

PRODUCT BROCHURE

SMARTEMP[®]
IN COMFORT



Linear Multistream Ceiling Diffuser

LMC-AD

DESCRIPTION



The SMARTEMP® **Linear Multistream** Ceiling Diffuser, type LMC-AD (figure 1), is a multi-nozzle linear slot diffuser with adjustable discharge direction that can be flush mounted in a ceiling or freely suspended (ie no Coanda attachment to the ceiling required).

The diffuser's 1-to-6 linear slots house a plurality of barrel nozzles, each with an adjustable guide vane, delivering highly inductive discharge by breaking the supply air stream up into a multitude of alternating air jets.

Each barrel nozzle is made of black polycarbonate located between linear aluminium extrusions that are anodised or powder coated. Each guide vane is readily adjustable to any one of five discharge patterns (figure 2 - three 2-way blow examples shown) to change the discharge angle from horizontal through diagonal to vertical (figures 3 & 4). Two-way discharge is standard (figures 3 & 4); one-way discharge is available as an option (figure 5).

Intense mixing at the diffuser discharge face produces high induction that strongly dilutes the supply air stream with large quantities of room air. Rapid temperature equalisation of the supply air stream with room air occurs, preventing cold air dumping, thereby ensuring uniform temperature distribution (no cold and draughty or hot and stagnant spots) and high comfort levels in the space. Heating performance is also improved.

The stable discharge characteristics of the diffuser over a wide range of supply air temperatures and volume flow rates make the LMC-AD suitable both for constant flow and VAV systems, including low temperature air supply.

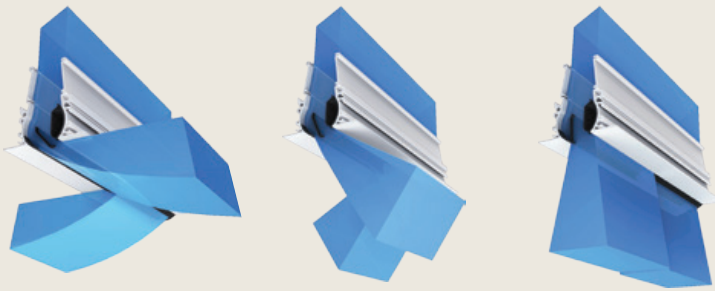
LMC-AD	Volume flow rate*		
Slots	\dot{V} [L/s/m] $\Delta T = -16$ K	\dot{V} [L/s/m] $\Delta T = -12$ K	\dot{V} [L/s/m] $\Delta T = -8$ K
1	9-36	8-36	6-36
2	19-75	16-75	13-75
3	29-116	25-116	21-116
4	38-150	33-150	27-150
5	47-188	41-188	33-188
6	57-228	49-228	40-228

*Max \dot{V} based on 35 Pa P_t max (including side-entry connection box).



Figure 1

DISCHARGE DIRECTION EXAMPLES WITH 2-WAY PATTERN



Direction A

Direction C

Direction E

Figure 2

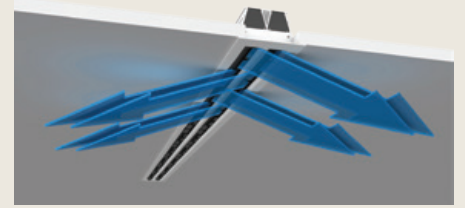


Figure 3

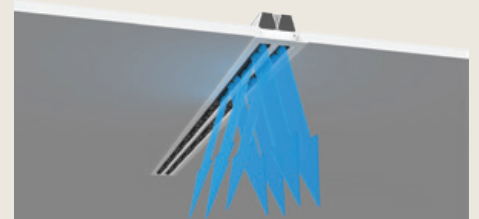


Figure 4

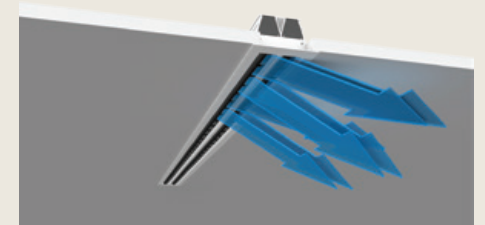


Figure 5

CONSTRUCTION

- 1 - Plenum Box
- 2 - Supply Air Diffuser
- 3 - Return Air Diffuser
- 4 - Expansion Bracket
- 5 - Joining Strip
- 6 - Corner piece
- 7 - End Flange

