Active Chilled Beams

Type DID300

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Description · Construction

Description

Active chilled beams type DID300 use a combination of air and water systems. They combine the air flow characteristics of ceiling diffusers with the energy benefits of load dissipation using water.
The primary volume flow required for fresh air is supplied through a duct into which nozzles are fitted.
As a result secondary room air is induced through vertical water coils.
In the mixing section of the type DID300 the conditioned secondary air is mixed with the primary air and discharged into the room via slots. The type DID300 can be used for cooling and/or heating.
Optionally a condensation tray can be provided below each coil. If the room dew point temperature is reached resultant condensation is trapped in the trays. Two drainage spigots are provided with locking caps. If necessary the caps can be removed on site to drain the condensate.

Caution!
In the version without condensation drip trays, the chilled water flow temperature should be selected to prevent it from falling below the room dewpoint.

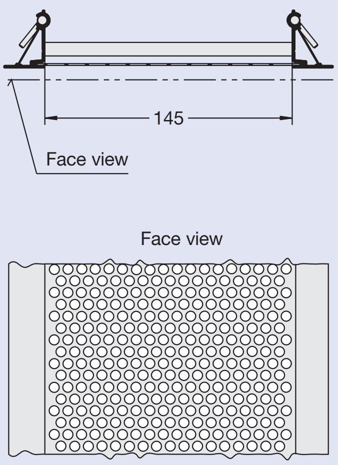
Construction

The type DID300 is particularly suitable for use in low ceiling void spaces because of its shallow construction. Thus the type DID300 is not only suitable for new buildings but is also ideal for refurbishment projects.
When connected appropriately they can be used for individual room control or form grouped zone control.

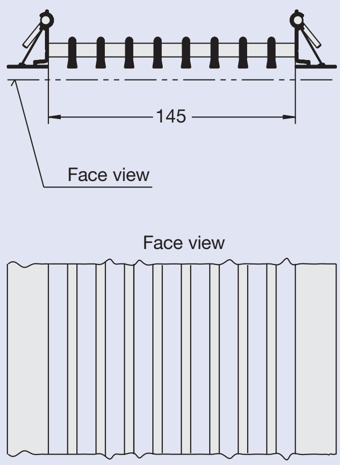
Despite the small primary air volumes the use of a coil with the energy medium of water gives a disproportionately high cooling and heating performance.
The standard type DID300 is constructed as a 2-pipe or 4-pipe system.
The discharge nozzles in the primary air duct are available in three different sizes, selection depending on volume flow rates.

The induction path grille can be supplied either in a perforated or bar grille format.
Because of the variety of possible ceiling systems, options are available for integration into various ceilings.

Induction grille
Perforated plate version "LR"



Induction grille
Bar grille "G"



Dimensions – Standard sizes available							
L_1 / L_N	Dimensions in mm						
	1200	1500	1800	2100	2400	2700	3000
1200							
1500							
1800							
2100							
2400							
2700							
3000							

L_1 = Total length (diffuser face)
L_N = Nominal length

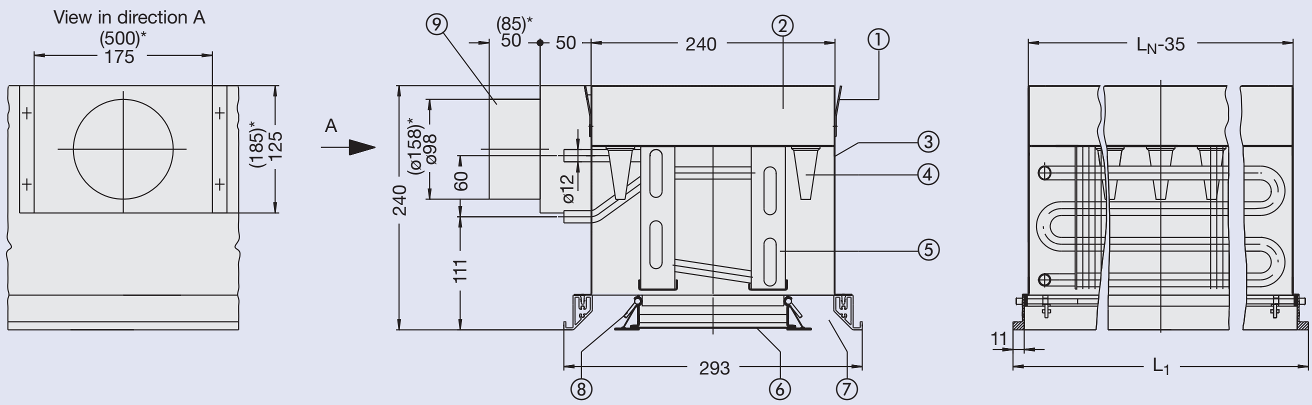
Max. operating pressure:
for 2-pipe and 4-pipe system

6 bar at 90 °C
7 bar at 20 °C

Other operating pressures supplied on request!

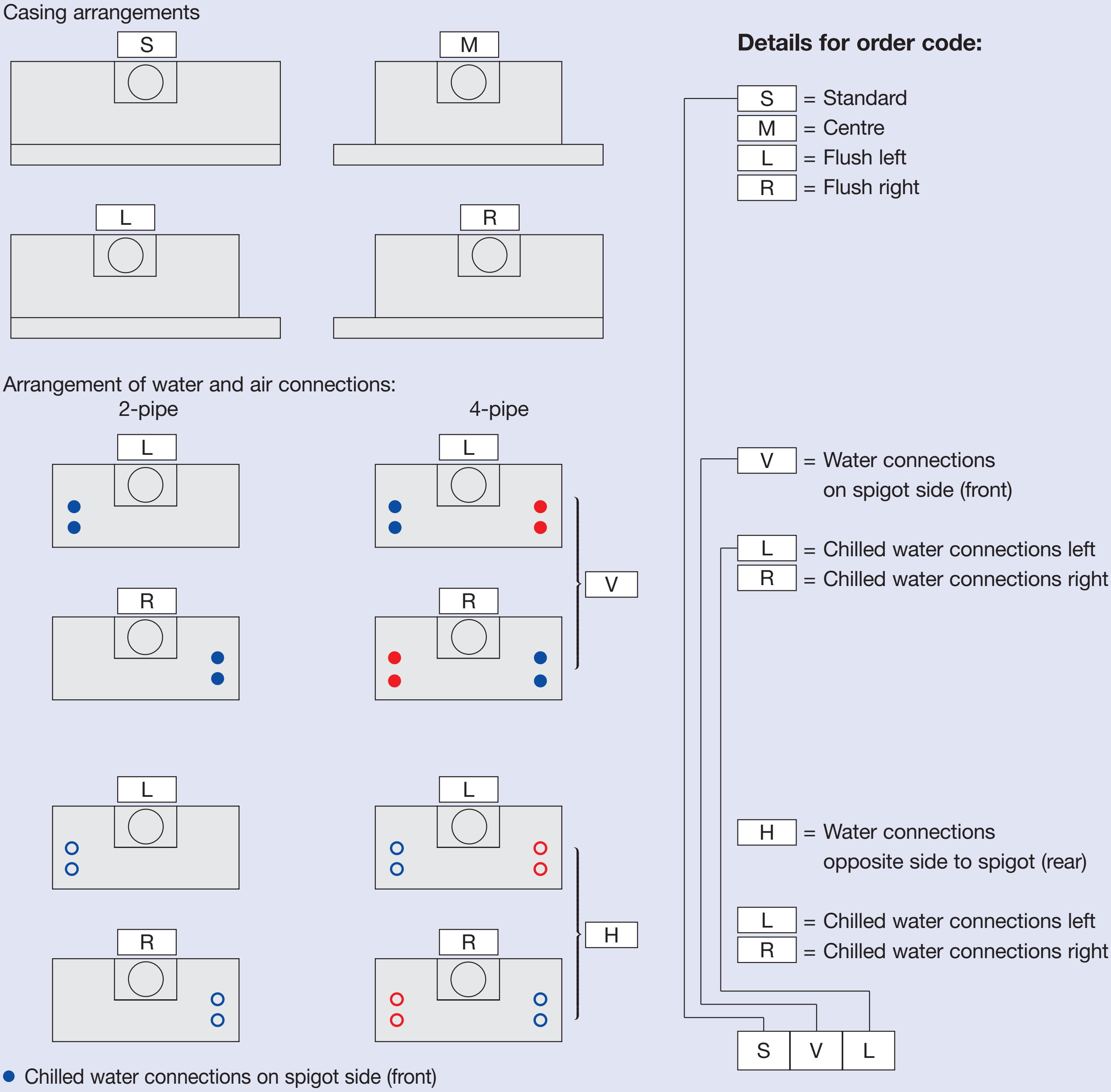
Note:
L_1: Ceiling grid dimensions of 1200 … 3000 mm possible!
L_N: Only standard dimensions available!

