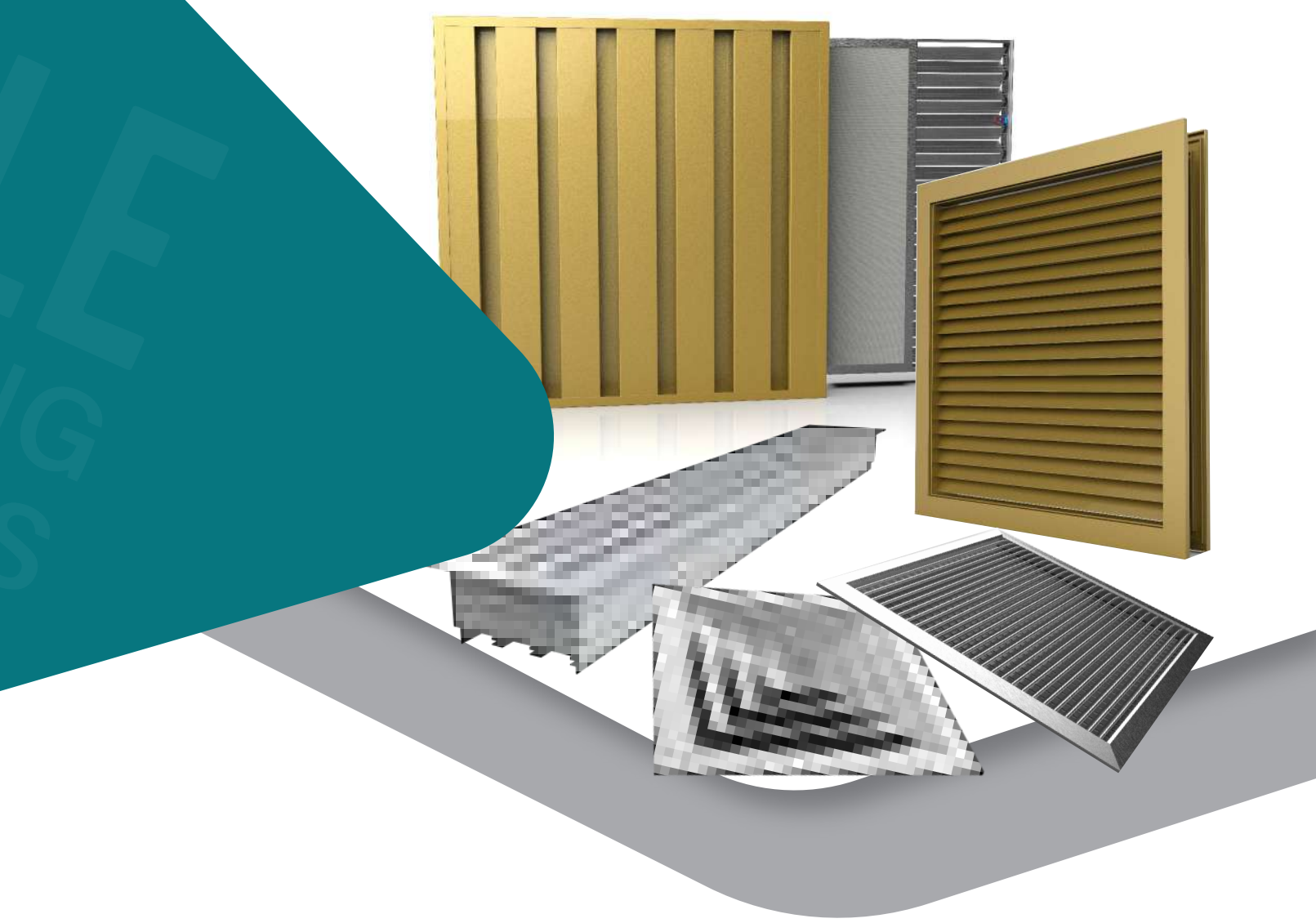
CASTLE
ENGINEERING
INDUSTRIES



AIR OUTLETS

AIR OUTLETS

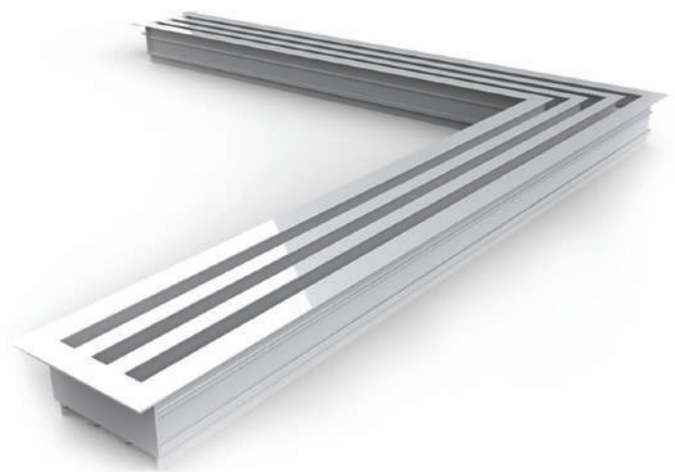
Linear Slot Diffuser
Chapter 4

Table
Of Content:

Standard Construction:

Description:

The SD series slot diffusers are engineered to uphold superior air diffusion in occupied spaces, ensuring optimal air quality. Versatile in function, they can be effectively employed for supply, return, and exhaust air applications.



In supply air systems, the air pattern can be effortlessly adjusted by rotating the air deflectors in either direction, offering flexibility in directing airflow according to specific requirements.

For return or exhaust air applications, the use of air deflectors is not required, simplifying installation and operation.

Materials:

The slot diffusers, along with air deflectors and hit-and-miss dampers, are crafted from durable extruded aluminum alloy profiles.