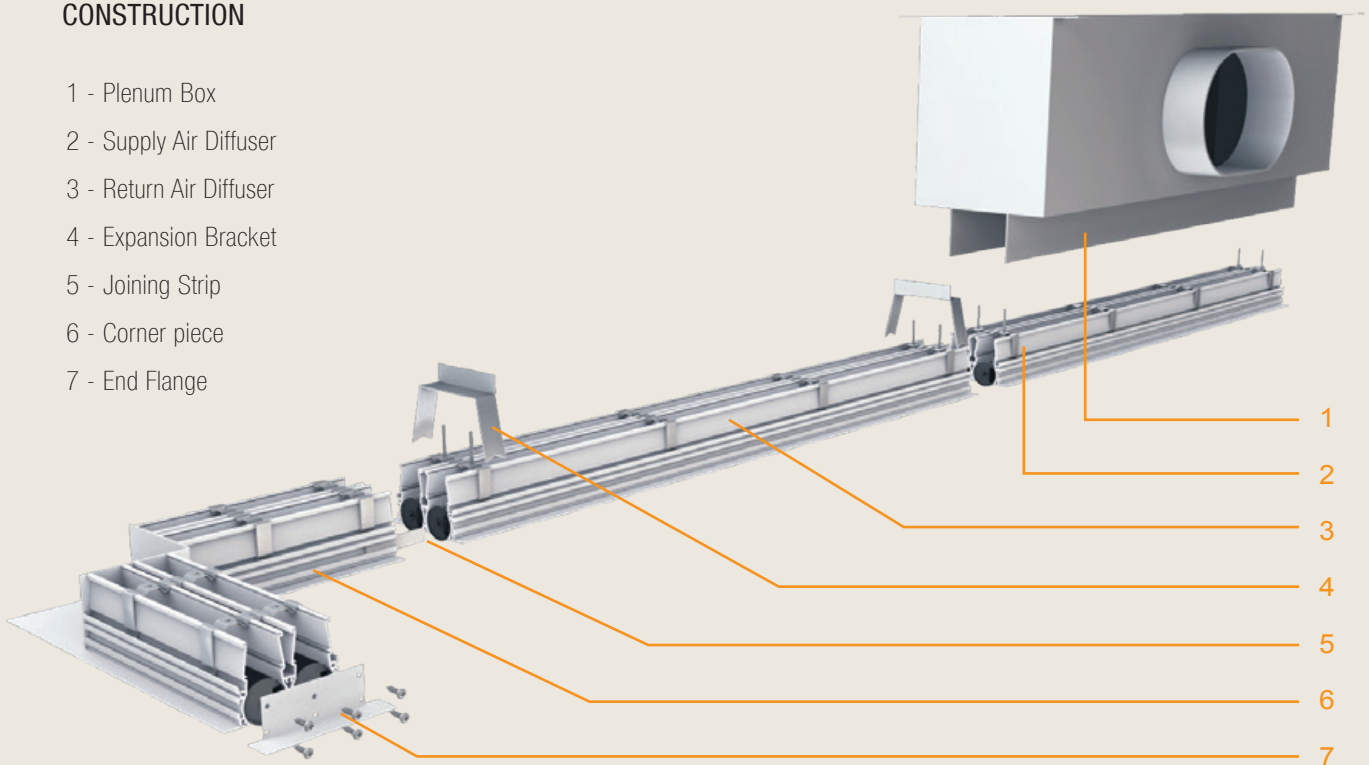