* ( ) dimensions for L_N > 1800 mm



① Suspension lugs
② Primary air duct
③ Casing
④ Discharge nozzles
⑤ Coils
(pipe ∅12 mm)
⑥ Induction grille
⑦ Discharge slot
⑧ Fixing bolts
⑨ Air connecting spigot

Type DID300 – Arrangement of diffuser face and active section:



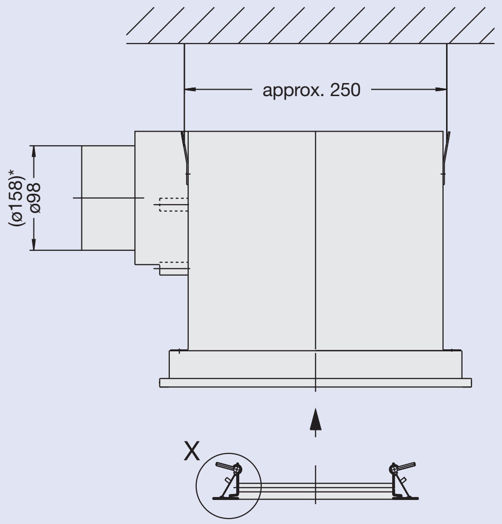
- ● Chilled water connections on spigot side (front)
- ● Warm water connections on spigot side (front)
- ○ Chilled water connections on opposite side from spigot (rear)
- ○ Warm water connections on opposite side from spigot (rear)

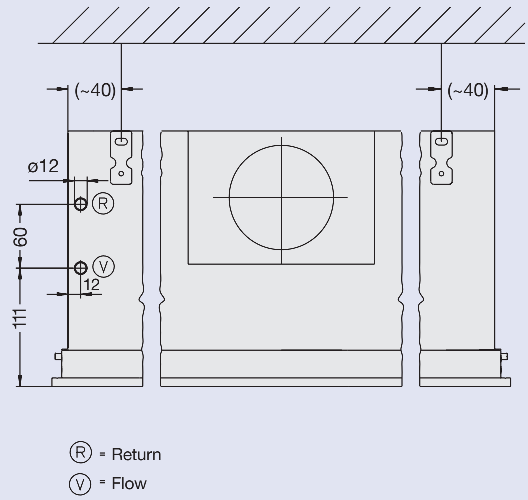
Assembly

The two long sides of the DID300 are each provided with two hanging brackets. For L_N = 2100 and above a further hanging bracket is added to both sides at approximately 293 mm from the centre. The assembly is installed on site using wire or metal hangers which must have the Building Authority certificate of approval. When the DID300 has been installed the whole induction grille can be hinged down lengthways to approximately 45° if the corresponding fixing bolts are released on one of the long sides. The induction grille is secured by two safety cables. The other two fixing bolts must also be released in order to remove the induction grille completely.

The Health and Safety Regulations should be noted when doing this.
The reverse order is used to refit the induction grille to the unit. Note that the fixing bolts are clipped into the clamps for the locked condition.
The coils can be accessed by removing the induction grille.

The connections for the coils are on the outside of the DID300. They can be soldered for a rigid connection or flexible hoses with push-on connectors can be used.
The air must be connected from the side.



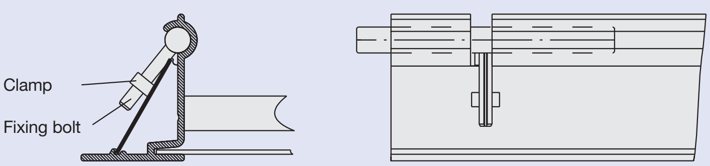


* ( ) dimensions for L_N > 1800 mm

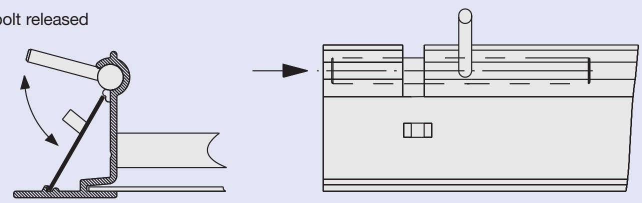
Detail X

Locked position of fixing bolts

Rotate the fixing bolts into the clamp to the lock position



Fixing bolt released

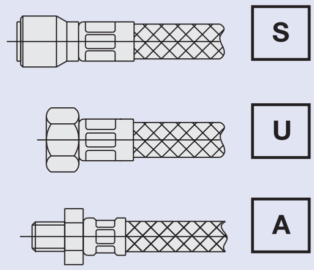


L_1 from 1200...2100 = 4 fixing bolts per unit

L_1> 2100 = 6 fixing bolts per unit (also in the middle)

Flexible hose (FS12),

for water connection Ø 12 mm
(ends can be combined in any way)

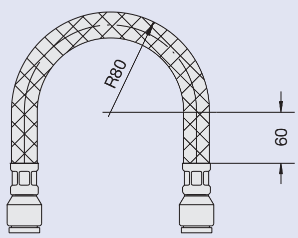


S – with push-fit connector Ø 12 mm, L = 500, 750, 1000 mm

U – with union nuts 1/2” flat sealing L = 500, 750, 1000 mm

A – with external thread 1/2” flat sealing L = 500, 750, 1000 mm

min. bending radius



Possible connections	
both ends	**combination**
FS12-S	FS12-S/U
FS12-U	FS12-S/A
FS12-A	FS12-U/A

Installation

Installation

The DID300 unit is fitted with a side flange for flush mounting in conventionally constructed ceilings. This ensures the best possible ceiling integration.

Installation in ceiling grid

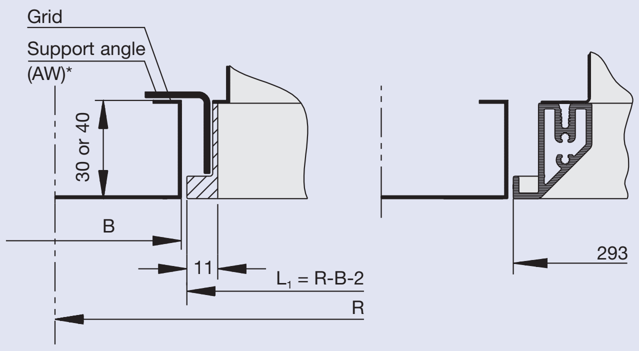
Support angles can be site fitted to the ends of the DID300. One leg of the angle is drilled for fixing to cater for a 30mm high grid, the other leg is drilled for a 40mm high grid. The appropriate leg should be selected when fixing the angles. The supporting angles are provided loose and can be fitted to the existing grid on site.

