OFFICINE VOLTA
L'INNOVAZIONE È NELL'ARIA

## LINEAR DIFFUSERS

# BF.USA

### CONSTRUCTION FEATURES:

The single slot linear diffusers with concealed perimeter frame of the BF.USA series are generally installed in spaces with a height of between 2.7 and 4.0 m and with ventilation systems operating within ± 10 K temperature differential between internal and supplied air. The most frequently used type of installation is flush with plasterboard, with ceiling installation (vertical throw) and on the wall (horizontal throw). In the wall installation, if the distance between the upper edge of the diffuser and the ceiling is less than 200 mm, a Coanda effect is obtained; otherwise, a free throw is achieved. The concealed perimeter frame, designed to facilitate positioning on plasterboard, makes the BF.USA series highly appreciated by designers who find in it not only functionality but also furnishing motifs. They can be used for both supply and return and in systems with variable air flow rates in the range 50…100%. In the special execution, they can be mounted one after the other to make continuous lines which, with the use of particular inactive corner pieces, are able to follow the ideal line of the perimeter of the room.

OFFICINE VOLTA
L'INNOVAZIONE È NELL'ARIA

FIXING

Standard fitting with "L-shaped" profiles to facilitate the plastering.

MATERIALS

Perimeter frame, spacers and flow deviating blades in extruded anodized aluminum or painted in white, RAL 9016 or black, RAL 9005; on request raw aluminium or any RAL color.

Equalising stretched sheet and slinding damper in galvanized steel.

Plenum box in galvanized sheet steel; possible external insulation in polyethylene foam (fire reaction Euroclass, according to UNI EN 13501-1:2009, B-s2, d0).

DIMENSIONS - customized lenght on request

BF.USA.2
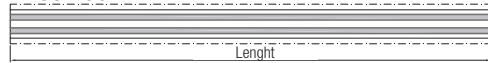
Lenght

BF.USA.40

Lenght

BF.USA.50
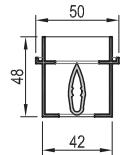
Lenght

BF.USA.70
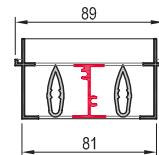
Lenght
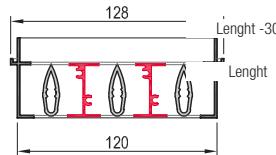
BF.USA.1
50
48
42
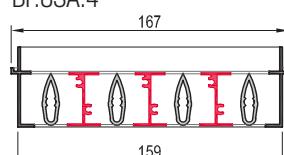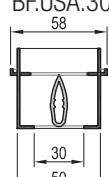
BF.USA.2
89
81

BF.USA.3
128
Lenght -30
Lenght
120

BF.USA.4
167
159

BF.USA.30
58
30
50
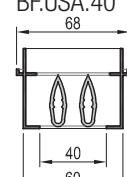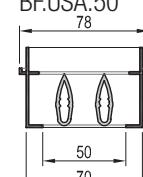
BF.USA.40
68
40
60
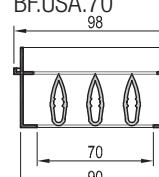
BF.USA.50
78
50
70
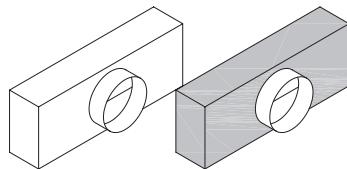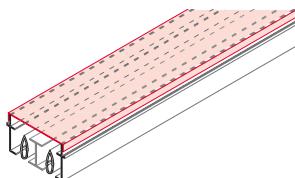
BF.USA.70
98
70
90

| n° of slots | lenght | n° of inlets | Ø inlet |
| | mm | | mm |
|---|---|---|---|
| 1<br>BF.USA.1<br>BF.USA.30 | 1000 | 1 | 125 |
| | 1500 | 2 | |
| | 2000 | 3 | |
| | 2500 | 3 | |
| | 3000 | 4 | |
| 2<br>BF.USA.2<br>BF.USA.40<br>BF.USA.50 | 1000 | 1 | 150 |
| | 1500 | 2 | |
| | 2000 | 3 | |
| | 2500 | 3 | |
| | 3000 | 4 | |
| 3<br>BF.USA.3<br>BF.USA.70 | 1000 | 1 | 150 (BF.USA.3)<br>180 (BF.USA.70) |
| | 1500 | 2 | |
| | 2000 | 3 | |
| | 2500 | 3 | |
| | 3000 | 4 | |
| 4<br>BF.USA.4 | 1000 | 1 | 180 |
| | 1500 | 2 | |
| | 2000 | 3 | |
| | 2500 | 3 | |
| | 3000 | 4 | |

LINEAR DIFFUSERS

BF.USA

LINEAR DIFFUSERS

BF.USA

ACCESSORIIES
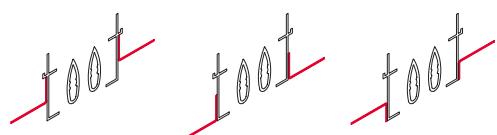
**PL.BF and PL.BF.ISO**

Plenum box, with or without external insulation, with lateral circular inlet, riveted in the factory to the diffuser.

**SER.BF**

Sliding regulation damper, handling from the front of the diffuser.
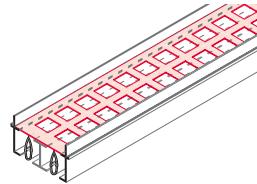
**TEG.BF**

Closing plate for the air passage, suitable for making part of the diffuser inactive.

**LE.BF**

Equalising stretched sheet steel fitted on the back of the diffuser.
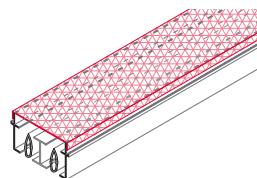
**FIS.BF**

Supporting profile for brick or plasterboard walls.
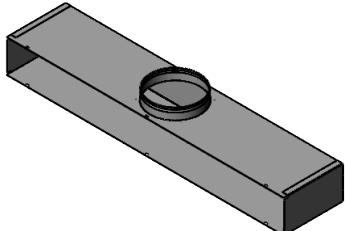
**CM.BF**

Open end frame, riveted to the diffuser.

## PLENUM

### PL.BF / PL.BF.ISO

Galvanized steel plenum box
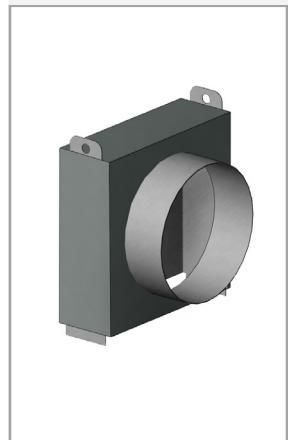
- riveted to the diffuser.

- standard inlet or with built-in damper on request.

- eyebolts for fixing.

