SGW

Werder GmbH

Mechanical Centrifugal Force Sediment Separators (FSA)

Areas of application

The areas in which the new mechanical centrilügal force Sediment separators (FSA) canbe used are:

- Ventilation
- Heating
- Air conditioning
- Recycling
- Environmental protection

The centrifugal force Sediment separators canbe used to separate out dust, droplets and Snow.
Their advantages are:

- low energy requirements due to low pressure drop
- low acoustic pressure level
- maintenance free / low maintenance for extreme loading
- low weight due to the use of aluminium profiles
- variable in structural shape and dimensions
- Vibration-free
- universal usage in roofed areas, in Walls and below flooring

Our filters prove their worth in numerous cases of application in Europe, Asia, North and Central America.

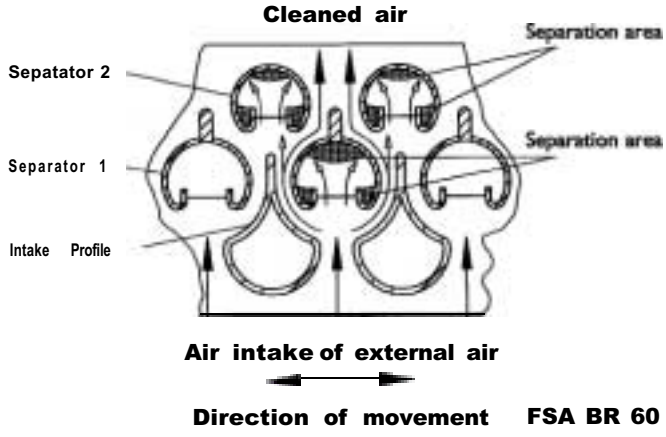


Figure 1

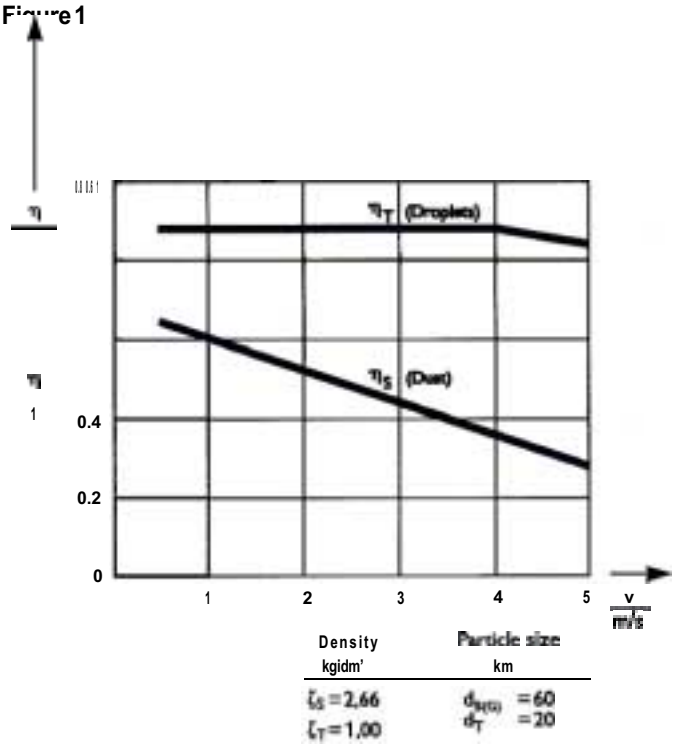


Figure 2

Principle of Operation

Rounded intake profiles admit the air stream to be cleaned through the intake openings, mainly independent of the direction of movement

The accelerated air is banked-up by the separater 1 and separator 2 and tumed around. Particles make their way into the hollow sections as a result of the effects of inertia Low current areas in the hollow sections ferm trap areas, in which the particles to be separated out slow downwards due to gravity. An interceptor box below the hollow section collects the particles and prevents them from being sucked up by bleed air (figure 1).