For this fitting it is no longer necessary to level the DID300 units. Weight relative to the stability of the construction must be taken off the ceiling. Suspension cables are provided for this.
The same also applies to preventing the units themselves from sagging.

Installation in T-bar ceilings

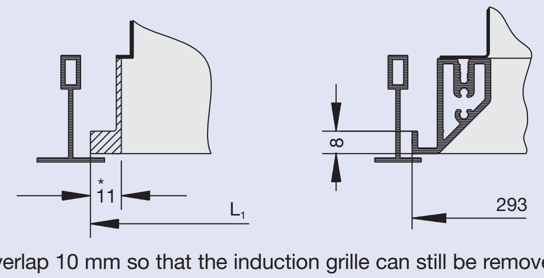
These options allow for installation in a visible T-bar ceiling arrangement or in plasterboard or other closed ceiling systems.

Installation in grid ceilings



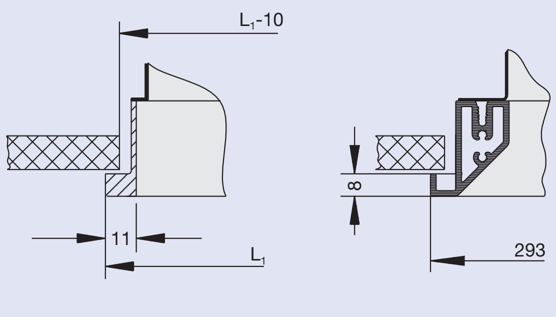
B = Grid width
R = Grid pitch
* Supporting angle (AW) can be supplied loose as an accessory

Installation in T-bar ceilings



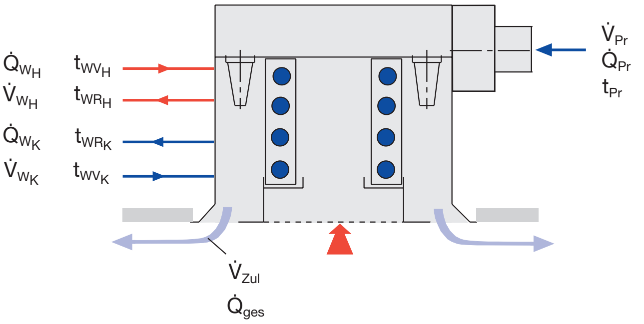
* max. overlap 10 mm so that the induction grille can still be removed.

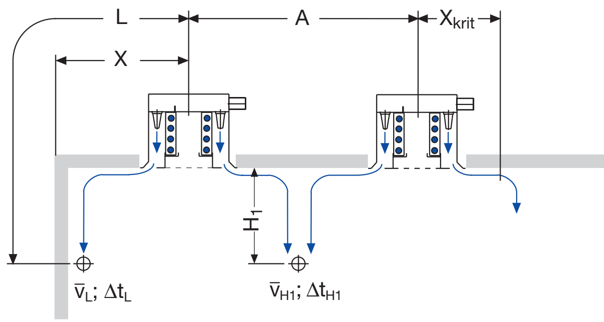
Installation in plasterboard ceiling or closed ceiling



Depending on the quality of the room air, there is the possibility of dust deposits as with all room air induction units. If necessary the unit can be cleaned with ordinary, non-aggressive household cleaners. The heat exchangers can be cleaned with industrial vacuum cleaners.

(See also VDI 6022, sheet 1 – “Hygiene requirements for room air-conditioning systems”).





$\dot{V}_{Pr}$ in l/s: Primary air volume flow rate

$\dot{V}_{W_H}$ in l/h: Water volume flow rate, heating

$\dot{V}_{W_K}$ in l/h: Water volume flow rate, cooling

$\dot{Q}_{Pr}$ in W: Primary air cooling capacity

$\dot{Q}_{W_H}$ in W: Water heating capacity

$\dot{Q}_{W_K}$ in W: Water cooling capacity

$\dot{Q}_{ges}$ in W: Total thermal capacity

Δt_L in K: Temperature difference between room t_R and core t_L at distance L

Δt_{H1} in K: Temperature difference between room t_R and core t_{H1} at distance A\2+H_1

Δt_{Pr} in K: Difference between room air and primary air temperature

Δt_W in K: Water temperature difference

Δt_{RWV} in K: Difference between room air and water flow temperature

Δp_t in Pa: Air pressure drop

Δp_W in kPa: Water pressure drop

t_{WV_H} in °C: Water flow temperature, heating

t_{WR_H} in °C: Water return temperature, heating

t_{WV_K} in °C: Water flow temperature, cooling

t_{WR_K} in °C: Water return temperature, cooling

$\bar{v}_L$ in m/s: Time average air velocity at distance L

$\bar{v}_{H1}$ in m/s: Time average air velocity at distance H_1

A in m: Spacing between 2 diffusers

L in m: Horizontal and vertical distance (x + H_1) discharge to the wall

X_{crit} in m: Horizontal distance from diffuser at which the supply air begins to separate from ceiling

H_1 in m: Distance ceiling/occupied zone

L_{WA} in dB(A): A-weighted sound power level

F_W : Water volume correction factor (can only be used for water performance)

K_{fo} : Free cross-sectional area correction factor (face section)

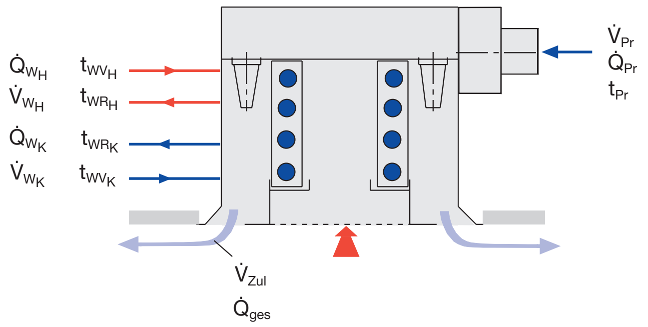
Performance overview DID300 – cooling

L_N = 1200 mm, 1500 mm, 1800 mm

Reference values

t_{WVK} = 16 °C: Water flow temperature, cooling
t_{Pr} = 16 °C: Primary air temperature
$\dot{V}_{WK}$ = 110 l/h: Water volume flow rate, cooling

$\dot{V}_{Zul}$ in l/s: Supply air volume flow rate
$\dot{V}_{Pr}$ in l/s: Primary air volume flow rate
$\dot{Q}_{ges}$ in Watt: Total cooling capacity $\dot{Q}_{Pr} + \dot{Q}_S$
$\dot{Q}_{Pr}$ in Watt: Cooling capacity of the primary air
$\dot{Q}_S$ in Watt: Cooling capacity of the secondary air
$\dot{q}_{Zul}$ in W/m²: Specific cooling capacity
Δp_t in Pa: Primary air pressure drop
Δp_w in kPa: Water pressure drop
L_{WA} in dB(A): A-weighted sound power level
$\bar{v}_L$ in m/s: Time average air velocity



See pages 15, 16, 17 and 18 for selection example

2-pipe system

Table 1:

L_N = 1200 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	14	70	136	270	406	54	1.9	37	95	2.2
B	20	78	194	291	484	65	2.7	35	72	2.2
C	26	83	252	281	532	71	3.5	33	56	2.2

Room air temperature t_R = 26 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	14	70	169	338	506	68	1.9	37	95	2.2
B	20	78	241	363	604	81	2.7	35	72	2.2
C	26	83	314	351	664	89	3.5	33	56	2.2

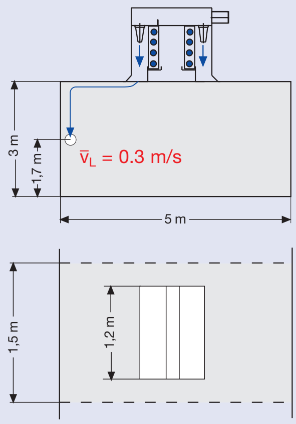


Table 2:

L_N = 1500 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	16	80	155	312	466	52	1.8	33	98	2.6
B	24	94	232	343	576	64	2.7	36	82	2.6
C	32	102	310	336	646	72	3.6	38	68	2.6

Room air temperature t_R = 26 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	16	80	193	389	582	65	1.8	33	98	2.6
B	24	94	289	429	719	80	2.7	36	82	2.6
C	32	102	386	421	806	90	3.6	38	68	2.6

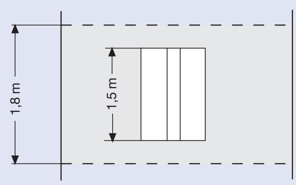


Table 3:

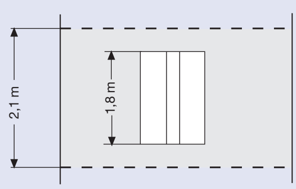
L_N = 1800 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	19	95	184	361	545	52	1.8	35	106	3.0
B	26	101	252	378	630	60	2.5	36	74	3.0
C	34	109	329	367	696	66	3.2	38	59	3.0

Room air temperature t_R = 26 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	19	95	229	451	680	65	1.8	35	106	3.0
B	26	101	314	473	786	75	2.5	36	74	3.0
C	34	109	410	459	869	83	3.2	38	59	3.0



4-pipe system

Table 4:

L_N = 1200 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	14	70	136	246	382	51	1.9	37	95	1.7
B	20	78	194	265	459	61	2.7	35	72	1.7
C	26	83	252	256	508	68	3.5	33	56	1.7

Room air temperature t_R = 26 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	14	70	169	308	477	64	1.9	37	95	1.7
B	20	78	241	332	573	76	2.7	35	72	1.7
C	26	83	314	320	634	84	3.5	33	56	1.7

Table 5:

L_N = 1500 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	16	80	155	285	440	49	1.8	33	98	2.0
B	24	94	232	314	547	61	2.7	36	82	2.0
C	32	102	310	308	618	69	3.6	38	68	2.0

Room air temperature t_R = 26 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	16	80	193	356	549	61	1.8	33	98	2.0
B	24	94	289	393	682	76	2.7	36	82	2.0
C	32	102	386	385	771	86	3.6	38	68	2.0

Table 6:

L_N = 1800 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	19	95	184	331	515	49	1.8	35	106	2.3
B	26	101	252	347	599	57	2.5	36	74	2.3
C	34	109	329	336	665	63	3.2	38	59	2.3

Room air temperature t_R = 26 °C

Nozzle type	$\dot{V}_{PR}$ l/s	$\dot{V}_{Zul}$ l/s	$\dot{Q}_{Pr}$ Watt	$\dot{Q}_S$ Watt	$\dot{Q}_{ges}$ Watt	$\dot{q}_{Zul}$ W/m²	$\dot{V}_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_w kPa
A	19	95	229	413	642	61	1.8	35	106	2.3
B	26	101	314	434	747	71	2.5	36	74	2.3
C	34	109	410	420	830	79	3.2	38	59	2.3

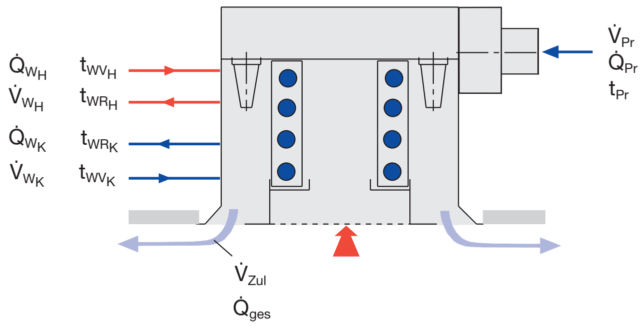
Performance overview DID300 – cooling

L_N = 2100 mm, 2400 mm, 2700 mm, 3000 mm

Reference values

t_{WVK} = 16 °C: Water flow temperature, cooling
t_{Pr} = 16 °C: Primary air temperature
$\dot V_{WK}$ = 210 l/h: Water volume flow rate, cooling

$\dot V_{Zul}$ in l/s: Supply air volume flow rate
$\dot V_{Pr}$ in l/s: Primary air volume flow rate
$\dot Q_{ges}$ in Watt: Total cooling capacity $\dot Q_{Pr} + \dot Q_S$
$\dot Q_{Pr}$ in Watt: Cooling capacity of the primary air
$\dot Q_S$ in Watt: Cooling capacity of the secondary air
$\dot q_{Zul}$ in W/m²: Specific cooling capacity
Δp_t in Pa: Primary air pressure drop
Δp_W in kPa: Water pressure drop
L_{WA} in dB(A): A-weighted sound power level
$\bar v_L$ in m/s: Time average air velocity



2-pipe system

Table 7:
L_N = 2100 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	22	110	213	478	691	58	1.8	30	108	10.1
B	31	121	300	510	810	68	2.6	32	79	10.1
C	41	131	397	497	894	75	3.4	33	64	10.1

Room air temperature t_R = 26 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	22	110	265	597	863	72	1.8	30	108	10.1
B	31	121	374	638	1012	84	2.6	32	79	10.1
C	41	131	494	622	1116	93	3.4	33	64	10.1

Table 8:
L_N = 2400 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	25	125	242	535	777	58	1.9	32	109	11.3
B	34	133	329	560	889	66	2.5	33	75	11.3
C	46	147	445	552	998	74	3.4	35	63	11.3

Room air temperature t_R = 26 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	25	125	301	668	970	72	1.9	34	109	11.3
B	34	133	410	699	1109	82	2.5	33	75	11.3
C	46	147	555	690	1245	92	3.4	35	63	11.3

Table 9:
L_N = 2700 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	28	140	271	589	860	57	1.9	34	110	12.5
B	39	152	377	624	1002	67	2.6	35	80	12.5
C	52	166	503	612	1115	74	3.5	36	66	12.5

Room air temperature t_R = 26 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	28	140	338	737	1074	72	1.9	34	110	12.5
B	39	152	470	780	1251	83	2.6	33	80	12.5
C	52	166	627	765	1392	93	3.5	36	66	12.5

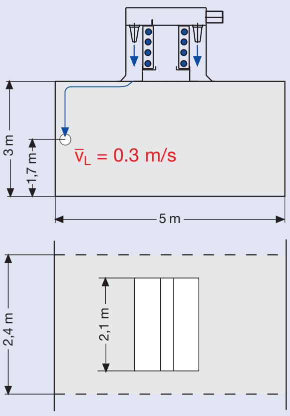
Table 10:
L_N = 3000 mm

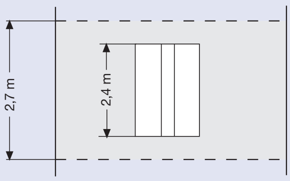
Room air temperature t_R = 24 °C

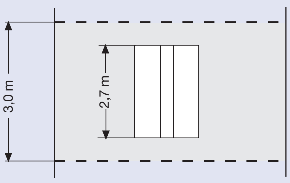
Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	31	155	300	642	942	57	1.9	35	112	13.6
B	42	164	407	670	1076	65	2.5	35	76	13.6
C	60	192	581	681	1261	76	3.6	39	72	13.6

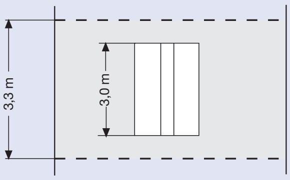
Room air temperature t_R = 26 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	31	155	374	803	1177	71	1.9	35	112	13.6
B	42	164	506	837	1344	81	2.5	35	76	13.6
C	60	192	723	851	1574	95	3.6	39	72	13.6









