

TECHNICAL CONDITIONS

CIPRES FILTR BRNO s. r. o.

FILTERS OF CARM SERIES

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1. IN GENERAL

The CARM filters are the pocket-type filters which have been constructed as automatically regenerating stationary filtration units intended for the most complicated processes of filtration. Regeneration process is carried out by the compressed air (0.5–0.7MPa) and controlled in electronic way. These models are being used in the central suction and filtration facilities. However, they may also be used as small filtration units.

The construction system allows for creation of filtration area of any size, having possibility of easy extension by grouping the filtration blocks over each other and next to each other.

2. USE

CARM filters have been used to catch dust particles exhausted from the sources of dust generation in the following industries:

- wood-processing;
- metal-processing;
- ceramics and bricks;
- chemistry;
- food-processing;
- car repairs;
- energies;

Their structures may vary according to the dust nature; **they are also intended for filtration of explosive dust.** They are fitted with filtration materials made of **non-woven textiles** available in the market.

Common-type air masses up to 140°C shall be used with the filtration fabric FITEVIG PES 600/V - burned.

In case of air masses with higher temperatures up to 250°C there are the filtration fabrics TeF CX/CX 4584 and TeF PI/PI5084 to be used.

Further on, there may also be used the filtration fibres with special characteristics (antistatic design, hydrophobic and oleophobic designs, etc.).

3. FUNCTION OF FILTER

Dusty air-mass is fed to the pre-separation section; then it flows through filtration bags where impurities are trapped. Then it flows through the head of the frame around the high-pressure pipes to the outlet of the filter.

So that the filtering system can operate continuously, the filtration medium must also be continuously regenerated. This is done automatically, by the compressed air with counter-flow.

In adjustable intervals and by energizing the solenoid valve, the electronic control panel AOV will start operation of the membrane valve which in the open position allows overflowing of the compressed air from the reservoir into the high-pressure pipes (Fig.1). Then it is injected at high speed from the rear side into the filtration element (Fig.2).

Due to the shape of the frame head, the mixture of the compressed and ambient air flows into the bag in the ratio of 1: 4 to 1: 6, which is enough to its deformation and full inflation.

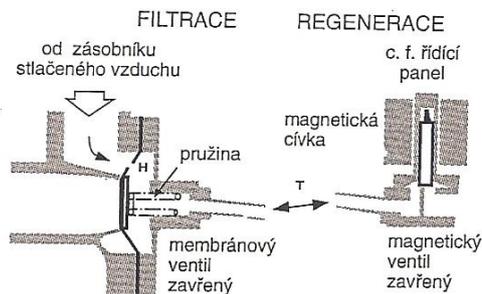
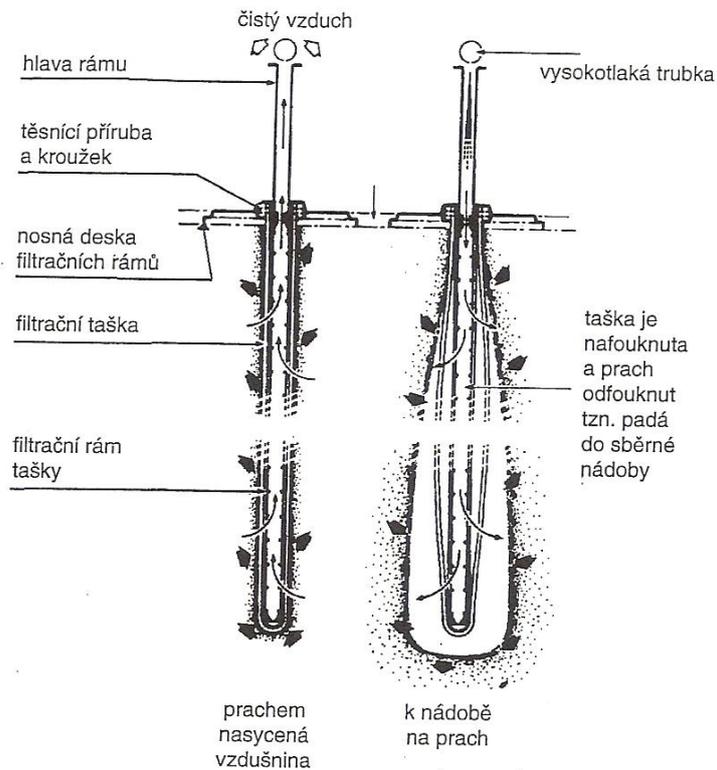
The filtration medium is rinsed and the crust of dust outwardly deposited cracks. Then larger and smaller particles fall down, those which were cut off from the filtration medium by both deformation and flushing into the receptacle.