PL.BF.ISO: external insulated version with CE marked polyethylene foam (Euroclass of reaction to fire, according to UNI EN 13501-1:2009, B-s2, d0).
Note that the insuilation layer provides +6mm thickness on each covered side.
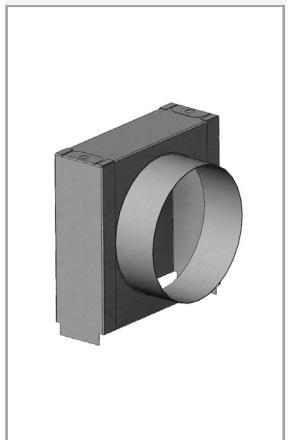
## PARTS IN DETAIL
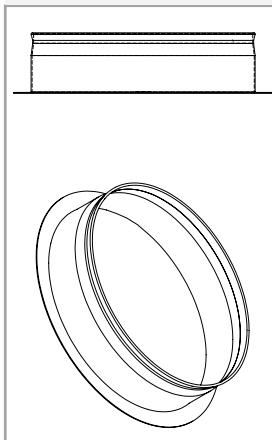
| Straight eyebolts for fixing in a PL.ISO (insulated) | Folded eyebolts for fixing in a PL. (non insulated) | Standard inlet | Inlet with built-in damper |
|---|---|---|---|
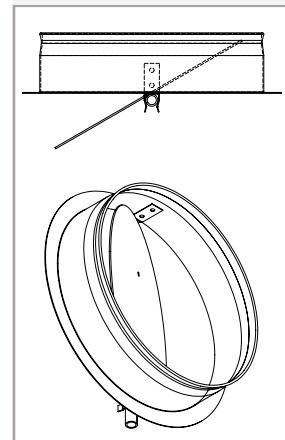
www.officinevolta.it

OFFICINE
VOLTA
L'INNOVAZIONE È NELL'ARIA
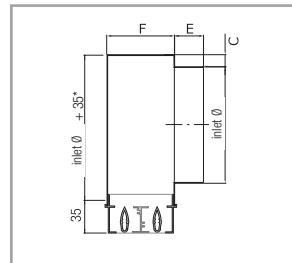
DIMENSIONS
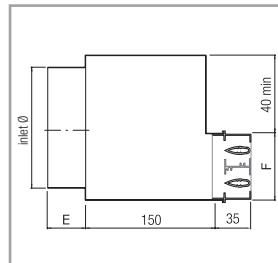
| N° of slots | Inlet Ø | F | C | E |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| 1 - BF.USA.1 | 125 | 43 | 15 | 50 |
| 1 - BF.USA.30 | 125 | 53 | 15 | 50 |
| 1 - BF.USA.40 | 150 | 63 | 15 | 50 |
| 1 - BF.USA.50 | 180 | 73 | 15 | 50 |
| 1 - BF.USA.70 | 180 | 93 | 15 | 50 |
| 2 - BF.USA.2 | 150 | 82 | 15 | 50 |
| 3 - BF.USA.3 | 150 | 121 | 15 | 50 |
| 4 - BF.USA.4 | 180 | 160 | 15 | 50 |

POSSIBILE SHAPES FOR PLENUM PL.BF / PL.BF.ISO
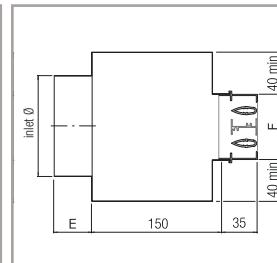
Standard
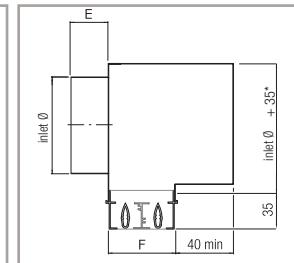
A-shaped - rear inlet

B-shaped - rear inlet

A-shaped - side inlet
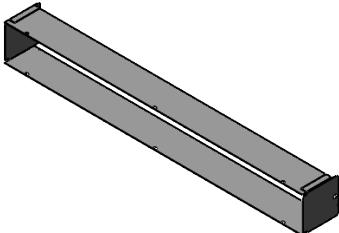


*Ø + 50 with inlet with built-in damper

The air flow damper is not the same product (SER.BF) mentioned in the accessories page. SER.BF is located in the diffuser.

LINEAR DIFFUSERS

BF.USA

# FRAMES

CM.BF
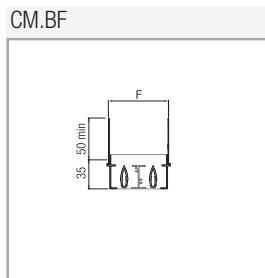


Galvanized steel frame

- riveted to the diffuser.

- eyebolts for fixing.
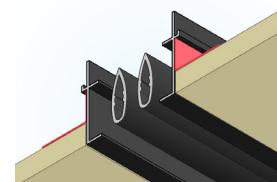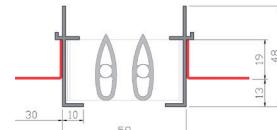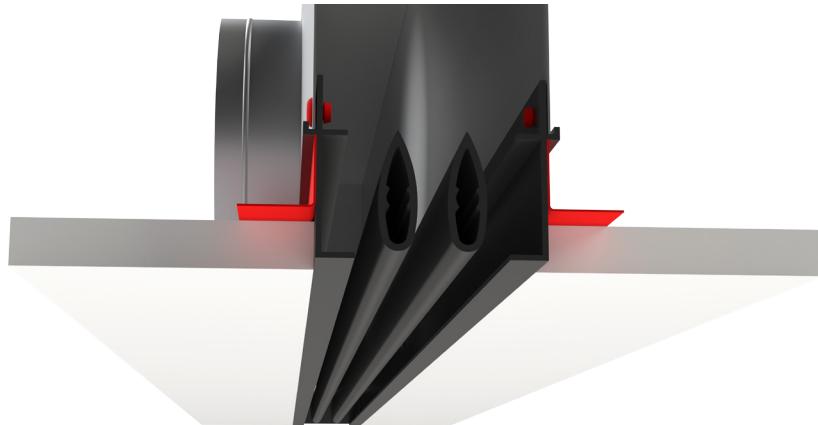
## DIMENSIONS

| N° of slots | F |
|---|---|
| | mm |
| 1 - BF.USA.1 | 43 |
| 1 - BF.USA.30 | 53 |
| 1 - BF.USA.40 | 63 |
| 1 - BF.USA.50 | 73 |
| 1 - BF.USA.70 | 93 |
| 2 - BF.USA.2 | 82 |
| 3 - BF.USA.3 | 121 |
| 4 - BF.USA.4 | 160 |

