54 Audia Court, Unit 2
Concord, ON L4K 3N5
(905)-738-1400

Submittal 22-001-015

PROJECT NAME	PROJECT ADDRESS	DATE SUBMITTED
ENBRIDGE BLDG B 22-001	405 Eastern Ave, Toronto, ON, M4M 1B7	Feb 14, 2023

TO	FROM
Ananth Manigandan	MOHAMMED LODHI
COMPANY	COMPANY
ROCHON BUILDING CORPORATION	Consult Mechanical Inc.
EMAIL	EMAIL
AManigandan@rochonbuildingcorp.com	mohammed.l@consultmechanical.com
ADDRESS	ADDRESS
74 INDUSTY STREET TORONTO, ON M6M 4L7	54 Audia Court, Unit 2 Concord, ON L4K 3N5

Title

NAD KLIMA DIFFUSER

Description

HIGH INDUCTION DIFFUSERS

Package Items

SPEC	SUBSECTION	ITEM	TYPE

Submittal
No. 23.000020.0

WALTERFEDY
Kitchener | Hamilton | Toronto | walterfedy.com

Final Status: Reviewed as Modified

Title:	NAD Klima Diffuser Submittal	**Type:**	Shop Drawings
Project No.:	2019-0248-10	**Status:**	Returned
Project:	ENB_STN-B	**Priority:**	Review Required
Division:	23. Heating, Ventilating, and Air Conditioning (HVAC)	**Reference:**	
Number:	23.000020.0	**Subcontract:**	Work Release to Master Construction Agreement
Revision:	0		
Required by Subcontractor On:		**Required from Consultant On:**	2023-Feb-13

Description

23-000.20 – NAD Klima Diffuser Submittal

Attachment(s):

History:

Action Taken: Reviewed as Modified

From:	Sahil Mehan WalterFedy 675 Queen Street South Suite 111 Kitchener, ON, N2M1A1 Canada (519) 576-2150	**To:**	Daniel Librandi Rochon Building Corporation 74 Industry Street York, Ontario, M6M 4L7 Canada (416) 638-6666
Status:	Issued	**Date:**	2023-Feb-15
Carrier:		**Waybill:**	
CC:	Mike Piorello Rochon Building Corporation 74 Industry Street York, Ontario, M6M 4L7 Canada (416) 638-6666		Steve Raviele Rochon Building Corporation 74 Industry Street York, Ontario, M6M 4L7 Canada (416) 638-6666

Submittal
No. 23.000020.0

WALTERFEDY
Kitchener | Hamilton | Toronto | walterfedy.com

Final Status: Reviewed as Modified

Taha Canan
Rochon Building Corporation
74 Industry Street
York, Ontario, M6M 4L7
Canada
(416) 638-6666

Comments:

Attachment(s):

23-000.20 - NAD Klima Diffuser Submittal

Action Taken: Reviewed as Modified

From:	Patrick Dormer WalterFedy 675 Queen Street South Suite 111 Kitchener, ON, N2M1A1 Canada (519) 576-2150	**To:**	Cody Hewlin WalterFedy 675 Queen Street South Suite 111 Kitchener, ON, N2M1A1 Canada (519) 576-2150
Status:	Issued	**Date:**	2023-Feb-14
Carrier:		**Waybill:**	
CC:			

Comments:

Attachment(s):

Action Taken: Reviewed as Modified

From:	Clint Ehgoetz WalterFedy 675 Queen Street South Suite 111 Kitchener, ON, N2M1A1 Canada (519) 576-2150 ext 266	**To:**	Patrick Dormer WalterFedy 675 Queen Street South Suite 111 Kitchener, ON, N2M1A1 Canada (519) 576-2150

Submittal
No. 23.000020.0

WALTERFEDY
Kitchener | Hamilton | Toronto | walterfedy.com

Final Status: Reviewed as Modified

Status:	Issued	**Date:**	2023-Feb-14
Carrier:		**Waybill:**	
CC:			
Comments:			

Attachment(s):

Action Taken:	Reviewed as Modified		
From:	Nick Bertoia WalterFedy 675 Queen Street South Suite 111 Kitchener, ON, N2M1A1 Canada (519) 576-2150	**To:**	Clint Ehgoetz WalterFedy 675 Queen Street South Suite 111 Kitchener, ON, N2M1A1 Canada (519) 576-2150 ext 266
Status:	Issued	**Date:**	2023-Feb-14
Carrier:		**Waybill:**	
CC:			
Comments:			

Arch please review for aesthetics and colour choice on engineered ductwork

Attachment(s):

Rochon BUILDING CORPORATION

SHOP DRAWING TRANSMITTAL

DRAWING REVIEW

This review is for the sole purpose of ascertaining conformance with the design concept and does not relieve the subcontractor of their responsibilities for errors and omissions or for meeting all requirements of the contract documents.

DATE: February 7, 2023
☒ Reviewed ☐ Reviewed As Modified
☐ Revise And Resubmit

REVIEWED BY: Daniel Librandi

Rochon BUILDING CORPORATION
74 industry Street, Toronto, Ont. M6M 4L7

TRANSMITTED: ☐ FAX ☐ COURIER ☐ MAIL ☐ HAND ☑ EMAIL

PROJECT NAME: Enbridge Station B **DATE:** February 7, 2023

PROJECT NO.: B21070 **FROM:** Daniel Librandi

SUBJECT: 23-000.20 – NAD Klima Diffuser Submittal

TO	CC	COMPANY	ATTENTION	PHONE	EMAIL
X		WalterFedy Architects	Patrick Dormer		pdormer@walterfedy.com
X		WalterFedy Architects	Cody Hewlin	519-576-2150 EXT:434	cody.hewlin@walterfedy.com
X		WalterFedy Architects	Wade Brown	519-576-2150 Ext:472	wbrown@walterfedy.com
	X	Enbridge	Sal Simone	416-272-8162	Sal.Simone@enbridge.com
	X	Enbridge	Steve Dinopoulos		steve.dinopoulos@enbridge.com
	X	Enbridge	Anthony Roti	416-795-9752	anthony.roti@enbridge.com

REMARKS

ITEM #	PREPARED BY	DESCRIPTION
1	Consult Mechnaical	23-000.20 – NAD Klima Diffuser Submittal

If Items are not received as listed please notify us immediately.

☑ **FOR APPROVAL**

☐ **FOR FABRICATION**

☑ **FOR YOUR USE**

☐ **AS REQUESTED**

☐ **APPROVED**

☐ **APPROVED AS NOTED**

☐ **REJECTED**

☐ **REVISION & RESUBMISSION**

VENTILATION
COMMERCIAL
INDUSTRIAL
HIGH PERFORMANCE BUILDING PRODUCTS

8851 Hwy 50 Unit 1
Woodbridge, ON, L4H 4V5
P 416.674.6744 **F** 416.674.0293

www.eficoncepts.com

SUBMITTAL

Project Name: Enbridge Station B Toronto

Date: 2023-01-20

Customer: Airex Inc.

Customer PO: 1023148

Engineer: Walter Fedy Partnership

Ref #:

Submitted By: George Lazarevski

EFI #: A220281SS

Item	Equipment	Tags	Description	Rev	# Pgs	# Sets
1	NAD Klima	S1, S2, S3, S4	Model DAL358	1	4	1
1	NAD Klima	S10 to S21	Model RRA	1	33	1

Engineer's Comments

EFI Master notes:

1. Confirm colour and dimensions before release.
2. Duct tags S20, S21 added.
3. Duct EF (tag S17) diameter increased according to the flow rate 516 L/s.
4. Tags S1, S2, S3, S4 included.

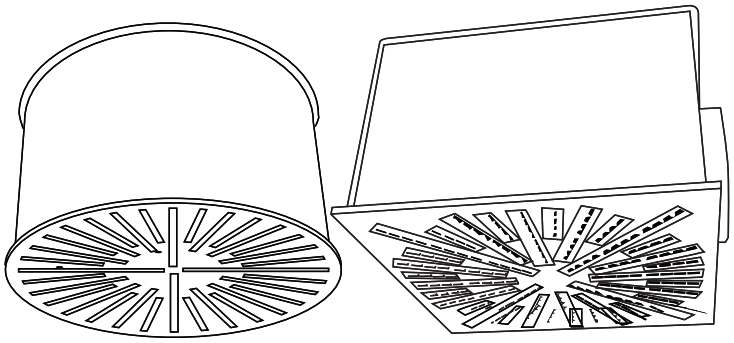
George Lazarevski, Inside Sales Representative, glazarevski@master.ca, 905-850-4811 x50321

DAL 358 Submittal

NAD Klima Ontario
2840, Argentia Road, Unit 6 , Mississauga (Ont) L5N 8G4
(416) 860-1067
ontario@nadklima.com

NAD Klima
144 rue Léger, Sherbrooke (Qué) J1L 1L9
(819) 780-0111 • 1 866 531-1739
info@nadklima.com

Date	
Project	
Engineer	
Contractor	



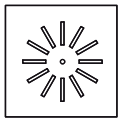
The diffuser

- Made of 20 ga. mat finished steel.
- The round or square front plate integrated eccentric adjustable rollers.
- The 100 mm long eccentric rollers shall have an alphanumeric identification, which will allow adjustment of the air flow pattern over 180 degrees.
- Adapted to fit regular North American suspended ceilings or classic gypsum ceilings.
- Configurations allowing a helical air diffusion or in 1, 2 or 3 ways, corner or "L". (see page 2)
- Powder coated with a polyester TGIC-free paint,
- Colour from the RAL colour chart, according the client choice

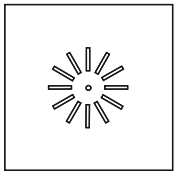
Plenum

- Made and tagged by the diffuser's manufacturer.
- Made from 24-gauge galvanized steel
- Perforated stabilizing (equalizing) plate,
- Four suspension points which adhere to paraseismic standards,
- The inlet shall be centered on the side or on the top of the plenum, and its size shall be calibrated to accommodate the airflow rate.
- The joints of the plenum shall be sealed with caulking, which is free of VOC (volatile organic compounds) emissions.
- The diffuser front plate shall be attached to the plenum by a central screw.

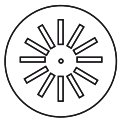
Configuration



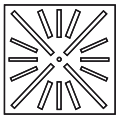
DAL 358-Q-300/400



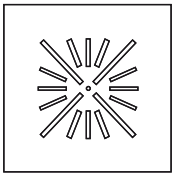
DAL 358-Q-300/603



DAL 358-R-300

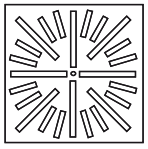


DAL 358-Q-400/400

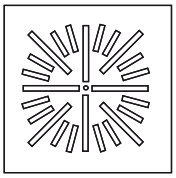


DAL 358-Q-400/603

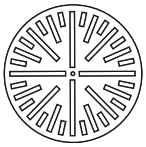
DAL 358-R-400



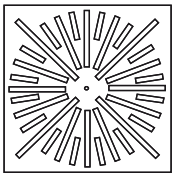
DAL 358-Q-500/502



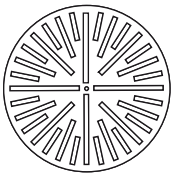
DAL 358-Q-500/603



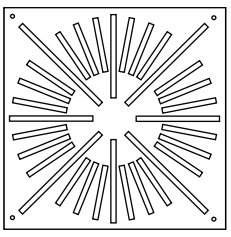
DAL 358-R-500



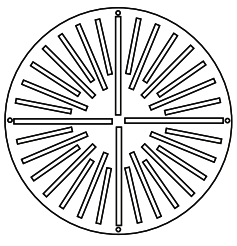
DAL 358-Q-600/603



DAL 358-R-600



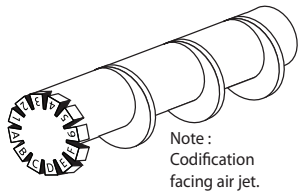
DAL 358-Q-800/800

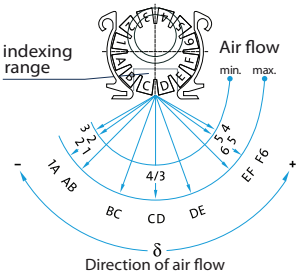


DAL 358-R-800

DAL 358 - Air flow and air direction

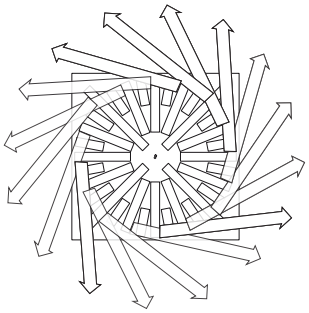
The 100 mm long eccentric rollers can be rotated 360 degrees. In standard position (21), the eccentric rollers establish, through the profile of the slots, a streamline through which carried along. At the outlet of the roller, a low pressure is created, generating a high rate of induction.

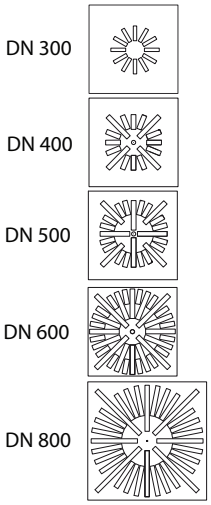




DN 600 360° swirl airflow

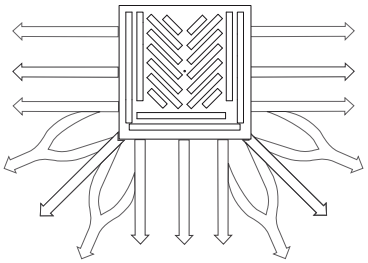
ST = Standard swirl airflow (21)
HL = Flow rise (>5 m)
(exterior 21 and center CD)
VF = Vertical airflow (CD)

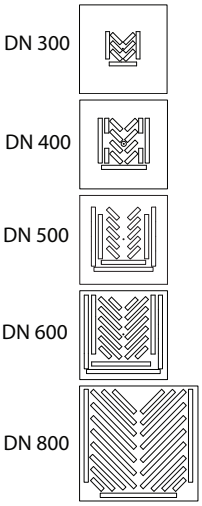




DN 600 3 directions covering 180°

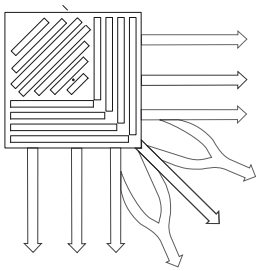
3W = Airflow 180° (wall) (21- 34)

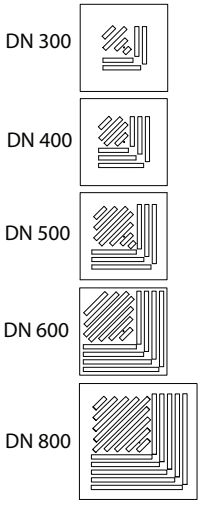




DN 600 2 airflow direction at 90°

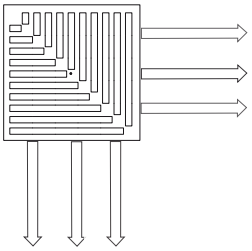
2C = Airflow 90° (corner) (21)

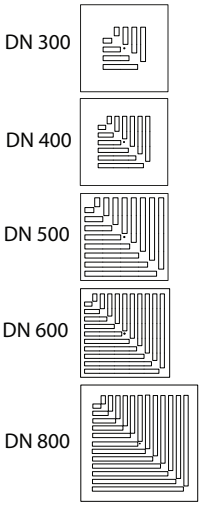




DN 600 2 directions in the corner

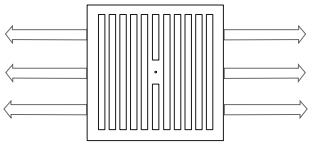
2L = Airflow in two directions in an L shape
(2 streams) (21)

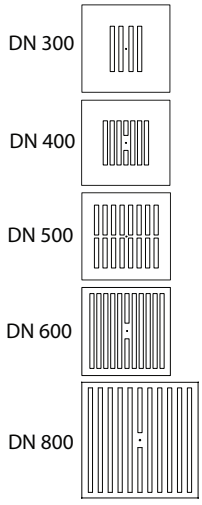




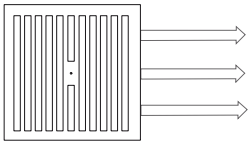
DN 600 2 opposing directions

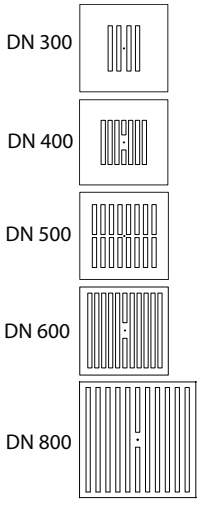
2W = Airflow on two opposing directions (21- 56)





DN 600 1 direction





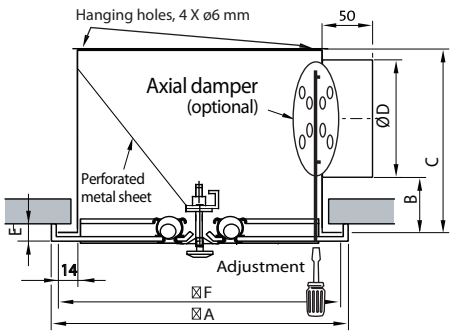
The technician have to take consideration the correction factor when using balometer in balancing air volume.
These correction factors are indicated in diffuser's installation guide or in DAL 358's Catalog.

DAL 358 - Dimensions and weight

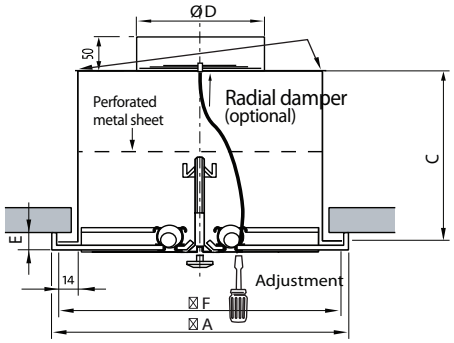
squarre plenum

DN	300/400	500	600	800
Size A	603	603	603	800
Size B	76	82	68	66
SizeC	251	312	347	411
Size ØD	150/200	200/250	200/250	300
Size E	12	12	12	12
Size F	387	488	584	790
Weight [Kg]	4.5/4.7	7.4	11	17.1
A_{eff} [m^2]	0.0080/0.0134	0.0214	0.0347	0.0508

Side inlet



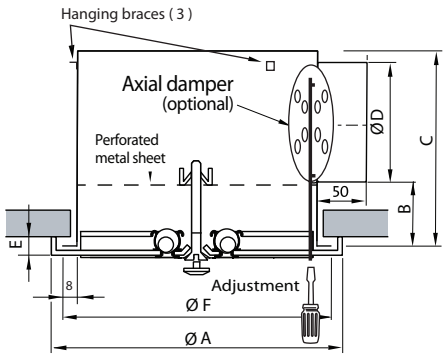
Top inlet



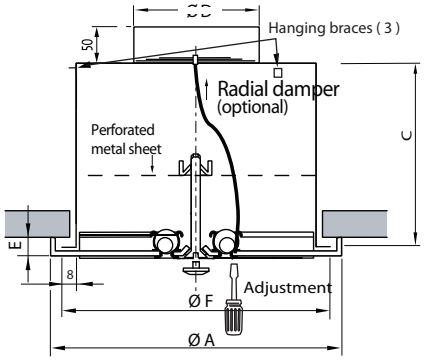
round plenum

DN	300/400	500	600	800
Size ØA	400	500	600	800
Size B	76	82	67	66
Size C	252	312	347	411
Size ØD	150	200	250	300
Size E	8	8	8	8
Size Ø F	392	492	592	792
Weight [Kg]	3.8 /4.3	6.5	8.5	14.3
A_{eff} [m^2]	0.0080/0.0134	0.0214	0.0347	0.0508

Side inlet



Top inlet



DAL 358 - Fireproof damper

square plenum

DN	300		400		500		600
Size □A	603	400	603	400	603	502	603
Size C	400	400	400	400	450	450	498
Size ØD	150	150	150	150	200	200	250
Size □F	584	396	584	396	584	488	584
Weight [Kg]	16.7	10.7	16.8	10.9	17.7	14.6	19.2

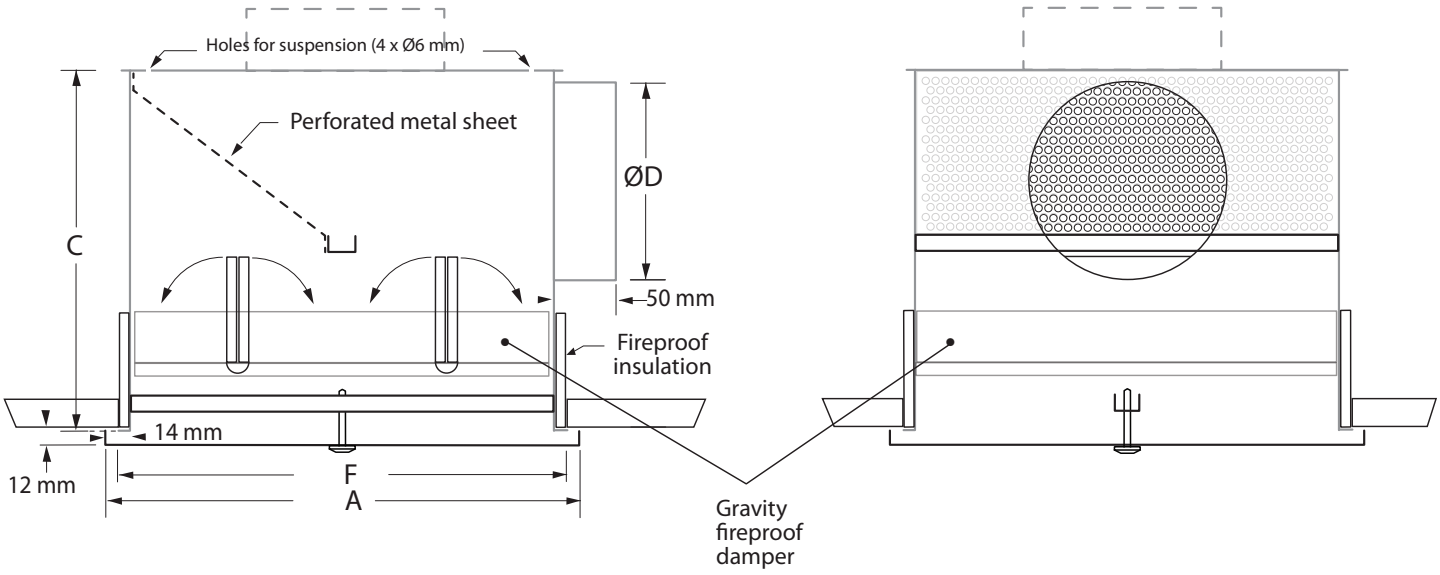
Note : The balancing damper is not available with the fireproof damper.

Classified ULC (Underwriters laboratories of Canada), the NAD Klima diffusers with fire resistant dampers have a fire-resistant rating of 3 hours.