Air Deflectors:

Each slot diffuser is equipped with two air deflectors, offering the flexibility to set horizontal or vertical air diffusion patterns as needed.

Hit-and-Miss Damper:

Control over air volume is facilitated by the hit-and-miss damper, affixed to the top side of the slot diffuser. This damper comprises two extruded aluminum profiles with evenly spaced rectangle openings. While the top profile is adjustable, the bottom profile remains fixed. Adjusting the hit-and-miss damper may increase the noise criteria (NC) level within occupied spaces. For optimal noise control, it is recommended to utilize an equalizing grid and regulate air volume at the plenum box inlet collar with a volume control damper.

Equalizing Grid:

Enhancing the even distribution of air on the discharge side of the diffuser, the equalizing grid consists of a single extruded aluminum profile with equally spaced rectangle openings, affixed to the top side of the slot diffuser.

Slot Width:

Available in 3/4” (20mm) and 1” (25mm) options.

Standard Length:

Each section of the slot diffuser can extend up to a maximum length of 3000mm.

Mitered Corners:

Mitered corners are available for continuous slot diffusers, ensuring seamless integration around ceiling edges.

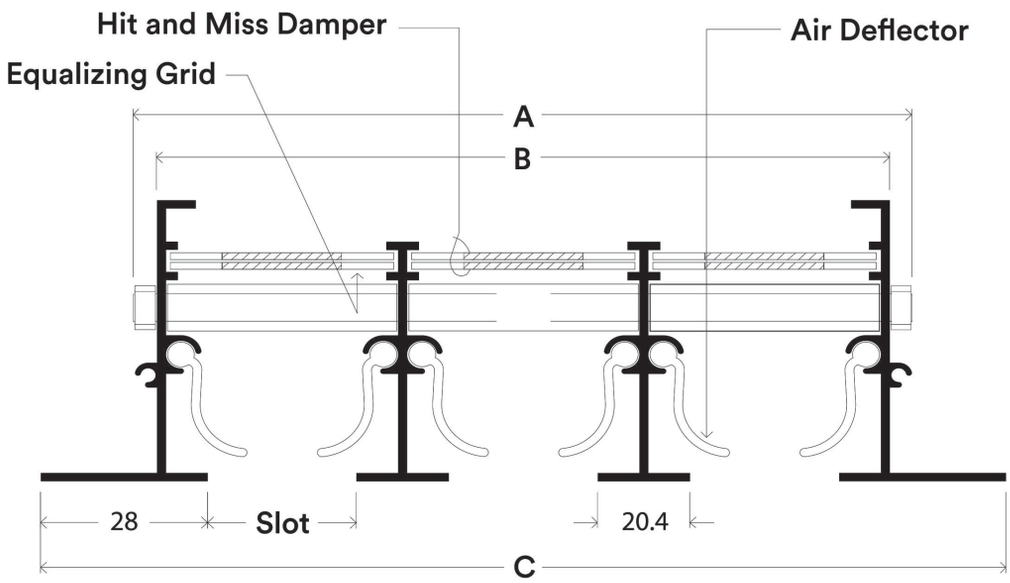
Finish:

The standard coating finish for the slot diffuser is a polyester powder coating in white color RAL 9010. Hit-and-miss dampers and equalizing grids come in black color.

Optional Finish:

Slot diffusers and air deflectors can be customized with anodized aluminum in silver or powder-coated to any specified color. Hit-and-miss dampers and equalizing grids are available in black color.

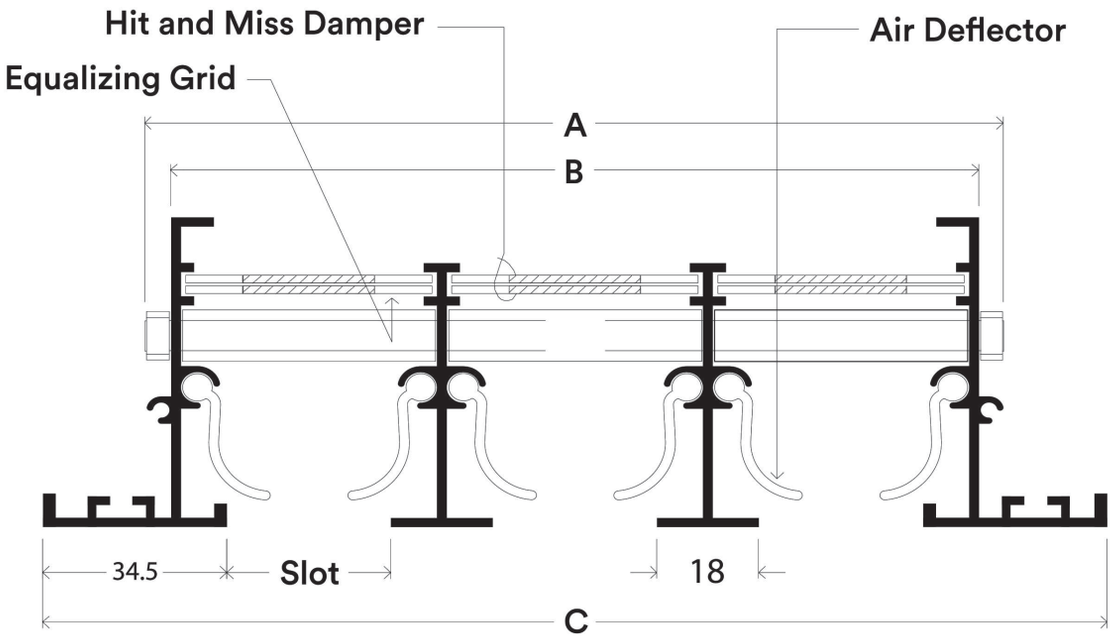
Model: SLD1



Slot width ¾” (20mm)						
No. of slot	1	2	3	4	5	6
A (mm)	50	90	130	170	210	250
B (mm)	40	80	120	160	200	240
C (mm)	76	116	156	196	236	276
CFM/FT	25-80	30-90	40-100	60-150	70-175	80-200