CM.BF
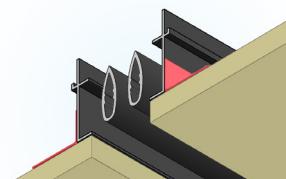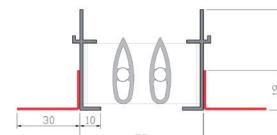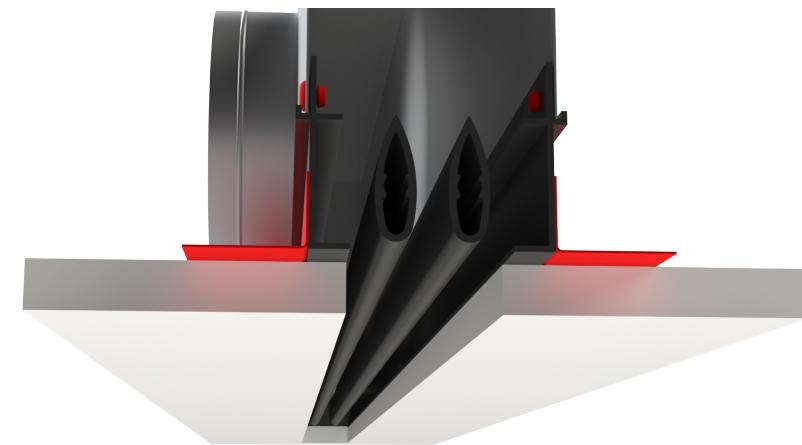
INSTALLATION VARIATIONS
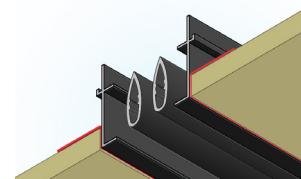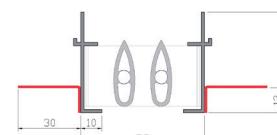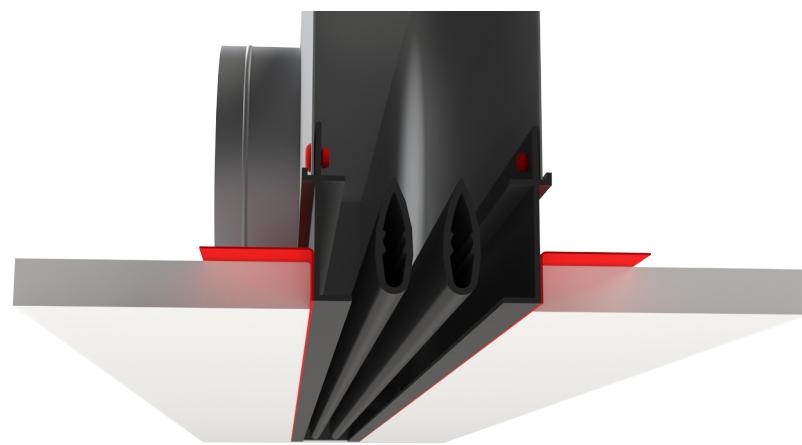
BF.USA + FIS.BF "A" type



BF.USA + FIS.BF "B" type



BF.USA + FIS.BF "C" type



LINEAR DIFFUSERS

BF.USA

## TECHNICAL DATA

### Quick selection table

| type | L | Qmin | | Qmax | | $L_{WA}$min | $L_{WA}$max | Δpmin | Δpmax |
|---|---|---|---|---|---|---|---|---|---|
| | mm | l/s | m³/h | l/s | m3/h | dB(A) | dB(A) | Pa | Pa |
| BF.USA.1 | 1.000 | 14 | 50 | 58 | 180 | <20 | 43 | 7 | 78 |
| BF.USA.2 | 1.000 | 28 | 100 | 108 | 350 | <20 | 50 | 7 | 70 |
| BF.USA.30 | 1.000 | 31 | 110 | 106 | 380 | <20 | 45 | <5 | 25 |
| BF.USA.40 | 1.000 | 36 | 130 | 125 | 450 | <20 | 46 | <5 | 25 |
| BF.USA.50 | 1.000 | 56 | 200 | 194 | 700 | <20 | 49 | <5 | 30 |
| BF.USA.70 | 1.000 | 92 | 330 | 264 | 950 | <20 | 48 | <5 | 30 |

Q        air flow rate per diffuser per linear metre

$L_{WA}$        A-weighted sound power level, correction in compliance with UNI EN ISO 3741

Δp        static pressure drop

### Free area of passage
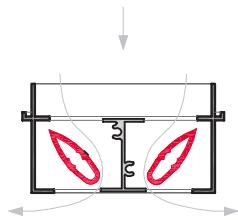
$A_{eff}$ in m² per L = 1000mm

| type | Throw from ceiling | | |
|---|---|---|---|
| | horizontal | inclinato | vertical |
| BF.USA.1 | 0,007 | 0,010 | 0,011 |
| BF.USA.2 | 0,014 | 0,020 | 0,022 |
| BF.USA.30* | 0,023 | - | 0,023 |
| BF.USA.40* | 0,024 | - | 0,024 |
| BF.USA.50* | 0,032 | - | 0,032 |
| BF.USA.70* | 0,052 | - | 0,052 |
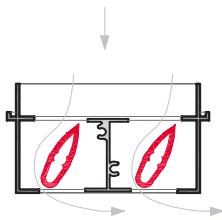
* for BF.USA.40 - 50 - 70 the throw can be only horizontal from the wall or vertical from the ceiling.

## Throw direction
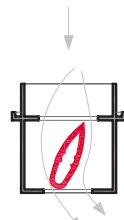
BF.USA.1 - 2 - 3 - 4
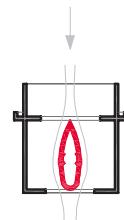


Horizontal throw in two directions

Horizontal throw in one direction
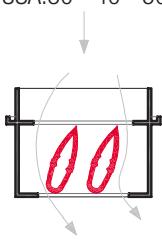
Oblique throw
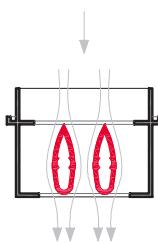
Vertical throw
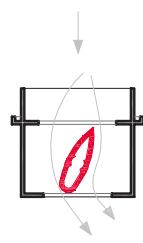
BF.USA.30 - 40 - 50 - 70
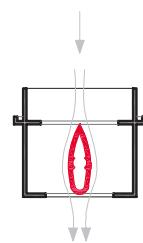


