



VOKES AIR



Hepatex CR

Setting the quality standard





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APPLICATIONS



Clean Air



Power Generation



Clean Room



Industrial

KEY FACTS

- ▶ **Initial efficiency from 85% to 99.999995% for MPPS**
Suited to all types of applications
- ▶ **Optimised velocity distribution**
For stable air flow and longer life
- ▶ **Guaranteed leak-free**
For assured protection
- ▶ **Mechanically stable**
For optimum performance
- ▶ **Various frame types and sizes**
To suit all requirements
- ▶ **Two face guards and anodized aluminium frame**
For rigidity, strength and safety in operation
- ▶ **Integrated one-piece round, gel or knife edge gasket**
To ensure an air-tight seal in all environments
- ▶ **ULPACATS quality certificates available**
For guaranteed safety and performance
- ▶ **Low pressure drop**
Reduced energy consumption and operating costs

Hepatex CR filters are high-efficiency submicron particulate air filters designed to protect people, equipment and processes from airborne particulate contamination.

Hepatex CR filters are used in situations requiring high or very high levels of air purity. They are primarily designed as intake filters for low turbulence displacement (or laminar) flow clean room ceilings and clean workbenches.

Typical applications can be found in: microelectronics, semiconductor manufacture, medicine, chemistry, pharmacy, microbiology, film and magnetic tape production, compact disc manufacture, laboratories and the food industry.

▼ Hepatex CR



Construction

A filter medium constructed from various grades of micro glass fibre paper is folded into a pack designed with the optimum pleat height and density for the specific operating conditions. Continuous thread separators coated with adhesive, support the individual pleats and impart great stability to the whole pack.

As standard, the entire pack is sealed into an anodised aluminium frame with a continuous one-piece gasket to ensure a perfect seal between the filter assembly and its housing.

Design

MANN+HUMMEL VOKES AIR became one of the first filter manufacturing companies to install an automated filter medium tester.

With this instrument the penetration of each individual medium as a function of particle size and velocity (diagrams 1 and 2) may be determined. This allows the selection of the optimum filter medium for any particular filter type and application from the wide variety of media available on the market.

This instrument is therefore also able to calculate, measure and guarantee all relevant filtration characteristics for individual projects.

Diagram 1 shows that every filter medium has a maximum penetration. The associated particle diameter is known as MPPS (Most Penetrating Particle Size).

The MPPS is a function of the particle and fibre diameters, velocity through the medium, thickness of the medium and the packing density.

The integral and local penetration values of all Hepatex CR filters are – beside the traditional NaCl values – specified for MPPS and thus conform fully to the stipulations of EN 1822.

Pre-filtration

The service life of Hepatex CR filters can be prolonged by efficient prefiltration for which we would recommend the higher grades of the Compatex FP filters.

Typical Media Penetrations

Diagram 1

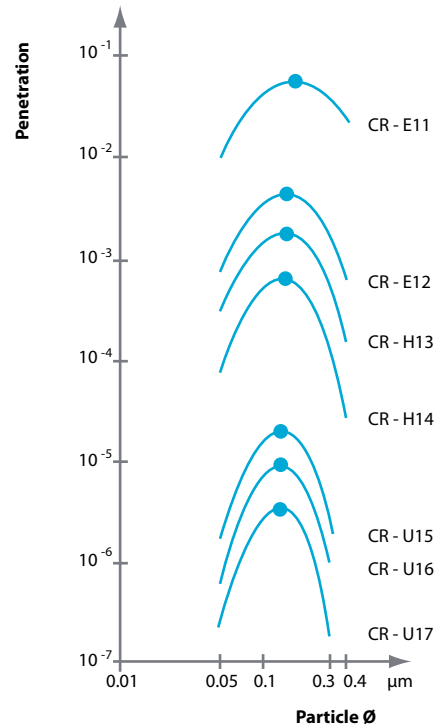
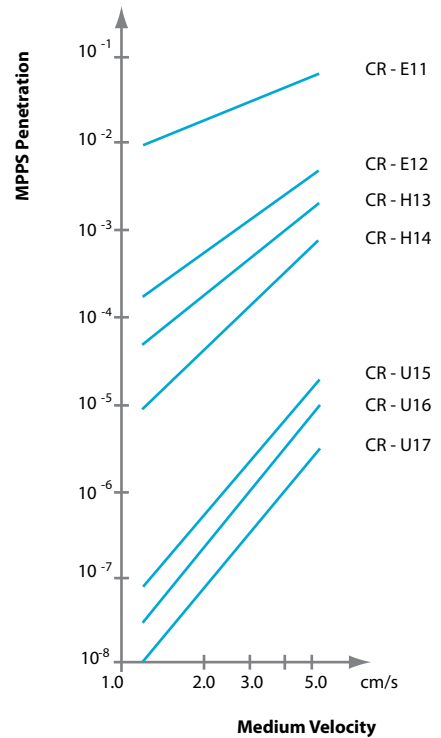