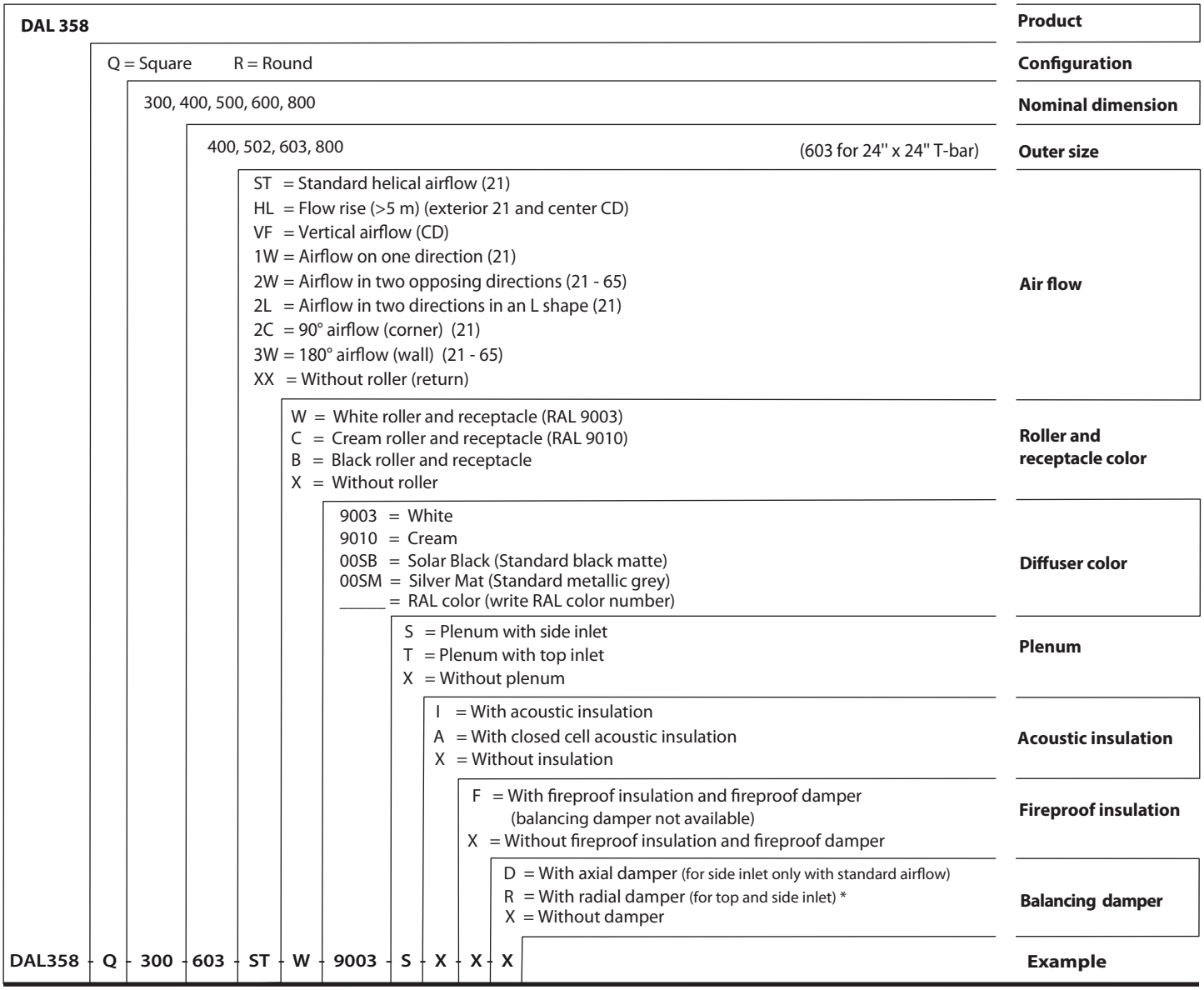
The fire-resistant damper is integrated directly to the plenum. This assembly is designed for installation in either a suspended or gypsum ceiling.

LISTED
Air Terminal Unit
R38924
CAN/ULC - S112.2 et CAN/ULC - S101

CEILING AIR DIFFUSER
FIRE RESISTANCE CLASSIFICATION
ANSI/UL 555C et ANSI/UL 263



DAL358 - Codification



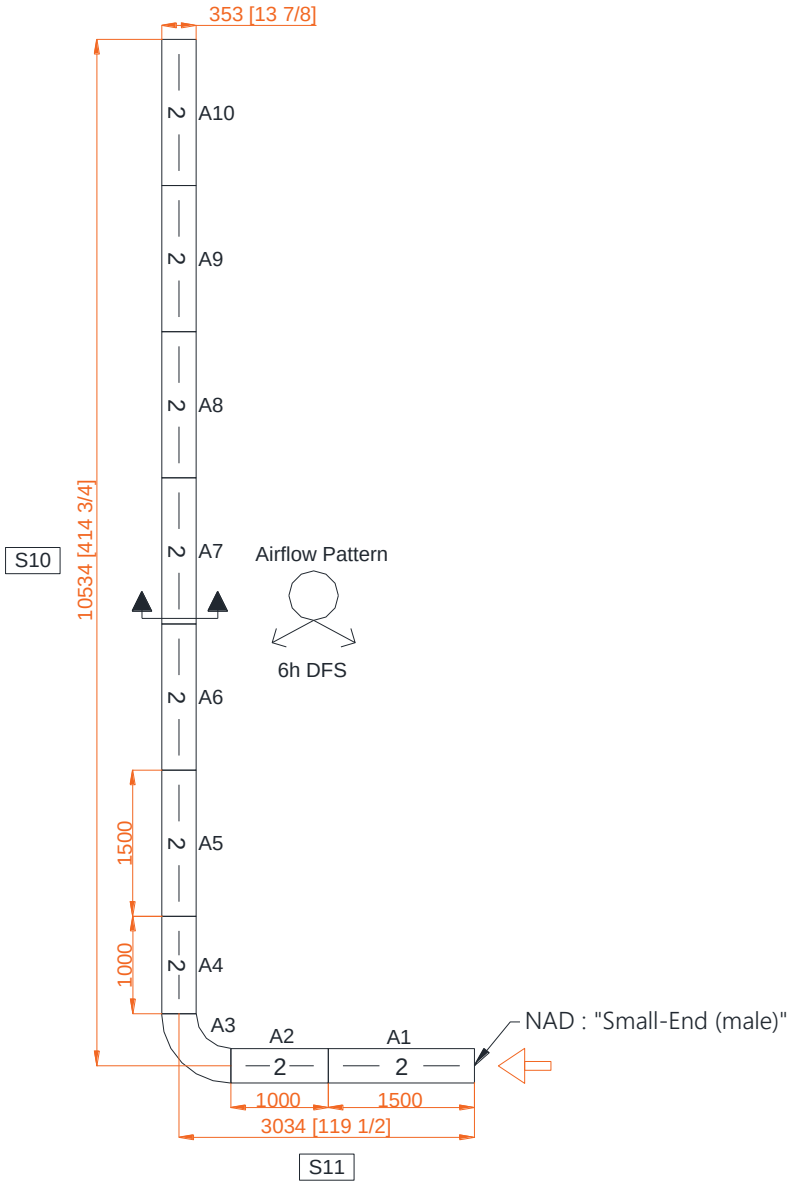
To optimize the air distribution over long lengths of duct, we use reducers to render the distribution more uniform.

NAD Klima shop drawing

Project :	Enbridge Station B
Duct identification	Duct A to I
Airflow	A to I: 1 129 cfm/ea (533 L/s/ea) EF: 1 093 cfm (516 L/s), I: 1 377 cfm (650 L/s)
Static pressure available	0.3 po/H20/ea.
Room Height	**TBC**
RRA AFF	**TBC**
Room width and lenght	See drawing
Duct temperature in winter	100F (**TBC)**
Room temperature in winter	72F (**TBC)**
Duct temperature in summer	55F (**TBC)**
Room temperature in summer	72F (**TBC)**
Room humidity in winter	30-40%rh
Room humidity in summer	30-40%rh

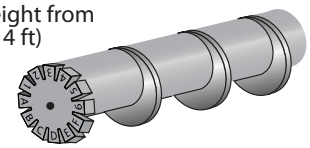
- **Note:** Please specify, with the use of a drawing, if there are physical constraints on site or special requirements for the air pattern**.**
- **Important :** The contractor must validate and confirm the final dimensions as well as the height of the room and the installation height of the ducts before production can start.

Duct A (FC-1.19B)			
Nom	Qty	Code	Total 1 129 cfm.
A1, A5 à A9	6	RRA-1500-1300-353-2-006-DFS-W-9003-X-X	137 cfm/ea.
A2, A4	2	RRA-1000-0800-353-2-006-DFS-W-9003-X-X	85 cfm.
A3	1	RRA-ELB-90-356-S-9003-X	
A10	1	RRA-1500-1300-353-2-006-DFS-W-9003-X-R	137 cfm
Sleeve	7	RRA-SLE-356-0000-9003-X	
Cap	1	RRA-CAP-356-9003-X	

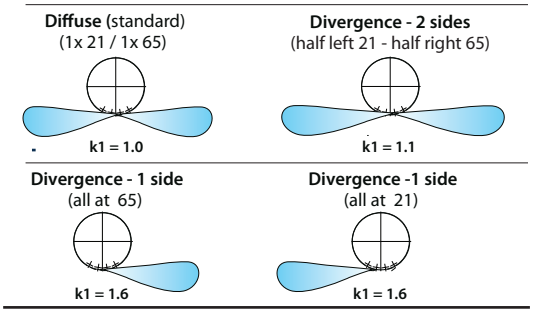


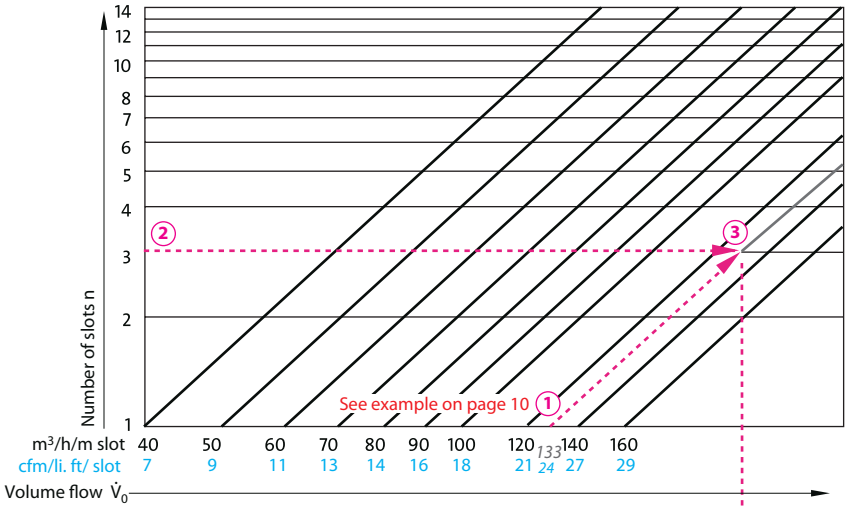
Air flow velocity diagram
RRA with eccentric rollers

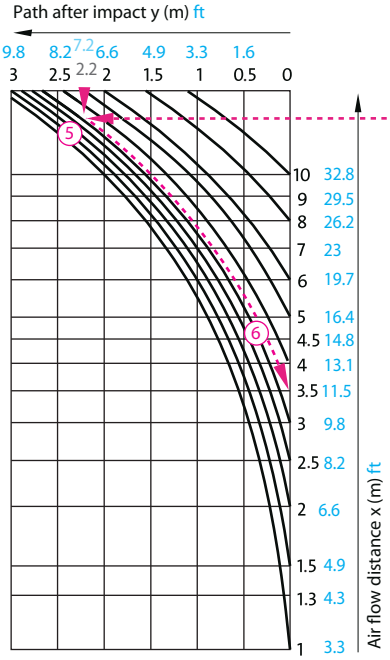
For an installation height from
3 m (10 ft) to 4.3 m (14 ft)

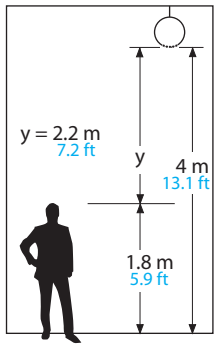


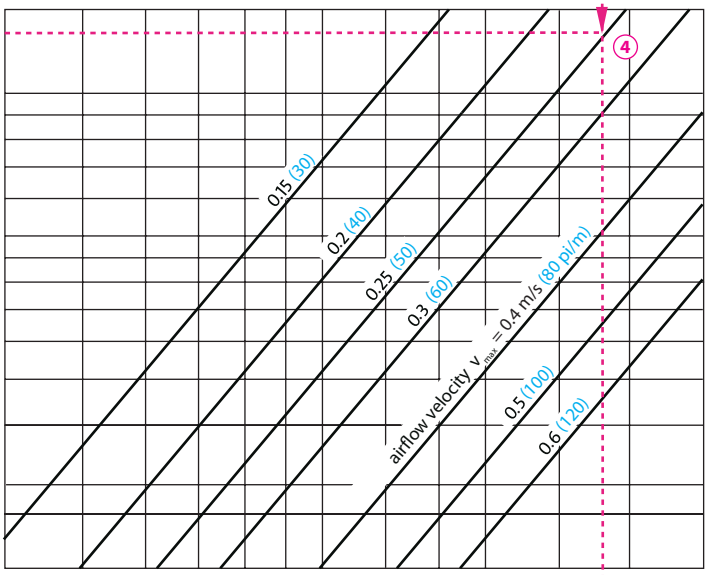
Airstream pattern (roller position) $V_{max} = k1 \times V_{max\ diagram}$

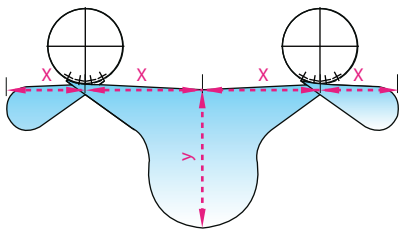




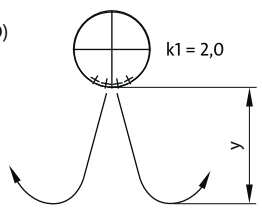


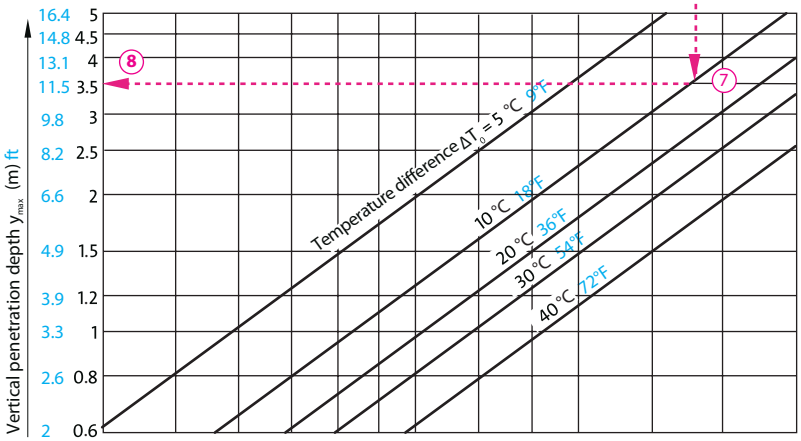






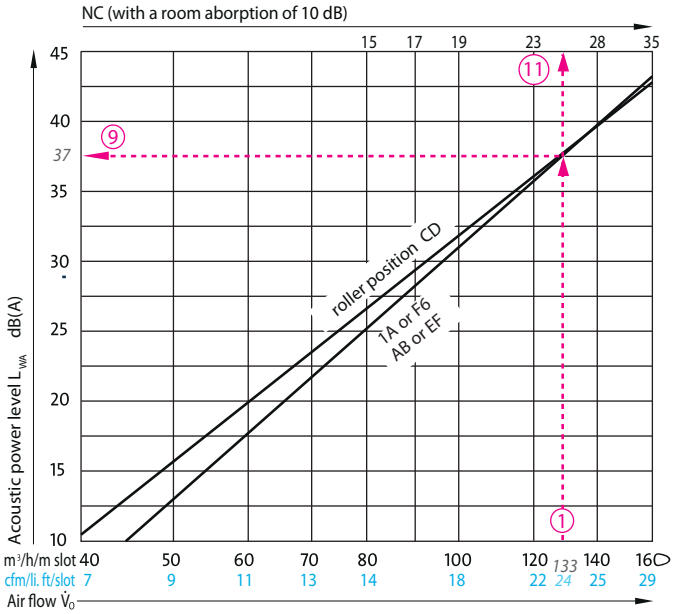
Vertical
(All CD)





Acoustic power diagrams

RRA with eccentric rollers



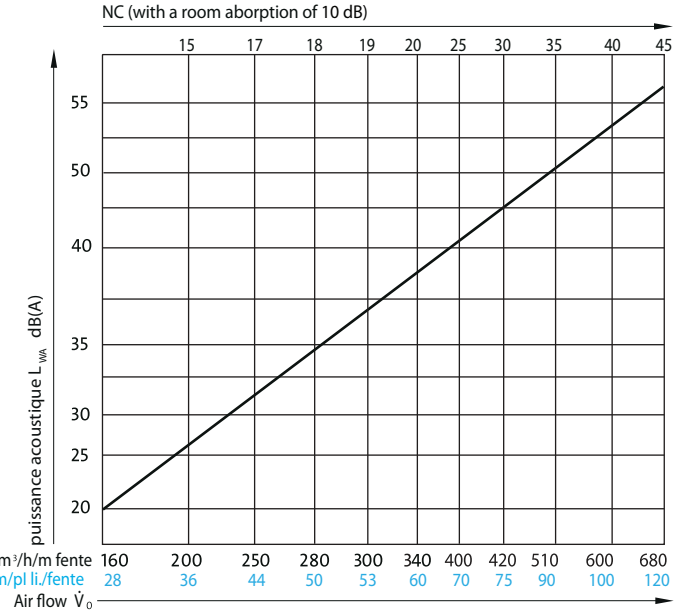
Number of slots	1	2	3	4	5	6	7
NC diagram +	0	1	2	4	5	5	6

Number of slots	8	9	10	11	12	13	14
NC diagram +	7	7	8	8	8	9	9

Number of slots n	$L_{WA} = L_{WA\ Diagram} + \Delta L_{WA}$		
	$L_R = 1000$ $L_S = 800$ ΔL_{WA}	$L_R = 1500$ $L_S = 1300$ ΔL_{WA}	$L_R = 1700$ $L_S = 1500$ ΔL_{WA}
1	0.0	2.1	2.7
2	3.0	5.1	5.7
3	4.7	6.8 (10)	7.5
4	6.0	8.1	8.8
5	7.0	9.1	9.7
6	7.8	9.8	10.5
7	8.4	10.5	11.2
8	9.0	11.1	11.8
9	9.5	11.6	12.3
10	10.0	12.1	12.7
11	10.4	12.5	-
12	10.8	12.9	-
13	11.1	13.2	-
14	11.5	13.5	-

L_R = Duct length L_S = Slot length Standard

RRA with nozzle rollers



Number of slots	1	2	3	4	5	6	7
NC diagram +	0	4	7	8	9	9	10

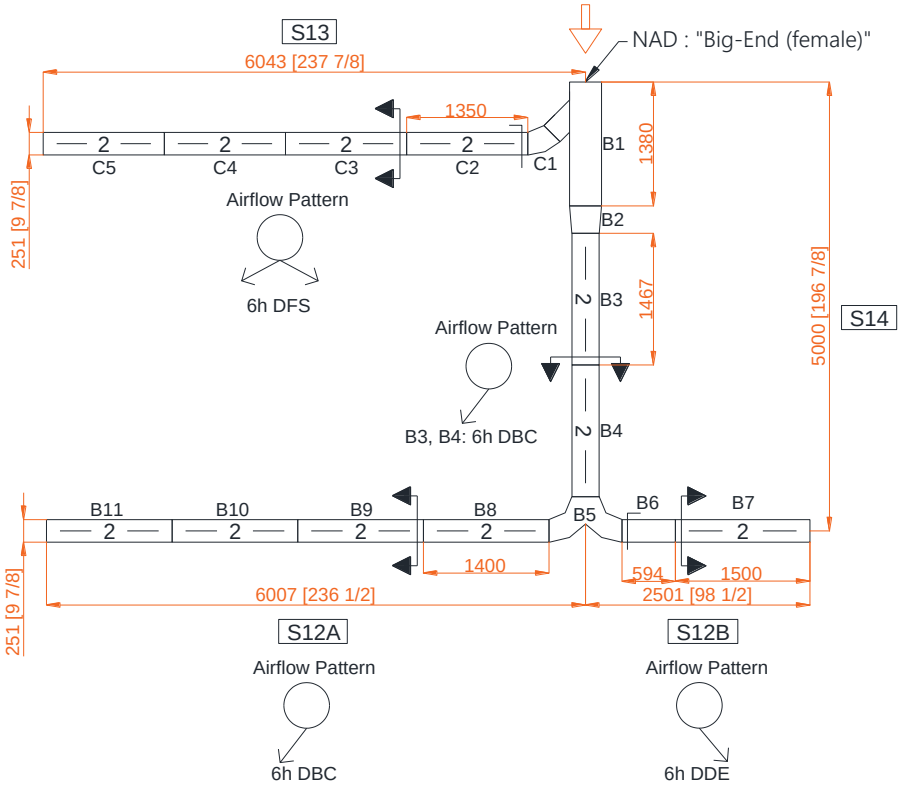
RRA data with eccentric rollers:
- Total airflow: 2080 m³/h
- Number of RRA sections: 4
- Number of slots per RRA: 3
- Length of the RRA: L_R = 1500 mm
- Length of the slot: L_S = 1300 mm

Required:
1. Air flow by meter of slot
2. Critical air flow distance X
3. Vertical penetration in heating Y_{max}
4. Acoustic power generated L_{WA} and noise criteria (NC)

Solution :

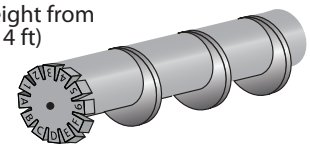
1. From total air flow, the number of section of RRA and slots, we find: (2080 m³ /h ÷ 4 RRA) ÷ 3 slots = 173 m³/h by slot
   For a 1300 mm slot length, we calculate the air flow by meter of slot
   173 m³ /h x 0.77 = 133 m³ /h/m slot (1)
2. From dimension's diagram, the air velocity in occupied area of 0.25 m/s (4) and a distance after meeting y = 4 m - 1.8 m= 2.2 m (5), we find the distance of air flow: X = 3.5 m (6) (see page 7).
3. For a temperature difference of +10 °C (7), we find the vertical penetration: Y_{max} = 3.5 m. (8)
4. From the acoustic power diagram, we read: $L_{WA\ diagram}$= 37 dB(A) (9) and a number of slots n = 3: ΔL_{WA}= 6.8 dB(A) (10)
   Finally, the acoustic power generated is:
   $L_{WA} = L_{WA\ diagram} + \Delta L_{WA}$ = 43.8 dB(A) - 10 dB(A) = 33.8 dB(A)
   Noise criteria (NC) = 25 + 2 (3 fentes) = 27 (11)