4-pipe system

Table 11:
L_N = 2100 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	22	110	213	436	649	54	1.8	30	108	7.7
B	31	121	300	466	766	64	2.6	32	79	7.7
C	41	131	397	454	851	71	3.4	33	64	7.7

Room air temperature t_R = 26 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	22	110	265	545	810	67	1.8	30	108	7.7
B	31	121	374	582	956	80	2.6	32	79	7.7
C	41	131	494	567	1062	88	3.4	33	64	7.7

Table 12:
L_N = 2400 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	25	125	242	488	730	54	1.9	32	109	8.6
B	34	133	329	511	840	62	2.5	33	75	8.6
C	46	147	445	505	950	70	3.4	35	63	8.6

Room air temperature t_R = 26 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	25	125	301	610	912	68	1.9	32	109	8.6
B	34	133	410	639	1049	78	2.5	33	75	8.6
C	46	147	555	631	1185	88	3.4	35	63	8.6

Table 13:
L_N = 2700 mm

Room air temperature t_R = 24 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	28	140	271	539	810	54	1.9	34	110	9.5
B	39	152	377	571	949	63	2.6	35	80	9.5
C	52	166	503	560	1063	71	3.5	36	66	9.5

Room air temperature t_R = 26 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	28	140	338	674	1011	67	1.9	34	110	9.5
B	39	152	470	714	1185	79	2.6	35	80	9.5
C	52	166	627	700	1327	88	3.5	36	66	9.5

Table 14:
L_N = 3000 mm

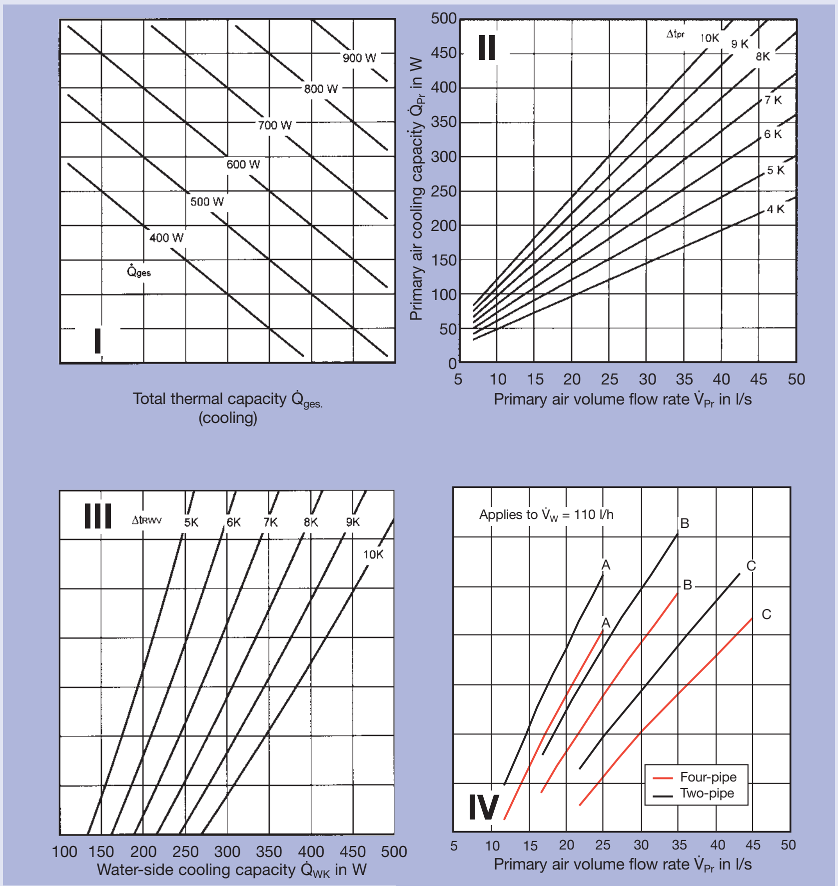
Room air temperature t_R = 24 °C

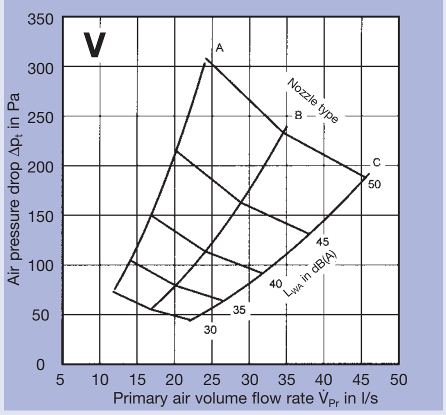
Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	31	155	300	588	888	54	1.9	35	112	10.4
B	42	164	407	614	1021	62	2.5	35	76	10.4
C	60	192	581	624	1205	73	3.6	39	72	10.3

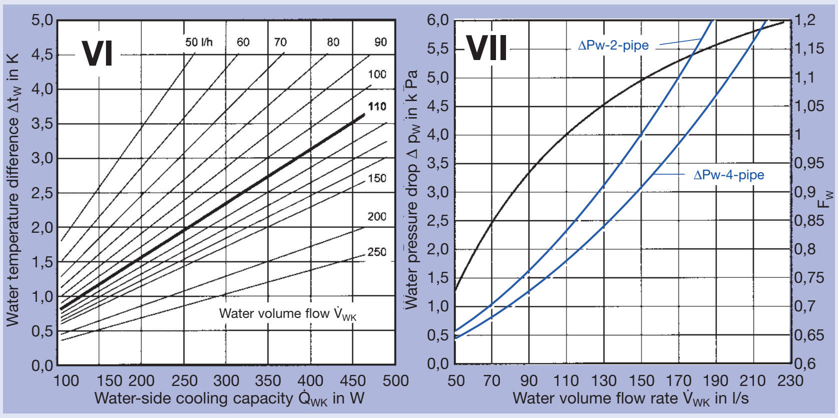
Room air temperature t_R = 26 °C

Nozzle type	$\dot V_{Pr}$ l/s	$\dot V_{Zul}$ l/s	$\dot Q_{Pr}$ Watt	$\dot Q_S$ Watt	$\dot Q_{ges}$ Watt	$\dot q_{Zul}$ W/m²	$\dot V_{Pr}$/m² l/s(m²)	L_{WA} dB(A)	Δp_t Pa	Δp_W kPa
A	31	155	374	735	1109	67	1.9	35	112	10.3
B	42	164	506	768	1274	77	2.5	35	76	10.3
C	60	192	723	780	1503	91	3.6	39	72	10.3

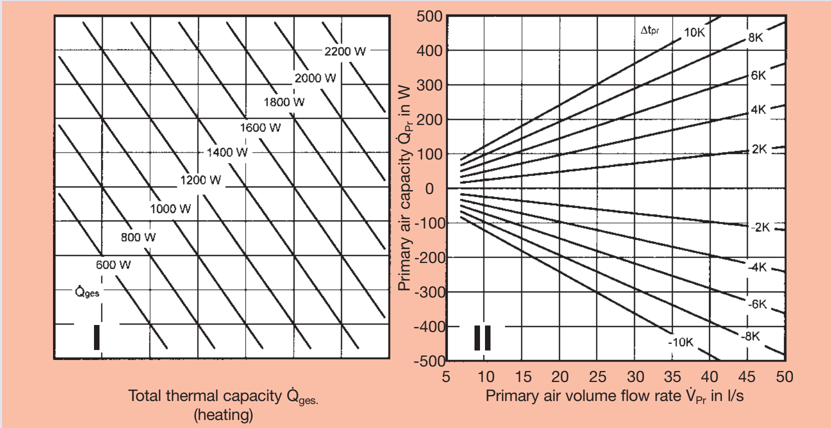
Correction factor K_{fo} free cross-sectional area DID300 face section L_N 1200 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type** A	B	C
12	0.93		
20	0.96	0.96	
25	0.97	0.97	0.94
35		0.98	0.95
45			0.96
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type** A	B	C
12-45	1		