This process is continuous and it occurs only in one-tenth of active filtration elements. Therefore, these filters are able to operate in continuous operations. **This sophisticated system allows loading the filtration surfaces by 4-7 cm/s. Loading of 3-4 cm/s is carried out in exceptional cases only.**

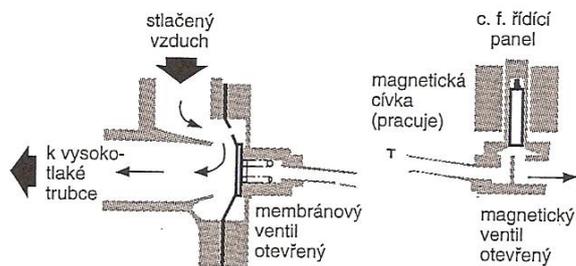
The guaranteed outlet concentration of the separated additives is 1-10 mg/m³ of the air mass exhausted. The measurement results of specific actions undertaken have shown that the actual concentration ranged from 1 to 5 mg/ m³.

Sound pressure level L_{PA} rises up to 70dB(a)

Sound pressure level L_{PA} is to be measured at the fan outlet under conditions of free space at the distance of 2 metres.



a) stlačený vzduch bude veden přes membránu a malý otvor 1. do vysokotlaké trubky



b) po zaktivování magnetického ventilu dojde k posunu membrány tak, aby mohl stlačený vzduch proudit ze zásobníku do vysokotlakých trubek

4 TYPES OF FILTERS

CIPRES FILTR BRNO s. r. o. manufactures the series as follows:

- A) CARM GH
- B) CARM V

A) Filters of the series of CARM GH

These are the filters of cabinet-type construction. These units may be arranged into sets with arbitrary powers.

A1) SIZES FO FILTERS – NUMERICAL TYPE DESIGNATION

The filtration units include the filtration bags of 3 different lengths – 0.7m; 1.0 m; 1.5 m. Each filter may be fitted with two sizes of a collection vessel for waste materials (55.80 l) or it may also be terminated by chamber-type fed in anti-explosion design.

| Number of filters positioned next to each other | Line of filter | Type of filter | Number of filtration bags in the line | Number of identical lines positioned next to each other | Number of lines positioned over each other | Length of filtration bags | Design | Discharge and collection of filtration mass |
|---|----------------|----------------|---------------------------------------|---|--|---------------------------|--------|--|
| 2 CARM GH 10 / 1 / 5 / 15 / EX ; RP | | | | | | | | |
| Most frequent variants | | | | | | | | |
| 2 | | | 06 | 1 | 1 | 07 | EX | - explosion |
| 3 | | | 10 | 2 | 2 | 10 | HH | - extinguishing nozzle |
| 4 | | | 12 | 3 | 3 | 12 | S | - special |
| 5 | | | 15 | 4 | 4 | 15 | | RP - rotating feeder |
| etc. | | | 16 | | 5 | 17 | | KLV - weight flap |
| | | | 18 | | 6 | | | KLD - double-acting valve |
| | | | 21 | | 7 | | | ŠB - fixer |
| | | | 22 | | | | | MTL - bow-knot |
| | | | 25 | | | | | Š - screw conveyor |
| | | | 27 | | | | | 000 - collection vessel, container (litres; m ³) |
| | | | | | | | | BB - BigBag |

Examples:

CARM GH 10/1/4/15/55

-Filter CARM GH; width for 10 bags; 4 floors; 1,5m length of bags; collection vessel of 55 litres (CARM GH 60).