Duct BC (FC-1.19A)			
Nom	Qty	Code	Total 1 129 cfm.
B1	1	RRA-BRA-356-254-S-9003-X	
Inner Sleeve	1	RRA-SLI-353-XXXX-9003-X	
B2	1	RRA-RED-356-305-T-S-9003-X	
B3, B4	2	RRA-1467-0900-302-2-006-DBC-W-9003-X-X	100 cfm.
Sleeve	1	RRA-SLE-305-0000-9003-X	
B5	1	RRA-BRA-305-254-254-T-9003-X	
B6	1	RRA-0594-XXXX-251-X-XXX-XXX-W-9003-X-D	
B7	1	RRA-1500-1000-251-2-006-DDE-W-9003-X-X	108 cfm.
B8 to B10	3	RRA-1400-1100-251-2-006-DBC-W-9003-X-X	125 cfm/ea.
B11	1	RRA-1400-1100-251-2-006-DBC-W-9003-X-R	125 cfm.
Sleeve	4	RRA-SLE-254-0000-9003-X	
CAP	2	RRA-CAP-254-9003-X	
Inner Sleeve	1	RRA-SLI-251-XXXX-9003-X	
C1	1	RRA-ELB-45-254-S-9003-X	
C2	1	RRA-1350-0700-251-2-006-DFS-W-9003-X-D	80 cfm/ea.
C3 to C4	2	RRA-1350-0700-251-2-006-DFS-W-9003-X-X	80 cfm/ea.
C5	1	RRA-1350-0700-251-2-006-DFS-W-9003-X-R	80 cfm.
Sleeve	3	RRA-SLE-254-0000-9003-X	
CAP	1	RRA-CAP-254-9003-X	

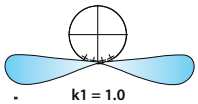
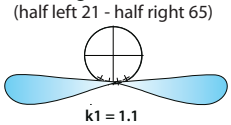
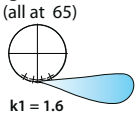
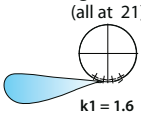


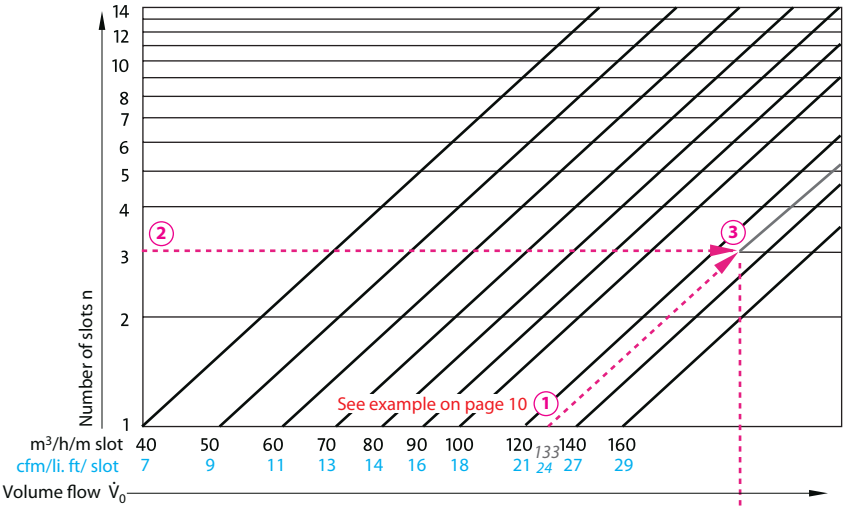
Air flow velocity diagram
RRA with eccentric rollers

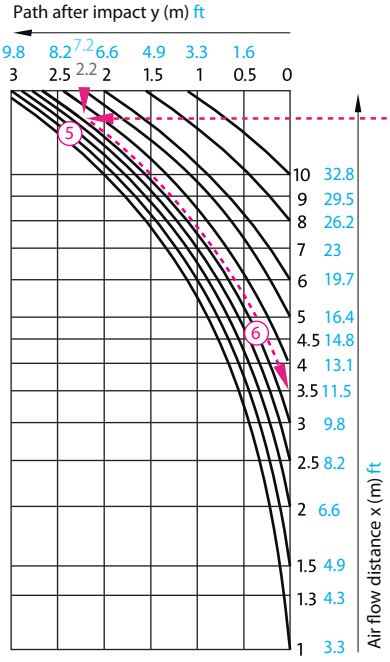
For an installation height from
3 m (10 ft) to 4.3 m (14 ft)

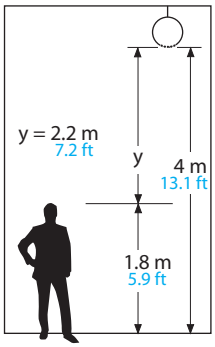


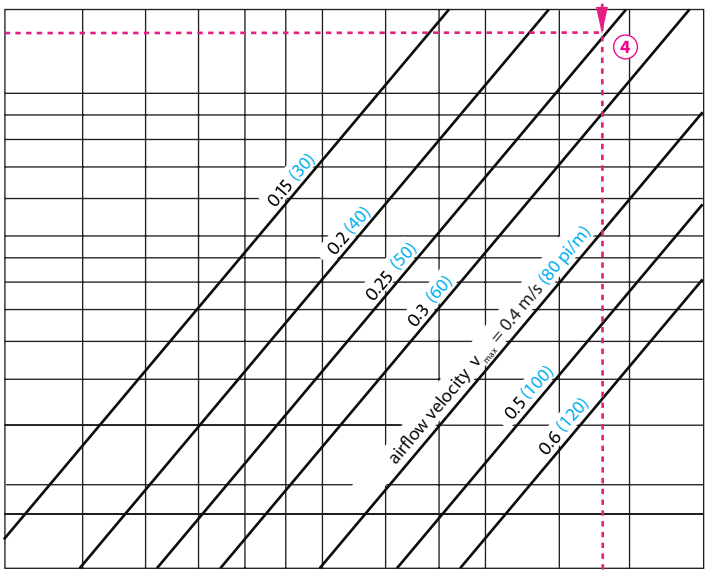
Airstream pattern (roller position) $V_{max} = k1 \times V_{max\ diagram}$

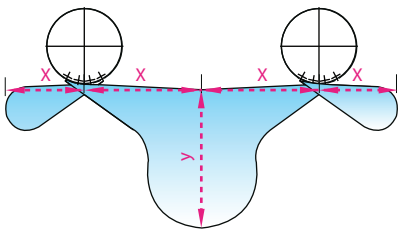
Diffuse (standard) (1x 21 / 1x 65)	**Divergence - 2 sides** (half left 21 - half right 65)
 k1 = 1.0	 k1 = 1.1
Divergence - 1 side (all at 65)	**Divergence -1 side** (all at 21)
 k1 = 1.6	 k1 = 1.6



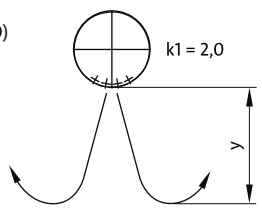


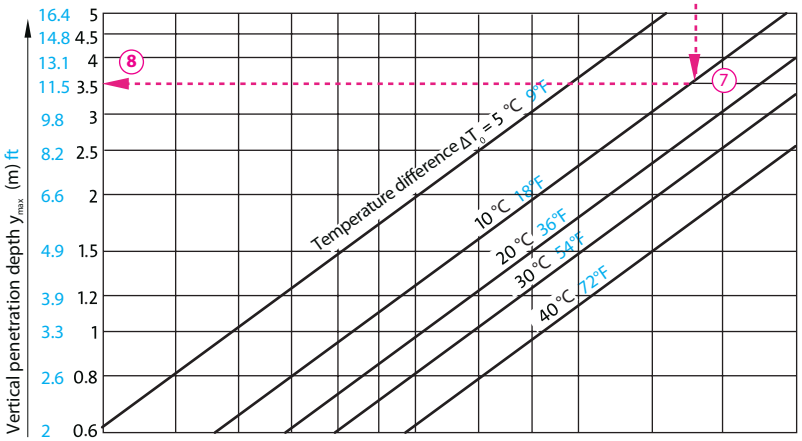






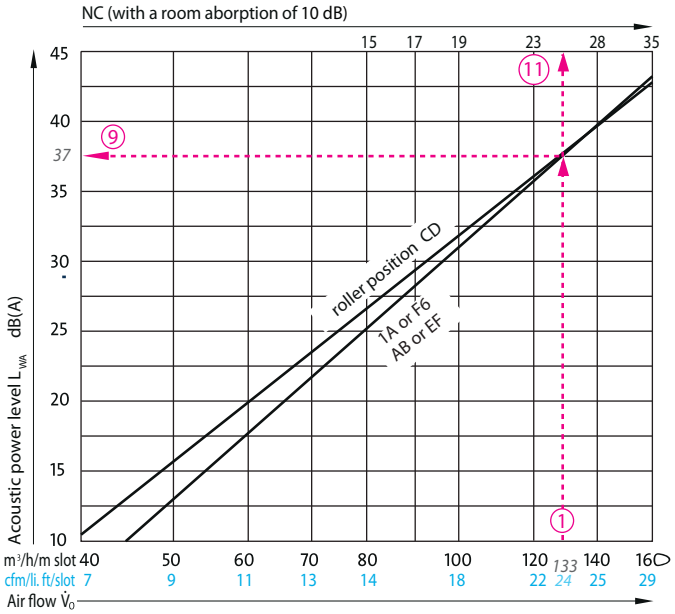
Vertical
(All CD)





Acoustic power diagrams

RRA with eccentric rollers



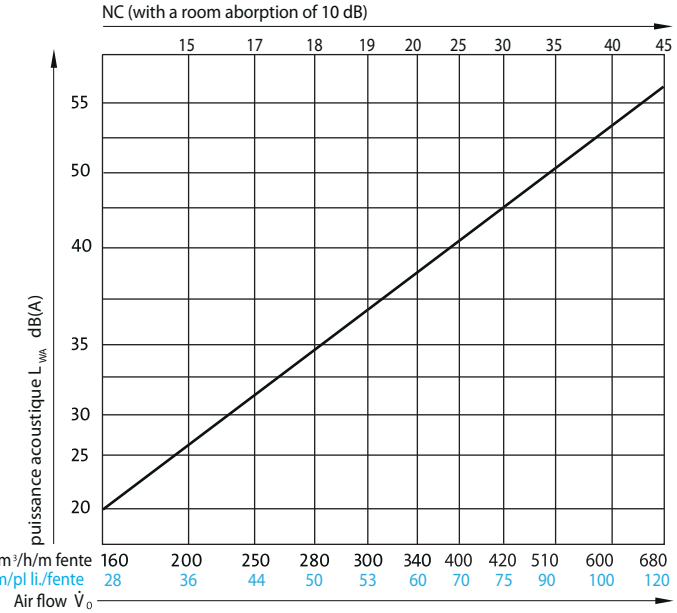
Number of slots	1	2	3	4	5	6	7
NC diagram +	0	1	2	4	5	5	6

Number of slots	8	9	10	11	12	13	14
NC diagram +	7	7	8	8	8	9	9

Number of slots n	$L_{WA} = L_{WA\ Diagram} + \Delta L_{WA}$		
	$L_R = 1000$ $L_S = 800$ ΔL_{WA}	$L_R = 1500$ $L_S = 1300$ ΔL_{WA}	$L_R = 1700$ $L_S = 1500$ ΔL_{WA}
1	0.0	2.1	2.7
2	3.0	5.1	5.7
3	4.7	6.8 (10)	7.5
4	6.0	8.1	8.8
5	7.0	9.1	9.7
6	7.8	9.8	10.5
7	8.4	10.5	11.2
8	9.0	11.1	11.8
9	9.5	11.6	12.3
10	10.0	12.1	12.7
11	10.4	12.5	-
12	10.8	12.9	-
13	11.1	13.2	-
14	11.5	13.5	-

L_R = Duct length L_S = Slot length Standard

RRA with nozzle rollers



Number of slots	1	2	3	4	5	6	7
NC diagram +	0	4	7	8	9	9	10

RRA data with eccentric rollers:
- Total airflow: 2080 m³/h
- Number of RRA sections: 4
- Number of slots per RRA: 3
- Length of the RRA: L_R = 1500 mm
- Length of the slot: L_S = 1300 mm

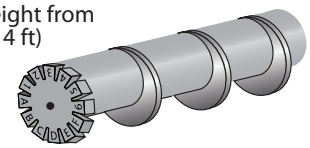
Required:
1. Air flow by meter of slot
2. Critical air flow distance X
3. Vertical penetration in heating Y_{max}
4. Acoustic power generated L_{WA} and noise criteria (NC)

Solution :

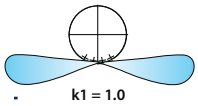
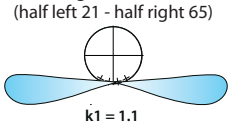
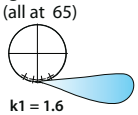
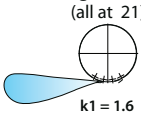
1. From total air flow, the number of section of RRA and slots, we find: (2080 m³ /h ÷ 4 RRA) ÷ 3 slots = 173 m³/h by slot
   For a 1300 mm slot length, we calculate the air flow by meter of slot
   173 m³ /h x 0.77 = 133 m³ /h/m slot (1)
2. From dimension's diagram, the air velocity in occupied area of 0.25 m/s (4) and a distance after meeting y = 4 m - 1.8 m= 2.2 m (5), we find the distance of air flow: X = 3.5 m (6) (see page 7).
3. For a temperature difference of +10 °C (7), we find the vertical penetration: Y_{max} = 3.5 m. (8)
4. From the acoustic power diagram, we read: $L_{WA\ diagram}$= 37 dB(A) (9) and a number of slots n = 3: ΔL_{WA}= 6.8 dB(A) (10)
   Finally, the acoustic power generated is:
   $L_{WA} = L_{WA\ diagram} + \Delta L_{WA}$ = 43.8 dB(A) - 10 dB(A) = 33.8 dB(A)
   Noise criteria (NC) = 25 + 2 (3 fentes) = 27 (11)

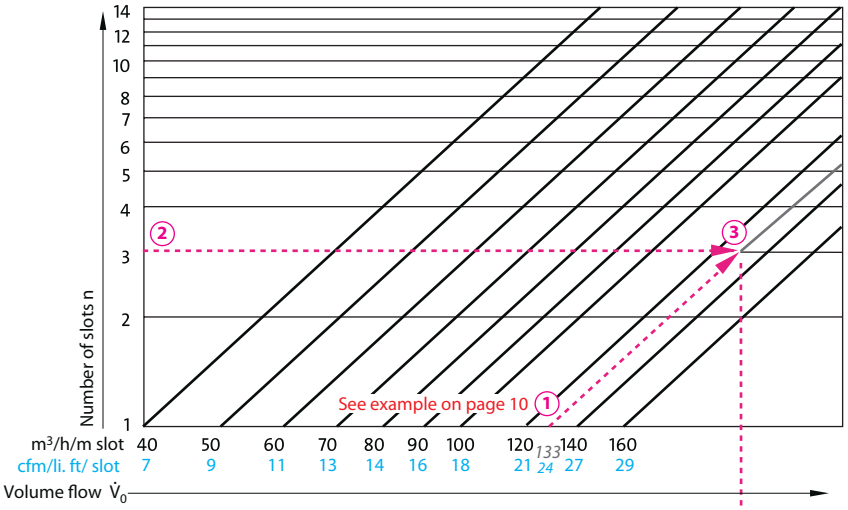
Air flow velocity diagram
RRA with eccentric rollers

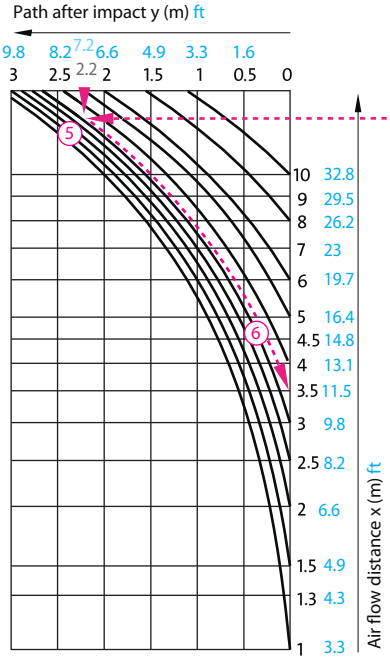
For an installation height from
3 m (10 ft) to 4.3 m (14 ft)

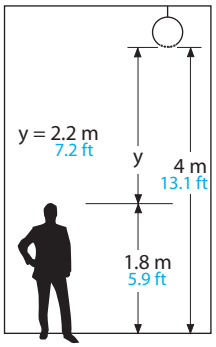


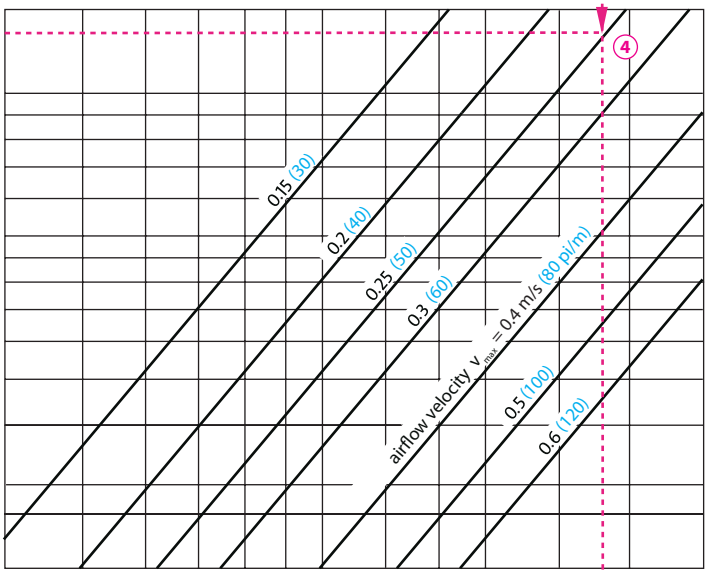
Airstream pattern (roller position) $V_{max} = k1 \times V_{max\ diagram}$

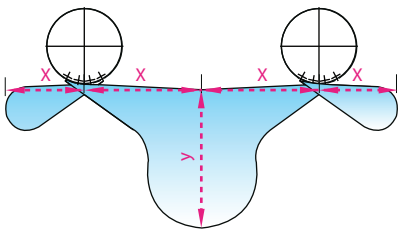
Diffuse (standard) (1x 21 / 1x 65)	**Divergence - 2 sides** (half left 21 - half right 65)
 k1 = 1.0	 k1 = 1.1
Divergence - 1 side (all at 65)	**Divergence -1 side** (all at 21)
 k1 = 1.6	 k1 = 1.6



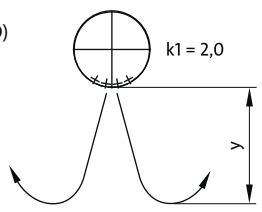


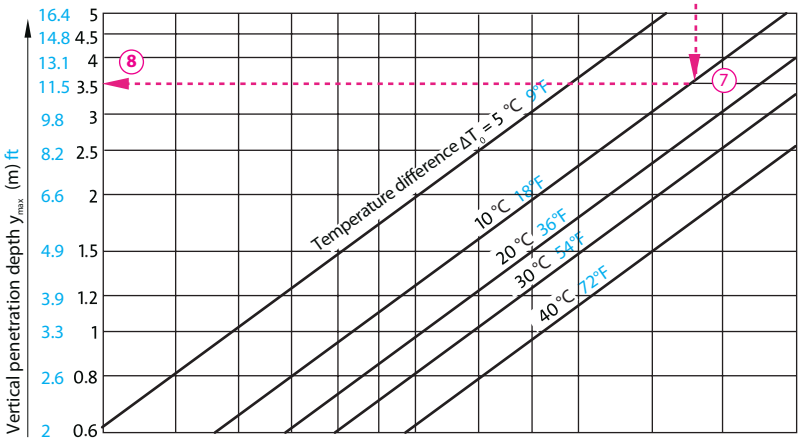






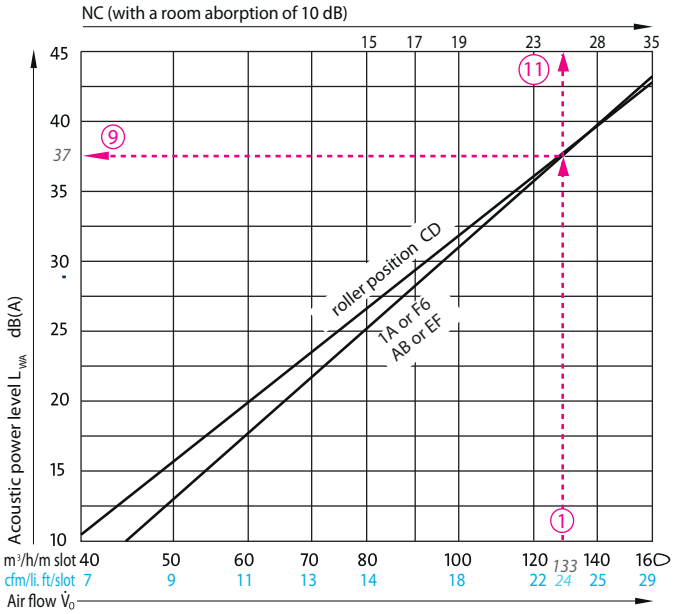
Vertical
(All CD)





Acoustic power diagrams

RRA with eccentric rollers



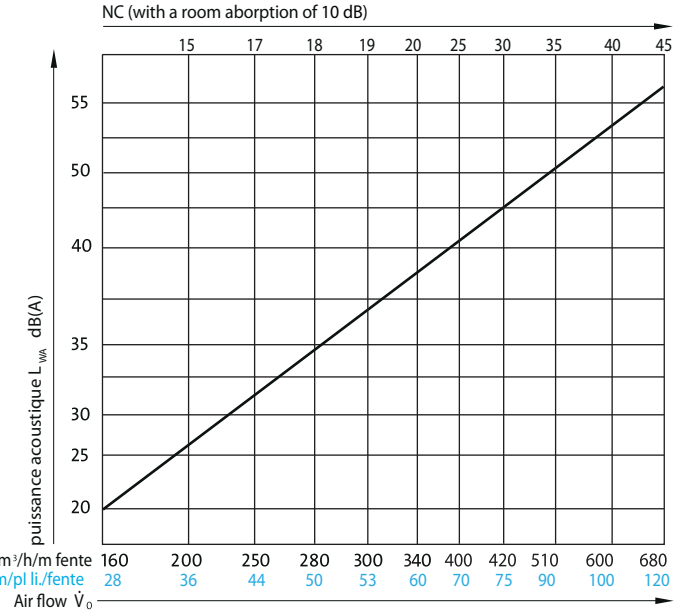
Number of slots	1	2	3	4	5	6	7
NC diagram +	0	1	2	4	5	5	6