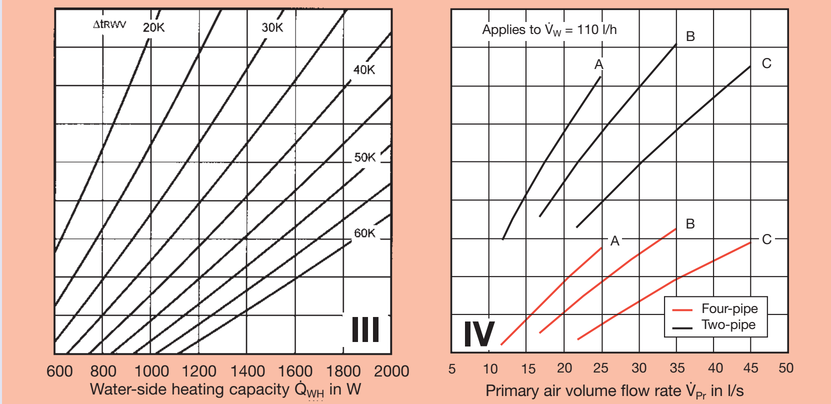


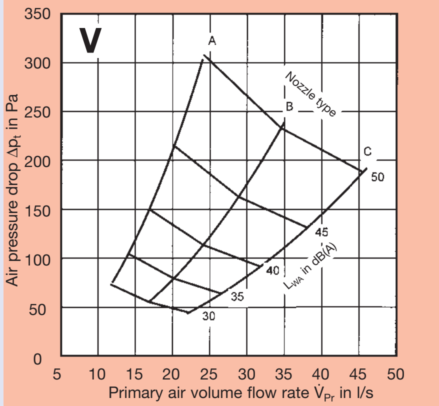


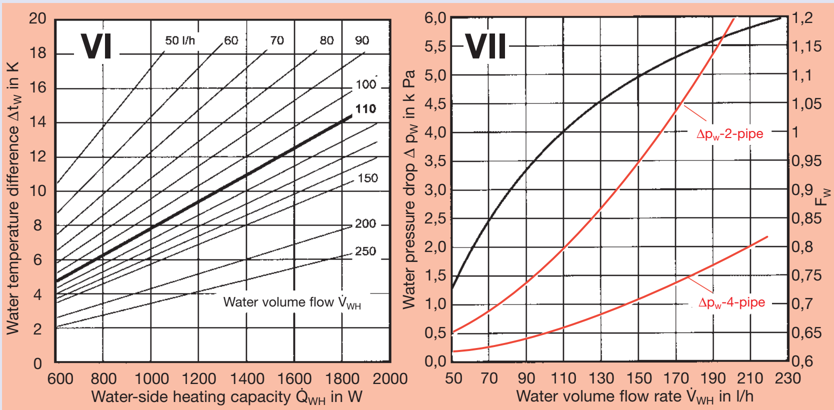


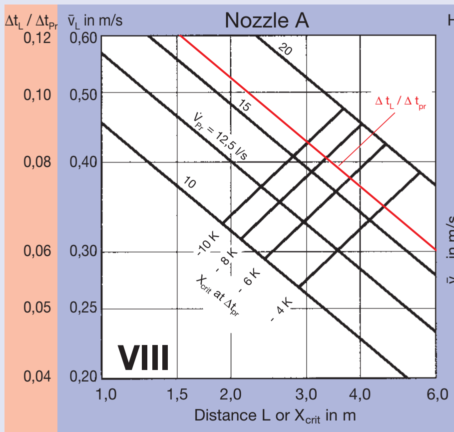
Correction factor K_{fo} free cross-sectional area DID300 face section L_N 1200 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
12	0.93		
20	0.96	0.96	
25	0.97	0.97	0.94
35		0.98	0.95
45			0.96
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
12-45	1		

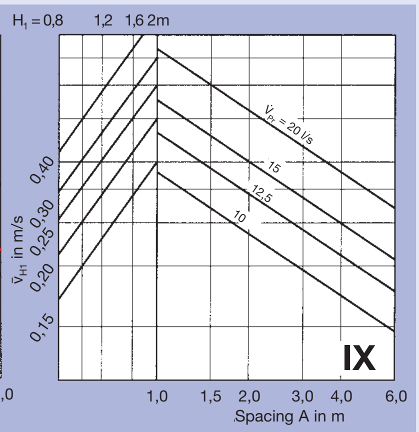


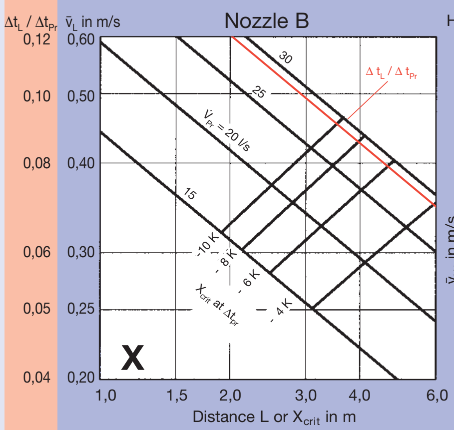


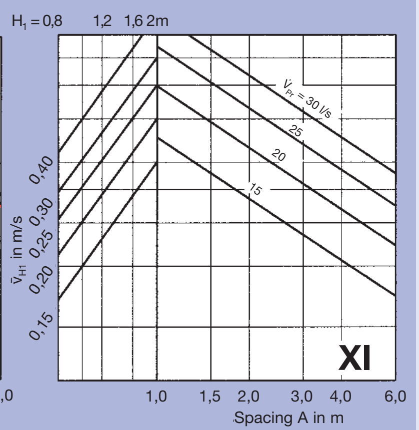


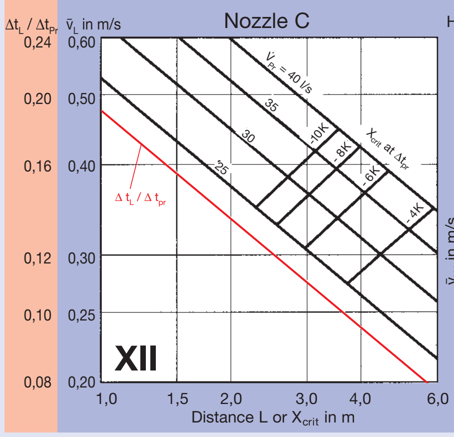


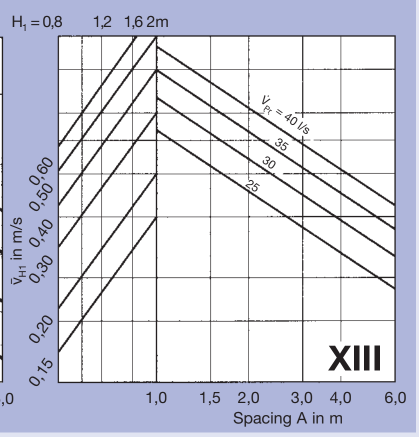

Nozzle A
Δt_L / Δt_Pr
v̄_L in m/s
V̇_Pr = 12,5 l/s
10
15
20
Δ t_L / Δ t_pr
-10 K
- 8 K
- 6 K
- 4 K
X_crit at Δt_pr
VIII
Distance L or X_crit in m