3 CARM GH 15/1/4/15/EX;RP;Š

-Filter CARM GH; width for 15 bags; 4 floors; length of bags 1.5m; explosive design with rotating feeder and worm conveyor. This all shall be done three times next to each other.

CARM GH 10/2/5(6)/15/2x55

-Filter CARM GH; width for 10 bags; 2 lines positioned next to each other; 5 floors + 1 upper are free; bag length 1.5m; collection vessel 2x55 litres.

CONVERSION TABLE BETWEEN THE OLD AND NEW MARKING.

| Old marking | New marking |
|-------------|-------------------|
| CARM GH 07 | CARM GH 10/1/1/07 |
| CARM GH 10 | CARM GH 10/1/1/10 |
| CARM GH 14 | CARM GH 10/1/2/07 |
| CARM GH 20 | CARM GH 10/1/2/10 |
| CARM GH 30 | CARM GH 10/1/2/15 |
| CARM GH 45 | CARM GH 10/1/3/15 |
| CARM GH 60 | CARM GH 10/1/4/15 |

A2) DESIGN OF FILTERS

Structures of the filters vary according to the nature of materials - dust to be filtered. **Filter in the anti-explosive design** is constructed as the unit fitted with enforced cabinet having the pressure resistance of **30 kPa**, with the aperture in the rear wall of the filter intended to discharge the pressure wave by the securing unit PÚSM 450x800 depending on individual **capacities of filters** and depending on the explosive characteristics **K_{St}**.

Before the discharging area, no obstacle can be placed within the distance of 1.5m at the top angle of 60° from the edges of the aperture; there shall be no flammable materials within the distance of 4m. Depending on particular situation, it is possible to place the non-flammable wall resistant against the pressure, at the distance of 1.5-4m from the discharging aperture.

The filtering device can be explosion-proof using the HRD system - suppression of explosion where it is not necessary to consider the requirement for safety zones.

All connections on the filter structure must be conductively interconnected and grounded.

A3) FIRE-FIGHTING MEASURES

In case of fire danger with flammable dust, the filters must be fitted with extinguishing nozzles for the system of spark extinguishing **ZJ-1** (manufacturer RSBP spol. s r. o. Ostrava – Radvanice); certification No. 214-99-0202/D 04035.

The filters are equipped with thermostatic sensors which, when the temperature rises above 70°C, emit pulse to open the ball valve actuator at the water inlet or switch on the signalling device.

B) Filters of the series of CARM V

If the filters are placed on the cartridges with explosive dust, there is a discharging area of these cartridges to be determined in cooperation with an "authorized person" or an authorized company.

These are the filters for atypical assemblies, for example these for deaerating the cartridges for waste materials. They can be either built directly in the cartridges using their filtration area or inserted into a square or circular cabinet which must be fitted with corresponding discharging area.

Filter structure is resistant to pressure impact of explosion up to 25 kPa.

5. CONTROL, MEASUREMENT AND REGULATION OF FILTERS

The filter equipment includes:

5.1 **Switchboard cabinets**

These are designed according to the proposed equipment; we supply them either with wiring or without it, according to applicable standards;

5.2 **Electronic control panels**

These are used for automatic regeneration of filtration elements (details are available in the leaflet CARM GH, CARM V)

5.3 **Membrane valves**

2/2-way types in designs 3/4" and 1"

5.4 **Electromagnetic valves**

24 V/50 Hz

Electromagnetic valves

These of 230V/50Hz to be used for fire-fighting system or distribution of compressed air;

Electronically controlled mud traps, including the filter for mechanical impurities (EĚOF)

These are used for automatic drain of water condensate in adjustable time intervals.