Slot width 1” (25mm)						
No. of slot	1	2	3	4	5	6
A (mm)	55	100	145	190	235	280
B (mm)	45	90	135	180	225	270
C (mm)	81	126	171	216	261	306
CFM/FT	25-80	40-100	50-125	70-175	80-200	90-250

Model: SLD2

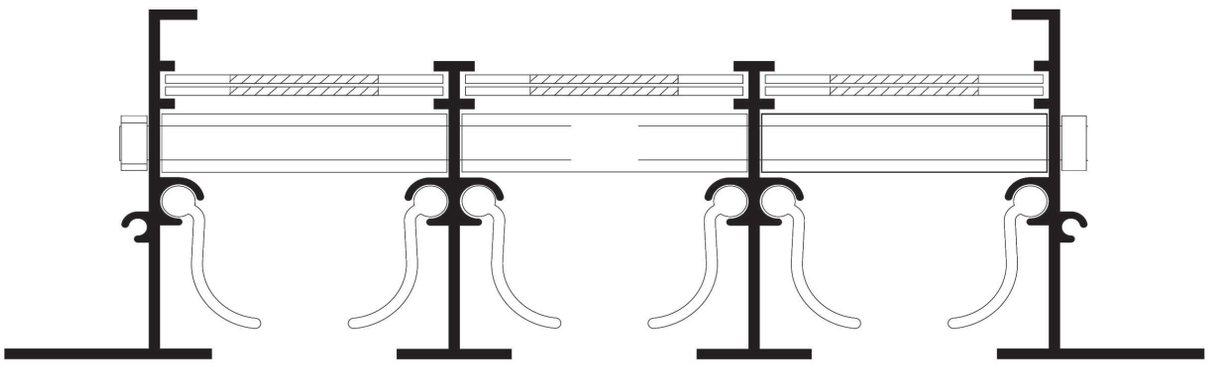


Slot width ¾”						
No. of slot	1	2	3	4	5	6
A (mm)	50	88	126	164	202	240
B (mm)	40	78	116	154	192	230
C (mm)	89	127	165	203	241	279
CFM/FT	25-80	30-90	40-100	60-150	70-175	80-200

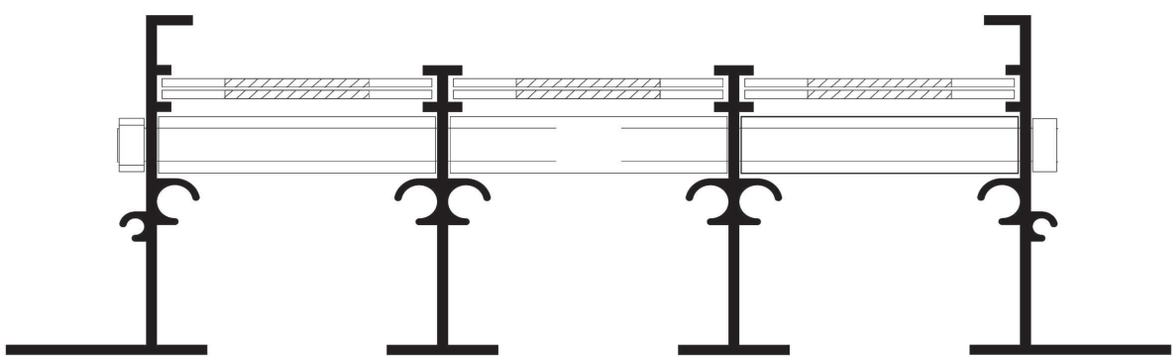
Slot width 1”						
No. of slot	1	2	3	4	5	6
A (mm)	55	98	141	184	227	270
B (mm)	45	88	131	174	217	260
C (mm)	94	137	180	223	266	309
CFM/FT	25-80	40-100	50-125	70-175	80-200	90-250

Models Constructions:

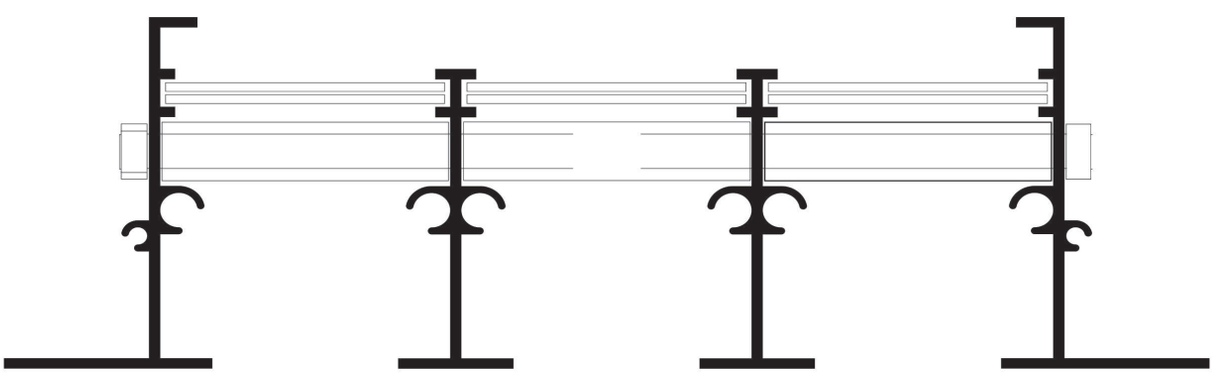
• Linear slot diffuser with deflections blades and hit and miss damper.