Number of slots	8	9	10	11	12	13	14
NC diagram +	7	7	8	8	8	9	9

Number of slots n	$L_{WA} = L_{WA\ Diagram} + \Delta L_{WA}$		
	$L_R = 1000$ $L_S = 800$ ΔL_{WA}	$L_R = 1500$ $L_S = 1300$ ΔL_{WA}	$L_R = 1700$ $L_S = 1500$ ΔL_{WA}
1	0.0	2.1	2.7
2	3.0	5.1	5.7
3	4.7	6.8 (10)	7.5
4	6.0	8.1	8.8
5	7.0	9.1	9.7
6	7.8	9.8	10.5
7	8.4	10.5	11.2
8	9.0	11.1	11.8
9	9.5	11.6	12.3
10	10.0	12.1	12.7
11	10.4	12.5	-
12	10.8	12.9	-
13	11.1	13.2	-
14	11.5	13.5	-

L_R = Duct length L_S = Slot length Standard

RRA with nozzle rollers



Number of slots	1	2	3	4	5	6	7
NC diagram +	0	4	7	8	9	9	10

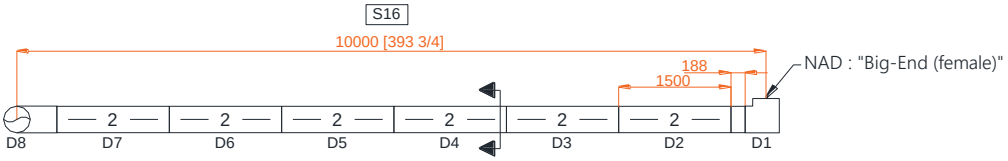
RRA data with eccentric rollers:
- Total airflow: 2080 m³/h
- Number of RRA sections: 4
- Number of slots per RRA: 3
- Length of the RRA: $L_R = 1500$ mm
- Length of the slot: $L_S = 1300$ mm

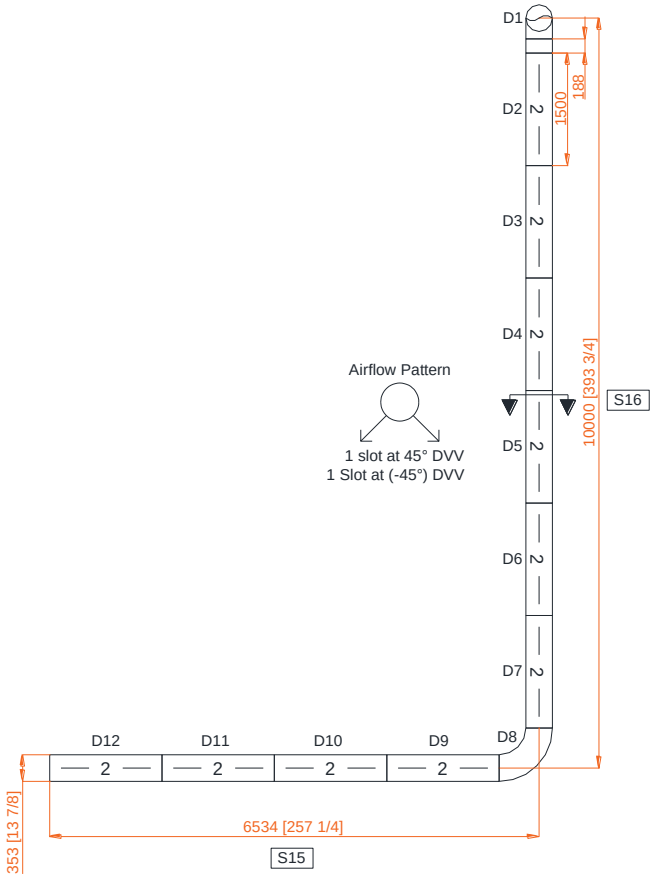
Required:
1. Air flow by meter of slot
2. Critical air flow distance X
3. Vertical penetration in heating Y_{max}
4. Acoustic power generated L_{WA} and noise criteria (NC)

Solution :

1. From total air flow, the number of section of RRA and slots, we find: (2080 m³ /h ÷ 4 RRA) ÷ 3 slots = 173 m³/h by slot
   For a 1300 mm slot length, we calculate the air flow by meter of slot
   173 m³ /h x 0.77 = 133 m³ /h/m slot (1)
2. From dimension's diagram, the air velocity in occupied area of 0.25 m/s (4) and a distance after meeting y = 4 m - 1.8 m= 2.2 m (5), we find the distance of air flow: X = 3.5 m (6) (see page 7).
3. For a temperature difference of +10 °C (7), we find the vertical penetration: Y_{max} = 3.5 m. (8)
4. From the acoustic power diagram, we read: $L_{WA\ diagram}$= 37 dB(A) (9) and a number of slots n = 3: ΔL_{WA}= 6.8 dB(A) (10)
   Finally, the acoustic power generated is:
   $L_{WA} = L_{WA\ diagram} + \Delta L_{WA}$ = 43.8 dB(A) - 10 dB(A) = 33.8 dB(A)
   Noise criteria (NC) = 25 + 2 (3 fentes) = 27 (11)

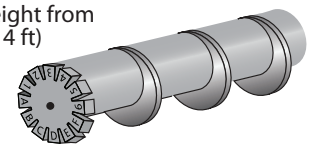
Duct D (FC-1.17)			
Nom	Qty	Code	Total 1 129 cfm.
Collar	1	RRA-WCO-356-9003-X	
Inner Sleeve	1	RRA-SLI-353-XXXX-9003-X	
D1	1	RRA-ELB-QA-356-A-9003-X	Lengthen the output to 188mm
D2 to D7	6	RRA-1500-1000-353-2-AAA-DVV-W-9003-X-X	115 cfm/ea.
D8	1	RRA-ELB-90-356-S-9003-X	
D9 to D11	3	RRA-1500-1000-353-2-AAA-DVV-W-9003-X-X	110 cfm/ea.
D12	1	RRA-1500-1000-353-2-AAA-DVV-W-9003-X-R	110 cfm.
Sleeve	8	RRA-SLE-356-0000-9003-X	
CAP	1	RRA-CAP-356-9003-X	



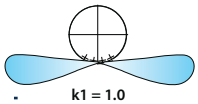
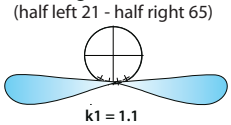
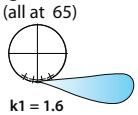
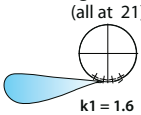


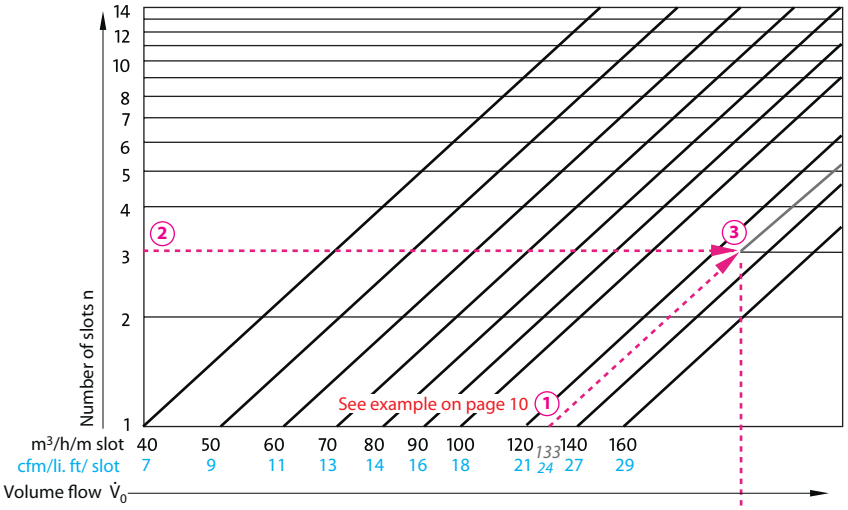
Air flow velocity diagram
RRA with eccentric rollers

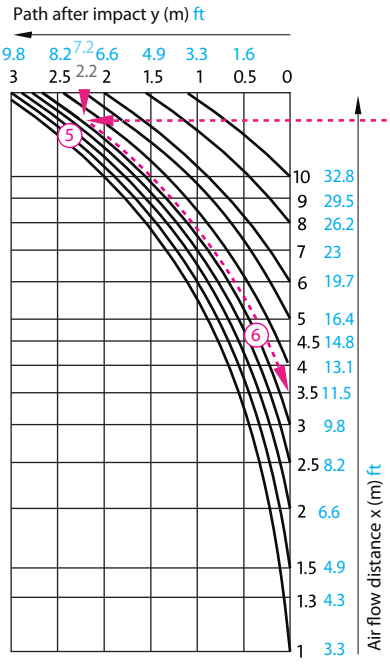
For an installation height from
3 m (10 ft) to 4.3 m (14 ft)

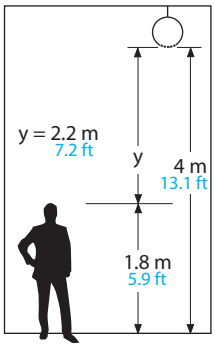


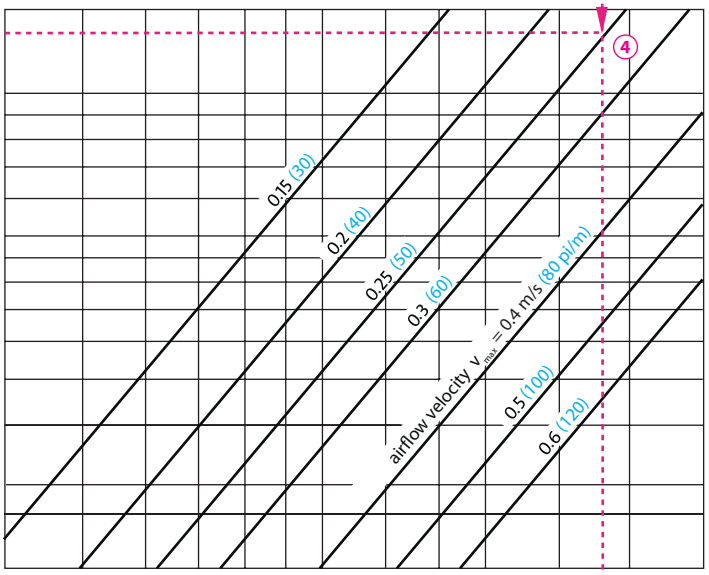
Airstream pattern (roller position) $V_{max} = k1 \times V_{max\ diagram}$

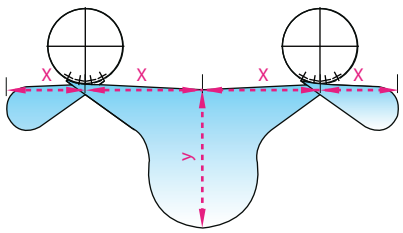
Diffuse (standard) (1x 21 / 1x 65)	**Divergence - 2 sides** (half left 21 - half right 65)
 k1 = 1.0	 k1 = 1.1
Divergence - 1 side (all at 65)	**Divergence -1 side** (all at 21)
 k1 = 1.6	 k1 = 1.6



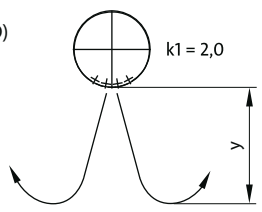


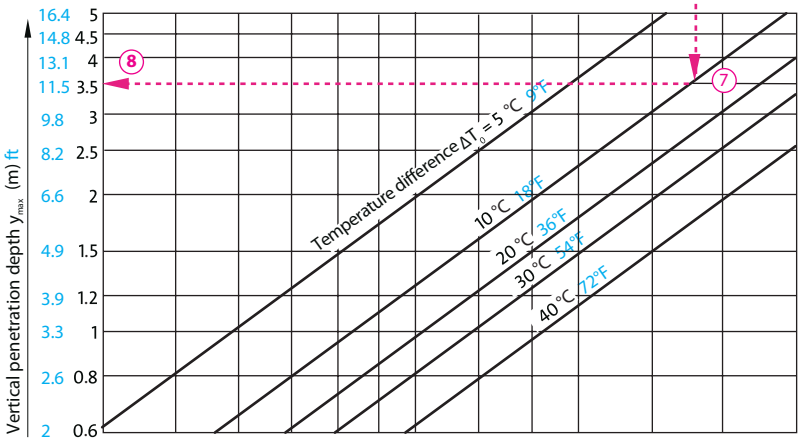






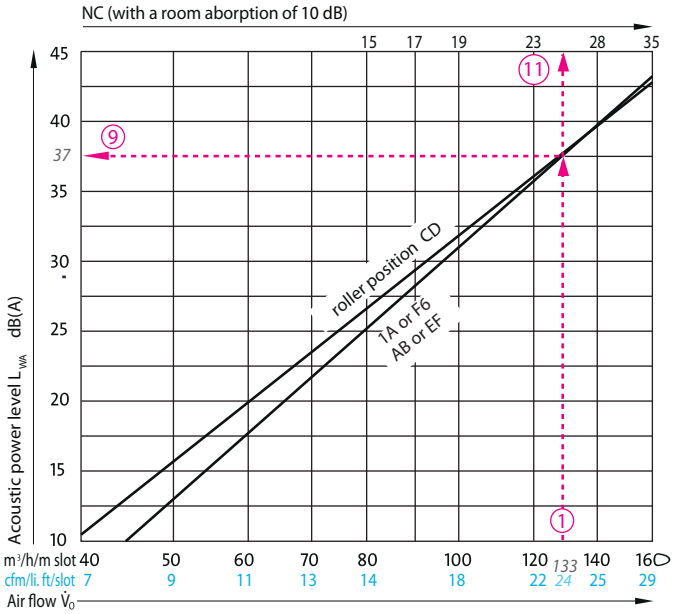
Vertical
(All CD)





Acoustic power diagrams

RRA with eccentric rollers



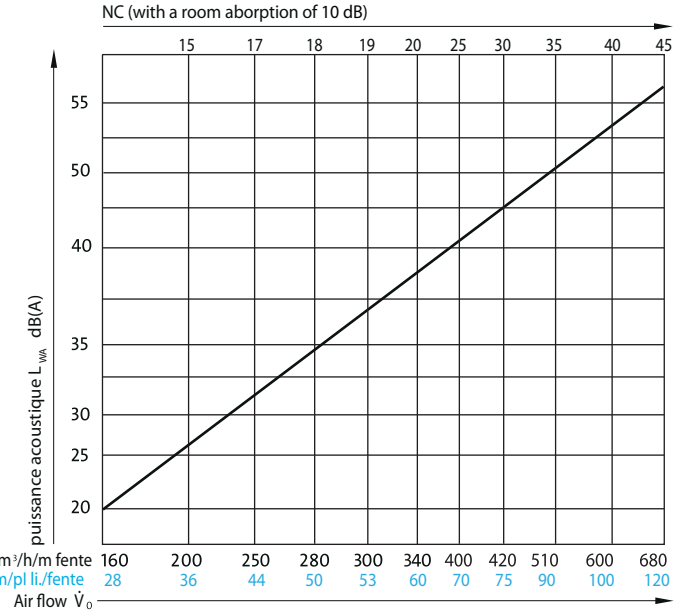
Number of slots	1	2	3	4	5	6	7
NC diagram +	0	1	2	4	5	5	6

Number of slots	8	9	10	11	12	13	14
NC diagram +	7	7	8	8	8	9	9

Number of slots n	$L_{WA} = L_{WA\ Diagram} + \Delta L_{WA}$		
	$L_R = 1000$ $L_S = 800$ ΔL_{WA}	$L_R = 1500$ $L_S = 1300$ ΔL_{WA}	$L_R = 1700$ $L_S = 1500$ ΔL_{WA}
1	0.0	2.1	2.7
2	3.0	5.1	5.7
3	4.7	6.8 (10)	7.5
4	6.0	8.1	8.8
5	7.0	9.1	9.7
6	7.8	9.8	10.5
7	8.4	10.5	11.2
8	9.0	11.1	11.8
9	9.5	11.6	12.3
10	10.0	12.1	12.7
11	10.4	12.5	-
12	10.8	12.9	-
13	11.1	13.2	-
14	11.5	13.5	-

L_R = Duct length L_S = Slot length Standard

RRA with nozzle rollers



Number of slots	1	2	3	4	5	6	7
NC diagram +	0	4	7	8	9	9	10

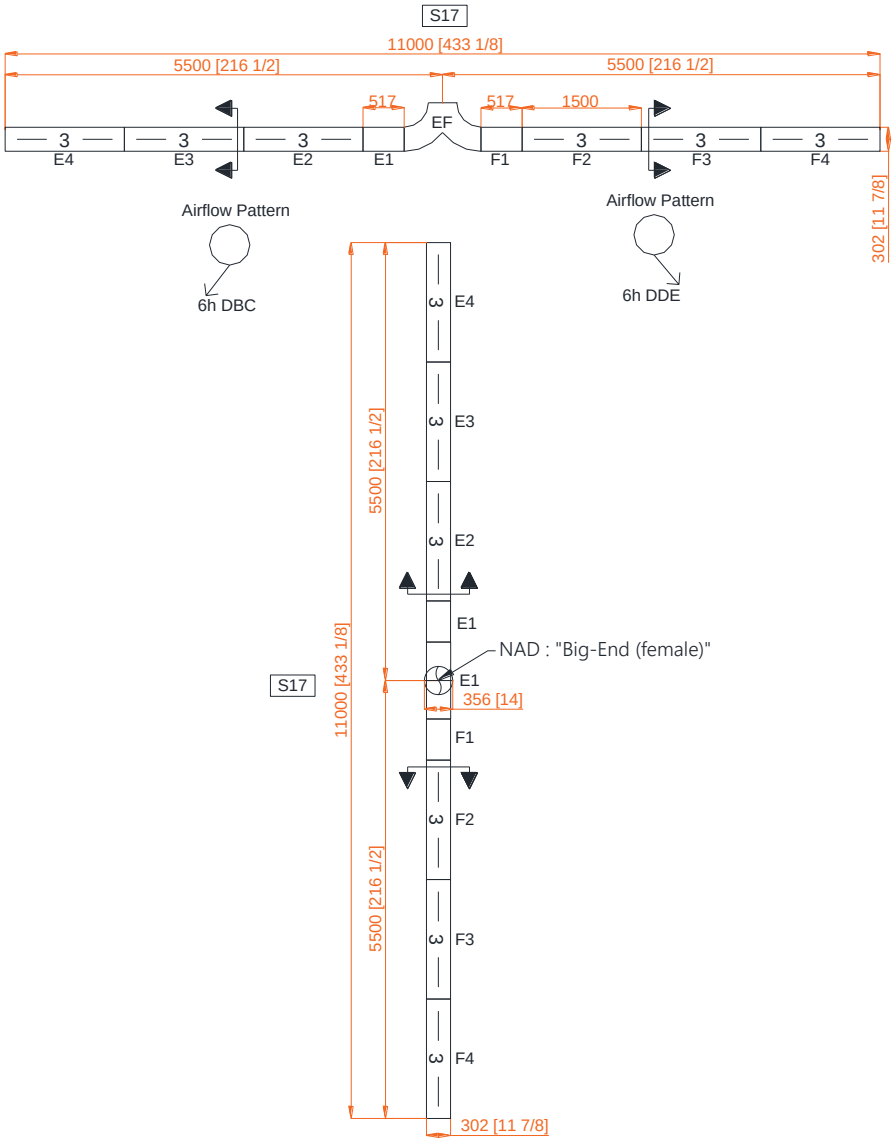
RRA data with eccentric rollers:
- Total airflow: 2080 m³/h
- Number of RRA sections: 4
- Number of slots per RRA: 3
- Length of the RRA: L_R = 1500 mm
- Length of the slot: L_S = 1300 mm

Required:
1. Air flow by meter of slot
2. Critical air flow distance X
3. Vertical penetration in heating Y_{max}
4. Acoustic power generated L_{WA} and noise criteria (NC)

Solution :

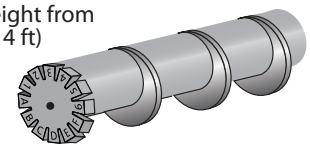
1. From total air flow, the number of section of RRA and slots, we find: (2080 m³ /h ÷ 4 RRA) ÷ 3 slots = 173 m³/h by slot
   For a 1300 mm slot length, we calculate the air flow by meter of slot
   173 m³ /h x 0.77 = 133 m³ /h/m slot (1)
2. From dimension's diagram, the air velocity in occupied area of 0.25 m/s (4) and a distance after meeting y = 4 m - 1.8 m= 2.2 m (5), we find the distance of air flow: X = 3.5 m (6) (see page 7).
3. For a temperature difference of +10 °C (7), we find the vertical penetration: Y_{max} = 3.5 m. (8)
4. From the acoustic power diagram, we read: $L_{WA\ diagram}$= 37 dB(A) (9) and a number of slots n = 3: ΔL_{WA}= 6.8 dB(A) (10)
   Finally, the acoustic power generated is:
   $L_{WA} = L_{WA\ diagram} + \Delta L_{WA}$ = 43.8 dB(A) - 10 dB(A) = 33.8 dB(A)
   Noise criteria (NC) = 25 + 2 (3 fentes) = 27 (11)

Duct EF (FC-1.16)			
Nom	Qty	Code	Total 1093 cfm.
Collar	1	RRA-WCO-356-9003-X	
Inner Sleeve	1	RRA-SLI-353-XXXX-9003-X	
EF	1	RRA-BRA-356-305-305-T-9003-X	
F1	1	RRA-0517-XXXX-302-X-XXX-XXX-W-9003-X-X	
F2 to F4	3	RRA-1500-1100-302-3-006-DDE-W-9003-X-X	182 cfm/ea.
E1	1	RRA-0517-XXXX-302-X-XXX-XXX-W-9003-X-X	
E2 to E4	3	RRA-1500-1100-302-3-006-DBC-W-9003-X-X	182 cfm/ea.
Sleeve	6	RRA-SLE-305-0000-9003-X	
CAP	2	RRA-CAP-305-9003-X	

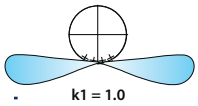
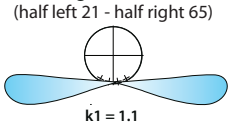
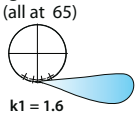
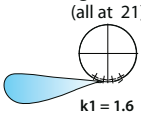