The contour of the air stream fed through the optimised Profile does not blow-off which minimises the energy

Filter effect

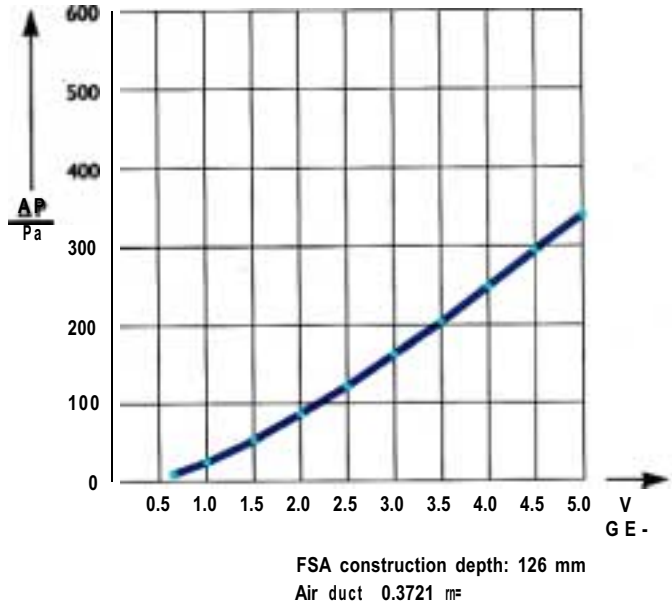
The filtration efficiencies for dust and droplets are shown in figure 2.

In principle;

- Coarse, mass particles are always separated out better with increasing size.
- Wiih increasing intake flow velocity, the filtration efficiency reduces. Intake flow velocity greater than 4 m/s can not be dimensioned.

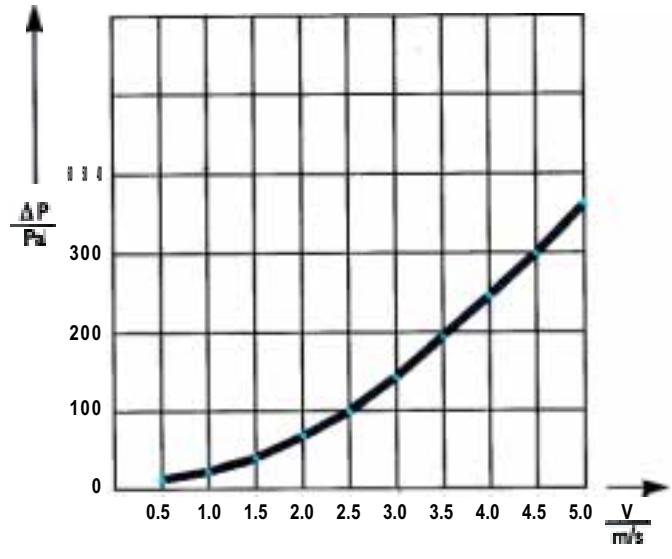
Parameters:

- The Separation of dust is at least 80 % for particle sizes over 60 mym and an air velocity of under 4 m/s.
- The Separation of droplets achieves at least 90 % at an average diameter of 20 mym and an air velocity of under 4.5 m/s.
- Snow Separation has been positively tested, blockaging is minimised by the grille contour. Extreme loads due to cold can be prevented by an additional electrical heating in the profiles.
- The effect of damp on the FSA leads to self-cleaning.
- In Order to prevent the possible infiltration of coarse materials, such as e.g. foliage, plastic and Paper, it is recommended that a perforated plate is fixed to the front (optional).



FSA construction depth: 126 mm
Air duct 0.3721 m=

Figure 3



FSA construction depth: 64 mm
Air duct 0.390 m'

Figure 4

Characteristic values

Flow energy losses through FSA

The lowest flow energy losses are achieved by the grille contour used. The calculation and optimisation of these has been cartied out within the f-amework of a research project Figure 3 Shows the pressure loss dependent upon the intake flow velocity for the FSA with a construction depth of 126 mm and figure 4 Shows the same for the FSA with a construction depth of 64 mm.