• Linear slot diffuser without deflections blades and with hit and miss damper.



• Linear slot diffuser without deflections blades with blanking strip replacing hit and miss damper.



Performance Data:

Air Volume

No. of Slots	Ak (ft ²/ft)	CFM/FT	25	30	40	50	60	70	80
1	0.021	THROW-H	6-11-17	8-15-21	11-17-23	18-23-28	21-26-31	23-28-33	25-30-35
		SP-H	0.084	0.128	0.196	0.352	0.624	0.884	1.444
		NC	22	26	32	40	46	52	58
	0.033	THROW-V	2-4-7	4-7-9	6-9-12	10-13-16	12-15-18	14-17-20	16-19-21
		SP-V	0.039	0.068	0.144	0.324	0.524	0.716	0.956
		NC	<20	<20	22	36	43	48	52
2	0.037	CFM/FT	30	40	50	60	70	80	90
		THROW-H	4-10-17	9-15-22	15-20-25	18-23-28	21-26-31	24-29-34	27-32-37
		SP-H	0.044	0.076	0.156	0.224	0.308	0.384	0.484
		NC	<20	22	31	37	43	46	50
	0.064	THROW-V	2-5-8	4-7-10	6-9-12	9-12-15	11-14-17	13-16-19	15-18-21
		SP-V	0.036	0.052	0.084	0.132	0.204	0.316	0.352
		NC	<20	<20	<20	25	31	36	40
3	0.055	CFM/FT	40	50	60	70	80	90	100
		THROW-H	12-17-22	15-20-24	18-23-26	20-25-29	23-28-32	25-30-35	28-33-39
		SP-H	0.04	0.06	0.09	0.12	0.16	0.2	0.24
		NC	<20	<20	26	30	33	37	40
	0.096	THROW-V	3-7-10	5-9-12	6-10-13	8-13-15	11-15-18	14-17-21	16-20-24
		SP-V	0.01	0.02	0.03	0.05	0.07	0.09	0.11
		NC	<20	<20	<20	<20	22	26	31
4	0.075	CFM/FT	60	70	80	90	100	125	150
		THROW-H	12-18-23	15-21-26	18-23-28	21-26-31	24-29-34	28-33-38	32-37-42
		SP-H	0.048	0.084	0.128	0.164	0.204	0.324	0.484
		NC	<20	24	28	33	36	45	51
	0.124	THROW-V	6-9-11	7-10-12	9-11-14	11-13-16	13-15-18	16-18-21	19-21-24
		SP-V	0.036	0.048	0.084	0.104	0.128	0.204	0.296
		NC	<20	<20	21	24	27	34	40
5	0.095	CFM/FT	70	80	90	100	125	150	175
		THROW-H	13-18-23	17-22-27	19-24-29	21-26-31	24-29-34	29-34-39	34-39-44
		SP-H	0.085	0.15	0.16	0.17	0.23	0.35	0.45
		NC	27	30	34	36	43	49	54
	0.152	THROW-V	5-9-14	7-11-16	10-13-19	13-16-22	15-19-25	17-21-27	20-24-31
		SP-V	0.035	0.045	0.05	0.065	0.1	0.15	0.205
		NC	<20	<20	23	26	33	37	41
6	0.120	CFM/FT	80	90	100	125	150	175	200
		THROW-H	14-19-24	17-22-27	20-25-30	24-29-34	27-32-37	30-35-40	33-38-43
		SP-H	0.039	0.059	0.079	0.124	0.192	0.248	0.336
		NC	<20	22	26	32	37	42	46
	0.189	THROW-V	5-7-9	7-9-12	9-13-15	12-15-18	14-17-20	16-20-23	18-22-25
		SP-V	0.024	0.036	0.044	0.076	0.116	0.156	0.196
		NC	<20	<20	<20	24	28	32	36

Please note the following:

- Airflow values are indicated in CFM (Cubic Feet per Minute) per linear foot, with Ak representing the area factor, and NC levels being determined based on 10dB room absorption.
- Throw data is supplied under isothermal air conditions at terminal velocities of 150, 100, and 50 feet per minute (FPM).
- Horizontal throw data applies to a 1-Way air pattern.
- Static Pressure (SP) values are expressed in inches of water gauge (W.G.), specified as SP-Horizontal and SP-Vertical.
- For return/exhaust applications lacking a pattern controller, the NC level is determined as NC (Vertical) - 3 dB, with the static pressure calculated as 1.25 times SP-Vertical.
- For return/exhaust applications without a damper and pattern controller, the NC level is set as NC (Vertical) - 5 dB, and the static pressure is calculated as 1.1 times SP-Vertical.