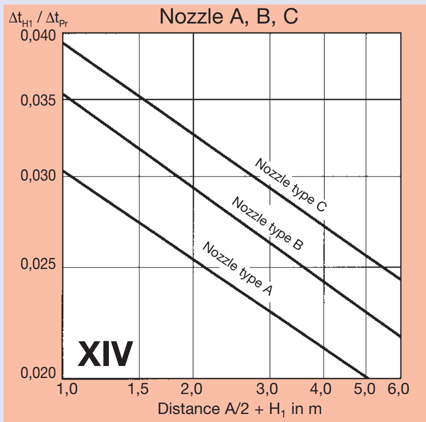

H_1 = 0,8
1,2
1,6 2m
v̄_H1 in m/s
V̇_Pr = 20 l/s
15
12,5
10
IX
Spacing A in m


Nozzle B
Δt_L / Δt_Pr
v̄_L in m/s
V̇_Pr = 20 l/s
15
25
30
Δ t_L / Δ t_Pr
-10 K
- 8 K
- 6 K
- 4 K
X_crit at Δt_pr
X
Distance L or X_crit in m

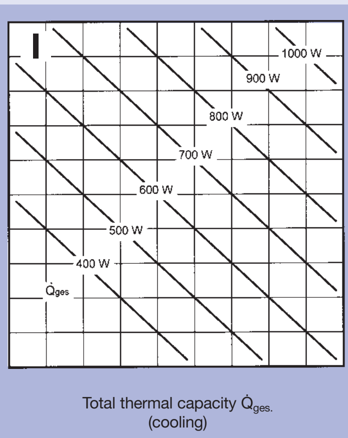

H_1 = 0,8
1,2
1,6 2m
v̄_H1 in m/s
V̇_Pr = 30 l/s
25
20
15
XI
Spacing A in m

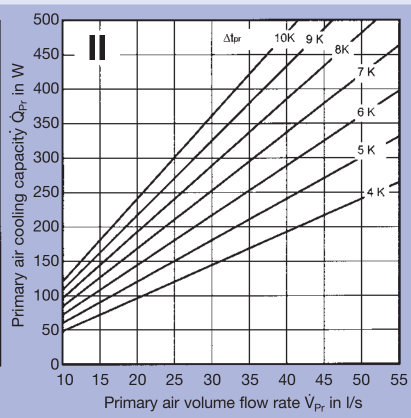

Nozzle C
Δt_L / Δt_Pr
v̄_L in m/s
V̇_Pr = 40 l/s
35
30
25
Δ t_L / Δ t_pr
-10K
- 8K
- 6K
- 4K
X_crit at Δt_pr
XII
Distance L or X_crit in m

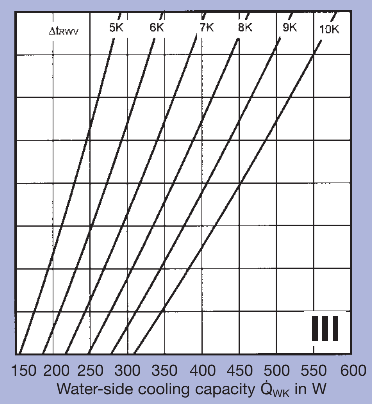

H_1 = 0,8
1,2
1,6 2m
v̄_H1 in m/s
V̇_Pr = 40 l/s
35
30
25
XIII
Spacing A in m

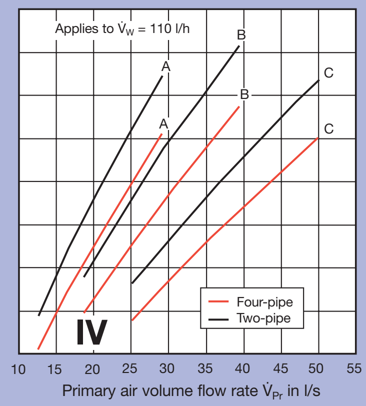

Nozzle A, B, C
Δt_H1 / Δt_Pr
Nozzle type C
Nozzle type B
Nozzle type A
XIV
Distance A/2 + H_1 in m

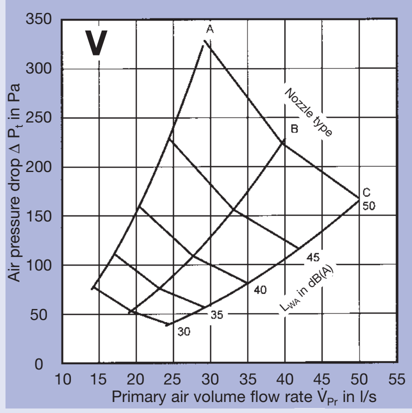
Correction factor K_{fo} free cross-sectional area DID300 face section L_N 1500 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type** A	B	C
15	0.93		
20	0.95	0.95	
25	0.96	0.96	0.93
35		0.97	0.94
45			0.95
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type** A	B	C
15-45	1		