Oblique throw

Flusso verticale

Flusso verticale

Vertical throw

LINEAR DIFFUSERS

BF.USA

www.officinevolta.it
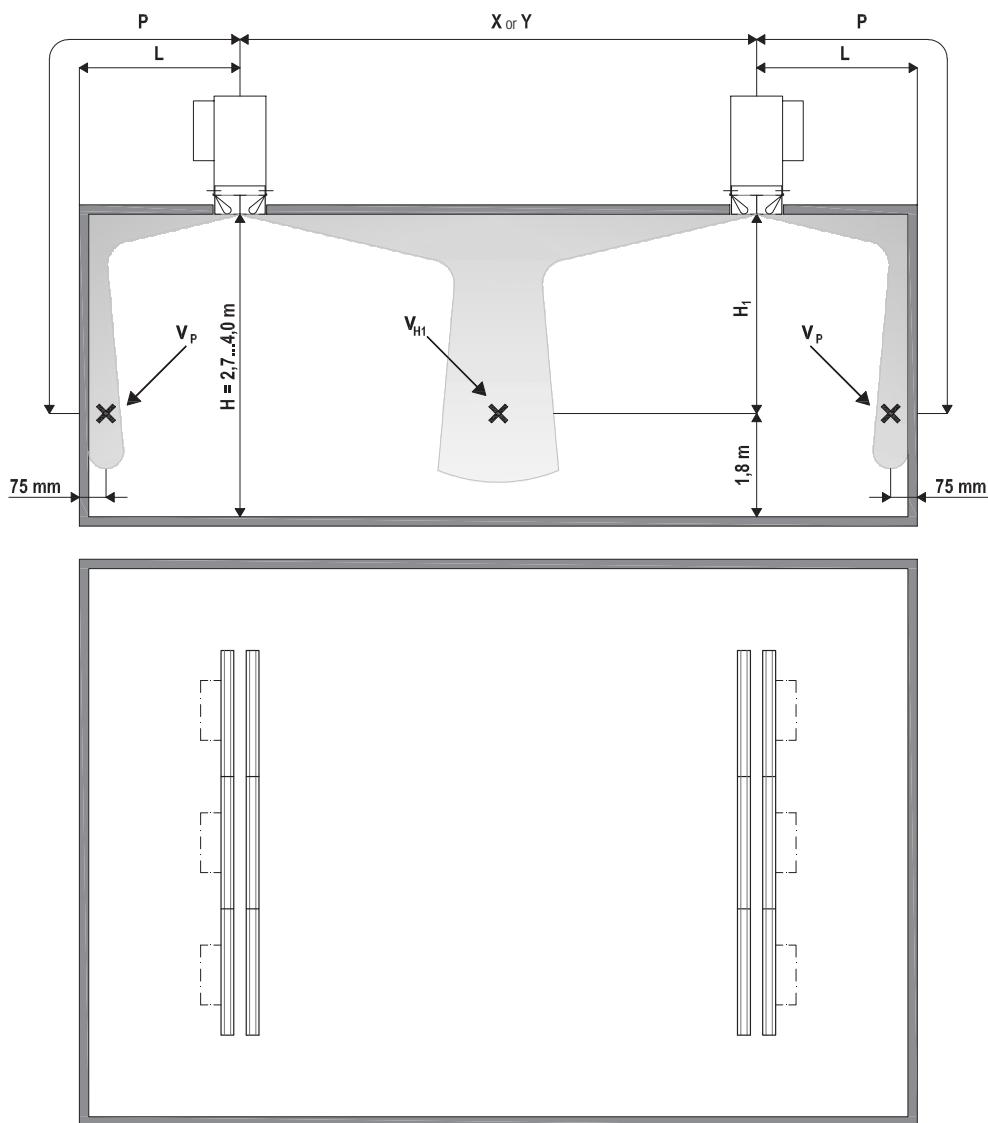
## AERAULIC - ACOUSTIC CHARACTERISTICS

The aeraulic characteristics were measured in our test room, varying the flow rate, the distance between two contiguous rows of diffusers, the distance from the wall and the position of the measuring point. The average speed of the air that can be obtained from the diagrams is intended as the average speed at a height of 1.8 m from the floor for a certain flow rate, for a certain distance between the diffusers and for a certain position of the measuring point or for a from the wall of 75 mm. The acoustic data relating to the generated sound level were measured in the reverberation room of the Giordano Institute, test report 205710 dated 16.12.2005.

Technical Data ($\Delta T = 10°C$)



| Q | flow rate per linear metre diffuser | $H_1$ | distance between ceiling and living area |
| X or Y | distance between two diffusers | $v_{H1}$ | average velocity between two diffusers at distance $H_1$ |
| P | horizontal distance L + vertical $H_1$ for throw towards the wall | $v_P$ | average velocity at 75 mm from the wall at distance P |
| L | distance between the center of the diffuser and the wall | | |

AERAULIC DATA - Pressure drop - Power sound level

Chart 1: BF.USA.1
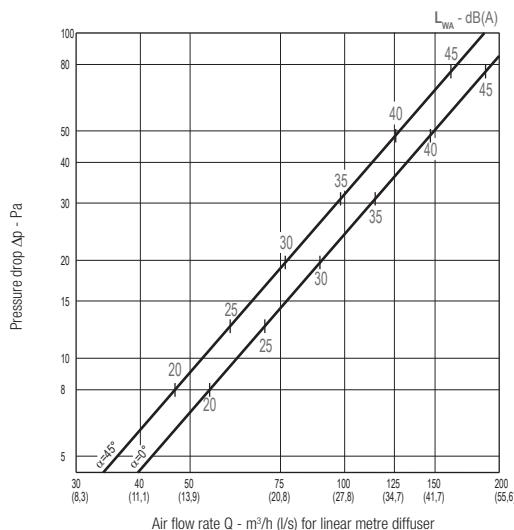


Chart 2: BF.USA.2
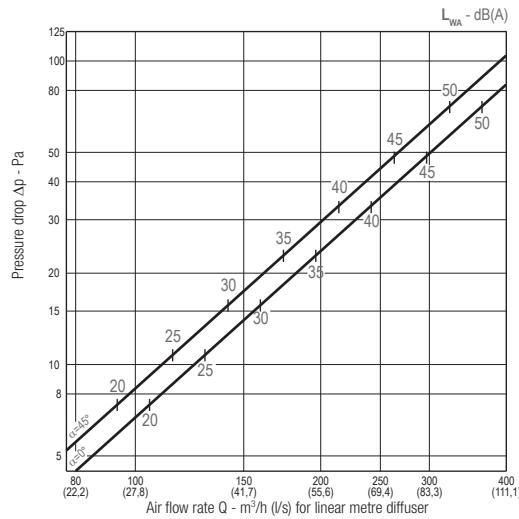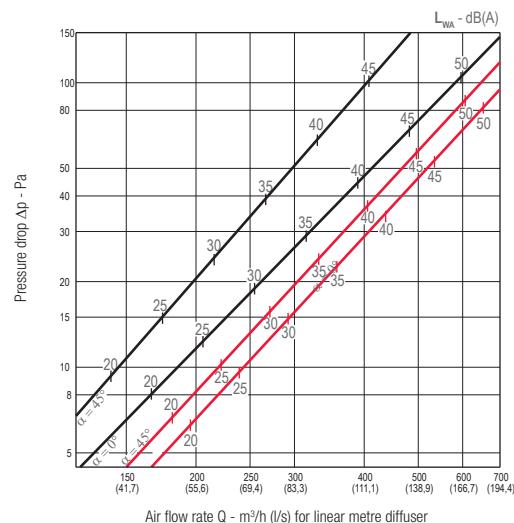