Air Volume

No. of Slots	Ak (ft ²/ft)	CFM/FT	25	30	40	50	60	70	80
1	0.021	THROW-H	5-11-17	7-13-19	10-16-22	16-21-26	19-24-29	21-26-31	23-28-33
		SP-H	0.052	0.096	0.192	0.288	0.472	0.656	0.896
		NC	<20	24	31	39	46	52	57
	0.035	THROW-V	2-5-7	3-6-8	6-9-12	9-12-15	11-14-17	13-16-19	15-18-21
		SP-V	0.036	0.048	0.108	0.164	0.236	0.356	0.476
		NC	<20	<20	<20	25	30	35	40
2	0.041	CFM/FT	40	50	60	70	80	90	100
		THROW-H	8-14-21	13-18-22	16-21-26	18-23-28	21-25-29	22-27-31	23-28-32
		SP-H	0.044	0.064	0.136	0.172	0.236	0.328	0.435
		NC	<20	22	30	35	40	45	48
	0.079	THROW-V	3-6-9	5-8-11	8-12-15	10-13-16	11-15-18	13-16-19	14-17-21
		SP-V	0.032	0.044	0.068	0.096	0.136	0.192	0.235
		NC	<20	<20	<20	21	26	30	33
3	0.056	CFM/FT	50	60	70	80	90	100	125
		THROW-H	10-14-20	13-18-23	16-21-26	19-23-28	21-26-30	22-27-31	25-30-35
		SP-H	0.076	0.104	0.156	0.204	0.276	0.356	0.536
		NC	<20	<20	25	30	34	37	45
	0.120	THROW-V	4-7-10	5-8-11	7-10-15	8-13-18	10-15-20	12-17-22	14-20-26
		SP-V	.008	.024	0.036	0.056	0.076	0.112	0.156
		NC	<20	<20	<20	<20	22	25	31
4	0.076	CFM/FT	70	80	90	100	125	150	175
		THROW-H	14-20-25	18-22-28	19-24-29	20-25-30	23-28-33	27-32-37	31-36-41
		SP-H	0.064	0.104	0.144	0.184	0.304	0.448	0.596
		NC	22	27	30	35	42	48	52
	0.161	THROW-V	5-8-11	6-9-13	7-11-16	9-14-18	11-16-22	13-18-25	15-21-27
		SP-V	0.016	0.036	0.044	0.064	0.096	0.148	0.164
		NC	<20	<20	<20	20	25	31	34
5	0.105	CFM/FT	80	90	100	125	150	175	200
		THROW-H	16-20-25	18-23-28	19-24-29	22-27-32	25-30-35	28-33-38	31-36-41
		SP-H	0.044	0.076	0.092	0.156	0.244	0.316	0.416
		NC	20	24	27	34	40	45	49
	0.197	THROW-V	5-8-11	6-10-14	8-12-16	9-14-19	12-17-22	14-20-26	16-22-28
		SP-V	0.024	0.036	0.044	0.072	0.112	0.144	0.176
		NC	<20	<20	<20	21	27	31	34
6	0.127	CFM/FT	90	100	125	150	175	200	250
		THROW-H	16-20-26	18-23-28	21-26-31	24-29-34	27-32-37	29-34-39	32-36-41
		SP-H	0.044	0.064	0.116	0.164	0.216	0.284	0.364
		NC	<20	23	28	35	37	41	45
	0.184	THROW-V	6-9-12	7-10-14	9-13-17	10-15-20	13-18-23	15-20-25	17-23-29
		SP-V	0.024	0.032	0.044	0.076	0.108	0.136	0.164
		NC	<20	<20	<20	23	27	31	34

Please note the following:

- Airflow values are indicated in CFM (Cubic Feet per Minute) per linear foot, with Ak representing the area factor, and NC levels being determined based on 10dB room absorption.
- Throw data is supplied under isothermal air conditions at terminal velocities of 150, 100, and 50 feet per minute (FPM).
- Horizontal throw data applies to a 1-Way air pattern.
- Static Pressure (SP) values are expressed in inches of water gauge (W.G.), specified as SP-Horizontal and SP-Vertical.
- For return/exhaust applications lacking a pattern controller, the NC level is determined as NC (Vertical) - 3 dB, with the static pressure calculated as 1.25 times SP-Vertical.
- For return/exhaust applications without a damper and pattern controller, the NC level is set as NC (Vertical) - 5 dB, and the static pressure is calculated as 1.1 times SP-Vertical.

Definitions:

• Air Pattern:

The throw of a jet refers to the distance an airstream travels from the air outlet to a point where the maximum velocity in the airstream cross-section has been reduced to a selected terminal velocity.

• Throw Distance:

The throw distance of a jet is denoted by Tv, where the subscript V indicates the terminal velocity for which the throw is provided.

• Characteristic Room Length (L):

The characteristic room length is the distance from the diffuser to the nearest boundary wall in the horizontal direction of airflow. However, if the airflow is directed to the opposite diffuser, the characteristic room length is one-half the distance between two diffusers plus the distance the mixed air jet travels downward to reach the occupied zone.

• Terminal Velocity (Vt):

Terminal velocity is the maximum sustained airstream velocity at the end of the throw (e.g., 150, 100, 50 fpm).

• Discharge or Intake Velocity (Vk):

The discharge or intake velocity of an outlet or inlet (in fpm) is the velocity of the airstream measured at certain locations between the outlets or inlet's vanes.

• Area Factor (Ak):

The area factor of an air outlet or inlet is a factor determined from the discharge or intake velocity (Vk) and the volume flow rate (Q in CFM).

Ak = Q/Vk

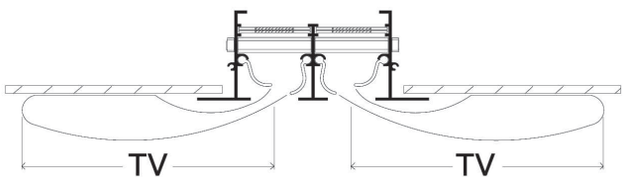
• Throw Data:

All throws indicated in the performance data are based on isothermal air and a 3 feet diffuser slot length. For other lengths, the throws can be determined using specific correction factors.

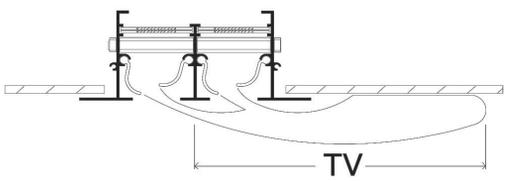
• Noise Criterion Data:

All NC levels shown in the performance data are based on 10dB room absorption and a 3 feet slot diffuser length. For other lengths, the NC levels can be determined using specific correction factors.