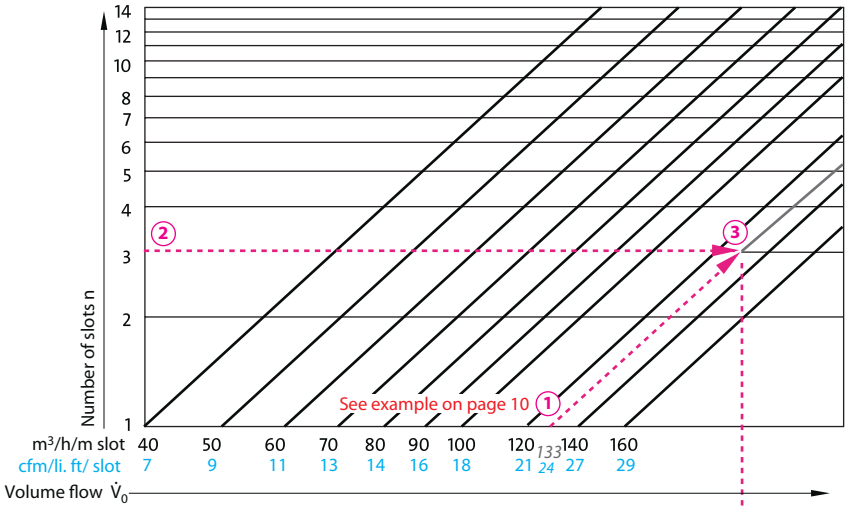
Air flow velocity diagram
RRA with eccentric rollers

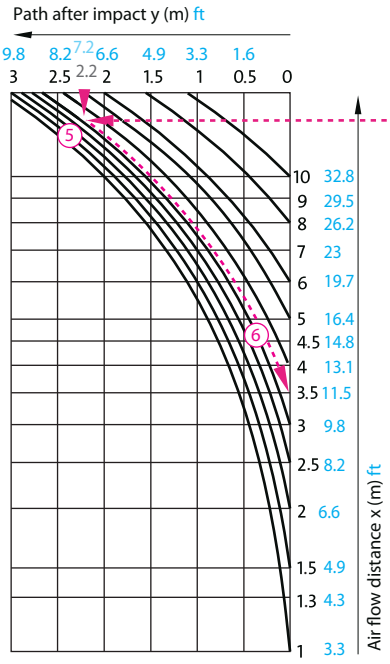
For an installation height from
3 m (10 ft) to 4.3 m (14 ft)

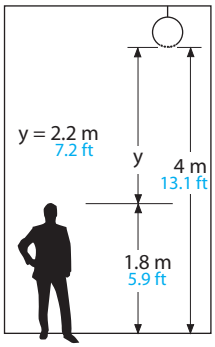


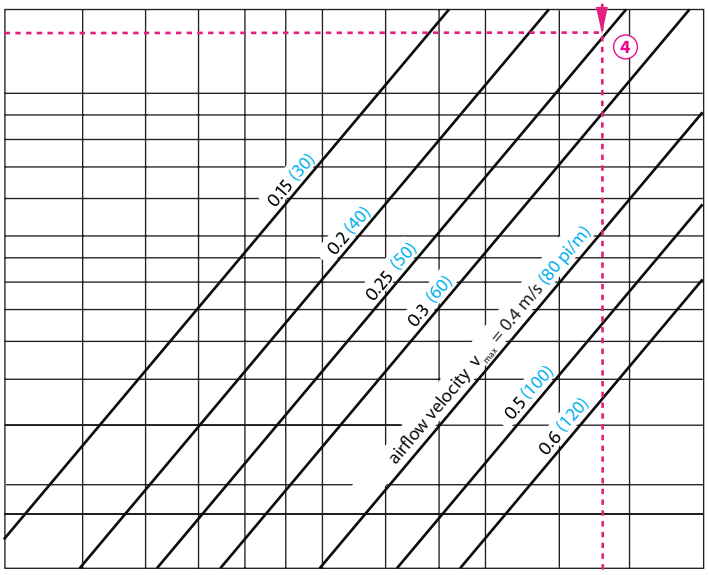
Airstream pattern (roller position) $V_{max} = k1 \times V_{max\ diagram}$

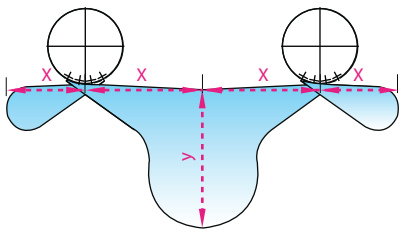
Diffuse (standard) (1x 21 / 1x 65)  k1 = 1.0	**Divergence - 2 sides** (half left 21 - half right 65)  k1 = 1.1
Divergence - 1 side (all at 65)  k1 = 1.6	**Divergence -1 side** (all at 21)  k1 = 1.6



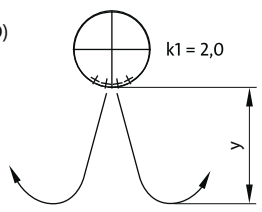


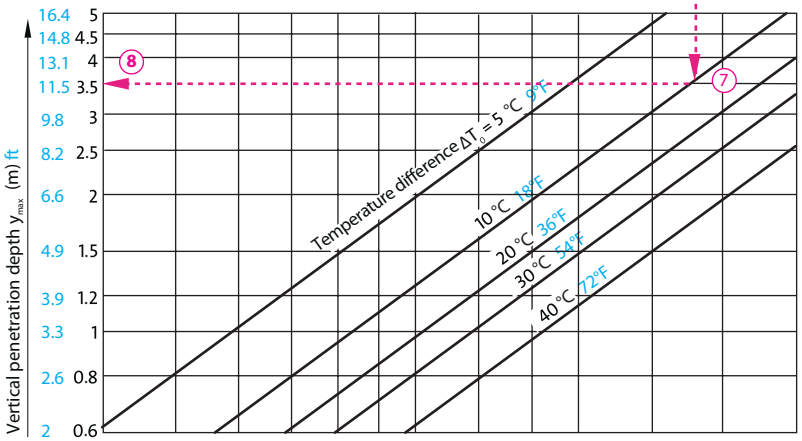






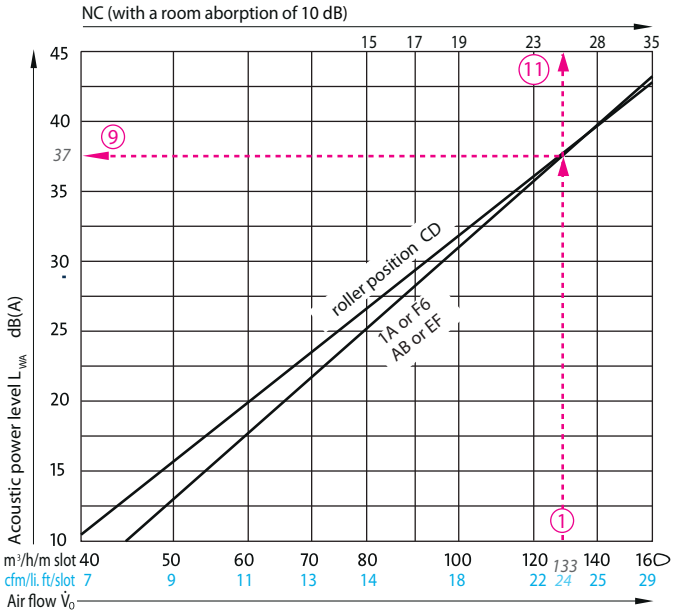
Vertical
(All CD)





Acoustic power diagrams

RRA with eccentric rollers



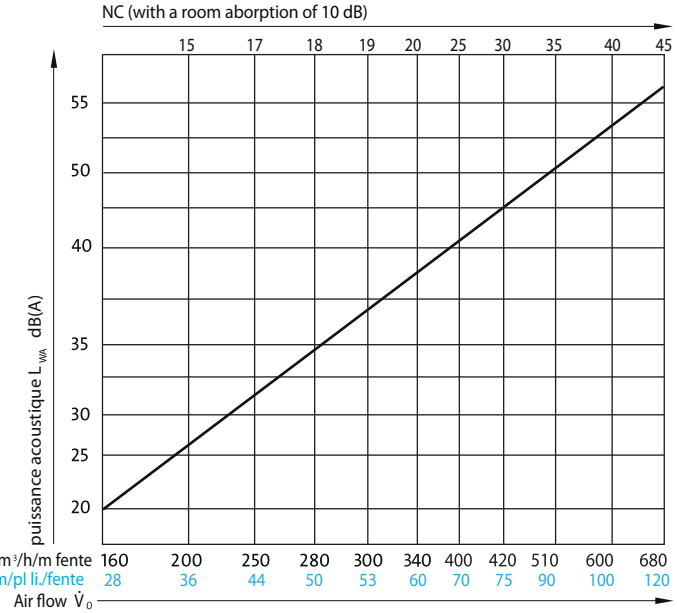
Number of slots	1	2	3	4	5	6	7
NC diagram +	0	1	2	4	5	5	6

Number of slots	8	9	10	11	12	13	14
NC diagram +	7	7	8	8	8	9	9

Number of slots n	$L_{WA} = L_{WA\ Diagram} + \Delta L_{WA}$		
	$L_R = 1000$ $L_S = 800$ ΔL_{WA}	$L_R = 1500$ $L_S = 1300$ ΔL_{WA}	$L_R = 1700$ $L_S = 1500$ ΔL_{WA}
1	0.0	2.1	2.7
2	3.0	5.1	5.7
3	4.7	6.8 (10)	7.5
4	6.0	8.1	8.8
5	7.0	9.1	9.7
6	7.8	9.8	10.5
7	8.4	10.5	11.2
8	9.0	11.1	11.8
9	9.5	11.6	12.3
10	10.0	12.1	12.7
11	10.4	12.5	-
12	10.8	12.9	-
13	11.1	13.2	-
14	11.5	13.5	-

L_R = Duct length L_S = Slot length Standard

RRA with nozzle rollers



Number of slots	1	2	3	4	5	6	7
NC diagram +	0	4	7	8	9	9	10

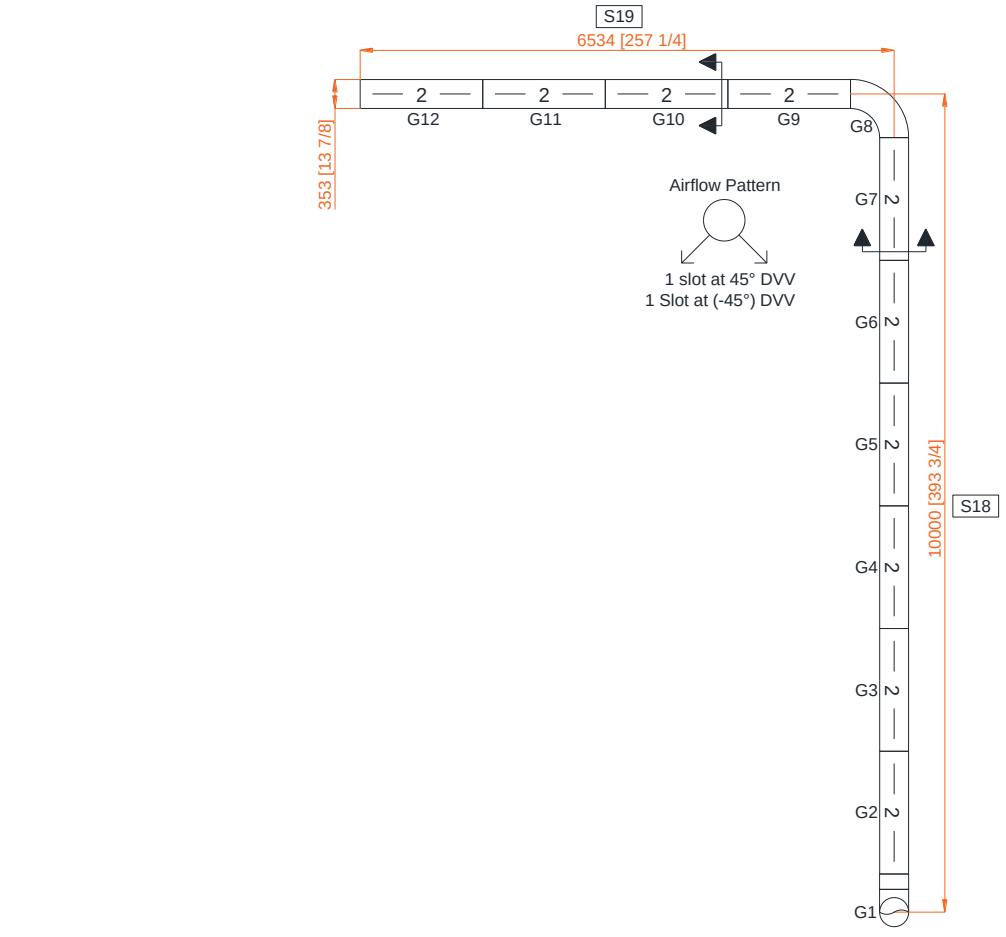
RRA data with eccentric rollers:
- Total airflow: 2080 m³/h
- Number of RRA sections: 4
- Number of slots per RRA: 3
- Length of the RRA: $L_R = 1500$ mm
- Length of the slot: $L_S = 1300$ mm

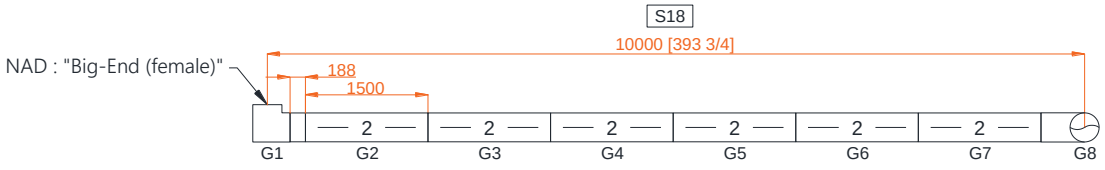
Required:
1. Air flow by meter of slot
2. Critical air flow distance X
3. Vertical penetration in heating Y_{max}
4. Acoustic power generated L_{WA} and noise criteria (NC)

Solution :

1. From total air flow, the number of section of RRA and slots, we find: (2080 m³ /h ÷ 4 RRA) ÷ 3 slots = 173 m³/h by slot
   For a 1300 mm slot length, we calculate the air flow by meter of slot
   173 m³ /h x 0.77 = 133 m³ /h/m slot (1)
2. From dimension's diagram, the air velocity in occupied area of 0.25 m/s (4) and a distance after meeting y = 4 m - 1.8 m= 2.2 m (5), we find the distance of air flow: X = 3.5 m (6) (see page 7).
3. For a temperature difference of +10 °C (7), we find the vertical penetration: Y_{max} = 3.5 m. (8)
4. From the acoustic power diagram, we read: $L_{WA\ diagram}$= 37 dB(A) (9) and a number of slots n = 3: ΔL_{WA}= 6.8 dB(A) (10)
   Finally, the acoustic power generated is:
   $L_{WA} = L_{WA\ diagram} + \Delta L_{WA}$ = 43.8 dB(A) - 10 dB(A) = 33.8 dB(A)
   Noise criteria (NC) = 25 + 2 (3 fentes) = 27 (11)

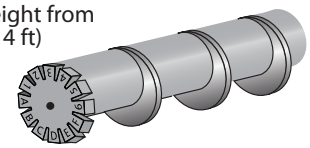
Duct G (FC-1.14)			
Nom	Qty	Code	Total 1 129 cfm.
Collar	1	RRA-WCO-356-9003-X	
Inner Sleeve	1	RRA-SLI-353-XXXX-9003-X	
G1	1	RRA-ELB-QA-356-A-9003-X	Lengthen the output to 188mm
G2 to G7	6	RRA-1500-1000-353-2-AAA-DVV-W-9003-X-X	115 cfm/ea.
G8	1	RRA-ELB-90-356-S-9003-X	
G9 to G11	3	RRA-1500-1000-353-2-AAA-DVV-W-9003-X-X	110 cfm/ea.
G12	1	RRA-1500-1000-353-2-AAA-DVV-W-9003-X-R	110 cfm.
Sleeve	8	RRA-SLE-356-0000-9003-X	
CAP	1	RRA-CAP-356-9003-X	



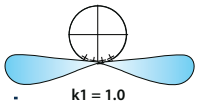
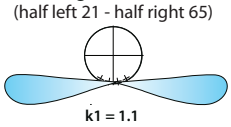
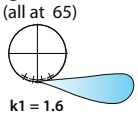
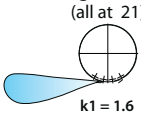


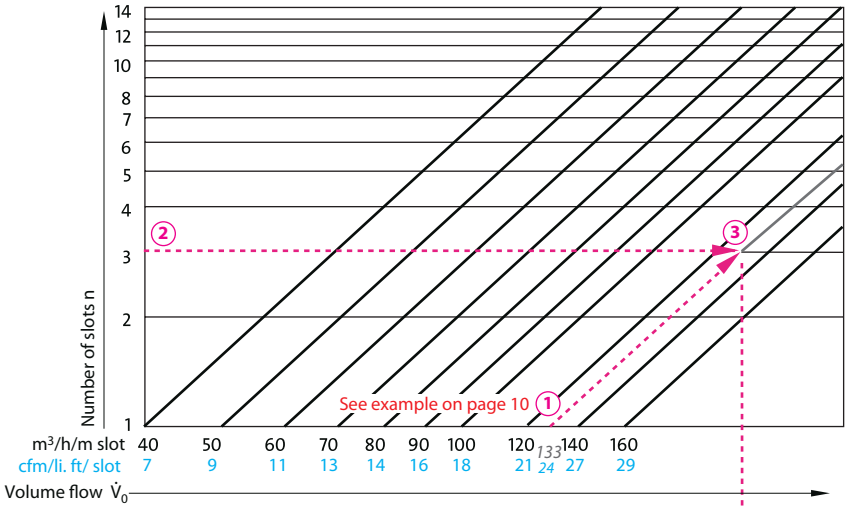
Air flow velocity diagram
RRA with eccentric rollers

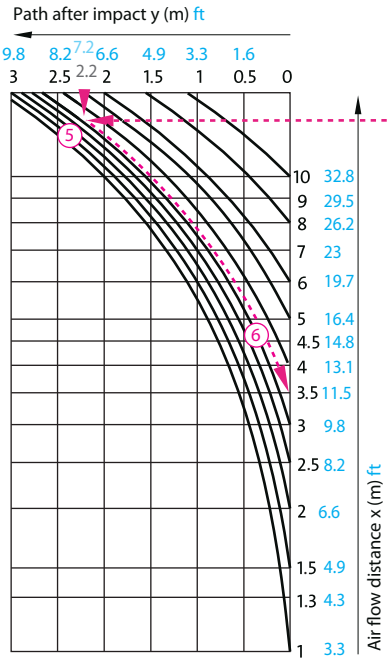
For an installation height from
3 m (10 ft) to 4.3 m (14 ft)

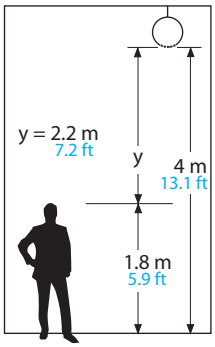


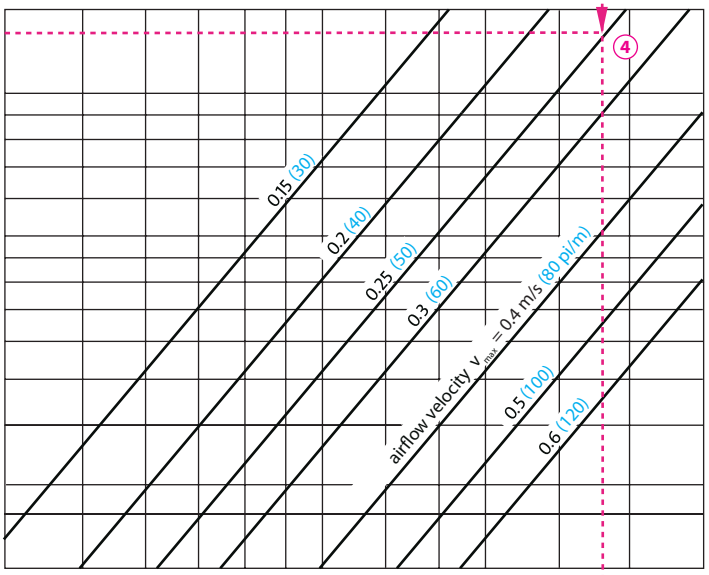
Airstream pattern (roller position) $V_{max} = k1 \times V_{max\ diagram}$

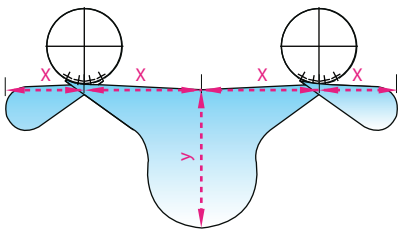
Diffuse (standard) (1x 21 / 1x 65)  k1 = 1.0	**Divergence - 2 sides** (half left 21 - half right 65)  k1 = 1.1
Divergence - 1 side (all at 65)  k1 = 1.6	**Divergence -1 side** (all at 21)  k1 = 1.6



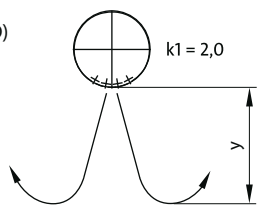


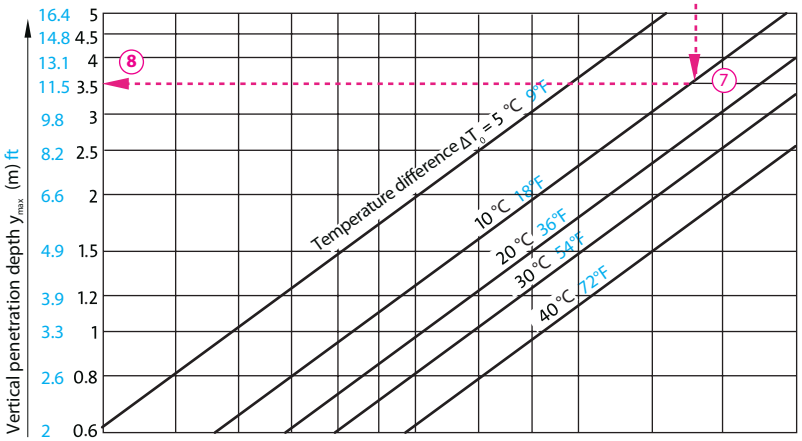






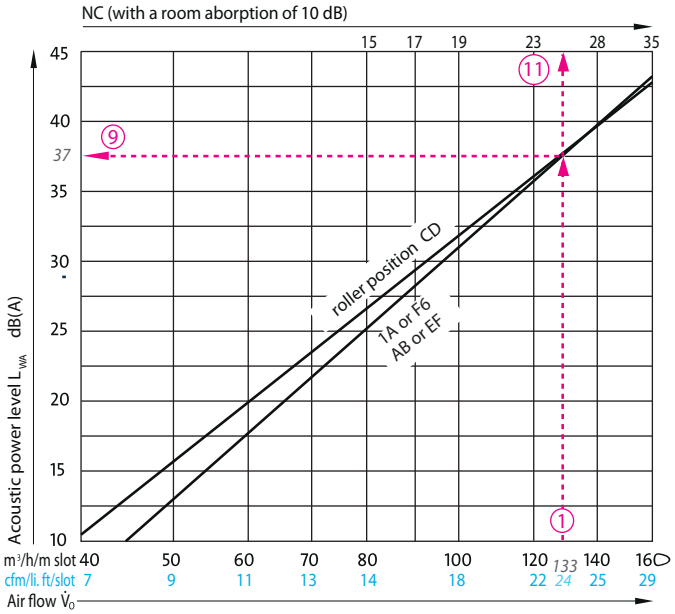
Vertical
(All CD)