The value of the total pressure loss coeficient for FSA with a grille height greater than 300 mm, was determined as having the value 20-22, mainly independent of the intake flow velocity.

The free intake area amounts to 24 % of the total inner filter area.

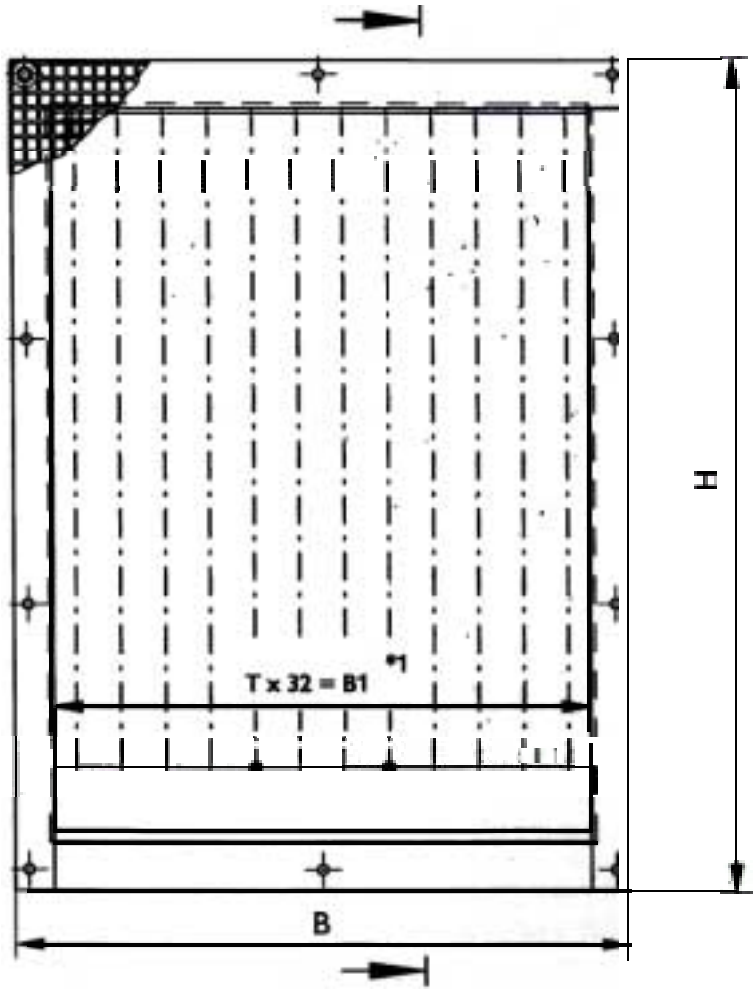
Structural shapes of the FSA

Filter description

Intake profile, separator 1, 2 and 3 at-e built up as grilles with a sheet metal positioner at dimensioned distances. The distance between two adjacent profiles is called the grid. The construction depth is fixed by the width of the sheet metal positioner. Another overmeasure is added due to the structural shape of the grille. (see figure 5)

Profile rows can be constructed such that they can be removed, as a special Variation. Thus, the separated grille is suited for special cleaning measures (figure 6).