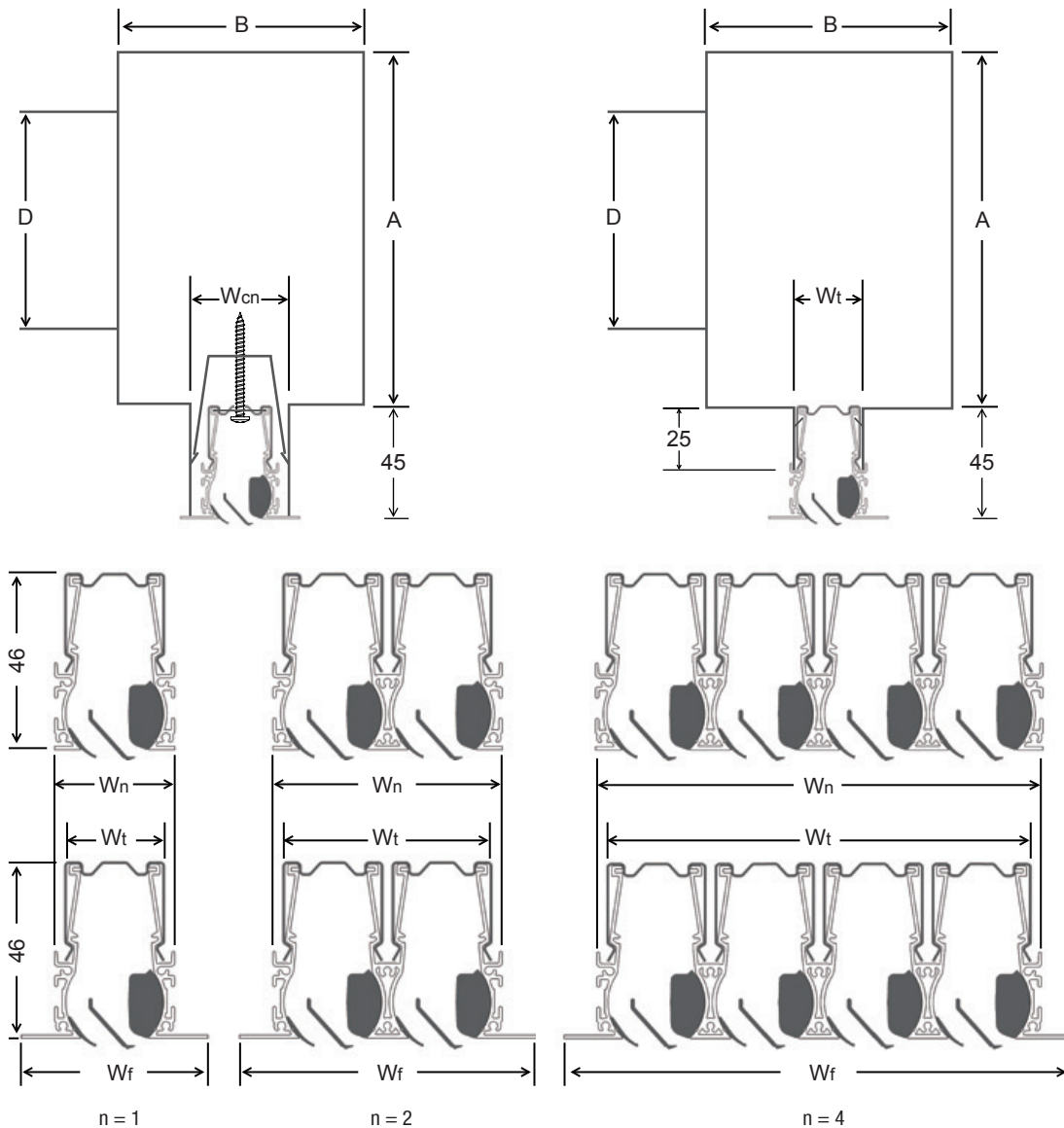


