PLANNING INSTRUCTIONS

ER-APB 100

Construction of a ventilation system in accordance with DIN 18017

① Roof cowl
② Thermal insulation
③ Main duct
④ Connecting duct
⑤ Ceiling compound
⑥ Ventilation or installation shaft
⑦ Cleaning opening, end lid

Roof cowl

MAICO roof cowls have been especially designed for ventilation systems. There is no static pressure loss. Therefore the pressure drop design can be made in the same way as for an open duct.

Thermal insulation

Ventilation ducts used in refrigerated areas with non-insulated attics must be insulated against condensation.

Main duct

The main duct is the central ventilation duct that leads vertically through the entire building. The connecting ducts for the individual fans branch off from it.

The main duct must be made of non-combustible material (e.g. a folded spiral-seams duct). In addition, it must be air-tight and protected from any damage caused by condensation.

Make sure to install the main duct between the lowest and highest connecting ducts so that it is vertical, straight and has the same inside cross section. Secure it firmly, e.g. to a solid wall.

Connecting duct

The connecting duct runs from the individual fans to the main duct.

Ceiling compound

If the building is subject to fire protection regulations , the ceiling compound must be at least 100 mm thick between the main duct and the fire protection casing in the floor passageway.

MAICO recommends that ceiling compound is fitted in all buildings for sound insulation between the floors.

Ventilation or installation shaft with or without fire protection classification.

Whether the ventilation or installation shafts require fire protection classification depends on the fire protection system being used.

Cleaning opening, end lid condensation drainage

If possible, install the cleaning opening in the cellar to prevent soiling the living units when cleaning the main duct.

If possible, fit the end lid in the cellar.

If the end lid is not installed in the cellar, and the main duct runs through unheated parts of the building, it will be necessary to fit a condensation connection to the building's drainage system. An additional cleaning opening should also be provided.

Legal requirements

Standards and regulations

General fire protection regulations are listed in:

- Copy of the building regulations
- State building regulations.

- Approved building guidelines regarding technical fire protection requirements for ventilation systems.

Technical regulations can be found in:

- DIN 4102-4.
- DIN 18017-3.
- Certificates of approval.

Of special importance here are the certificates of approval which define the technical details regarding fire protection devices.

Installation regulations according to DIN

All fire protection measures are intended to prevent fire and smoke from spreading to other fire lobbies in the case of fire.

Fire-proof installation shafts in accordance with DIN 4102-4

Ventilation shafts must be made of mineral based building materials and have a technical fire protection classification.

The ventilation duct cross section must not exceed a maximum of 1,000 cm^2 .

The main duct must be made of non-combustible material.

If the building is subject to fire protection regulations , the ceiling compound must be at least 100 mm thick between the main duct and the fire protection casing in the floor passageway.

Fire protection shut-off device for systems in accordance with DIN 18017 -3

Fire protection shut-off devices close off the connection ducts against fire and smoke.

This is achieved using either:

- Metal lamella (backflow preventer).
- Ceiling barriers.

All fire protection shut-off devices from MAICO are maintenance-free.

Ventilation units in living areas for systems in accordance with DIN 18017-3

According to the relevant approvals, domestic kitchens, bathrooms and WCs are allowed to be ventilated via a shared main duct.

All ventilation units are to be installed in such a manner that it is possible to check and control the individual components in their fitted state.

The backflow preventers for all MAICO ventilation units are easily accessible.

Kitchen ventilation in accordance with state building regulations

Mechanical ventilation is required for:

- Internal kitchens.
- Kitchenettes without windows.

Fire protection shut-off devices in accordance with DIN 18017-3 should not be installed in commercial kitchens, as these are insufficient. Instead, ventilation ducts with fire protection shut-off devices in accordance with DIN 4102 must be installed.

MAICO recommends basic ventilation via a separate single duct extraction system for kitchens. In addition to this, an extractor hood offering air circulation operation should be fitted above the oven for cleaning grease from the kitchen exhaust air.

It is forbidden to connecting the extraction hood to the main duct.

Protection areas in bathrooms in accordance with DIN VDE 0100-701

- Distances to be maintained – protection areas in bathrooms in accordance with DIN VDE 0100-701.

- Bathrooms are divided into 3 areas in which different requirements apply to the degree of protection for electrical appliances.