Figure 6



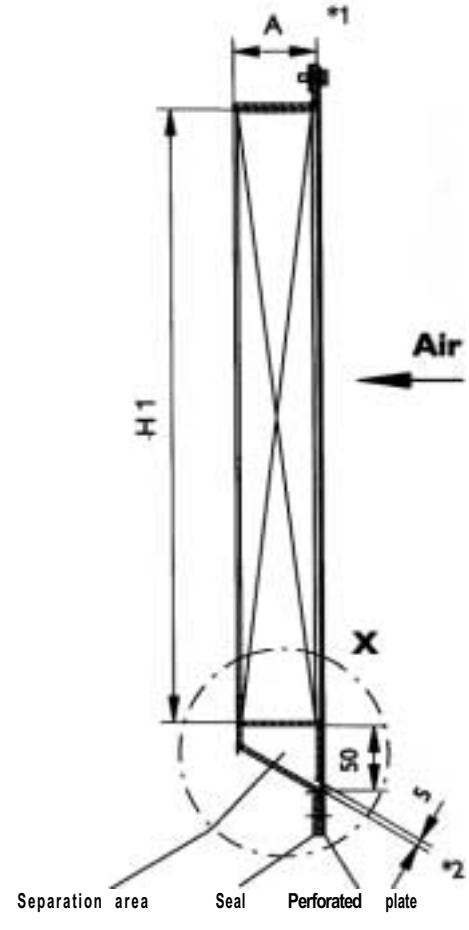
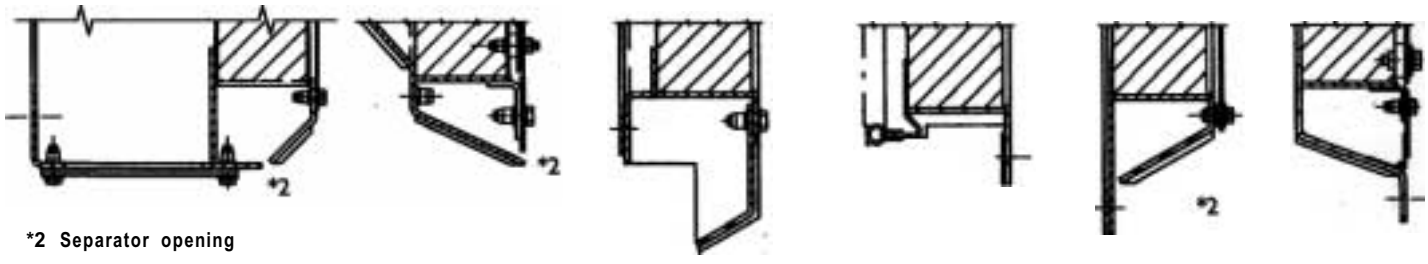


Figure 5

Variations of x



*2 Separator opening

Grille shapes

*1 FSA BR 60: A min. = 64 mm, grid = 32 mm
FSA BR 120: A min. = 126 mm, grid = 64 mm
Freely select all other measurements, T = division

- Front intake profile round for grid 64 mm, aluminium extruded Profile
- Front intake Profile round for grid 32 mm, aluminium extruded Profile
- Separator 1 and 2 as aluminium extruded Profile
- Separation area optionally with flap, with taps, or without special Separation area (figure 5)
- Separation areas fixed beneath the grill, according to design requirements
- Profile rows removable, special shape construction on request
- Flange and screw hole arrangements on request

Figure 7

Filter shapes

Equipment

1. as built-in filter (figure 7)

– Perforated plate at the front (Qg8 DIN 24042) optional

– Seal (CR-50 Shore) self-adhesive optional

– Heating (electrical – intake Profile and separater 1) optional (figure 8)

2. as suction box aluminium construction

– Grille in the side Walls standard

– Grille in the rear wall optional

- Perforated plates, Seal, separator box, soundproofing, heating, flow Sensors optional

3. as Container

– as sudion box

– stainless steel construction of the Container as required by customer

4. In the case of special requirements, a fitter mat can be fitted in series with the FSA grille. This is then subjed to an exchange cycle (figure 9).