Figure 6

TECHNICAL DATA



DIMENSIONS

Number of Slots (n)	1	2	3	4	5	6	n
Width Flangeless Face W_n [mm]	31	59	87	115	143	171	$28 \cdot n + 3$
Width Flanged Face W_f [mm]	48	76	104	132	160	188	$28 \cdot n + 20$
Width of Diffuser Throat W_t [mm]	27	55	83	111	139	167	$28 \cdot n - 1$
Width of Plenum Neck W_{cn} [mm]	41	69	97	125	149	176	$41 + (n-1) \cdot 28$
Recommended Plenum Height A [mm]*	200	255	300	325	355	390	$D + 76$
Recommended Plenum Width B [mm]*	81	109	137	165	193	221	$W_n + 50$
Recommended Spigot Dimension D [mm]* per 1 m length	124	179	224	249	279	314	$< 3.6 \text{ m/s}$
Recommended Spigot Dimension D [mm]* per 1.5 m length	149	224	249	279	314	354	$< 3.6 \text{ m/s}$

*Check exact dimension with local supplier

Standard neck lengths: 1050, 1200, 1350, 1500 mm. Other lengths on request.

Neck length (including screw heads) increases by 3.0 mm per end flange.

NOTES TO NOMOGRAM ON PAGE 6

Comments / Nomogram valid for:

2 Heating valid for 100% high-level return.

Valid for discharge from closed ceiling.



Adjustments:

For low-level return:

$\Delta T_{\text{max, heating}} \approx (1 + (\text{LRA}\%)/100) \bullet \Delta T_{\text{max}}$, where $\text{LRA}\% = \% \text{ low-level return}$.

For freely suspended diffuser:

Heating $\Delta T_{\text{max, freely suspended}} \approx \Delta T_{\text{max, heating}} / 1.2$



Recommended Air Pattern Settings:

For H = 2 to 3 m:

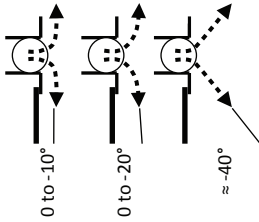
A: 0° to -10° discharge to the horizontal.

For H = 3 to 4 m:

B: 0° to -20° discharge to the horizontal.

For H = 4 to 5 m:

C: $\approx -40^\circ$ discharge to the horizontal.



3 Total pressure (P_t) is inclusive of side-entry connection box pressure loss.

4 Draw a line vertically down the nomogram for 2-way blow, or correct for 1-way blow.

5 For height ≤ 2.7 m select height twice (once in the grey zone; once in the white zone).

6 C_{min} is either the minimum spacing between two 2-way blow diffuser rows (halve this value for throw to walls / glazing) or the minimum throw of a 1-way blow diffuser row.

7 C_{max} is either the maximum spacing between two 2-way blow diffuser rows (halve this value for throw to walls / glazing) or the maximum throw of a 1-way blow diffuser row. Active Length Ratio (R_{LA}) is the ratio of the active length L_A relative to the room length L . Determine C_{max} twice (once for cooling ΔT ; once for discharge height) then select the lower of the two outputs.

8 Select desired comfort level to determine minimum and maximum spacing or throw (C_{min} & C_{max}) and minimum discharge height (H_{min}).

H_{min} for discharge from closed ceiling.

For freely suspended diffuser:

$H_{\text{min, freely suspended}} \approx H_{\text{min}} \bullet 1.1$



9 Sound pressure level L_P [NC/m] is valid in a standard commercial office only with 2.7 m to 3 m ceiling.

Thermal Comfort Guide:

ADPI $\geq 95\%$: **Premium comfort** sedentary activity, such as in auditoria.

ADPI $\geq 90\%$: **High comfort** near-sedentary activity, such as in board rooms, high end offices and libraries.

ADPI $\geq 80\%$: **Good comfort** near-sedentary activity, such as in open-plan offices and meeting rooms.

ADPI $\geq 70\%$: **Standard comfort** medium activity, such as in transient spaces, retail and lobbies.

Layout Recommendations:

Refer to nomograms for performance data.