Chart 3: BF.USA.3 - BF.USA.4



Correction for chart 1 - 2 - 3

| Type | Para-meter | Throw | | | | | |
|---|---|---|---|---|---|---|---|
| | | Horizontal with damper | | Oblique with damper | | Vertical with damper | |
| | | 0° | 45° | 0° | 45° | 0° | 45° |
| BF.USA.1 | $\Delta p$ | x 1 | x 1,3 | x 0,85 | x 1,25 | x 0,8 | x 1,2 |
| | $L_{WA}$ | 0 | + 3 | -2 | + 1 | -1 | + 2 |
| BF.USA.2 | $\Delta p$ | x 1 | x 1,3 | x 0,85 | x 1,25 | x 0,8 | x 1,2 |
| | $L_{WA}$ | 0 | + 3 | -2 | + 1 | -1 | + 2 |
| BF.USA.40 | $\Delta p$ | x 1 | x 1,3 | | | x 1 | x 1,3 |
| | $L_{WA}$ | 0 | + 3 | | | 0 | + 3 |
| BF.USA.50 | $\Delta p$ | x 1 | x 1,3 | | | x 1 | x 1,3 |
| | $L_{WA}$ | 0 | + 3 | | | 0 | + 3 |
| BF.USA.70 | $\Delta p$ | x 1 | x 1,3 | | | x 1 | x 1,3 |
| | $L_{WA}$ | 0 | + 3 | | | 0 | + 3 |

Static pressure drops are referred to diffusers that are assembled to the standard plenum box.

OFFICINE **VOLTA**
L'INNOVAZIONE È NELL'ARIA

AERAULIC DATA - Pressure drop - Power sound level

Chart 1: BF.USA.30 - BF.USA.40
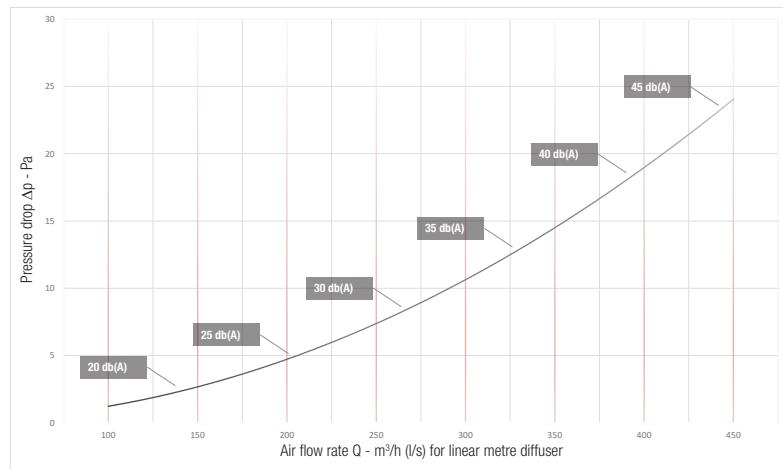


Chart 2: BF.USA.50
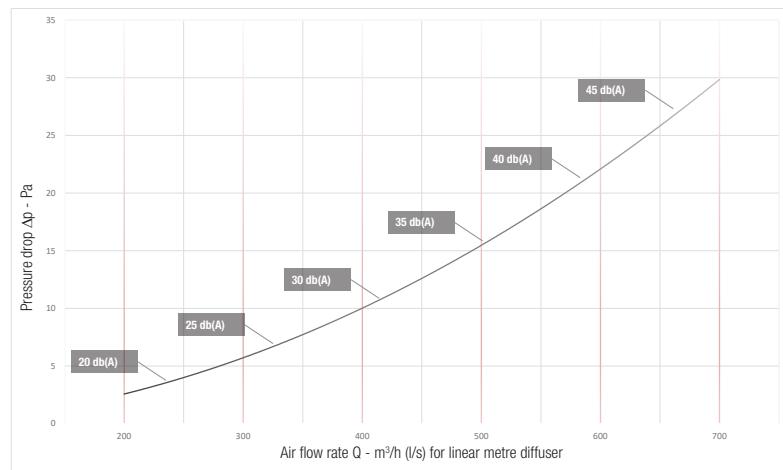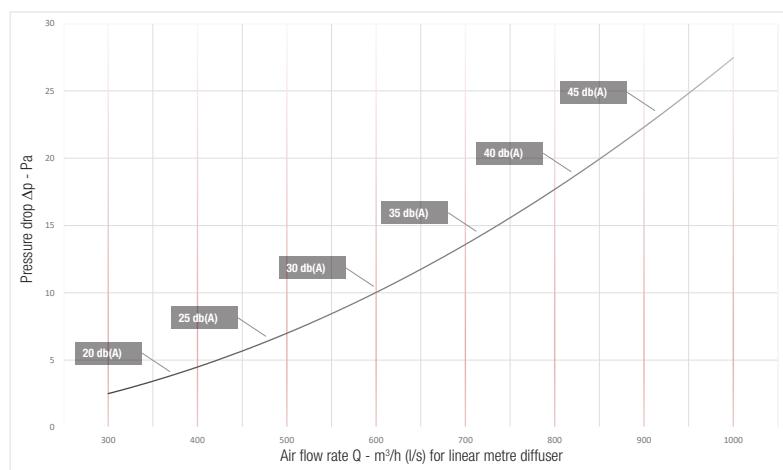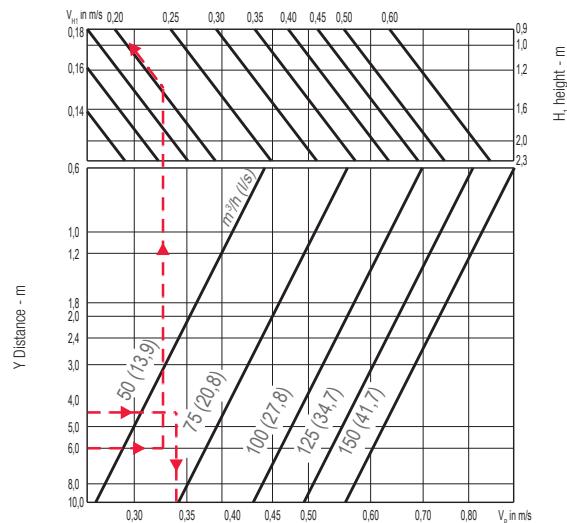


Chart 3: BF.USA.70
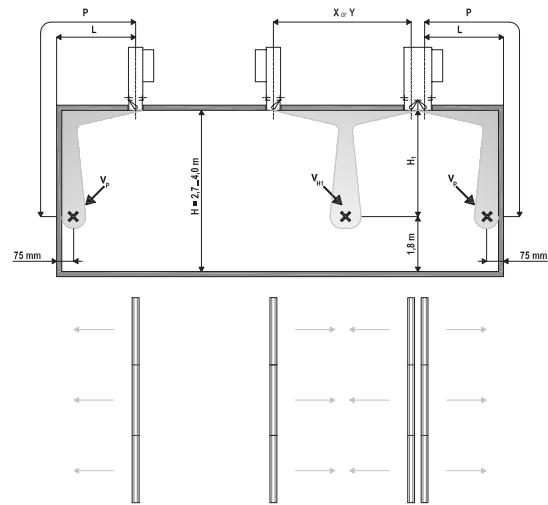


Static pressure drops are referred to diffusers that are assembled to the standard plenum box.