Sector	Permitted voltage	IP-degree of protection for current-using equipment
0	AC 12 V or DC 30 V	IP X7
1	230 V (fans)	IP X5
2	230 V	IP X4, (IP X5 if there is a risk of water jets)

- If water jets occur in area 1 and 2, select units with an IP X5 degree of protection.
- All MAICO ER-/ER EC units have the IP X5 degree of protection.

Planning / layout according to DIN 1946-6

- With single and central air extraction systems which have building approval for use in accordance with DIN 18017-3, both such systems as well as ventilation systems can be planned and implemented in accordance with DIN 1946-6. Do, however, note the different requirements of the respective standards. In particular, fire protection in accordance with DIN 18017-3 is only permitted if the corresponding requirements of DIN 18017-3 and the ventilation system guidelines are met.

Classified according to material and building material classes in accordance with DIN 4102, part 1

Building materials, ducts and all other materials that will be used are to be sub-divided into building material classes according to their flammability.

In principle, ventilation ducts as well as their covers and insulation materials must be made from non-inflammable building materials (Class A1). Exceptions are only permitted when it can be ensured that no fire or smoke can reach other floors or fire lobbies.

Table

Fire resistance duration

Minimum time in minutes that a component must retain fire and smoke. F30, F60, F90 etc. fire resistance classes are defined according to their fire resistance duration.

Table

Different fire resistance durations are stipulated for the various German States.

Table

Complete floors are floors that project more than 1.4 m above the centre of the measured ground area and are at least 2.3 m high. With upper floors this height must cover at least 3/4 of the ground area of the floors beneath (applies to Baden-Württemberg, other states may have different regulations):

High rise buildings are buildings in which the floor of at least one of the day rooms lies more than 22 m above the surrounding ground.

Low rise buildings are buildings in which a day room does not have a floor that lies more than 7 m above the surrounding ground.

The following applies to Baden-Württemberg: Low rise buildings are buildings in which the parapet height of a window in any of the day rooms does not lie more than 8 m above the surrounding ground.
For detailed questions, such as how complete floors are defined in various states, please refer to the current local building regulations. This is usually very time-consuming.
This can be accomplished easier and quicker with the TGAplus fire protection software. You will find this program on our home page under www.maico-ventilatoren.com.

Volumetric flow regulations - layout of the duct system

The 2002 German Ordinance on energy saving in buildings (EnEV) stipulates an air exchange rate of 0.4 to 0.8 for living units. The following guide values for the exhaust and supply air volumetric flows are listed here. This means that the air in odorous and humid areas such as kitchens, bathrooms and WCs must be extracted and the fresh air must be supplied to living-rooms and bedrooms.
Table
Special regulations apply to domestic areas with air-ventilated fireplaces.
The operation of extraction units is only allowed:
If the exhaust gas duct is monitored by special safety devices; these must switch off the ventilation system if they are triggered.

Observe the following points for the supply air:

Supply air within the living unit: Ensure that there is an air flow in the direction of the kitchen, bathroom and WC.
Each of the inner rooms to be ventilated must have a non-closable free supply air cross section of at least 150 cm². MAICO door ventilation grilles are suitable for this.
Supply air in the living unit: Rooms with outside window or outside door have an air exchange rate of 0.5 in accordance with DIN 1946-6.
The complete living unit has an air exchange rate of 0.35.
If the exhaust air volumetric flow exceeds the normal supply air volumetric flows in accordance with DIN 1946-6, then supply air elements must be installed in order to ensure the balance between the supply air and exhaust air.

Layout example:

With this supply air volumetric flow of 62.4 m³/h, an exhaust fan with a supply volume of 60 m³/h can be fitted in the bathroom without any other measures having to be installed.
However, if an exhaust fan with an air volume of 100 m³/h is installed in the bathroom, the exhaust air volumetric flow will clearly exceed the supply air volumetric flow. Additional supply air elements must then be installed.