Figure 8

Figure 9

Special constructions

FSA BR 60, angled (figure 10)
Bending radius minimum of 800 mm for use in roof coves

Intake area: 0.246 m²

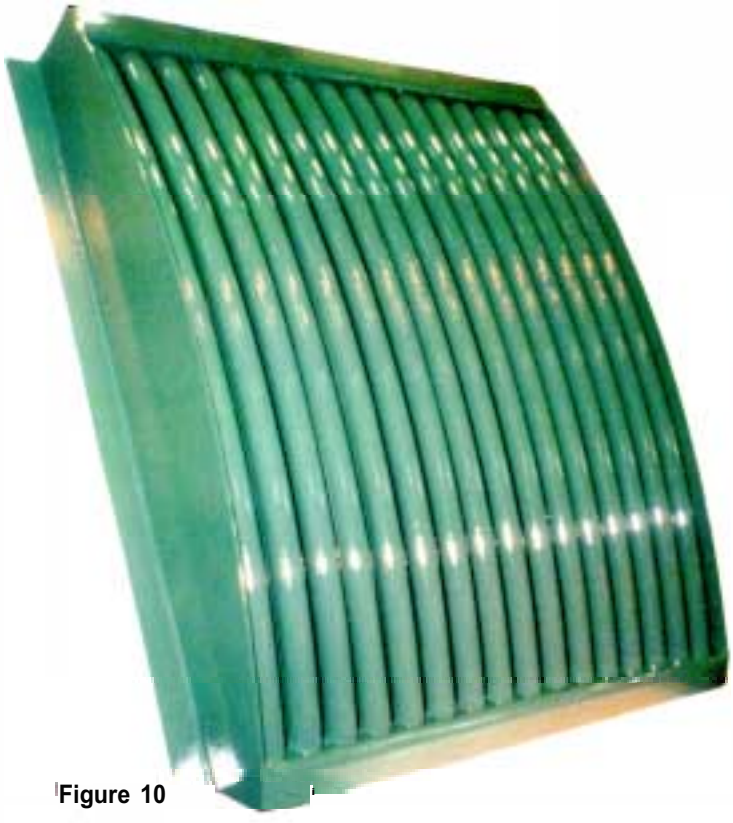


Figure 10

Density	1.2 kg/m³
Temperature	24°C
Air pressure	1009 mbar
Air humidity	76%.
Outlet width	0.51 m
Outlet height	0.48 m
Nozzles	0.25 m (diameter-)

Use for high velocities

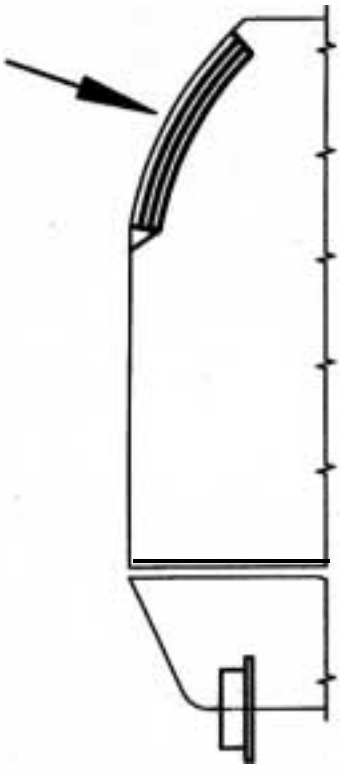
The stability of the flow volume in the working principle of the FSA, for tangential Overflows with velocities of up to 220 km/h, were determined through trials.
These results can be qualitatively extrapolated to Speeds of 350 km/h. Figure 11 Shows the test construction of an FSA BR 60 with a separator area downwards-facing, with a slit front. Figure 12 Shows the test construction in the wind tunnel.