## AERAULIC DATA - Horizontal throw from the ceiling on one or two sides
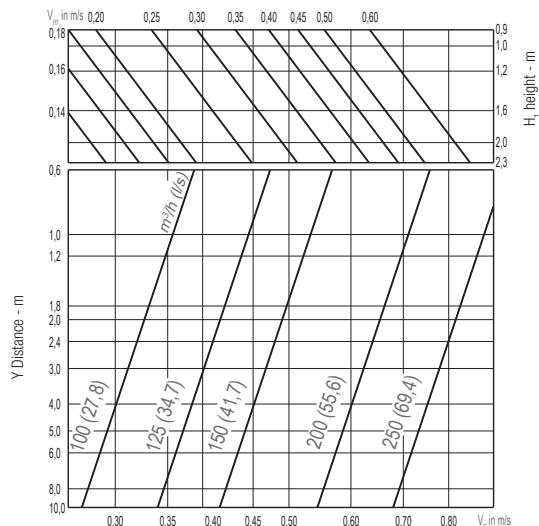
### BF.USA.1
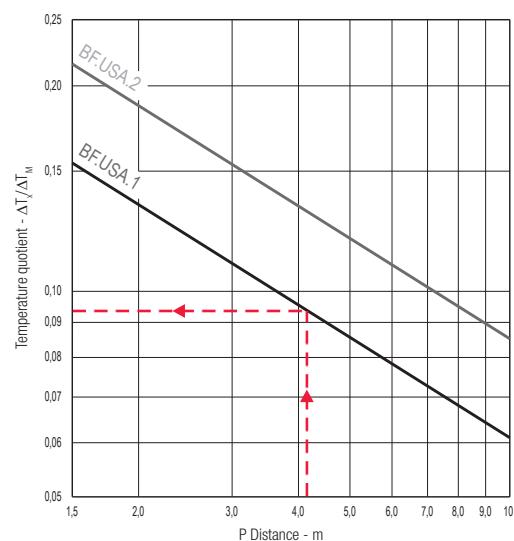


### Throw type



### BF.USA.2
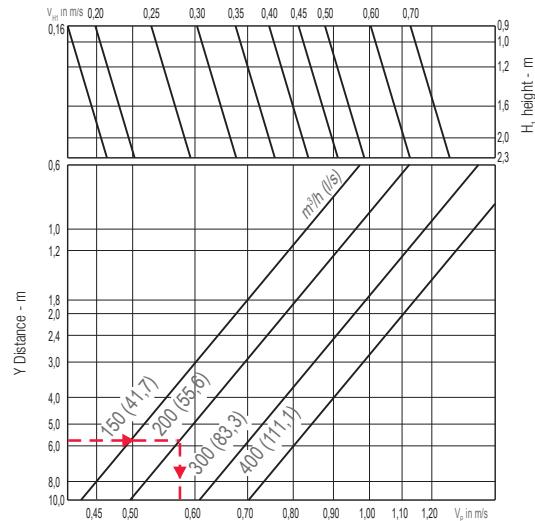


### Temperature quotient
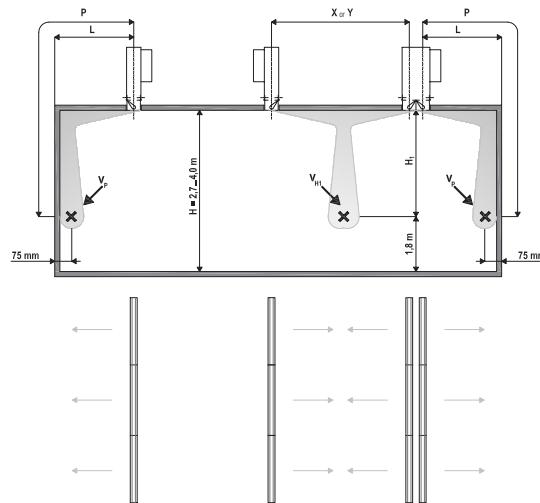
AERAULIC DATA - Horizontal throw from the ceiling on one or two sides
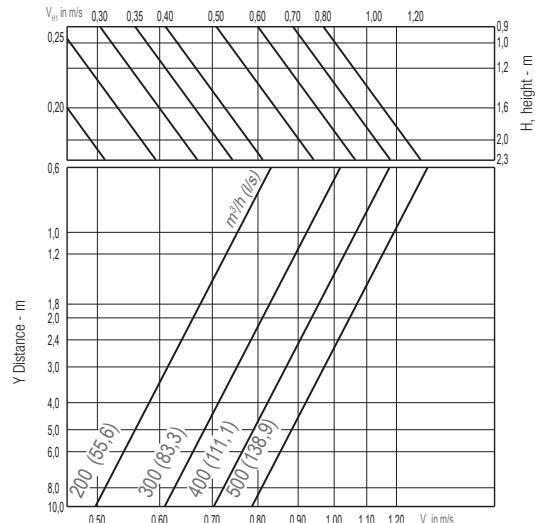
BF.USA.3
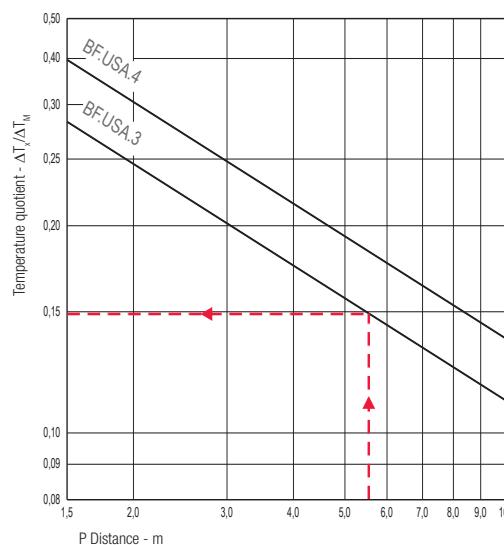