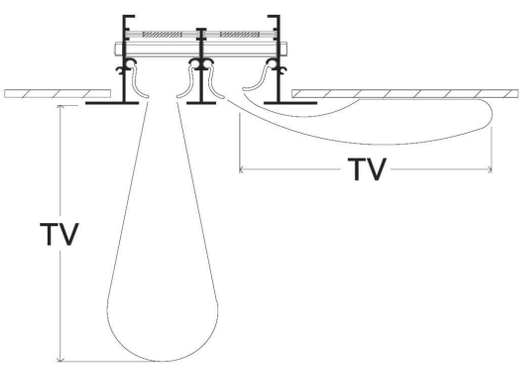
Air Pattern:



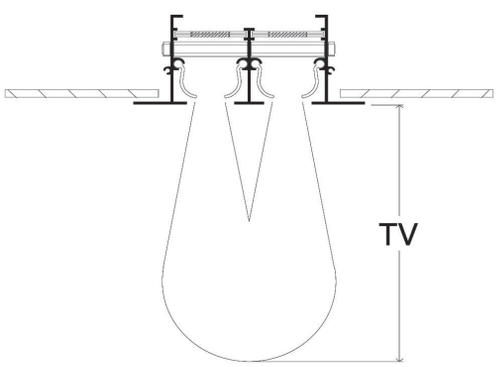
2- Way Horizontal Throw



1- Way Horizontal Throw



Vertical and Horizontal Throw



Vertical Throw

Example:

To determine the appropriate size of the slot diffuser Model SLD1 (1” slot width) for a supply air of 240 CFM with 1-Way horizontal throw, follow these steps:

Solution:

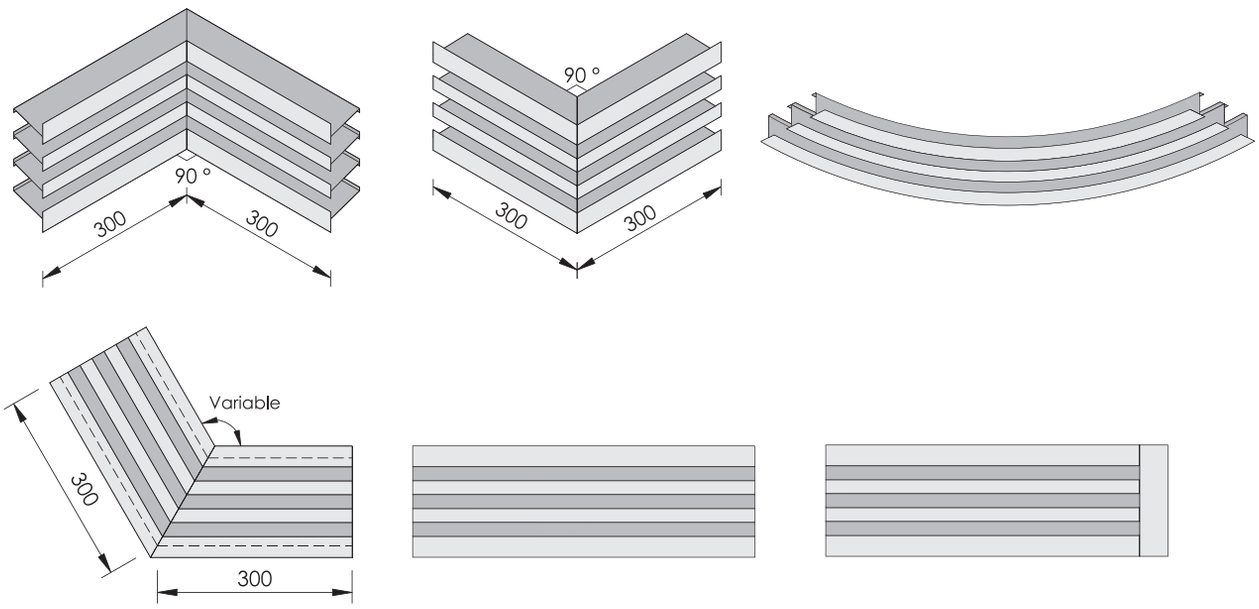
Refer to the performance data of the linear slot diffuser with a 1” slot width.

If 3 slots are selected for the given capacity, the length of the diffuser can be calculated as follows:

For a capacity of 80 CFM per foot, the length of the diffuser is equal to 240 CFM divided by 80 CFM per foot.

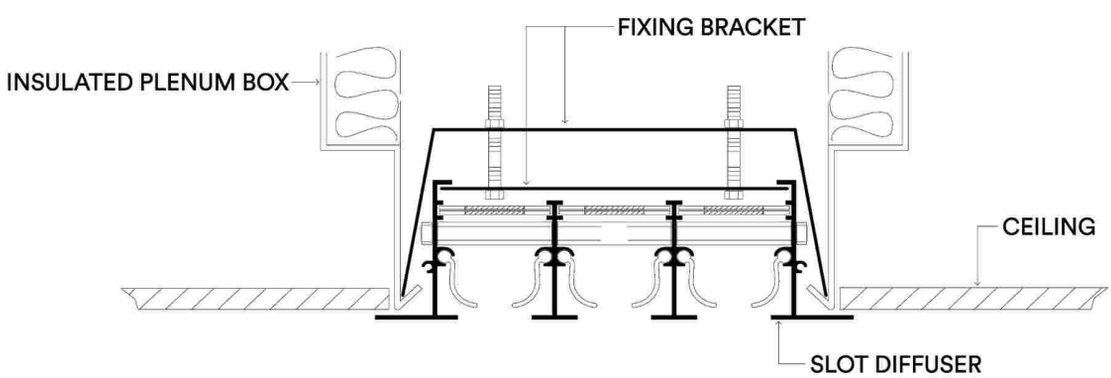
Length =	5 FEET
SP=	0.204
TH @ 150 FBM (TV)=	19 FEET
TH @ 100 FBM (TV)=	23 FEET
TH @ 50 FBM (TV)=	28 FEET
NC LEVEL=	30 DB