Diagram 2



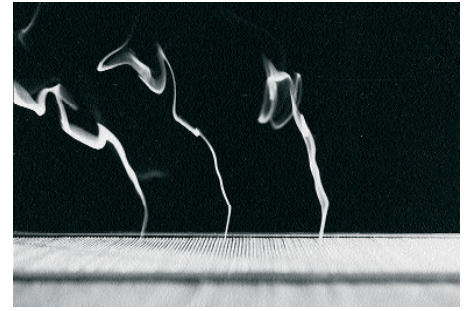
Quality Policy

At MANN+HUMMEL VOKES AIR we are committed to the design and production of filter equipment which is fit for its stated purpose, is of the highest quality, consistent in its performance and offers safety and reliability at the optimum price and product availability. This is achieved by operating and maintaining a comprehensive quality control system based on ISO 9001.

MANN+HUMMEL VOKES AIR concentrates on the quality assurance of the:

- ▶ Filter medium
- ▶ Production process
- ▶ Finished filter element

Hepatex CR filters are manufactured and tested in accordance with an established and audited procedure. During these processes, and depending on the requirements, a distinction is made between the different quality levels as explained below.



▲ Fig.1: Oil thread test to EN 1822-4 for testing testing EPA, HEPA and ULPA filters for leakage



Quality Level A

- ▶ Statistical control of filtration and other data at finished products and materials
- ▶ 100% visual inspection of the finished product before packing



Quality Level B

- ▶ 100% leak test of the finished filters to EN 1822-4 ("oil thread test", fig.1)



Quality Level C

- ▶ Batch test certificate to DIN EN 10204-2004-2.2



Quality Level D

With ULPACATS (ULPA filter Computer Aided Test System), MANN+HUMMEL VOKES AIR created new dimensions to quality assurance and test techniques: the filter is placed in a computer controlled test rig and runs at its rated air flow. It is challenged by an aerosol, and the upstream and downstream concentrations of that aerosol are measured by parallel traversing laser particle counters covering the entire surface of the filter.

The results are analysed at the MPPS for the particular filter, giving the integrated overall efficiency and the local penetrations in accordance with EN 1822. Should the local penetration be greater than an approved maximum, then the leaks are repaired on an associated rig where the actual leak locations are identified by the computer so that the smallest possible repair is carried out. The filter is then retested. All test readings are fully documented with an inspection certificate acc. to DIN EN 10204:2004-3.1 and the individual measuring protocols for the filter.

The ULPACATS test is a further guarantee of quality where particularly high levels of air purity are necessary (e.g. micro-electronic industry), avoids risks and ensures problem-free qualification and commissioning of the Clean Rooms.

Quality Levels by Efficiency

| | E10 | E11 | E12 | H13 | H14 | U15 | U16 | U17 |
|----------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Level A | Standard | Standard | Standard | Standard | Standard | Standard | Standard | Standard |
| Level B | N/A | N/A | N/A | Standard | Standard | Standard | Standard | Standard |
| Level C | N/A | N/A | N/A | Standard | Standard | N/A | N/A | N/A |
| Level D | N/A | N/A | N/A | Optional | Optional | Standard | Standard | Standard |