Electronically controlled mud traps, including the filter for mechanical impurities (EĚOF), are fitted with two-stage filter of mechanical impurities and reducing valve with pressure gauge (manometer). The best location is as close as possible to the filter.

5.5 "U" manometers

They are used to detect pressure drops in the filter.

6. DATA FOR ORDERING

An order must include:

- a) Required quantity of exhaust air V (m³/h) and inventory of exhausted machines with specified coefficient of operation concurrence; as well as the requirements for the exhausted air-mass volume or connection diameters for suction.
- b) Information of dust exhausted; test report in case of explosive dust.
- c) Information of the air-mass transported (temperature, environment from which it will be sucked).
- d) Request for method of delivery and acceptance.

7. OPERATING INSTRUCTIONS

7.1 Before commissioning the filter, it is required to make check and perform the following:

- a) correct direction of rotation of the fan's blade wheel (indicated by an arrow);
- b) check of tightness of individual joints;
- c) connection of compressed air - connecting piece 1/2";
- d) setting the correct working pressure on the reduction valve;
0.5–0.7 MPa – different versions according to the type of filter – see the technical description

Attention: Correct operating pressure is very important for the filter function; pressures below 0.45 MPa and those above 0.8 MPa cause regeneration outages.

- e) check of setting of the electronic control panel - pulse 200 ms
- pause 25–30 s
voltage 230V / 50Hz together with starting the fan
- f) insertion of the PVC bag into the collection vessel and proper tightness of the quick-lock (CARM filters).

7.2 After fulfilling the requirements and after checking 7.1a-7.1f, it is possible make commissioning of the filters. After commissioning, it is necessary to check the collection vessel and ensure frequent replacements of PVC bags.

7.3 In case of reduced suction effect at the source, it is necessary to inspect and check

- pressure difference of the filtration medium
(it should range between 800-1,600 Pa, regardless of the type of dust)

- and specifics of the device; a value shall be provided by manometer.)
- adjustment of flaps on the suction and exhaust side of the pipe-line
- adjustment of the operating pressure for compressed air
- functionality of magnetic and membrane valves in connection with functionality of the electronic control panel
- pipelines where dirt could be stuck (rag, wrinkled newspapers, etc.)
- exhaust pipe-lines, including filtering bags intended for return way of the clean air to the working area

7.4 The filters which are fitted with the safety device PÚSM 450x800 must be inspected in accordance with the operating and maintenance instructions specified in the technical conditions of the safety device. TP-2-001-90-RSBP.

7.5 In case of replacing the filter elements by own, there shall be first the process of dismantling of the high pressure pipes (1 nut M10 per 1 tube) and the fixing plates (1 nut M12 per 1 metal sheet). Then the filtration frame with the moved pocket may be removed and the pocket may be replaced. Installation shall be done in reverse order. It is necessary to pay attention to accurate back placement. Tightening of the fixing plates must be uniform to avoid damage to the collet of the frame and to avoid any leaks.

7.6 Replacement of a bag in the collecting vessel shall be done by lifting the handle, releasing and pulling the vessel out. Then it is necessary to remove the bag with dust. Installation shall be carried out in the reverse order; it is necessary to take care of correct position of the collecting vessel under the quick-lock system due to tightness requirements (CARM type).

7.7 Spare parts

- 1 x AOV
- 5 x pulse valve 1"
- 10 x fuses 0.5 A (230 V~)
- 10 x fuses 1.25 A (24 V)
- 1 x pressure switch
- 5 x valve membrane
- 15 x filtration bag
- 1 x U-manometer (3m hose, refill)
- 1 x rotor
- 1 x motor

7.8 Storage

Do not let the equipment weather and if you intend a long-term storage, be sure to make preservation of all components, which could be subject to oxidation. The equipment shall be stored in a dry and dust-free atmosphere without vibrations, where temperature ranges between 5°C up to +50°C. Relative humidity less than 60%.

- Store the equipment in a working position and ensure it against turnover.
- The electromotor storage abides by the electromotor manual [special appendix].