Acoustic power diagrams

RRA with eccentric rollers



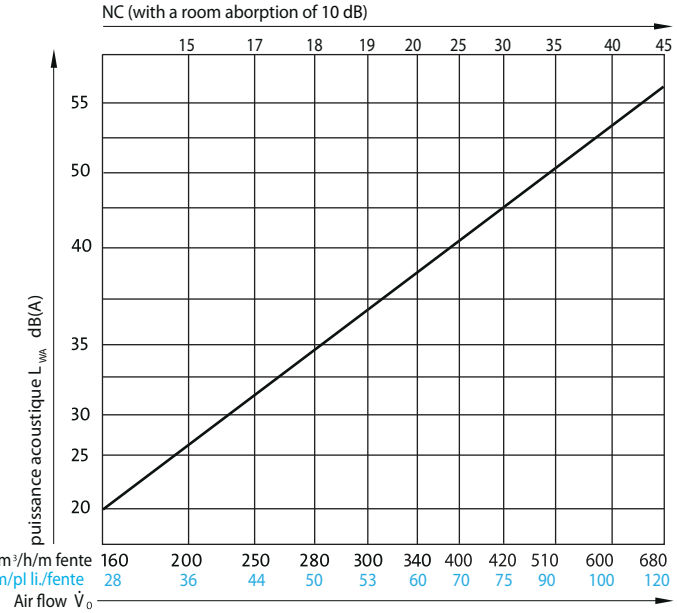
Number of slots	1	2	3	4	5	6	7
NC diagram +	0	1	2	4	5	5	6

Number of slots	8	9	10	11	12	13	14
NC diagram +	7	7	8	8	8	9	9

Number of slots n	$L_{WA} = L_{WA\ Diagram} + \Delta L_{WA}$		
	$L_R = 1000$ $L_S = 800$ ΔL_{WA}	$L_R = 1500$ $L_S = 1300$ ΔL_{WA}	$L_R = 1700$ $L_S = 1500$ ΔL_{WA}
1	0.0	2.1	2.7
2	3.0	5.1	5.7
3	4.7	6.8 (10)	7.5
4	6.0	8.1	8.8
5	7.0	9.1	9.7
6	7.8	9.8	10.5
7	8.4	10.5	11.2
8	9.0	11.1	11.8
9	9.5	11.6	12.3
10	10.0	12.1	12.7
11	10.4	12.5	-
12	10.8	12.9	-
13	11.1	13.2	-
14	11.5	13.5	-

L_R = Duct length L_S = Slot length Standard

RRA with nozzle rollers



Number of slots	1	2	3	4	5	6	7
NC diagram +	0	4	7	8	9	9	10

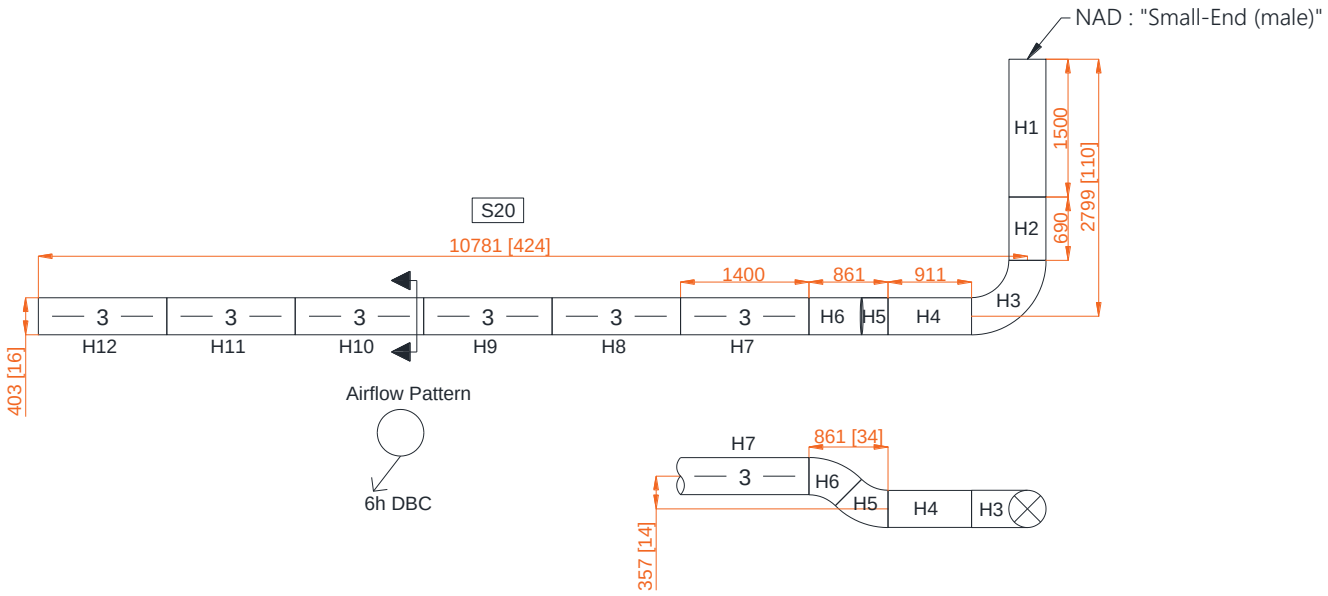
RRA data with eccentric rollers:
- Total airflow: 2080 m³/h
- Number of RRA sections: 4
- Number of slots per RRA: 3
- Length of the RRA: $L_R = 1500$ mm
- Length of the slot: $L_S = 1300$ mm

Required:
1. Air flow by meter of slot
2. Critical air flow distance X
3. Vertical penetration in heating Y_{max}
4. Acoustic power generated L_{WA} and noise criteria (NC)

Solution :

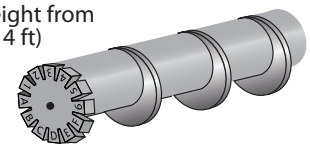
1. From total air flow, the number of section of RRA and slots, we find: (2080 m³ /h ÷ 4 RRA) ÷ 3 slots = 173 m³/h by slot
   For a 1300 mm slot length, we calculate the air flow by meter of slot
   173 m³ /h x 0.77 = 133 m³ /h/m slot (1)
2. From dimension's diagram, the air velocity in occupied area of 0.25 m/s (4) and a distance after meeting y = 4 m - 1.8 m= 2.2 m (5), we find the distance of air flow: X = 3.5 m (6) (see page 7).
3. For a temperature difference of +10 °C (7), we find the vertical penetration: Y_{max} = 3.5 m. (8)
4. From the acoustic power diagram, we read: $L_{WA\ diagram}$= 37 dB(A) (9) and a number of slots n = 3: ΔL_{WA}= 6.8 dB(A) (10)
   Finally, the acoustic power generated is:
   $L_{WA} = L_{WA\ diagram} + \Delta L_{WA}$ = 43.8 dB(A) - 10 dB(A) = 33.8 dB(A)
   Noise criteria (NC) = 25 + 2 (3 fentes) = 27 (11)

Duct H (FC-2.19)			
Nom	Qty	Code	Total 1129 cfm.
H1	1	RRA-1500-XXXX-403-X-XXX-XXX-X-9003-X-X	
H2	1	RRA-0690-XXXX-403-X-XXX-XXX-X-9003-X-X	
H3	1	RRA-ELB-90-406-S-9003-X	
H4	1	RRA-0911-XXXX-403-X-XXX-XXX-X-9003-X-X	
H5, H6	2	RRA-ELB-45-406-S-9003-X	
Inner Seeve	1	RRA-SLI-403-XXXX-9003-X	
H7 to H11	5	RRA-1500-1100-403-3-006-DBC-W-9003-X-X	188 cfm/ea.
H12	1	RRA-1500-1100-403-3-006-DBC-W-9003-X-R	188 cfm.
Sleeve	6	RRA-SLE-406-0000-9003-X	
CAP	1	RRA-CAP-406-9003-X	

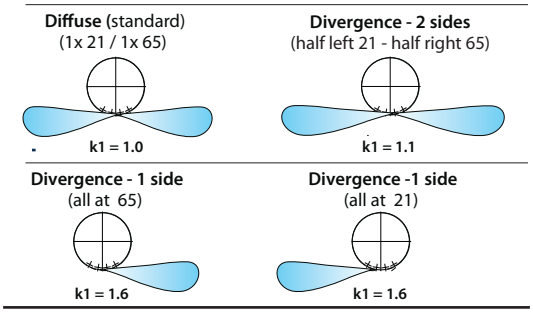


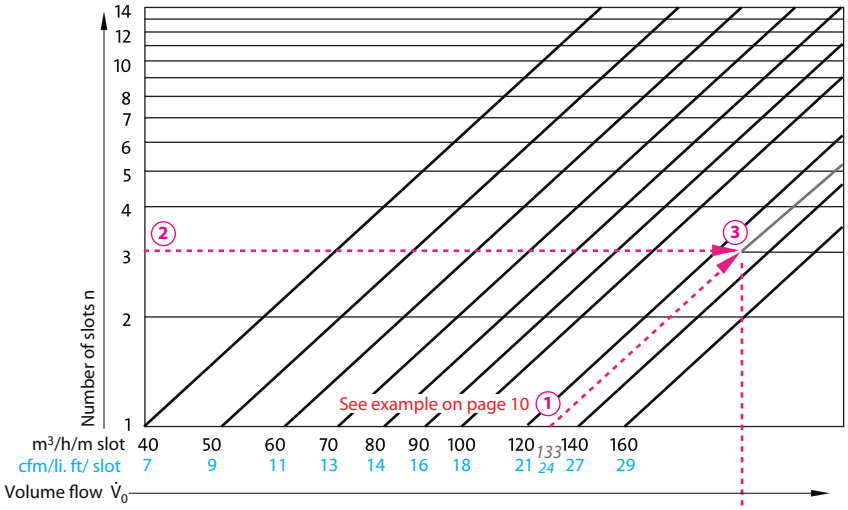
Air flow velocity diagram
RRA with eccentric rollers

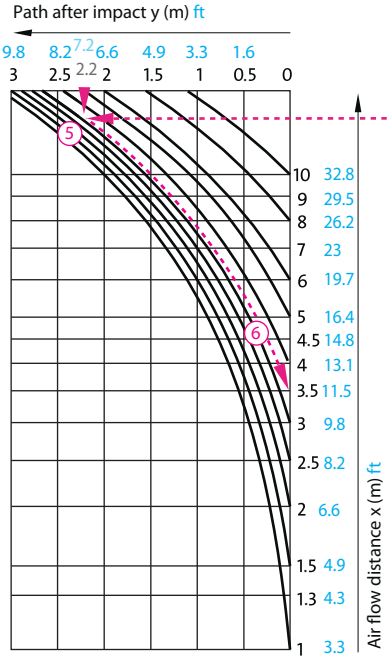
For an installation height from
3 m (10 ft) to 4.3 m (14 ft)

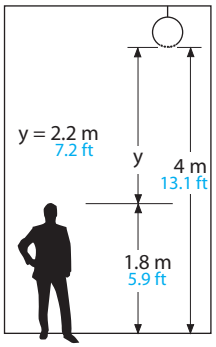


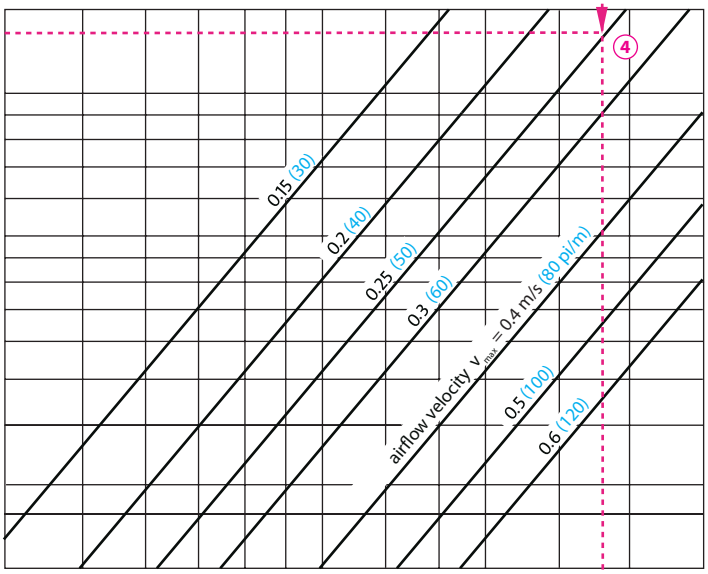
Airstream pattern (roller position) $V_{max} = k1 \times V_{max\ diagram}$

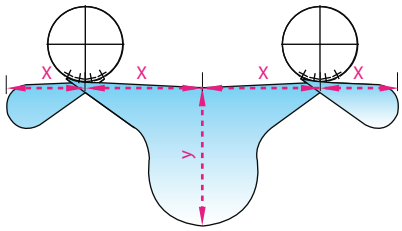




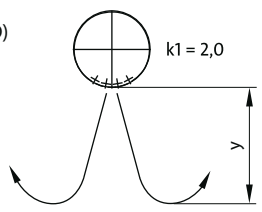


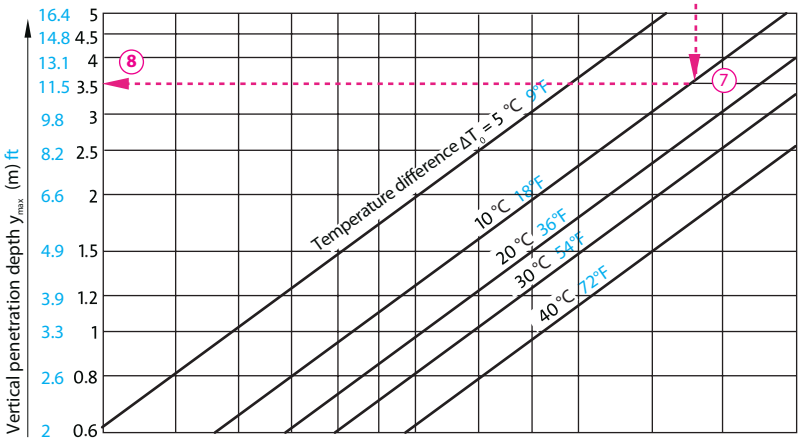






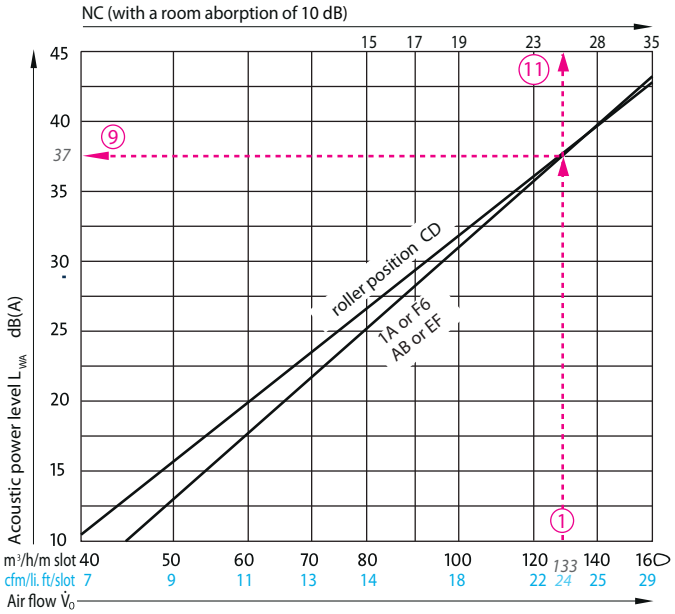
Vertical
(All CD)





Acoustic power diagrams

RRA with eccentric rollers



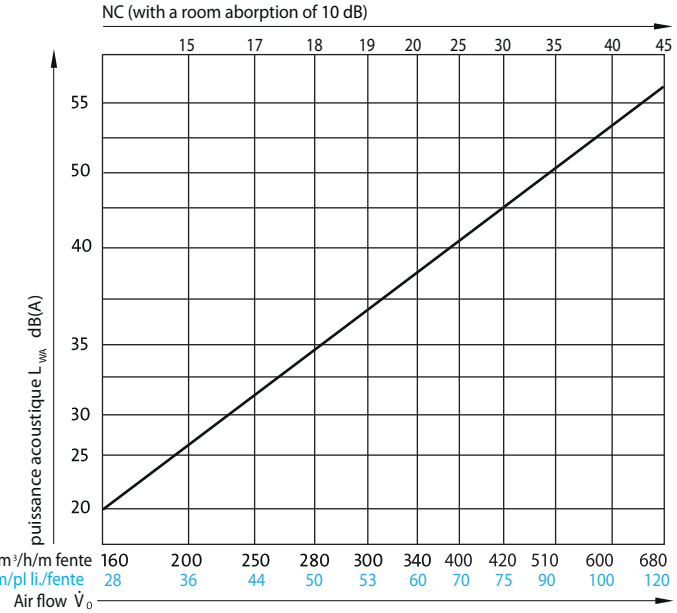
Number of slots	1	2	3	4	5	6	7
NC diagram +	0	1	2	4	5	5	6

Number of slots	8	9	10	11	12	13	14
NC diagram +	7	7	8	8	8	9	9

Number of slots n	$L_{WA} = L_{WA\ Diagram} + \Delta L_{WA}$		
	$L_R = 1000$ $L_S = 800$ ΔL_{WA}	$L_R = 1500$ $L_S = 1300$ ΔL_{WA}	$L_R = 1700$ $L_S = 1500$ ΔL_{WA}
1	0.0	2.1	2.7
2	3.0	5.1	5.7
3	4.7	6.8 (10)	7.5
4	6.0	8.1	8.8
5	7.0	9.1	9.7
6	7.8	9.8	10.5
7	8.4	10.5	11.2
8	9.0	11.1	11.8
9	9.5	11.6	12.3
10	10.0	12.1	12.7
11	10.4	12.5	-
12	10.8	12.9	-
13	11.1	13.2	-
14	11.5	13.5	-

L_R = Duct length L_S = Slot length Standard

RRA with nozzle rollers



Number of slots	1	2	3	4	5	6	7
NC diagram +	0	4	7	8	9	9	10

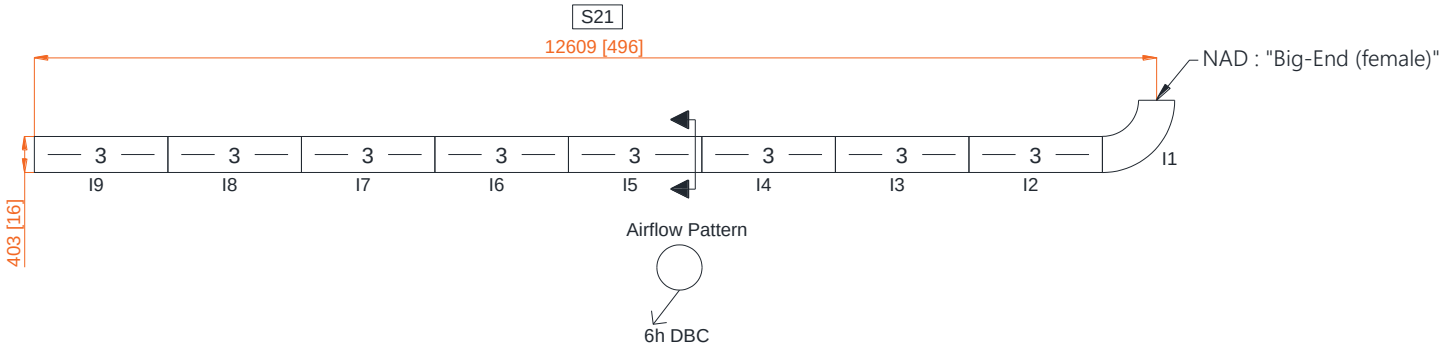
RRA data with eccentric rollers:
- Total airflow: 2080 m³/h
- Number of RRA sections: 4
- Number of slots per RRA: 3
- Length of the RRA: L_R = 1500 mm
- Length of the slot: L_S = 1300 mm

Required:
1. Air flow by meter of slot
2. Critical air flow distance X
3. Vertical penetration in heating Y_{max}
4. Acoustic power generated L_{WA} and noise criteria (NC)

Solution :

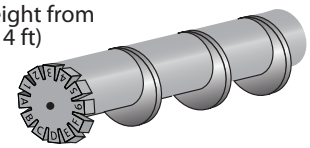
1. From total air flow, the number of section of RRA and slots, we find: (2080 m³ /h ÷ 4 RRA) ÷ 3 slots = 173 m³/h by slot
   For a 1300 mm slot length, we calculate the air flow by meter of slot
   173 m³ /h x 0.77 = 133 m³ /h/m slot (1)
2. From dimension's diagram, the air velocity in occupied area of 0.25 m/s (4) and a distance after meeting y = 4 m - 1.8 m= 2.2 m (5), we find the distance of air flow: X = 3.5 m (6) (see page 7).
3. For a temperature difference of +10 °C (7), we find the vertical penetration: Y_{max} = 3.5 m. (8)
4. From the acoustic power diagram, we read: $L_{WA\ diagram}$= 37 dB(A) (9) and a number of slots n = 3: ΔL_{WA}= 6.8 dB(A) (10)
   Finally, the acoustic power generated is:
   $L_{WA} = L_{WA\ diagram} + \Delta L_{WA}$ = 43.8 dB(A) - 10 dB(A) = 33.8 dB(A)
   Noise criteria (NC) = 25 + 2 (3 fentes) = 27 (11)

Duct I (FC-P.02)			
Nom	Qty	Code	Total 1 377 cfm.
I1	1	RRA-ELB-90-406-S-9003-X	
I2 to I8	7	RRA-1500-1000-403-3-006-DBC-W-9003-X-X	172 cfm/ea.
I9	1	RRA-1500-1000-403-3-006-DBC-W-9003-X-R	172 cfm.
Sleeve	7	RRA-SLE-406-0000-9003-X	
CAP	1	RRA-CAP-406-9003-X	

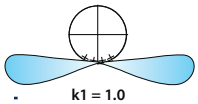
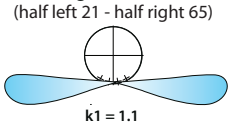
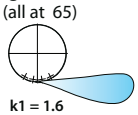
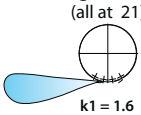