| Hepatex CR | Units | AS-H13 | AL-H13 | AS-H14 | AL-H14 | AS-U15 | AL-U15 | AS-U16 | AL-U16 |
|---|--------------------------------|---------|---------|----------|----------|-----------|-----------|------------|------------|
| Nominal air flow ^{(1) (2)} | m/s | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 |
| Pressure drop at nominal flow ⁽²⁾ | Pa | 115 | 90 | 120 | 85 | 170 | 100 | 190 | 110 |
| Recommended final pressure drop ⁽³⁾ | Pa | 240 | 150 | 240 | 150 | 340 | 180 | 380 | 200 |
| Filter surface area per m² face area ⁽¹⁾ | m ² /m ² | 24 | 38 | 24 | 38 | 24 | 38 | 24 | 38 |
| Filter Efficiencies | | | | | | | | | |
| EN 1822 integral value (typ. for CR) ⁽⁴⁾ | % | 99.98 | 99.98 | 99.998 | 99.998 | 99.9998 | 99.9998 | 99.99997 | 99.99997 |
| with MPPS-DEHS-aerosol (min.) ⁽⁴⁾ | % | ≥ 99.95 | ≥ 99.95 | ≥ 99.995 | ≥ 99.995 | ≥ 99.9995 | ≥ 99.9995 | ≥ 99.99995 | ≥ 99.99995 |
| EN 1822, MPPS-DEHS, local value ⁽⁴⁾ | % | ≥ 99.75 | ≥ 99.75 | ≥ 99.975 | ≥ 99.975 | ≥ 99.9975 | ≥ 99.9975 | ≥ 99.99975 | ≥ 99.99975 |
| Filter class to EN1822 | - | H13 | H13 | H14 | H14 | U15 | U15 | U16 | U16 |

1) External filter dimensions. 2) Tolerance: ± 10%. 3) Maximum final pressure drop ≤ 600 Pa. 4) DEHS = DieEthylHexylSebacat MPPS = Most Penetrating Particle Size.

Hepatex CR filters offer significantly higher efficiencies and are designed for a wide range of different “Clean” applications. CR filters are suitable for highest Clean Room requirements up to class 1 as per ISO 16 644-1 and for class A sterile pharmaceutical zones.

Hepatex CR filters of the CR-AL product line achieve a reduction in pressure loss of about 30% with the same filtration performance. They offer an alternative solution with lower operating costs, significantly reducing energy consumption.

Type CR-D and CR-V feature same performance data as the CR-A.

Specifications

Filter Frame

| | |
|-------------------|--|
| Type A / D / V | Anodized, extruded aluminium with mitred corners |
| Type AS / DS / VS | Normal pressure drops |
| Type AL / DL / VL | Very low pressure drops |

Filter medium Water repellent micro-glass-fibre paper, pleated in a regular V-pattern

Face guards On both sides of the pleat pack, expanded sheet steel, powder coated in white (RAL 9010)

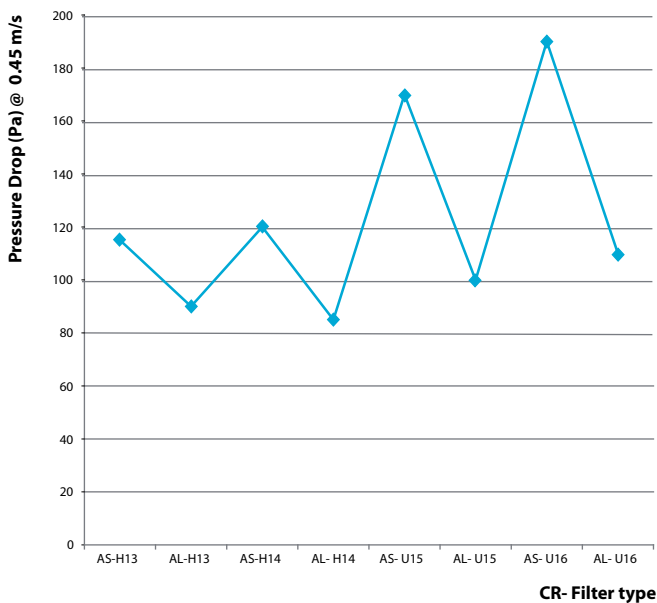
Sealing Compound Fire-resistant, white two-component polyurethane

Gasket EPDM foam, circular cross section with a closed surface

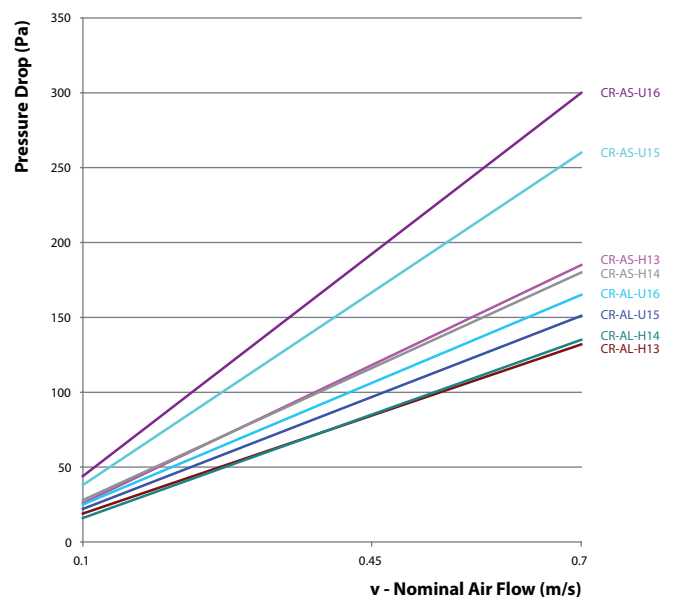
Max. Operating Temp. 70 °C (up to 120 °C available on request)