Dimensioning the main duct

The following diagrams are used for determining the diameter of the main duct, in accordance with 18017-3.
The following requirements apply to the layout:

- DN 80 connecting ducts up to 2 m long and 2 elbows.
- Vertical main duct without re-routing.
- Main duct with a constant diameter.
- Residual pressure rate 75 Pa.
- Duct roughness k = 0.15 mm
- Floor height 2.75 m

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- Exhaust duct height 1.5 m
- Coincidence factor 100%

Layout example for decentralised air extraction in accordance with DIN 18017-3

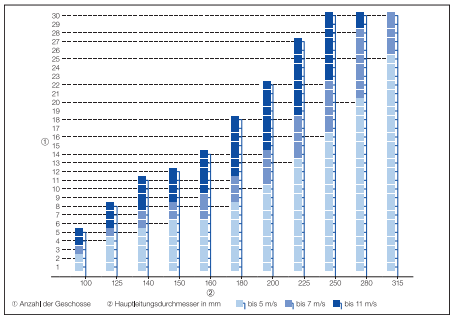
Assumption:

- Fans with 60 m³/h in the connecting duct.
- 2 fans per complete floor.
- Building with 11 floors.

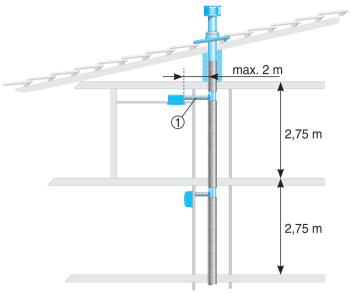
Procedure:

- On the diagram (for 2 fans per floor each with 60 m³/h), read the "11 floors" Y-axis - the associated main duct must have a diameter of 225 mm.

ER 60, one unit per complete floor*

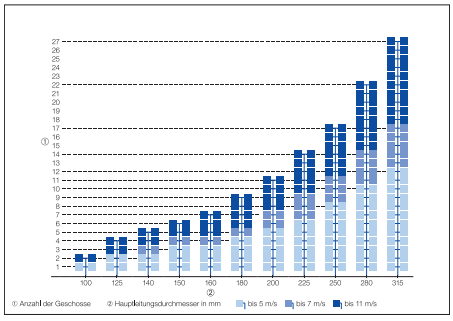


① Number of floors
② Main duct diameter in mm



① a maximum of 2 elbows

ER 60, two units per complete floor*



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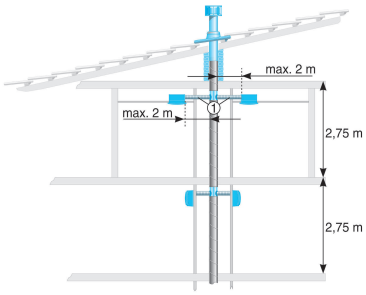

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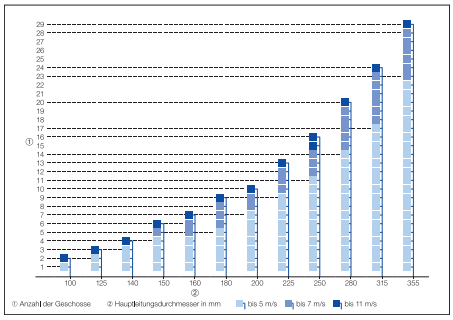
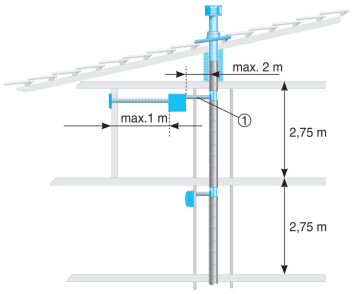
ER 100, one unit per complete floor*

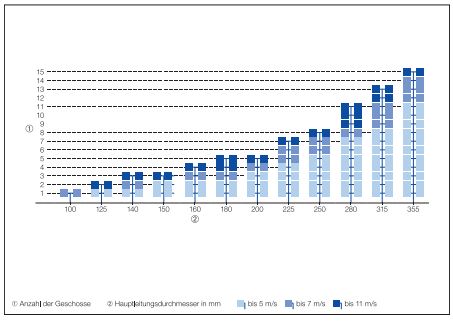


① Number of floors
② Main duct diameter in mm



① a maximum of 2 elbows

ER 100, two units per complete floor*



① Number of floors
② Main duct diameter in mm

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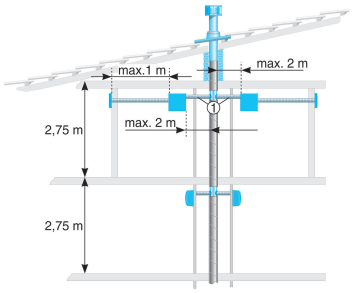

① a maximum of 2 elbows
*Configuration with a coincidence factor of 100 %.