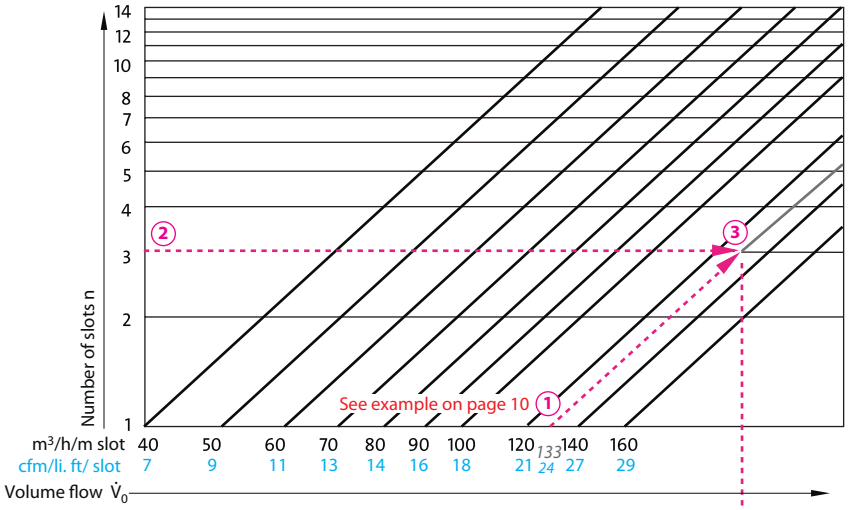
Air flow velocity diagram
RRA with eccentric rollers

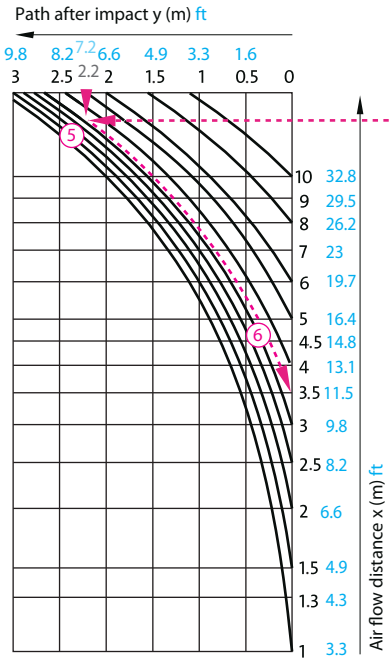
For an installation height from
3 m (10 ft) to 4.3 m (14 ft)

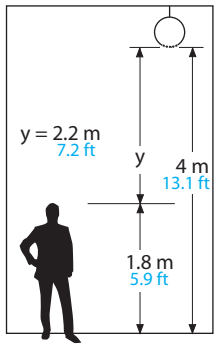


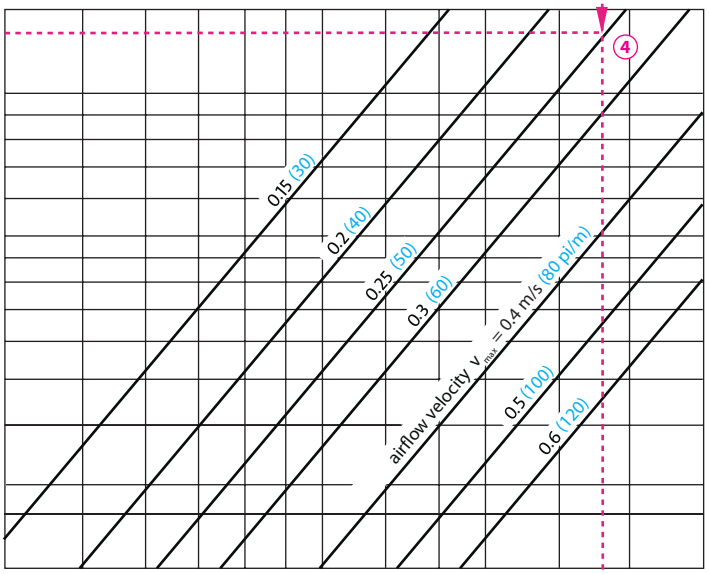
Airstream pattern (roller position) $V_{max} = k1 \times V_{max\ diagram}$

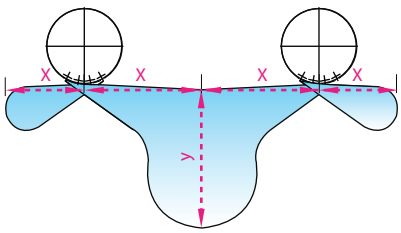
Diffuse (standard) (1x 21 / 1x 65)	**Divergence - 2 sides** (half left 21 - half right 65)
 k1 = 1.0	 k1 = 1.1
Divergence - 1 side (all at 65)	**Divergence -1 side** (all at 21)
 k1 = 1.6	 k1 = 1.6



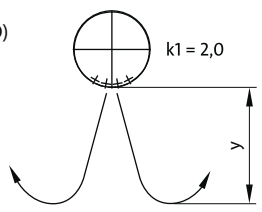


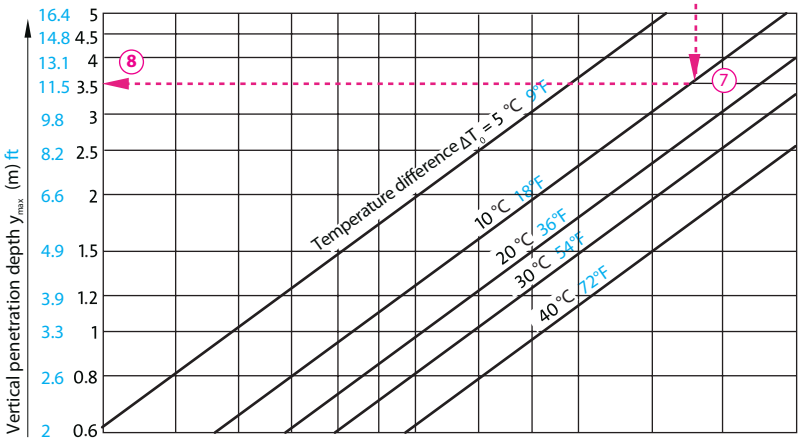






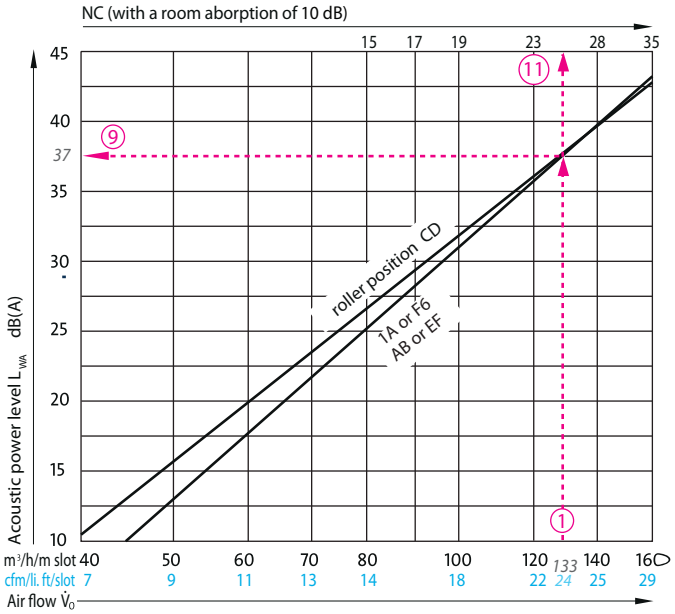
Vertical
(All CD)





Acoustic power diagrams

RRA with eccentric rollers



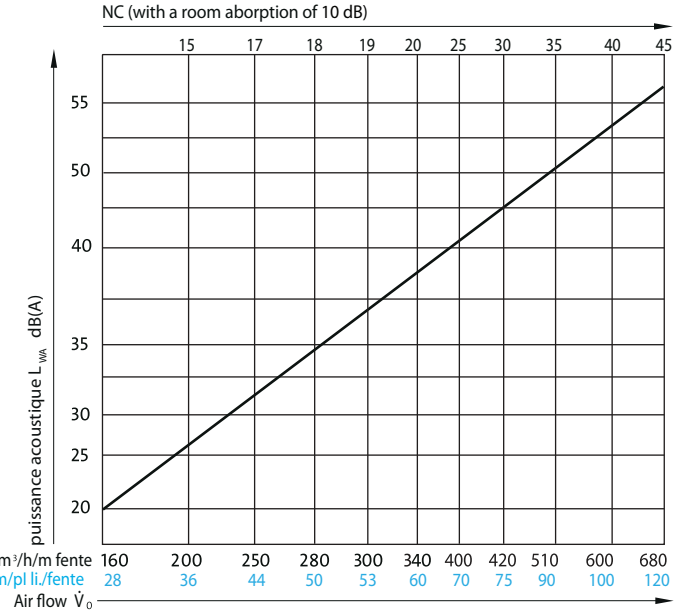
Number of slots	1	2	3	4	5	6	7
NC diagram +	0	1	2	4	5	5	6

Number of slots	8	9	10	11	12	13	14
NC diagram +	7	7	8	8	8	9	9

Number of slots n	$L_{WA} = L_{WA\ Diagram} + \Delta L_{WA}$		
	$L_R = 1000$ $L_S = 800$ ΔL_{WA}	$L_R = 1500$ $L_S = 1300$ ΔL_{WA}	$L_R = 1700$ $L_S = 1500$ ΔL_{WA}
1	0.0	2.1	2.7
2	3.0	5.1	5.7
3	4.7	6.8 (10)	7.5
4	6.0	8.1	8.8
5	7.0	9.1	9.7
6	7.8	9.8	10.5
7	8.4	10.5	11.2
8	9.0	11.1	11.8
9	9.5	11.6	12.3
10	10.0	12.1	12.7
11	10.4	12.5	-
12	10.8	12.9	-
13	11.1	13.2	-
14	11.5	13.5	-

L_R = Duct length L_S = Slot length Standard

RRA with nozzle rollers



Number of slots	1	2	3	4	5	6	7
NC diagram +	0	4	7	8	9	9	10

RRA data with eccentric rollers:
- Total airflow: 2080 m³/h
- Number of RRA sections: 4
- Number of slots per RRA: 3
- Length of the RRA: $L_R = 1500$ mm
- Length of the slot: $L_S = 1300$ mm

Required:
1. Air flow by meter of slot
2. Critical air flow distance X
3. Vertical penetration in heating Y_{max}
4. Acoustic power generated L_{WA} and noise criteria (NC)

Solution :

1. From total air flow, the number of section of RRA and slots, we find: (2080 m³ /h ÷ 4 RRA) ÷ 3 slots = 173 m³/h by slot
   For a 1300 mm slot length, we calculate the air flow by meter of slot
   173 m³ /h x 0.77 = 133 m³ /h/m slot (1)
2. From dimension's diagram, the air velocity in occupied area of 0.25 m/s (4) and a distance after meeting y = 4 m - 1.8 m= 2.2 m (5), we find the distance of air flow: X = 3.5 m (6) (see page 7).
3. For a temperature difference of +10 °C (7), we find the vertical penetration: Y_{max} = 3.5 m. (8)
4. From the acoustic power diagram, we read: $L_{WA\ diagram}$= 37 dB(A) (9) and a number of slots n = 3: ΔL_{WA}= 6.8 dB(A) (10)
   Finally, the acoustic power generated is:
   $L_{WA} = L_{WA\ diagram} + \Delta L_{WA}$ = 43.8 dB(A) - 10 dB(A) = 33.8 dB(A)
   Noise criteria (NC) = 25 + 2 (3 fentes) = 27 (11)

6

8

TOUCHDOWN WORKSTATION AREA

101A

100

101

102

103

104

105

106

107

108

109

110

112

112B

114

114A

134

DN

FC-1.10

FC-1.11

FC-1.12

FC-1.13

FC-1.14

FC-1.15

FC-1.16

FC-1.17

FC-1.18

FC-1.19A

FC-1.19B

FC-1.03

VAV-1-4

VAV-1-3

VAV-1-2

VAV-1-1

VAV-1-10

VAV-1-12

F/D AT FLOOR

FSD IN WALL

400x200 TD

1325x250

625x250

300x300

250x250

250x200

200x150

925x250

200ø

150ø

300ø

250ø

OED

FSD

UP

380 SF

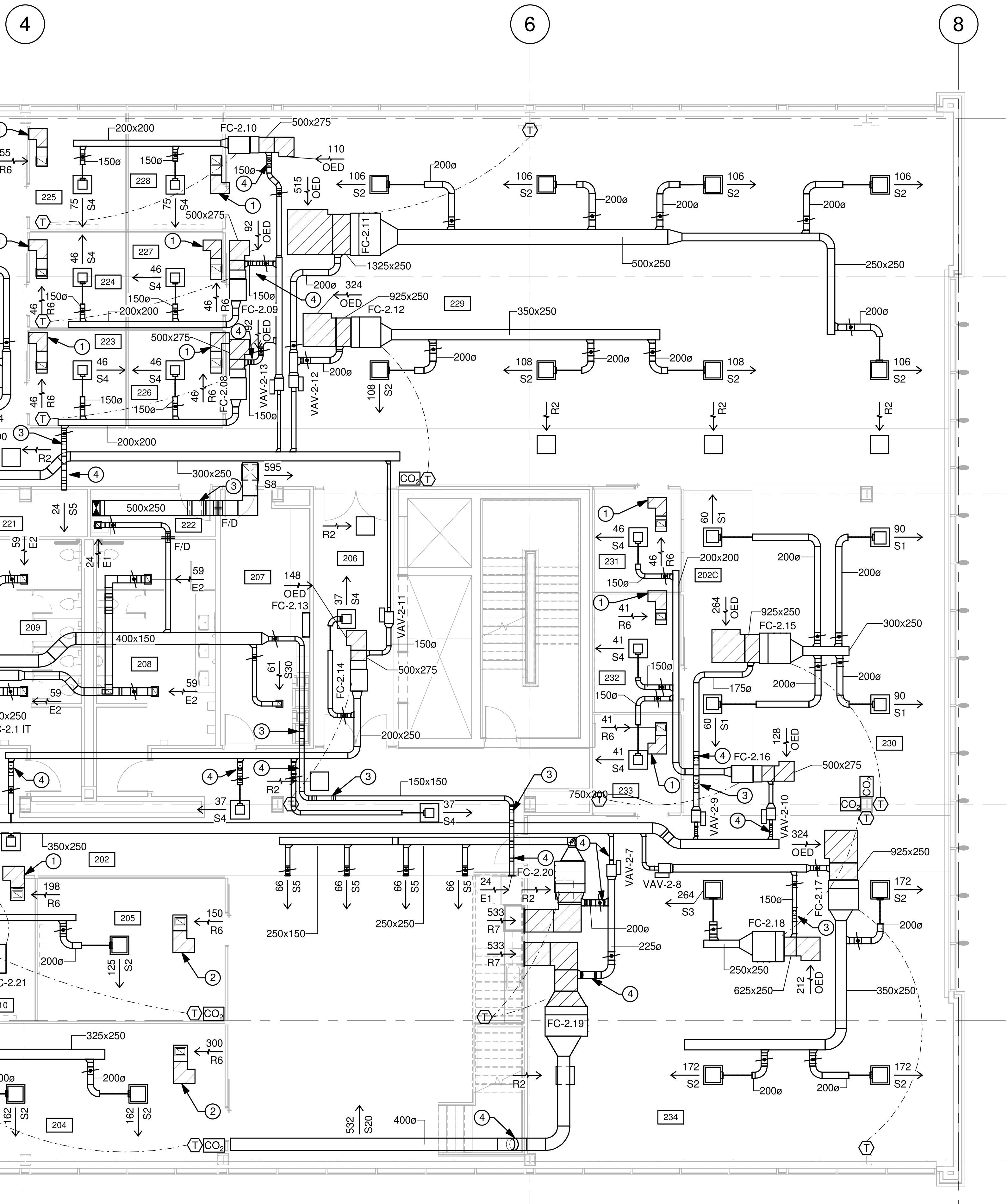
207 S19

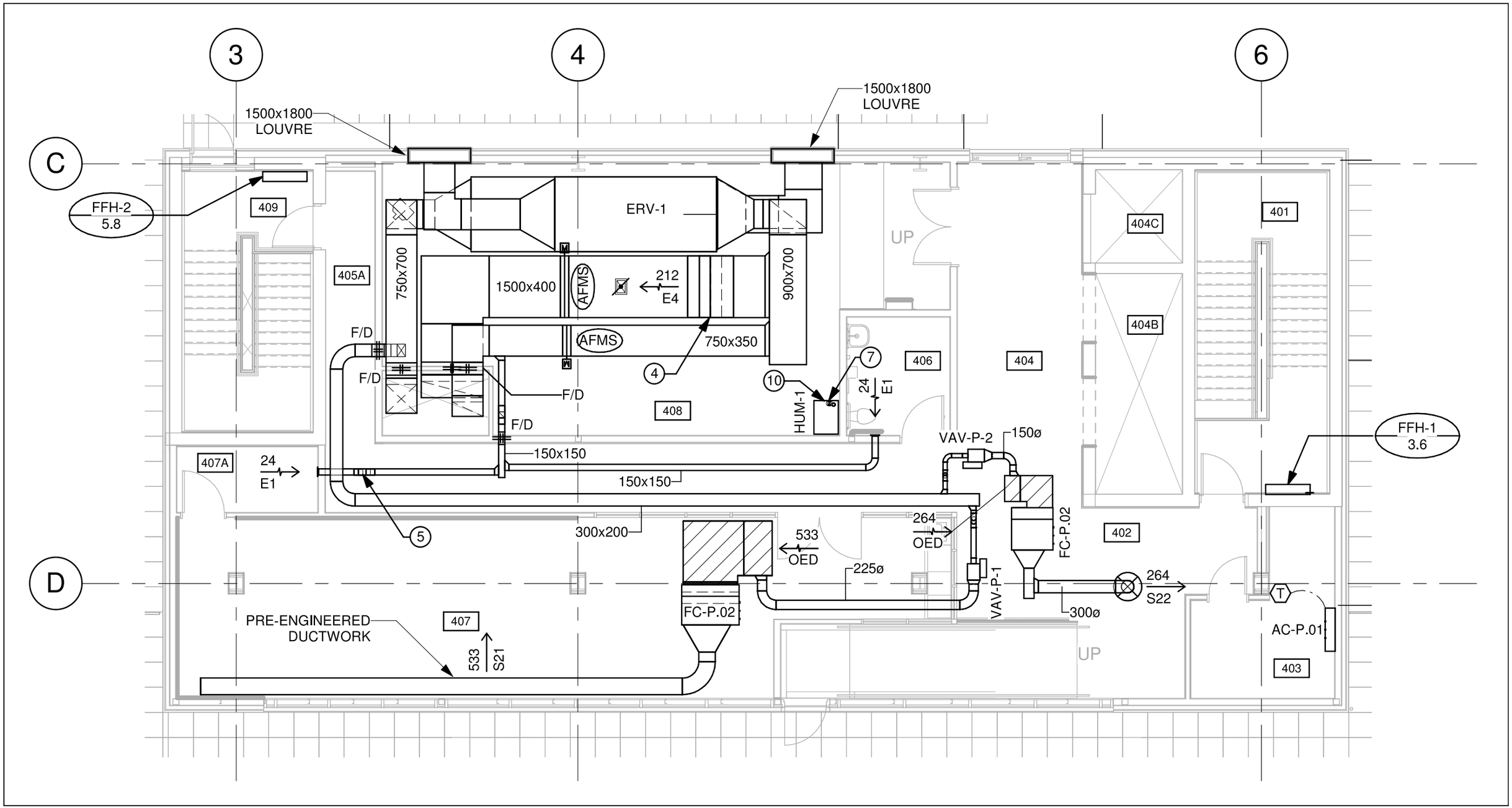
326 S18

216 S17

207 S15

7A


4
6
8
FC-2.10
500x275
200x200
110
OED
150ø
228
225
75
S4
515
OED
106
S2
200ø
FC-2.11
1325x250
500x250
250x250
227
224
46
R6
FC-2.09
92
OED
324
OED
925x250
FC-2.12
229
350x250
200x200
223
500x275
FC-2.08
VAV-2-13
VAV-2-12
108
S2
226
R2
200x200
300x250
595
S8
CO2
F/D
500x250
222
221
S5
E2
E1
59
206
207
148
OED
FC-2.13
37
S4
VAV-2-11
150ø
209
400x150
208
61
S30
FC-2.14
500x275
200x250
x250
C-2.1 IT
150x150
37
S4
350x250
202
198
R6
205
150
R6
66
S5
250x150
250x250
24
E1
FC-2.20
533
R7
200ø
225ø
FC-2.19
125
S2
C-2.21
325x250
300
R6
162
S2
204
532
S20
400ø
60
S1
90
S1
231
200x200
202C
264
OED
925x250
FC-2.15
300x250
41
S4
232
175ø
200ø
230
128
OED
FC-2.16
500x275
750x300
233
VAV-2-9
VAV-2-10
VAV-2-7
VAV-2-8
324
OED
925x250
FC-2.17
172
S2
S3
FC-2.18
250x250
625x250
212
OED
350x250
234



2 M103 PENTHOUSE PLAN - HVAC LAYOUT

1 : 100

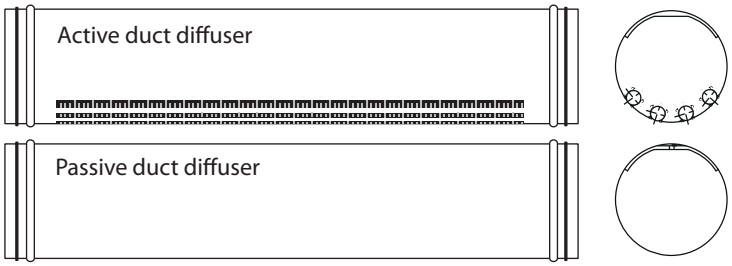
RRA Submittal

NAD Klima Ontario
2840, Argentia Road, Unit 6 , Mississauga (Ont) L5N 8G4
(416) 860-1067
ontario@nadklima.com

NAD Klima
144 rue Léger, Sherbrooke (Qué) J1L 1L9
(819) 780-0111 • 1 866 531-1739
info@nadklima.com

MADE IN CANADA

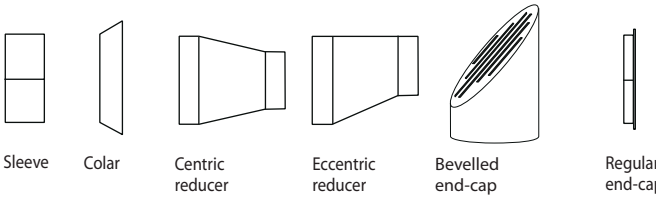
Date	
Project	
Engineer	
Contractor	



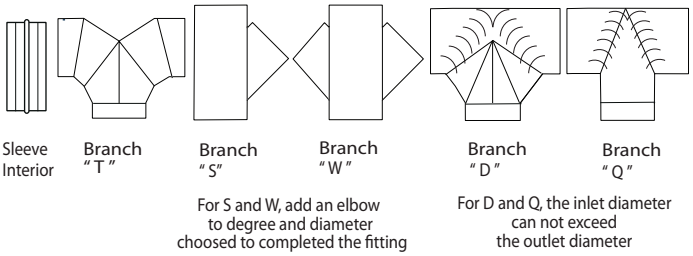
All of the standard accessories (elbows, connection sleeves, reduction connectors, multi-branch connectors, etc.)
are available in the exact dimensions of the duct.