Figure 1 1

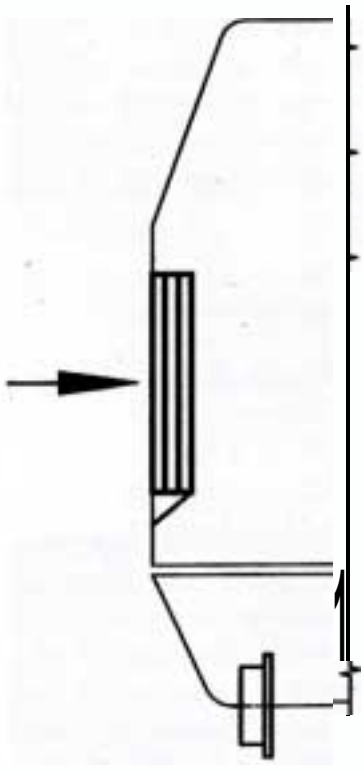
Figure 12

Built in variations

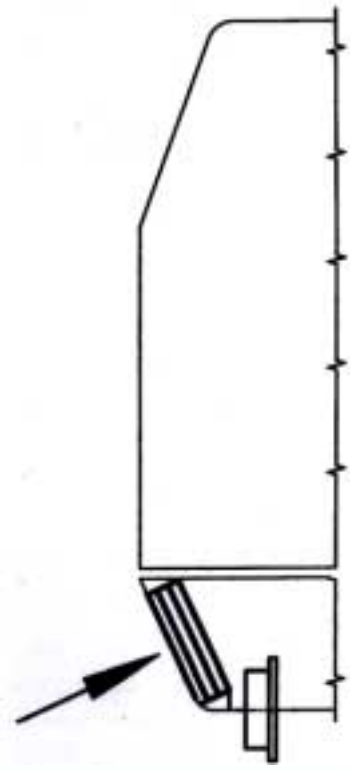
Roof area



Side wall area



Area under the corridor



Surface:

- Aluminiun plain etched
- Aluminium paint according to wishes of customer, e.g, EP metal base, PUR top coat
- Aluminium, anodised
- immersion painted, cathodic immenion-painted
- Achromatising and powder coating
- Stainless steel for Containers plain etched, passivated

Sound proofing

Measured in a resting condition with a Standard Sound Source B & K Type 4205, broadband noise
IOO Hz -10 kHz, standard sound source 95 dB

Soundproofing
Construction depth 126 = 2.8 dB (LIN)
Construction depth 66 = 1.7 dt3 (LIN)

The test results, dependent upon the design of the test, showed normal noise emissions and good sound proofingvalues.

Cleaning

Only for particularly high level of usage; in the servicing rhythm of the Operator, with pressurised air or water.

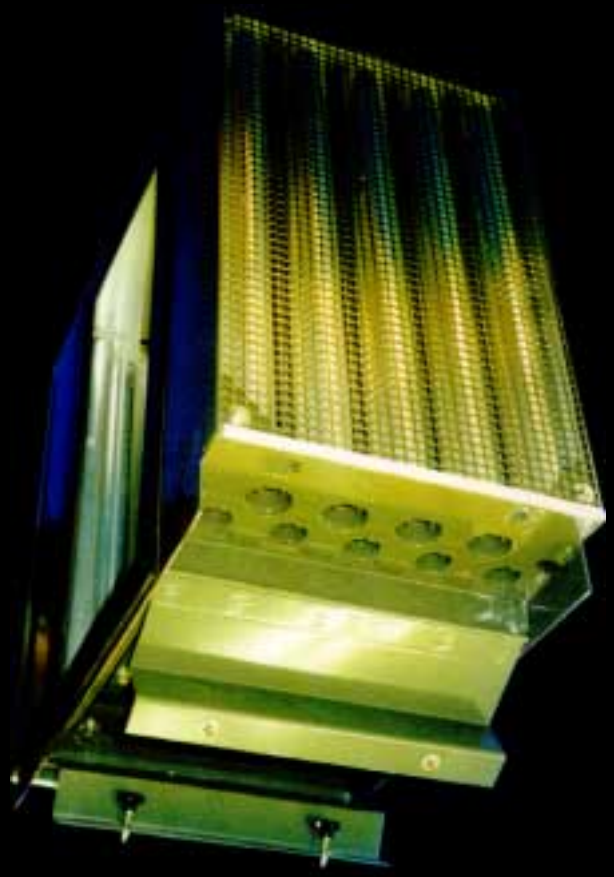
Test certificates available

- The determination of the pressure differente and the fitter efficiency were measured in the state materials testing Office of North Rhine-Westphalia The test certificate contains the results of the tests in accordante with the testing regulations DIN 24 185 Part 1.
- Oscillation and impact testing in accordance with the specifcations of the German Federal Rail Operator (LES DB)
- Flow volume through an FSA for tangential Overflow with high velocities
- Bulk dust investigations / separation by FSA
- Watet- Separation
- Ice and Snow removal (heating)
- FSA efficiency when covered