Throw type



BF.USA.4
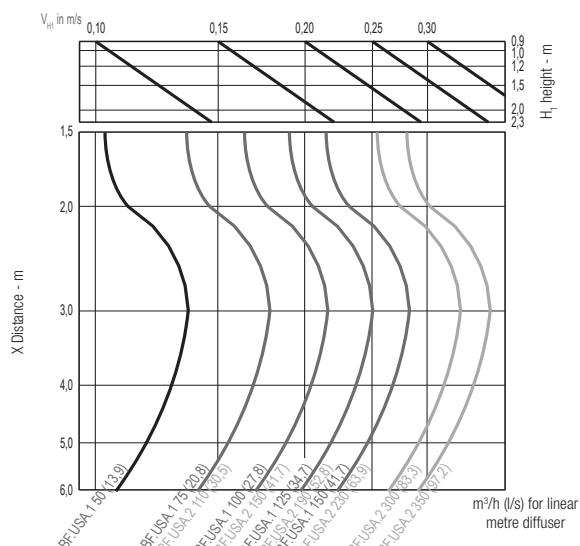


Temperature quotient
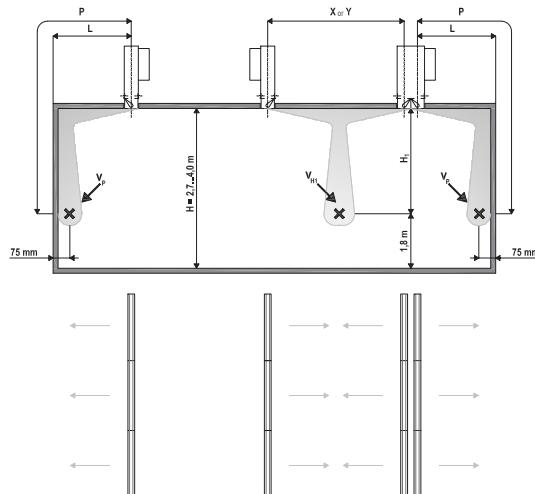
## AERAULIC DATA - Alternate horizontal throw
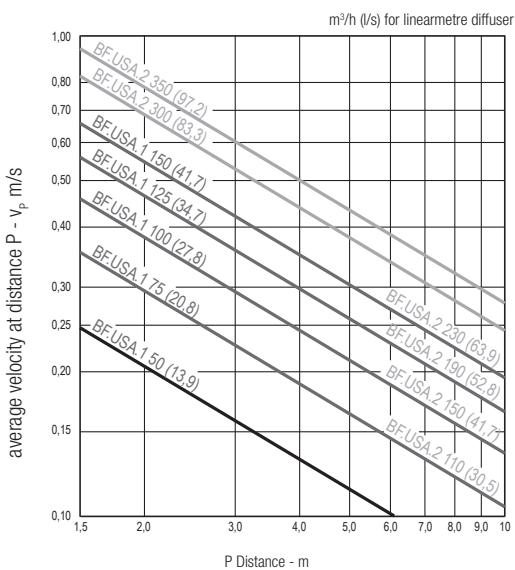
### BF.USA.1 - BF.USA.2
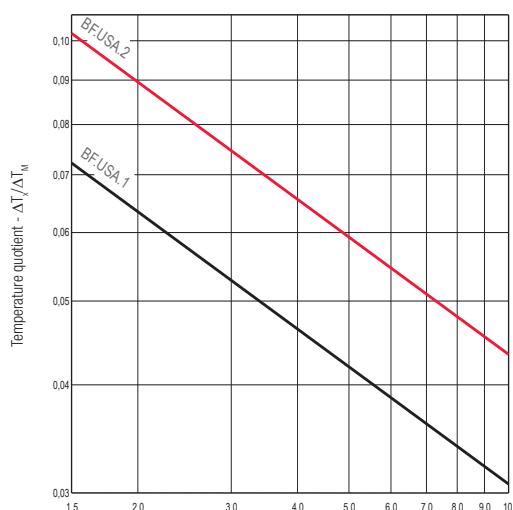


### Throw type



### BF.USA.1 - BF.USA.2



### Temperature quotient
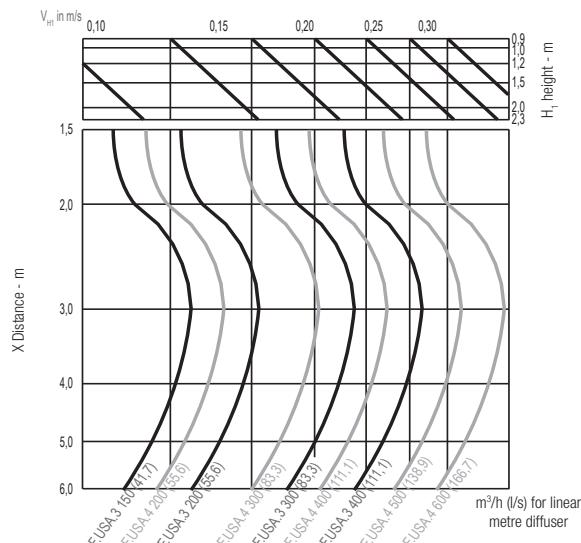
LINEAR DIFFUSERS
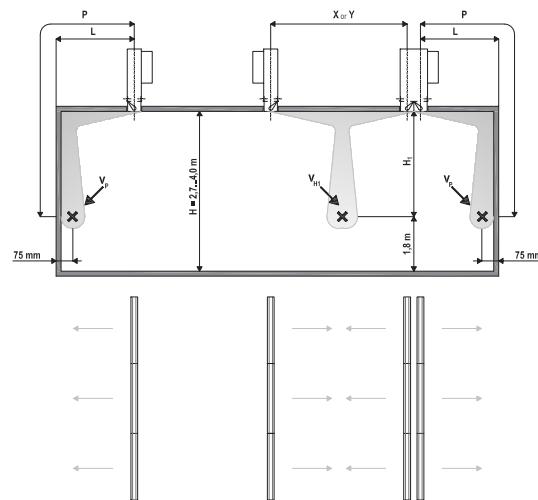
BF.USA

# AERAULIC DATA - Alternate horizontal throw
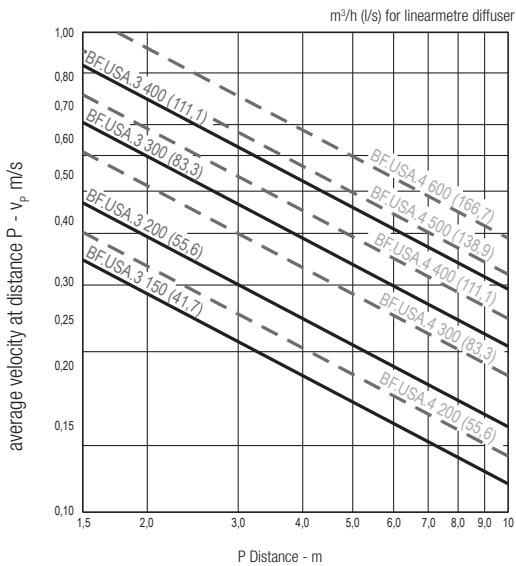
## BF.USA.3 - BF.USA.4

Throw type



V_H1 in m/s

H_1 height - m

X Distance - m

m³/h (l/s) for linear metre diffuser

BF.USA.3 150 (41,7)
BF.USA.4 200 (55,6)
BF.USA.3 200 (55,6)
BF.USA.4 300 (83,3)
BF.USA.3 300 (83,3)
BF.USA.4 400 (111,1)
BF.USA.3 400 (111,1)
BF.USA.4 500 (138,9)
BF.USA.4 600 (166,7)