Please note:

- The selection diagrams above do not apply to the Centro centralised ventilation system. Please note separate planning instructions.
- In the event of more stringent acoustic requirements, note flow velocities.

Controlled domestic ventilation

Why controlled domestic ventilation is so important

- No damp walls or mould
- Lower heating costs by ventilating uniformly
- Less pollutants and odours
- Clean supply air through filter
- No noise from the outside
- Safety through closed windows

What does "controlled domestic ventilation mean?"

- Fans supply and extract the required air quantities regardless of the weather.
- The air flows from the least polluted areas into the most polluted domestic areas where the air is then extracted.

A brief technical description

The core point for controlled domestic ventilation is an air flow from the least polluted to the most polluted rooms. Individual fans normally extract the air from kitchens, bathrooms and WCs and this causes outside air to flow through the supply air openings into bedrooms and living rooms. This stops pollution caused by odours, vapour or pollutants in the living rooms. Overflow openings (e.g. door ventilation grilles) between the individual rooms ensure the correct air flow within the domestic area.

Controlled domestic ventilation in new and in renovated buildings

In new and renovated buildings, controlled domestic ventilation offers advantages you should not do without:

- Faster drying.
- Odours emitted from floor coverings and wall finishes or from new furniture are reduced considerably.
- Living units that are not immediately occupied remain fresh and healthy.

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Controlled domestic ventilation with ER units

With MAICO single-room air extraction units, controlled domestic ventilation can be achieved quickly and reliably:

- The system requires no adjustment.
- No additional sound absorbers required. Shaft level difference according to DIN 4109, tested by IAB Oberursel (The Institute for Accoustics and Building Physics in Germany.
- Maintenance-free fire protection with MAICO aeroduct.
- Units can be controlled separately per living unit.
- Electricity consumption can be billed separately per living unit.

General information for exhaust and supply air openings

In general, one opening per room is sufficient. In the case of rooms with more than 25 m² 2 openings should be used, in order to better ventilate the room.

Exhaust air openings:

- As close to the ceiling as possible.
- Close to sources of humidity and odours.
- As far away as possible from the door.

Supply air openings:

- Not near seating areas.
- Close to radiators.
- As far away as possible from the door.

Supply air elements

MAICO supplies supply air elements for installation in window frames or walls.

ZE 45 F

Sound insulated supply air element for window installation in decentralised domestic ventilation.

ZE 10 T

Airstream operated supply air element with thermostat for draught-free, decentralised domestic ventilation.

ZE 10 IB

Sound insulated supply air element for decentralised domestic ventilation, continuously variable.

Dimensioning

Determining the supply air, overflow and exhaust zones

Supply air zone - Living rooms and day rooms:

- Living room
- Bedroom
- Children's room
- Office

Overflow zone

- Hall

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Exhaust air zone - Rooms which release moisture and odours:

- WC
- Utility room
- Bathroom
- Kitchen

Determining the volumetric flows

Supply air

At least one supply air element in the supply air zone.

One supply air element every 25 m² with larger rooms. Several supply air elements distribute the air more evenly through the room.

Example: A room with 30 m² requires 2 supply air elements.

Recommendation:

Per person at least 30 m³/h, air exchange rate 0.3/h to 0.8/h.

Exhaust air

Recommended volumetric flows

Example

Supply air

- Living area with a floor area of 80 m²
- 3 persons
- 2.4 m room height
- 0.6 /h air exchange
- 80 m² x 2.4 m x 0.6/h = 115 m³/ h
- Persons: 3 x 30 m ³/h = 90 m/ h

Exhaust air

- Bathroom with WC: 60 m³/ h
- Kitchen: 60 m³/ h
- Total: 120 m³/ h

Recommendation

- 2 x ER 100 D, 3-level
- 3 x supply air elements ZE 10 IB, ZE 10 T or ZE 45 F, depending on application.
- Operate the fans at the lowest level if no one is present and at night.
- When persons are present at the medium level.
- When demand is high (e.g. when taking a shower) at the highest level.