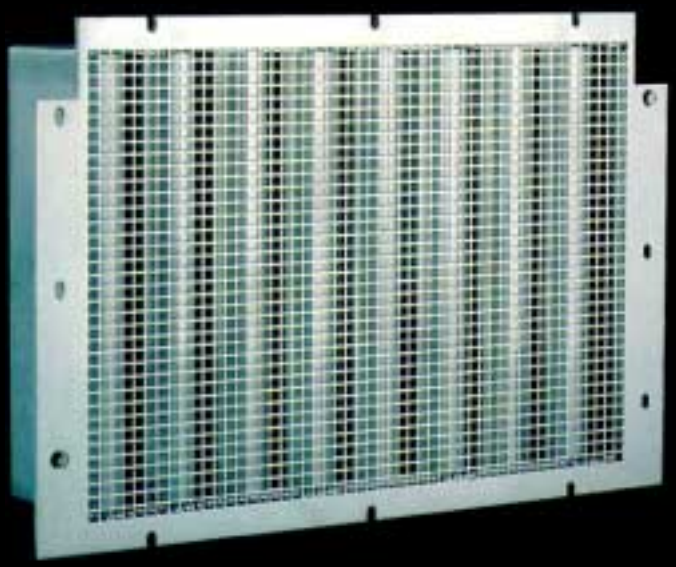
Example of a filter calculation

Nominal air flow volume	▶ 1.0 m³/s
Area B1 x H1	▶ 800 mm x 500 mm = 0,4 m²
Intake flow velocity	▶ 2.5 m/s
Pressure loss acc. with fig. 4	▶ ΔP = 100 Pa
Acoustic pressure level	▶ 79 dB
Sound proofing (at rest)	▶ 2.8 dB

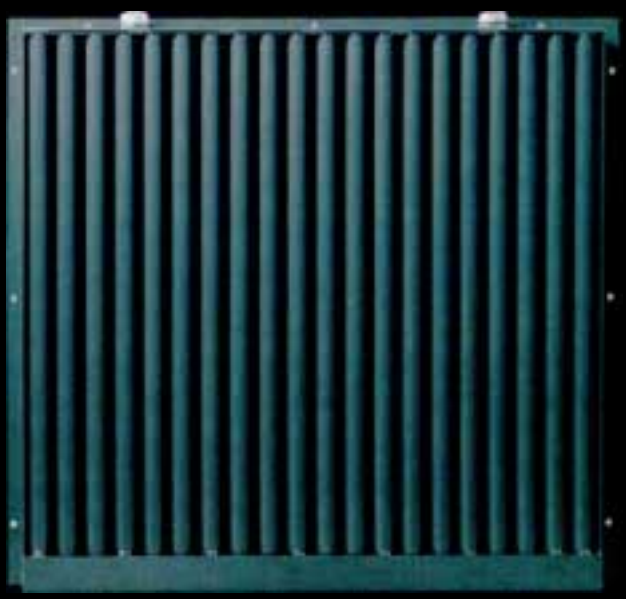
For specific cases, advice should be sought from the manufacturer.



FSA BR 120 as a suction box separator box open



FSA BR 120 . without separator box



FSA BR 60

SGW Werder GmbH
Am Zernsee 13
14542 Werder (Havel)

Telephone: 03327148 54 01
Telefax: 03327148 54 44
e-mail: Hahn.SGW@t-online.de