Fire Classification K2/F2 to DIN 53438

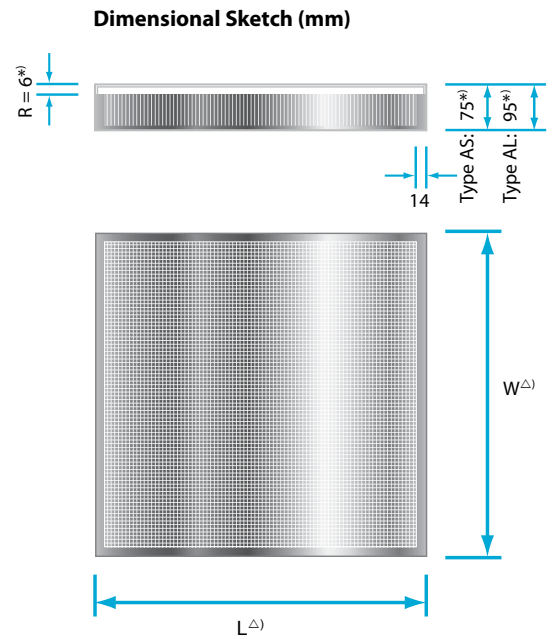
CR- Filter Selection Diagram



dp, v - Diagram



| Dimensions (mm) | | Airflow Rate (m ³ /h) at 0.45 m/s | Weight (kg) with frame | |
|-----------------|-------|--|------------------------|--------------|
| Length | Width | | AS / DS / VS | AL / DL / VL |
| 305* | 305 | 140 | 1.8 | 2.2 |
| 457 | 305 | 210 | 2.5 | 3.0 |
| 610* | 305 | 280 | 3.0 | 3.7 |
| 762 | 305 | 360 | 3.7 | 4.6 |
| 915 | 305 | 430 | 4.4 | 5.4 |
| 1220 | 305 | 600 | 5.7 | 7.0 |
| 1525 | 305 | 750 | 6.9 | 8.5 |
| 457* | 457 | 320 | 3.2 | 4.0 |
| 557* | 557 | 500 | 3.9 | 4.8 |
| 610* | 610 | 600 | 5.1 | 6.3 |
| 762 | 610 | 750 | 6.1 | 7.5 |
| 915* | 610 | 905 | 7.2 | 8.8 |
| 1220* | 610 | 1205 | 9.3 | 11.4 |
| 1525 | 610 | 1510 | 11.3 | 14.0 |
| 1830 | 610 | 1810 | 13.4 | 16.6 |
| 762 | 762 | 940 | 7.9 | 9.7 |
| 915 | 762 | 1130 | 9.1 | 11.2 |
| 1220 | 762 | 1510 | 11.5 | 14.2 |
| 1525 | 762 | 1880 | 14.7 | 18.2 |
| 915 | 915 | 1355 | 10.6 | 13.2 |
| 1220 | 915 | 1810 | 13.4 | 16.7 |
| 1525 | 915 | 2260 | 16.9 | 21.0 |



Δ) Dimension L and W

*) Seal compression from 1.5 to max. 2.0 mm

Order Code

CR Filter Range

Frame Type (first letter):

A: Standard aluminium

D, V: Special aluminium
(Details on next page)

Filter Design (second letter):

S: Standard pressure drop

L: Low pressure drop

E: Minimum Pressure Drop

Filter Efficiency:

Filter class to EN 1822

Cross-sectional dimensions:

Length x Width in mm

Face Guard:

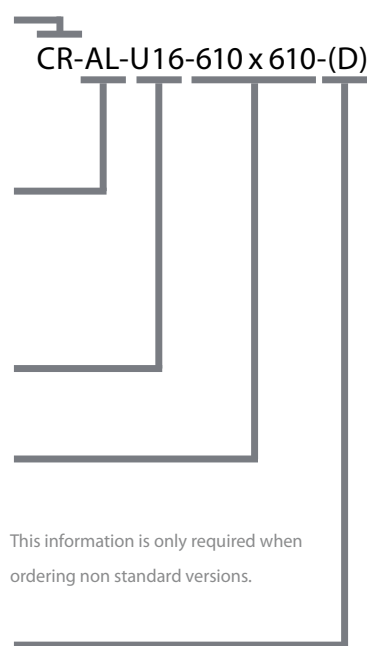
B: both sides (= standard for
profiles A, D and V)

D: one sided, on gasket side

G: one sided, opposite to gasket side

O: No face guard

Order Example



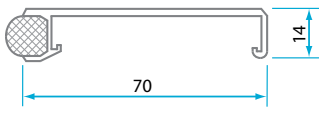
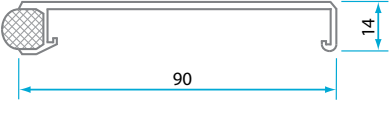
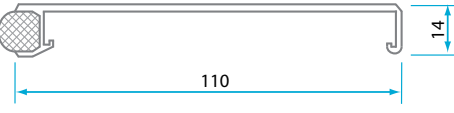
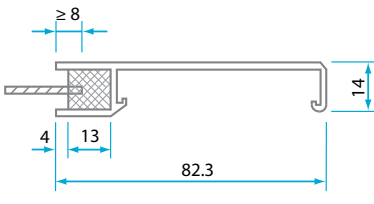
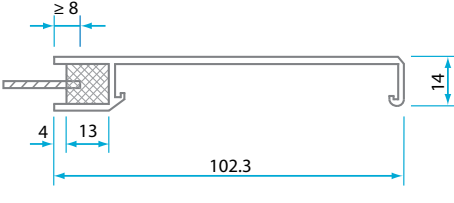
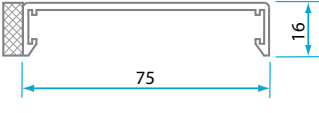
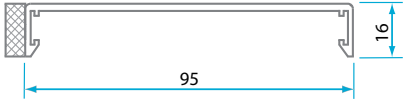
This information is only required when
ordering non standard versions.

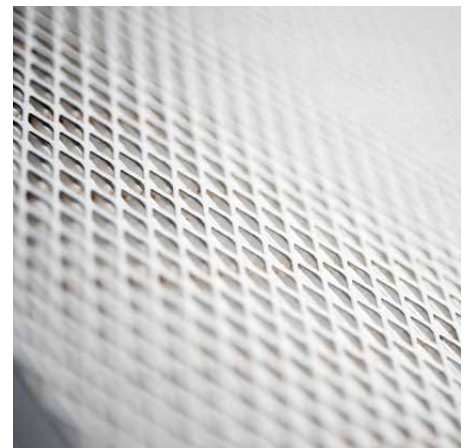
Special Versions

The following special versions can be supplied on
request:

- ▶ different aluminium frame types, see next page
- ▶ aluminium frames with single or no face guard
- ▶ custom dimensions L x W
- ▶ different filtration efficiencies and pressure drops
- ▶ CRM hooded filter module: Any CR filter
can be combined and sealed to the CRM hood
with intergrated spigot for individual air supply
connection.

Available Aluminium Frames

| Dimensional sketch (in mm) | Frame type | Application |
|---|------------|---|
|  | AS | Standard frame for all CR-AS filters. Designed for normal pressure drops. With elastomer gasket. |
|  | AL | Standard frame for all CR-AL filters. Designed for reduced pressure drops. With elastomer gasket. |
|  | AE | Standard frame for all CR-AE filters. Designed to achieve minimum pressure drops. With elastomer gasket. |
|  | DS | Special frame CR-DS, with a gel-seal filled groove, suitable to frame systems with knife edge. Normal pressure drops. CR-DS has the same performance data as the CR-AS (page 4). |
|  | DL | Special frame CR-DL, with a gel-seal filled groove, suitable to frame systems with knife edge. Reduced pressure drops. CR-DL has the same performance data as the CR-AL (see page 4). |
|  | VS | Special frame CR-VS, is available with a single or two-sided flat gasket to accept installations using Filtrasept. Normal pressure drops. CR-VS has the same performance data as the CR-AS (page 4). |
|  | VL | Special frame CR-VL, is available with a single or two-sided flat gasket to accept installations using Filtrasept. Reduced pressure drops. CR-VL has the same performance data as the CR-AL (see page 4). |



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