Notes:

- Spacing:

$$C_{\min} \leq C \leq C_{\max}$$

$$C_{\text{walls}} = C/2$$

- Active Length Ratio:

$$R_{LA} = L_A / L, \text{ where}$$

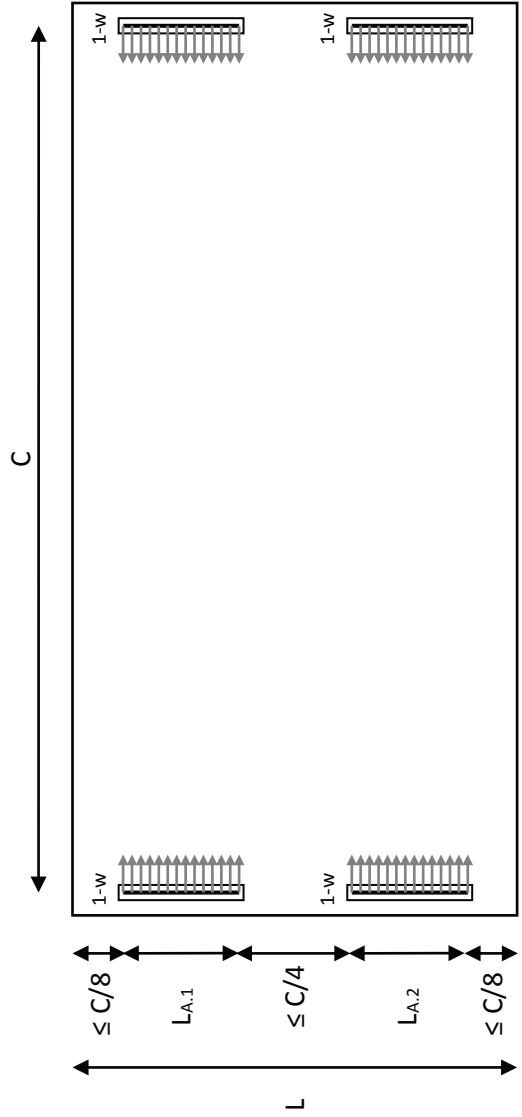
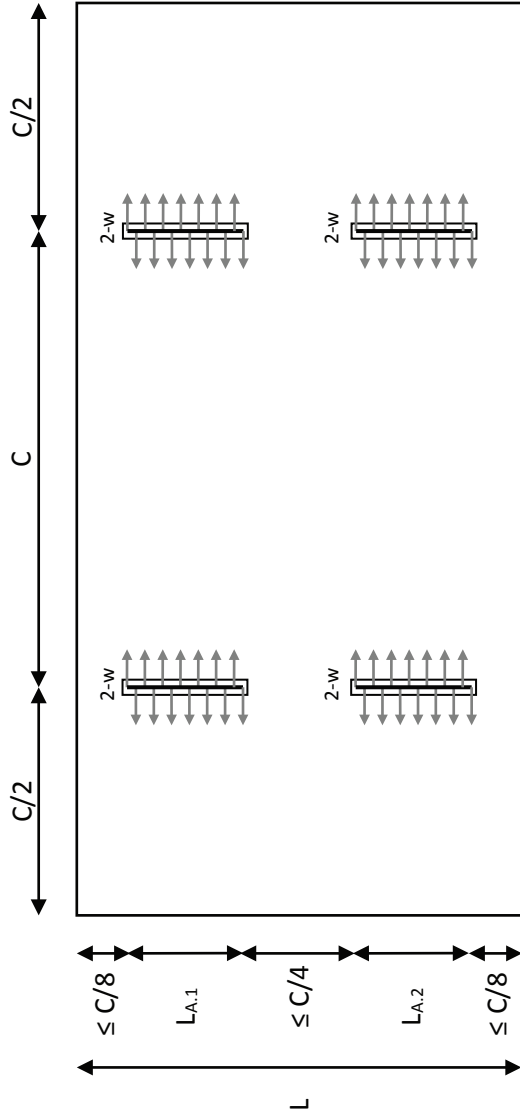
$$L_A \geq 0.1 \bullet L, \text{ and}$$