Unit Assemblies:

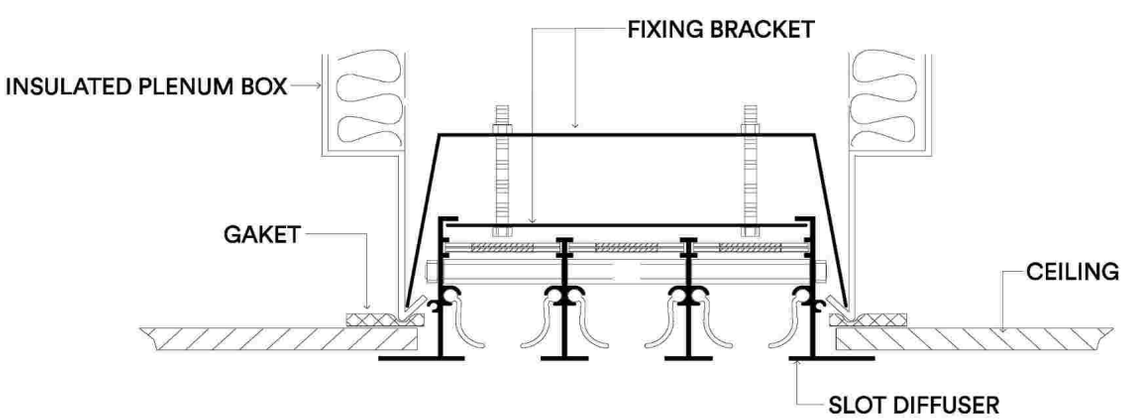


Mounting with plenum box:

• **Option1**

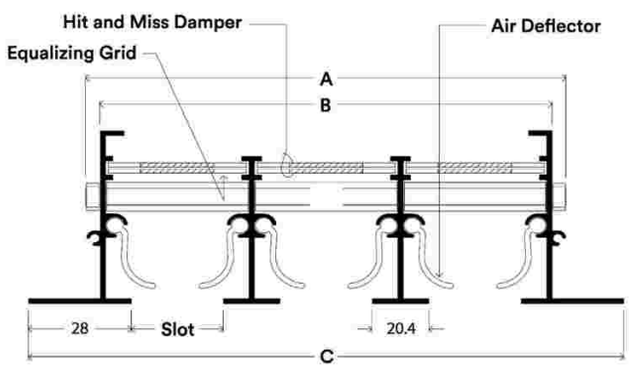


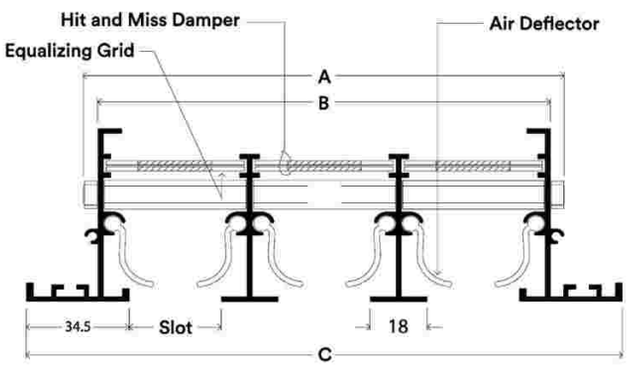
• **Option2**

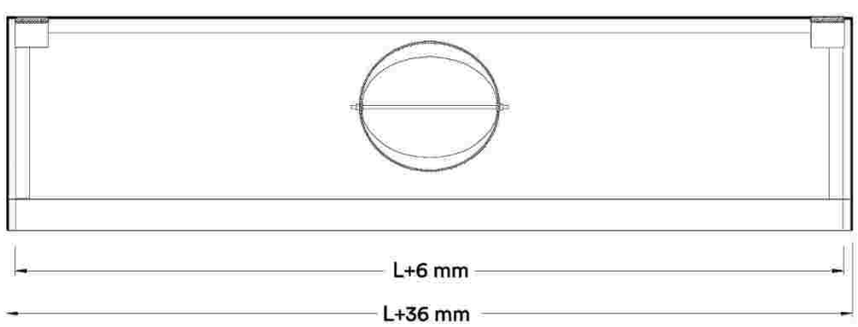


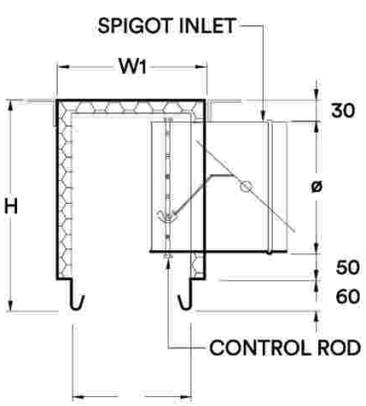
Plenum Slot Description:

1.Introducing our K-110 plenum boxes tailored for slot diffusers, ideal for a wide range of applications including supply, exhaust, and ducted return air systems. Crafted with meticulous attention to detail, our standard construction features galvanized steel sheet Ga.24, meeting ASTM A653 standards for lock forming quality with a thickness of 25mm. Additionally, our plenum boxes come equipped with acoustic lining boasting a density of 48kg/m3, ensuring optimal sound insulation. The exposed surface of the acoustic lining is encased in a robust black cloth facing, providing protection against fiberglass erosion. Furthermore, our plenum boxes feature a spigot inlet with a built-in balancing damper, allowing for effortless adjustment directly from the face of the diffuser for enhanced control.





