.evia.eu/position-papers/.

4 REHVA journal February 2019, Including air-exchange performance in building regulation.

5 TNO 2018 R11055 VentKook, Ventilatiesysteem met goede kookafzuiging.

6 EN 16798-1:2019 en, Energy performance of buildings – Part 1: Indoor environment input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics – Module M1-6.