$$L_A = \sum L_{A,i}$$

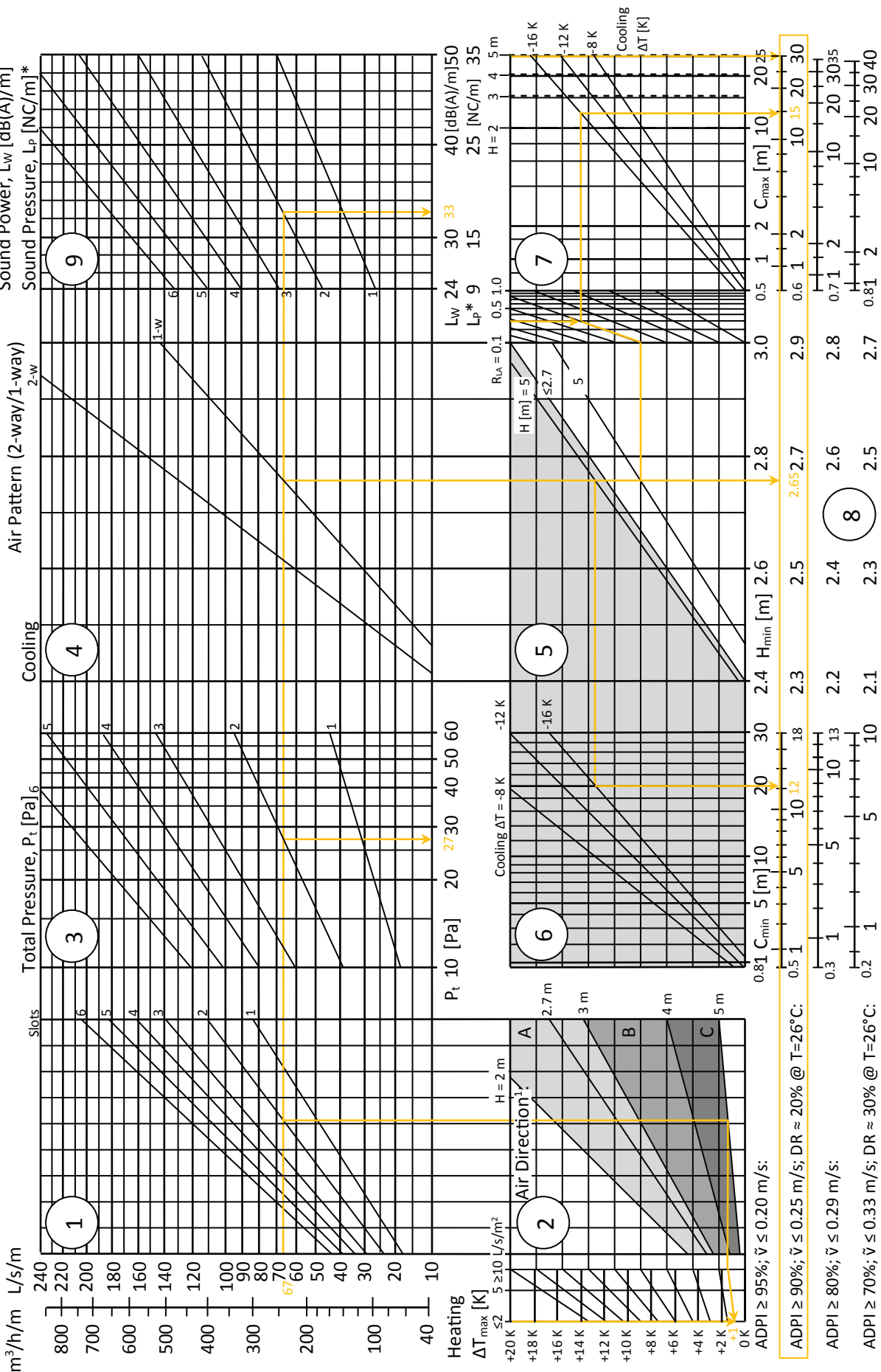
- Air Pattern:

2-w: 2-way blow

1-w: 1-way blow



LMC-AD



Notes:

* Based on 10 dB room absorption.

¹ Air Direction: A ≈ 0 to -10° ; B ≈ 0 to -20° ; C $\approx -40^\circ$

REFER TO NOTES ON PAGE 4

EXAMPLE: LMC-AD-2.1

Determine performance parameters for a row of LMC-AD-2.1 (two-slot; one-way blow) operating at 67 L/s, freely suspended at 5 m height, supplying approximately 2 L/s/m² to a library. The sum of the diffuser lengths spans 30% of the library length. The supply-to-room temperature differential when cooling is -16 K. 100% return air is from a low level.