## BF.USA.3 - BF.USA.4

Temperature quotient



m³/h (l/s) for linearmetre diffuser

average velocity at distance P - v_P m/s

P Distance - m

BF.USA.3 400 (111,1)
BF.USA.3 300 (83,3)
BF.USA.3 200 (55,6)
BF.USA.3 150 (41,7)
BF.USA.4 600 (166,7)
BF.USA.4 500 (138,9)
BF.USA.4 400 (111,1)
BF.USA.4 300 (83,3)
BF.USA.4 200 (55,6)

Temperature quotient - $\Delta T_y/\Delta T_M$

BF.USA.4
BF.USA.3

P Distance - m

BF.USA  LINEAR DIFFUSERS
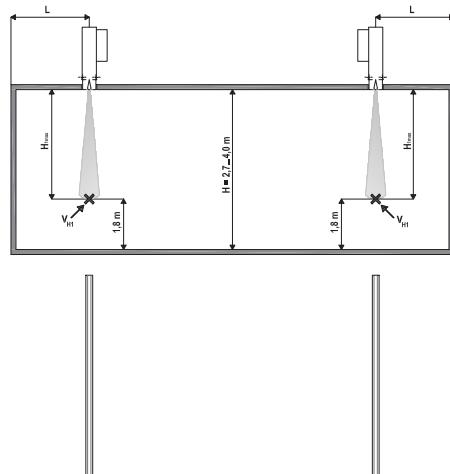
AERAULIC DATA - Vertical throw

BF.USA.1    - BF.USA.2
BF.USA.30 - BF.USA.40



Air flow rate Q - m³/h for linear metre diffuser
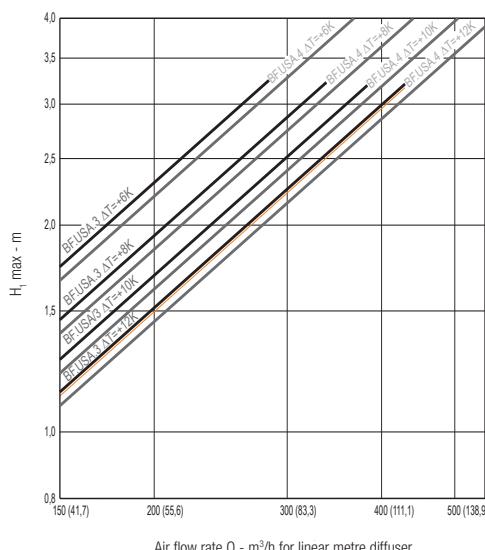
Throw type



BF.USA.3    - BF.USA.4
BF.USA.50 - BF.USA.70



Air flow rate Q - m³/h for linear metre diffuser

Example
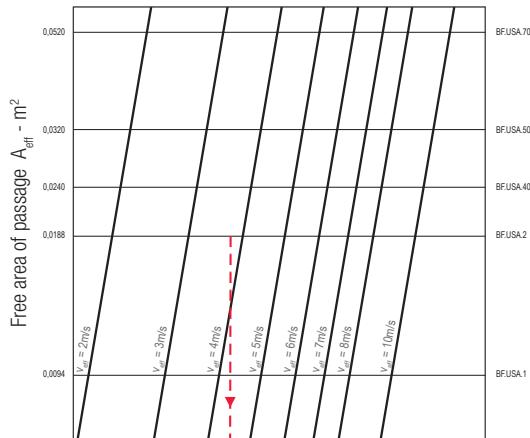
### Data:
- 2 slots diffuser, 270m³/h
- lenght 1700mm
- $\Delta t = +11$ K

Find the maximal depth of the air flow
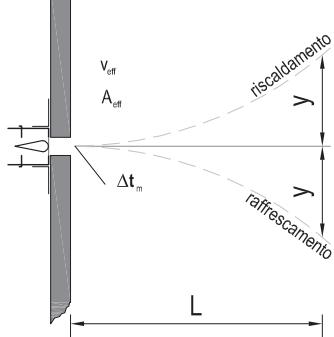
### Solution:
- linear metre flow rate
  270/1,7 = **158,8 m³/h**
- maximal depth of the air flow = **2,4m**
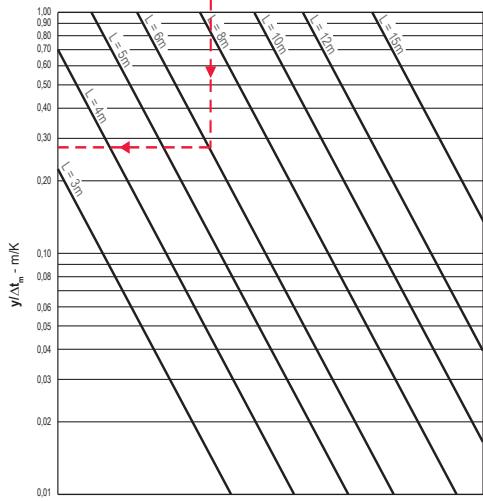
## AERAULIC DATA - Throw from wall - Throw deviation

Throw deviation depending on Δt



Throw type



Example

### Data
 - 3 slots diffuser, 580 m³/h
 - lenght: 2150 mm
 - Δt = - 8 K

Find the throw deviation at distance
L = 6 m

### Solution:
 - linear metre flow rate
   $580/2,15 = $ **269,7 m³/h**
 - $v_{eff} = Q/A_{eff} =$
   $= 269,7/(0,0071 \times 3 \times 3600 = $ **3,52 m/s**
 - y/Dtm = 0,285
   $y = 0,285 \times 8 = $ **2,12 m**

TEXT FOR TECHNICAL SPECIFICATION

Linear diffusers with one or more slots, made of anodized aluminum profiles powder coated in white, RAL 90016, or black, RAL 9005, possibly paintable in other shades of the RAL scale, teardrop deflectors with aerodynamic profile, adjustable from the front, with or without a series of accessories such as: plenum box with or without external thermal insulation in CE polyethylene foam (Euroclass fire reaction according to UNI EN 13501-1:2009 B-s2, d0), damper, equalizer plate. Option of having continous lines by assembling modules without closing frames. Flexible installation depending on the plenum box for lateral or front assembly.

Suitable for supply or return and, on request, with both supply and return in one double chamber plenum box.



LINEAR DIFFUSERS

BF.USA