Accessories

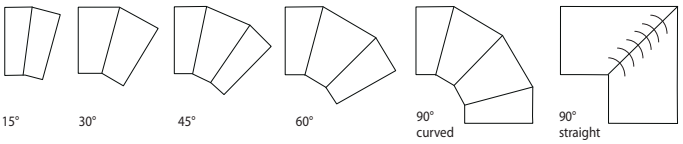
Big-end



small-end



Elbows are big-end

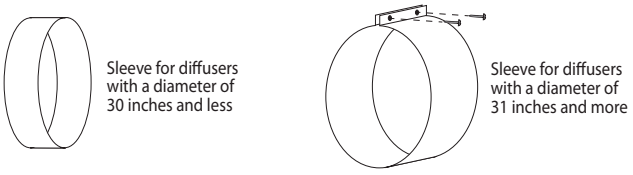


The diffuser

- Tubing diffuser
- Made of 22 ga brushed steel for ducts inferior to 457 mm (18 in) in diameter, and 20 ga for diameters superior or equal to 457 mm (18 in).
- Diameter from 203 mm (8 in) to 1419 mm (56 in).
- PVC gasket
- Tight sea between sections.
- Assembled with union sleeve.
- Steel reininforcements installed inside ducts of more than 433 mm (17 in) in diameter.
- Painted with a TGIC free polyester powder coat.
- Colour choosed by client on RAL colour chart only.
- Slots containing eccentric rollers and / or nozzle rollers.
- 100 mm (4 in) long eccentric rollers.
- Alphanumerically adjustment of duct's air flow.
- Air flow pattern over 180 degrees.
- Easy-to-clean
- A reducer fitting, or perforated balancing damper with a self-lock ing mechanism, installed after a maximum of 5 consecutive active sections of the same diameter.
- The duct diffuser can be active or passive (without slots).

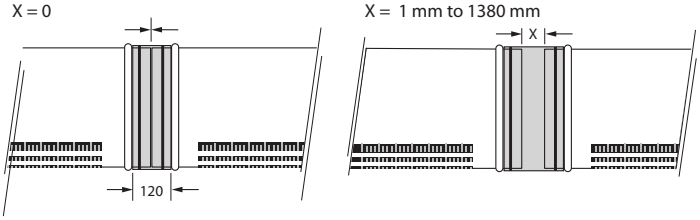
Assembling

The RRA diffuser sections are connected by connection sleeves which are adapted to the diameter of the duct.



Standard Sleeve (120 mm)
(RRA are joined)
X = 0

Special sleeve
(spacing between RRA)
X = 1 mm to 1380 mm



RRA - Réglage de la direction du jet d'air

Thanks to the shape of the eccentric rollers and adjustment dial with alphanumeric characters, the air jet's direction at the outlet of the diffuser can vary up to 180°. For each direction, there are two (2) roller positions ("reduced" or "not reduced"), as illustrated in figure E.

The length of each roller is 100 mm and they are individually adjustable.

As a result, the combinations of airflow are almost infinite. In manufacturing, the ducts are individually adjusted for each project. The standard setting for the rollers is set to diffusion mode, in the positions "21" and "65" alternately.
This setting produces strong induction, which can be used to meet heating and cooling needs, thereby creating high mixing levels. The nozzle rollers can only be set in the open and closed position.

As a result, the divergent mode allows jets to blow in more accurate directions.
This mode also allows a longer projection of the airflow. In specific zones which are habitually difficult to cover, a specialized setting can be created. Figures C and D show the relationship between the position of the eccentric roller and the direction of the exiting airflow. Note that to maximize air projection, multiple jets can be orientated in the same direction to optimize the coverage of a zone, even when heating.

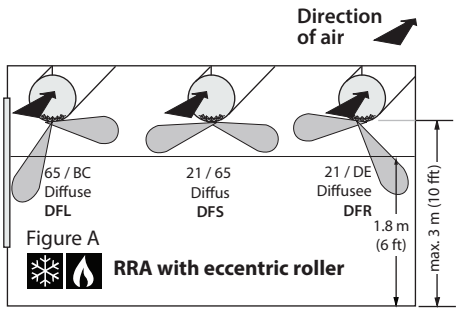


Figure A **RRA with eccentric roller**

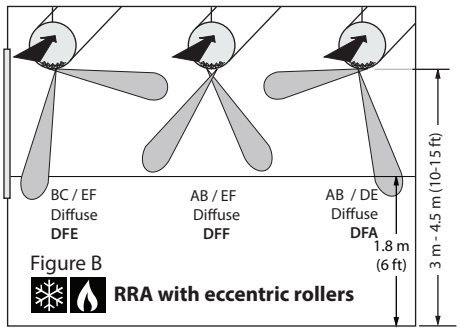


Figure B **RRA with eccentric rollers**

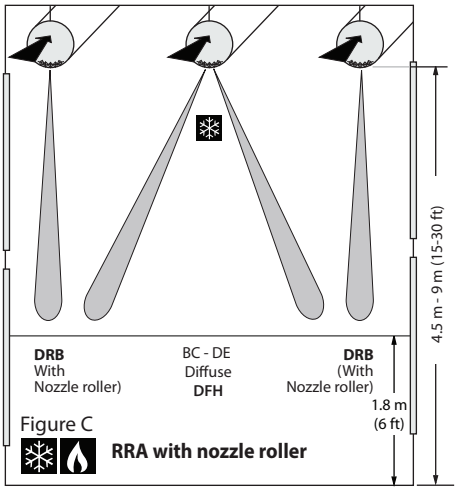
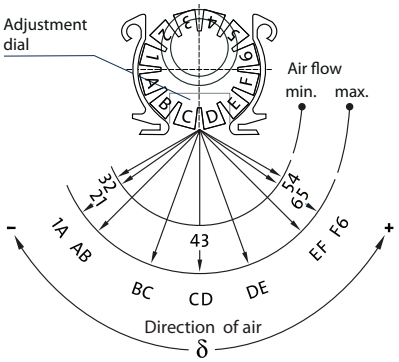
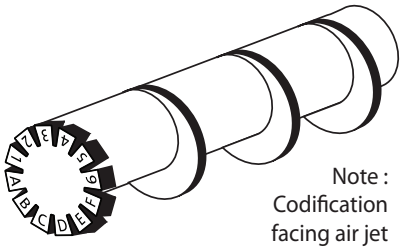


Figure C **RRA with nozzle roller**

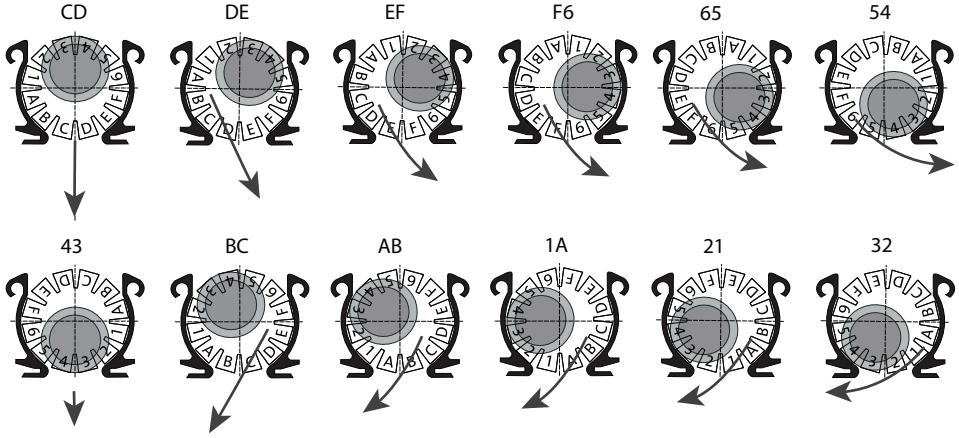
Eccentric roller

Figure E




Note : Codification facing air jet

Guide of direction of flow



Slots at + 90°

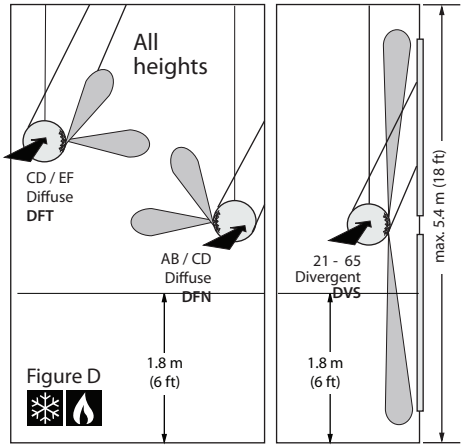
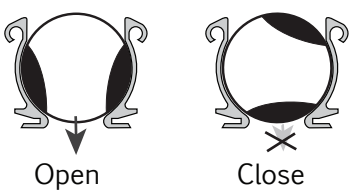
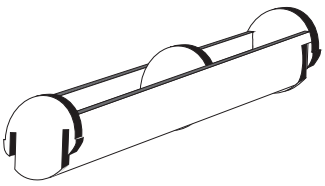


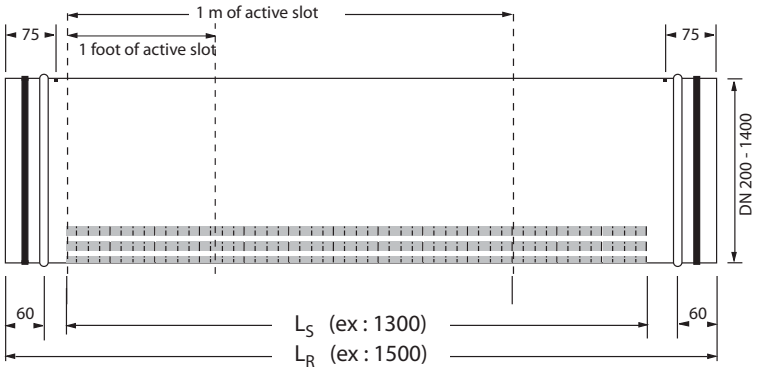
Figure D

Nozzle roller (DRB)





RRA - Dimensions and weight



Duct length - L_R	1000	1500	1700	2000
Slot length - L_S	800	1300	1500	1800

	Weight / slot (kg)			
	0.30	0.48	0.56	0.67
	Weight of passive RRA (kg)			
Diameter of RRA (mm)	Thickness of the metal sheet : 0.85 mm			
200	4.20	6.38	7.15	8.41
251	5.28	7.92	8.97	10.55
302	6.35	9.52	10.79	12.70
353	7.42	11.13	12.69	14.84
403	8.47	12.71	14.40	16.94
	Thickness of the metal sheet : 1.00 mm			
454	11.41	17.00	19.30	22.66
505	12.67	18.93	21.43	25.19
556	13.94	20.83	23.58	27.72
607	15.69	23.21	26.22	30.73
657	16.93	25.07	28.32	33.21
708	18.97	27.74	31.25	36.51
759	20.33	29.74	33.50	39.14
810	21.70	31.73	35.75	41.77
861	23.07	33.73	38.00	44.40
911	24.40	35.69	40.21	46.98
962	26.40	38.31	43.08	50.23
1013	27.79	40.35	45.37	52.90
1064	29.19	42.38	47.65	55.56
1115	30.59	44.41	49.93	58.22
1165	31.96	46.40	52.17	60.83
1216	33.36	48.43	54.46	63.50
1267	34.76	50.46	56.74	66.16
1318	36.16	52.49	59.02	68.82
1369	37.56	54.52	61.31	71.48
1419	38.93	56.51	63.55	74.10
		Standard		

RRA - Codification

RRA

Product

1000, 1500, 1800

Length of duct L_R

0800, 1300, 1600
____ = Special length, write the length in mm
XXXX = Non applicable (passive duct)

Length of slots L_S

200, 251, 302, 353, 403, 454, 505, 556, 607, 657, 708, 759, 810, 861, 911, 962,
1013, 1064, 1115, 1165, 1216, 1267, 1318, 1369, 1419

Ø Duct diameter

X = Passive
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15,

Quantity of slots

XXX = Passive duct
006 = Slots at 0° (6h)
003 = Slots at +90°(3h)
009 = Slots at -90° (9h)
012 = Slots at 180° (12h)
039 = Slots at +90° (3h) and at -90° (9h)
369 = Slots at +90° (3h), 0° (6h) and at -90° (9h)
612 = Slots at 0° (6h) and at 180° (12h)
AAA = Other (specify in annotation)

Slots position

XXX = Passive
DFS = Diffuse standard 21/ 65
DFR = Diffuse window DE / 21
DFL = Diffuse window BC / 65
DFF = Diffuse height AB / EF
DFT = Diffuse CD / EF - slots at 3 o'clock
DFN = Diffuse CD / AB - slots at 9 o'clock
DFH = Diffuse height BC / DE
DFA = Diffuse AB / DE
DVB = Divergent 21
DVD = Divergent 65
DVV = Divergent vertical CD
DRB = Divergent with roller nozzle

Air flow

W = White roller or white roller nozzle (RAL 9003)
C = Cream roller or cream roller nozzle (RAL 9010)
B = Black roller or black roller nozzle
X = Without roller

Color of eccentric rollers and roller nozzles

9003 = White
9010 = Cream
00SB = Solar Black (Standard matte black)
00SM = Silver Matte (Standard metallic grey)
____ = RAL color* (write the color number of RAL)

Diffuser color

A = With closed-cell acoustic insulation
X = Without insulation

Acoustic insulation

D = With damper
X = Without damper

Balancing damper

R = With register (perforated plate)
X = Without register

Register

RRA	1500	1300	200	1	006	DFS	W	9003	X	X	Annotation

Example

Codification for reducers

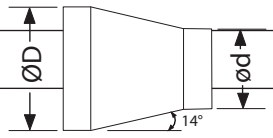
RRA

Product

RED = Reducer

254, 305, 356, 406, 457, 508, 559, 610, 660, 711, 762, 813, 864, 914, 965,
1016, 1067, 1118, 1168, 1219, 1270, 1321, 1372, 1422

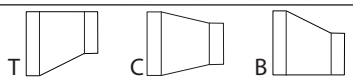
Ø D - Inlet diameter



203, 254, 305, 356, 406, 457, 508, 559, 610, 660, 711, 762, 813, 864, 914,
965, 1016, 1067, 1118, 1168, 1219, 1270, 1321, 1372

Ø d - Outlet diameter

T = Flat on Top (standard)
C = Center
B = Flat on Bottom



Configuration

S = Standard α = 14°
A = Other (specify in annotation)

Length

9003 = White, 9010 = Cream
00SB = Solar Black (Standard matte black)
00SM = Silver Matte (Standard metallic grey)
____ = RAL color * (write the color number of RAL)

Color

A = With closed-cell acoustic insulation
X = Without insulation

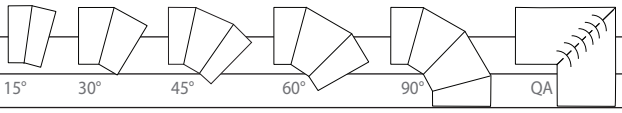
Acoustic insulation

RRA	RED	305	203	T	S	9003	X	Annotation

Example

RRA - Codification

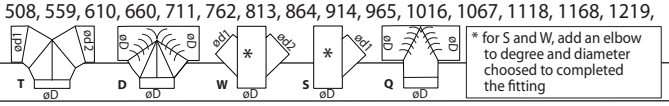
Codification for elbows



RRA	ELB = Elbows	**Product**
	15, 30, 45, 60, 90, QA	**Angle**
	203, 254, 305, 356, 406, 457, 508, 559, 610, 660, 711, 762, 813, 864, 914, 965, 1016, 1067, 1118, 1168, 1219, 1270, 1321, 1372, 1422	**Ø Diameter**
	S = Standard (based on : r = 1.5 D) A = Other (specify in annotation)	**Radius**
	9003 = White 9010 = Cream 00SB = Standard Matte Black 00SM = Standard Metallic Grey ____ = RAL colors * (write the color number of RAL)	**Color**
	A = With closed-cell insulation X = Without insulation	**Insulation**
RRA - ELB - 15 - 203 - S - 9003 - X		**Example**

Codification for the branches

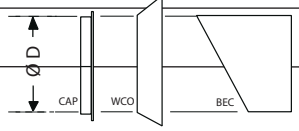
RRA	BRA = Branches	**Product**
	203, 254, 305, 356, 406, 457, 508, 559, 610, 660, 711, 762, 813, 864, 914, 965, 1016, 1067, 1118, 1168, 1219, 1270, 1321, 1372, 1422 (Note : For Q and D, inlet and outlet diameters are the same)	**ØD - Inlet diameter**
	203, 254, 305, 356, 406, 457, 508, 559, 610, 660, 711, 762, 813, 864, 914, 965, 1016, 1067, 1118, 1168, 1219, 1270, 1321, 1372, 1422 (Note : For Q and D, inlet and outlet diameters are the same)	**Ød1 - Outlet diameter (for T , W and S only)**
	203, 254, 305, 356, 406, 457, 508, 559, 610, 660, 711, 762, 813, 864, 914, 965, 1016, 1067, 1118, 1168, 1219, 1270, 1321, 1372, 1422	**Ød2 - Outlet diameter (for T and W only)**
	T, D, W, S, Q	**Configuration**
	9003 = White 9010 = Cream 00SB = Standard Matte Black 00SM = Standard Metallic Grey ____ = RAL colors * (write the color number of RAL)	**Color**
	A = With closed-cell insulation X = Without insulation	**Insulation**
RRA - BRA - 305 - 305 - 203 - T - 9003 - X		**Example**



* for S and W, add an elbow to degree and diameter choosed to completed the fitting

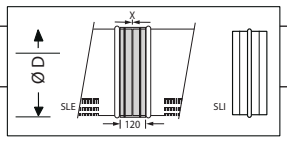
Codification for endcap and collar

RRA	CAP (End cap), BEC (Bevelled endcap), BES (Bevelled endcap + slots - return), BEG (Bevelled endcap + grid - return), WCO (Collar)	**Product**
	203, 254, 305, 356, 406, 457, 508, 559, 610, 660, 711, 762, 813, 864, 914, 965, 1016, 1067, 1118, 1168, 1219, 1270, 1321, 1372, 1422	**Ø Diameter**
	9003 = White 9010 = Cream 00SB = Standard Matte Black 00SM = Standard Metallic Grey ____ = RAL colors (write the color number of RAL)	**Color**
	A = With closed-cell insulation X = Without insulation	**Insulation**
RRA - CAP - 203 - 9003 - X		**Example**



Codification for sleeves

RRA	SLE (Sleeve) , SLI (Inner sleeve) (no length available)	**Product**
	203, 254, 305, 356, 406, 457, 508, 559, 610, 660, 711, 762, 813, 864, 914, 965, 1016, 1067, 1118, 1168, 1219, 1270, 1321, 1372, 1422	**Ø Diameter of SLE**
	200, 251, 302, 353, 403, 454, 505, 556, 607, 657, 708, 759, 810, 861, 911, 962, 1013, 1064, 1115, 1165, 1216, 1267, 1318, 1369, 1419	**Ø Diameter of SLI**
	XXXX = Non applicable (SLI) 0000 = Standard (The distance between RRA is 0 mm) ____ = Special - write the «x» value (distance between RRA) - from 0001 mm to 1380 mm maximum	**Length of the SLE**
	9003 = White, 9010 = Cream, 00SB = Standard Matte Black, 00SM = Standard Metallic Grey , ____ = RAL colors (write the color number of RAL)	**Color**
	A = With closed-cell insulation X = Without insulation	**Insulation**
RRA - SLE - 203 - 0000 - 9003 - X		**Example**

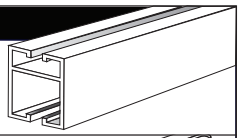


RRA - Codification

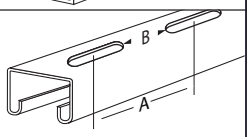
Suspension with rail

Description

RAI ALU Aluminum rail
1 1/4 in x 1 3/4 in x 10 ft



S33 Steel rail
1 5/8 in x 7/8 in x 10 ft



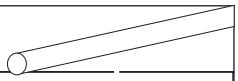
A : 2 po B : 7/8 po

9003 = White 00SB = Solar Black
9010 = Cream 00SM = Silver Matte
____ = Color RAL * (write the #)
XXXX = Unpainted

Color

RAI - ALU - 9003 **Example**

RCT Rod-cover for threaded rod
16 mm x 3.05 m (5/8 in x 10 ft)



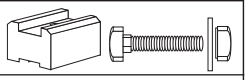
9003 = White 00SB = Solar black
9010 = Cream 00SM = Silver Mat
____ = Color RAL * (write the #)
XXXX = Unpainted

Color

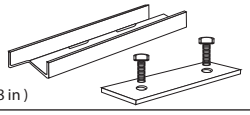
RCT - 9003 **Example**

Accessories supplied for aluminum rail (ALU)

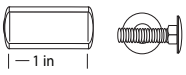
RKG Nylon guides assembly



RKJ Junction bar plate
200 x 28 x 12 mm
(7 13/16 x 1/2 x 1 1/16 in)
Plate : 60 mm X 16 mm (2 3/8 in X 5/8 in)

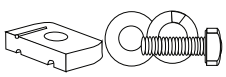


RKC Coupling assembly with bolt
and washer for installation
with aluminum rail (ALU)



Accessories supplied for steel rail (S33)

RKS Slider, bolt, standard washer
and lock washer assembly



RKG **Example**

Touch-up spray paint

CAN 9003 Paint can (RAL 9003)
CAN _____ Paint can (other colour RAL)
(write the number of the colour)

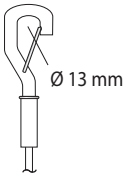
CAN - 9003

Example

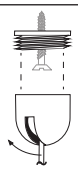
Suspension with cable

Description of anchors for the ceiling

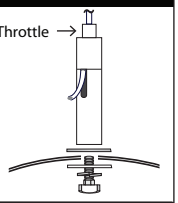
CPA Anchor with hook
nickel plated
Ø 13 mm x 70 mm x 14.3 mm
(Ø 1/2 in x 2 3/4 in x 9/16 in)



CCP Swiveling anchor
nickel plated
Not adjustable
Ø 25 x 28 1/2 mm
(Ø 1 in x 1 1/8 in)
(screw not supplied)



CCA Anchor for duct
Adjustment throttle
nickel plated
Ø 19 X 50 mm
(Ø 3/4 in x 2 in)



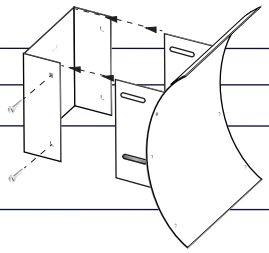
XXXX = Without cable
3048 mm - standard (10 ft)

Cable length

A = Nickel plated steel (standard)
S = Stainless Steel (optional)

CPA - 3048 - A **Example**

Adjustable wall mount



RRA **AWM** **Product**

203, 254, 305, 356, 406, 457, 508, 559, 610, 660, 711, 762, 813, 864, 914, 965, **Ø Diameter / diffuser**

9003 = White, 9010 = Cream,
00SB = Solar Black (Standard black matte), 00SM = Standard Metallic Grey
____ = Colour RAL (write the number of colour)

Colour

RRA - AWM - 203 - 9003 **Example**