- 1 Select a double slot (Slots 2).
- 2 5 m discharge height requires the diffuser air pattern to be set to C ($\approx -40^\circ$ from the horizontal).
Select ≤ 2 L/s/m² specific airflow, which gives a maximum heating temperature differential (ΔT_{\max}) of +1 K, valid for discharge from a closed ceiling and 100% high-level return.
For 100% low-level return, $\Delta T_{\max, \text{heating}} \approx (1 + (\text{LRA}\%)/100) \times \Delta T_{\max} \approx (1 + (100/100)) \bullet 1 \text{ K} \approx +2 \text{ K}$.
As the diffuser is freely-suspended, $\Delta T_{\max, \text{freely suspended}} \approx \Delta T_{\max, \text{heating}} / 1.2 \approx +1.7 \text{ K}$.
(This is not sufficient for heating. Consider using the Smartemp HSC-AD if heating is required.)
- 3 The total pressure (P_t) is 27 Pa, inclusive of side-entry connection box pressure loss.
- 4 To determine layout recommendations in cooling mode, select 1-w (one-way blow) air pattern.
- 5 Select 5 m discharge height twice (once in the grey zone; once in the white zone).
- 6 Select -16 K cooling.
- 7 Select $R_{LA} = 0.3$ (ie 30% active length ratio for 30% diffuser span across the library length). Select -16 K cooling and 5 m discharge height.
- 8 For a library, select ADPI = 90%. C_{\min} between two diffuser rows is 12 m (6 m to walls). $H_{\min, \text{freely suspended}} \approx H_{\min} \bullet 1.1 \approx 2.65 \bullet 1.1 \approx 2.9 \text{ m}$.
 C_{\max} between two diffuser rows is 15 m (ie the lower of 15 m for -16 K cooling and 30 m for 5 m discharge height) or 7.5 m to walls.
- 9 The A-weighted sound power level (L_w) of the diffuser is 33 dB(A). As this is a large volume library (and not a 2.7 to 3 m ceiling height office) the sound pressure level (L_p) should not be used (ie only L_w should be used for acoustical calculations).

ORDER DETAILS

LMC-AD-____-____-____-____-____-____-____-____

ACCESSORIES:

- 0* - Diffuser only.
- Kt - With uninsulated connection box clipped to diffuser throat.
- Kn - With uninsulated connection box screwed into diffuser neck.
- KIt - With internally insulated connection box clipped to diffuser throat.
- KIn - With internally insulated connection box screwed into diffuser neck.

BARREL COLOUR:

- B* - Black.
- W - White.

PROFILE COLOUR:

- RAL____ (Signal White RAL9003* standard).

FIXING :

- 0* - Without accessories / by others.
- EX - Expansion bracket.

DIFFUSER ENDS:

- 0 - Without end flange.
- E1 - 1 End flange + 2 joining strips.
- E2* - 2 End flanges.
- J - 2 Joining strips.

PROFILE TYPE:

- F* - With side flanges.
- N - Flangeless.

AIR PATTERN & DIRECTION:

- 2A* - 2-way horizontal, position A (0 to -10°).
- 1A - 1-way horizontal, position A (0 to -10°).
- 2B - 2-way horizontal, position B (0 to -20°).
- 1B - 1-way horizontal, position B (0 to -20°).
- 2C - 2-way diagonal, position C (≈ -40°).
- 1C - 1-way diagonal, position C (≈ -40°).
- 2D - 2-way vertical, position D (broad, short).
- 1D - 1-way vertical, position D (broad, short).
- 2E - 2-way vertical, position E (narrow, long).
- 1E - 1-way vertical, position E (narrow, long).

NUMBER OF SLOTS:

- 1, 2, 3, 4, 5, 6.
- Other slots available on request.

NOMINAL NECK LENGTH:

- 1050.
- 1200.
- 1350.
- 1500.
- Other lengths available on request.

MODEL:

- Linear Multistream Ceiling - Adjustable Direction.

Note: * Standard, if no type code entered

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