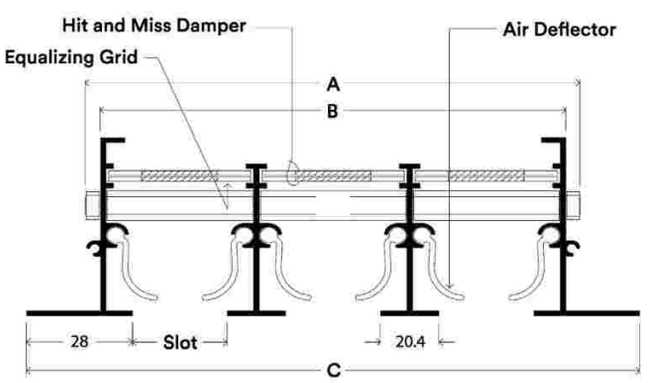


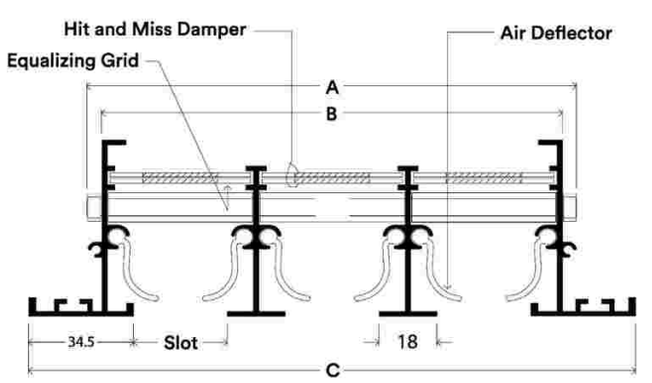


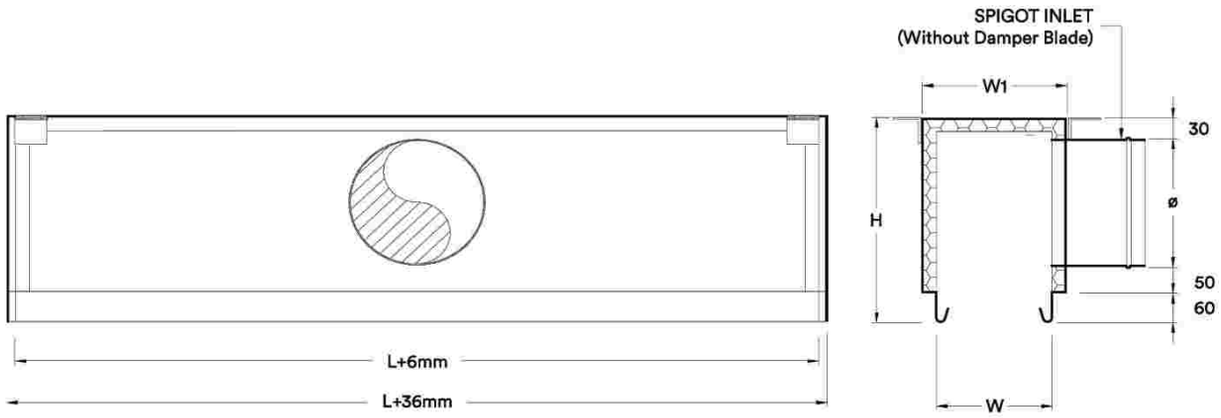
Slot width ¾”						
No. of slot	1	2	3	4	5	6
W (mm)	A+10					
W1 (mm)	W+50					
H (mm)	Φ+140					

Slot width 1”						
No. of slot	1	2	3	4	5	6
W (mm)	A+10					
W1 (mm)	W+50					
H (mm)	Φ+140					

2.Introducing our VK-140 plenum boxes, expertly crafted to complement slot diffusers, providing versatility for supply, exhaust, and ducted return air systems. Constructed to the highest standards, each plenum box features galvanized steel sheet Ga.24, meeting ASTM A653 specifications for lock forming quality with a thickness of 25mm. Additionally, our plenum boxes are equipped with acoustic lining boasting a density of 48kg/m³, ensuring exceptional sound insulation. The exposed surface of the acoustic lining is reinforced with a robust black cloth facing, offering reliable protection against fiberglass erosion. It’s important to note that the spigot inlet of our VK-140 plenum boxes does not include a balancing damper, ensuring simplicity and ease of installation.







Slot width ¾” (mm)						
No. of slot	1	2	3	4	5	6
W (mm)	A+10					
W1 (mm)	W+50					
H (mm)	ϕ+140					

Slot width 1” (mm)						
No. of slot	1	2	3	4	5	6
W (mm)	A+10					
W1 (mm)	W+50					
H (mm)	ϕ+140					

Ordering Data:

Ordering Data

•Model code.

•Slot Diffuser Dimensions.

•Surface Finishes for Slot Diffuser.

-Natural/Matt Silver Anodized.

-Powder Coating (standard 9010/9016) Other Colours Are Optional.

-Aluminium In Mill Finish.

-Other Special Finish Is on Request If Available.

CASTLE
ENGINEERING
INDUSTRIES

Contact Us

Address: 28km, Alex-Cairo Desert Road,
Abu Rawash Industrial Zone, Giza, Egypt.

Email: sales@castle-ei.com

Tel: +202 353 94394
Mob: +20 1288012995
Mob: +20 1281217517
Mob: +20 1273637171

Contact

Location