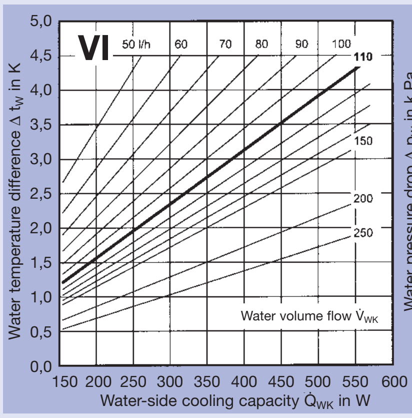


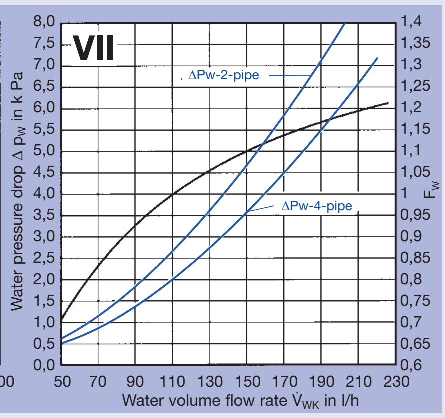




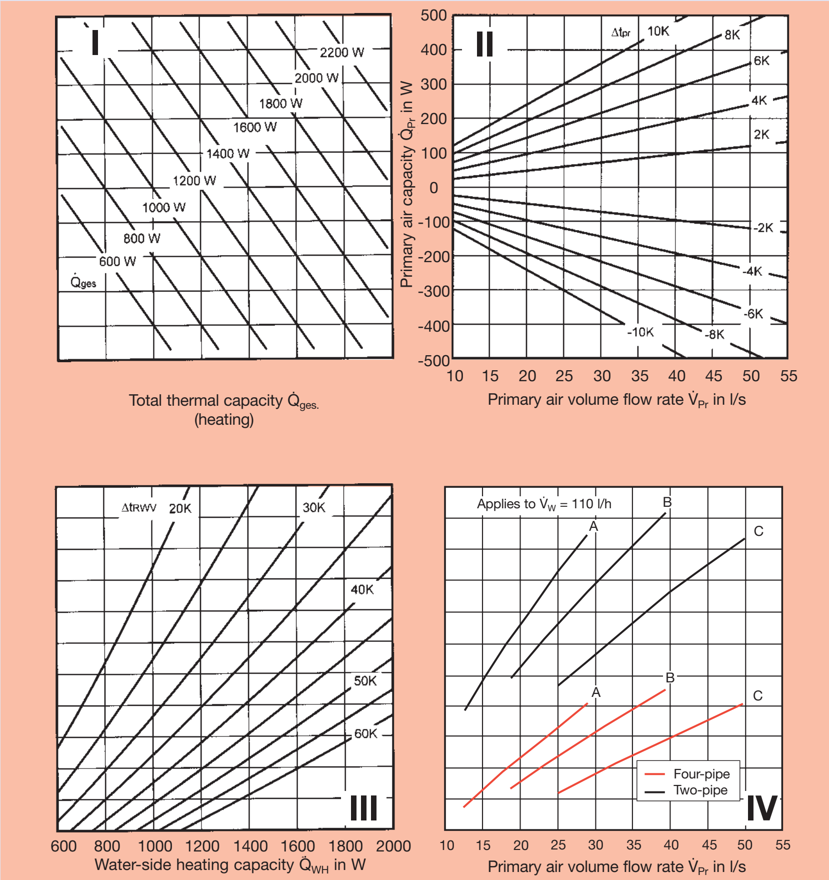


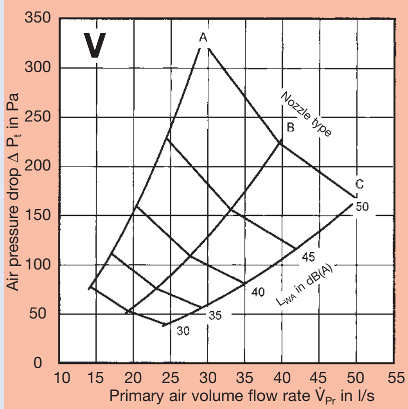


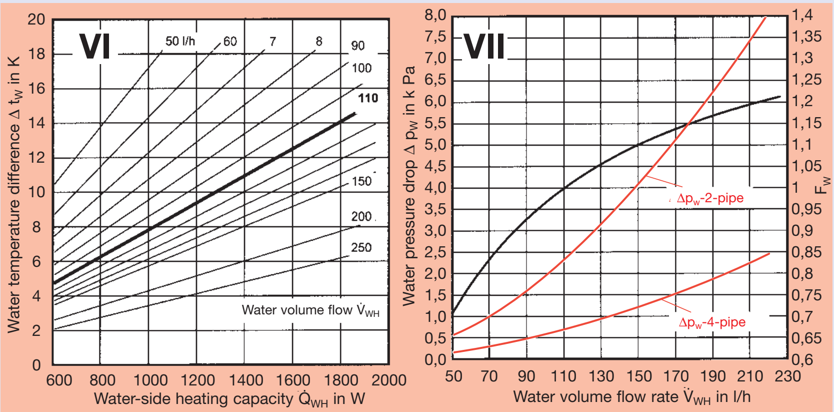


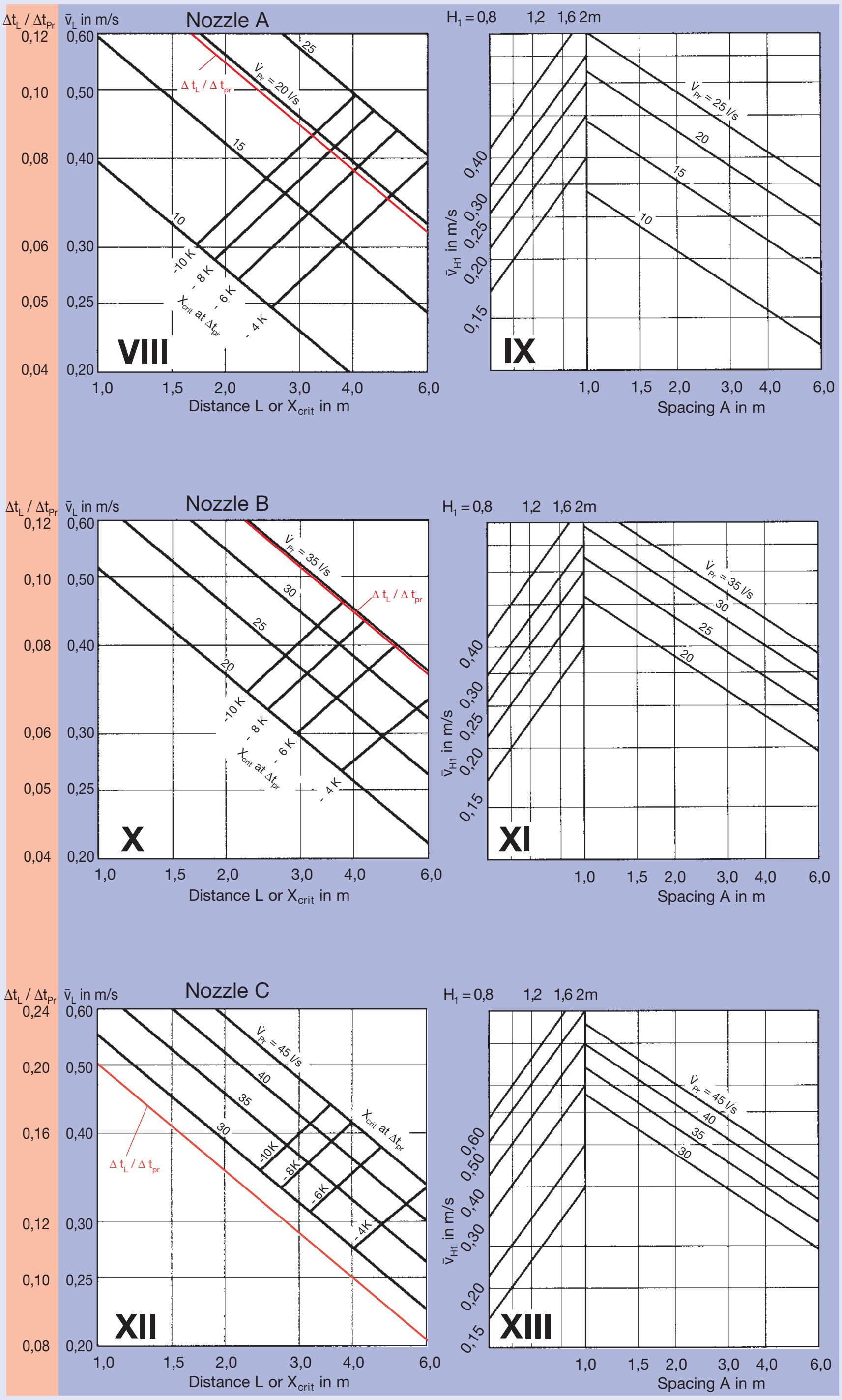


Correction factor K_{fo} free cross-sectional area DID300 face section L_N 1500 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	Nozzle type		
	A	B	C
15	0.93		
20	0.95	0.95	
25	0.96	0.96	0.93
35		0.97	0.94
45			0.95
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	Nozzle type		
	A	B	C
15-45	1		









See pages 19, 20 and 21 for selection example!

See page 11, table 3 and table 6 for preliminary selection!

Example:

Given:

DID300 unit L_N = 1800 mm, 4-pipe

Max. sound power level L_{WA} = 38 dB(A)

Individual room with 3 modules with a room width of B = 3 x 1800 mm

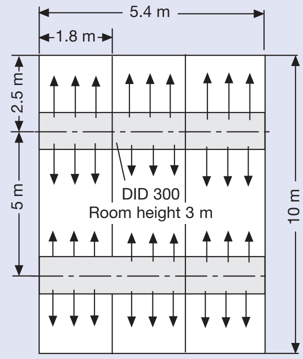
Room length: 10 m

Room height: 3.0 m

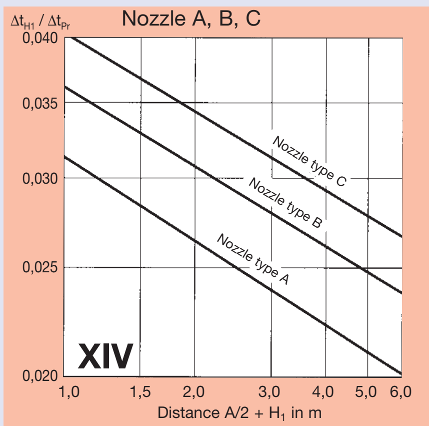
Primary air volume flow rate: $\dot{V}_{Pr}$ = 35 l/s

Arrangement of two DID300 units per module with spacing A of 5 m, X each 2.5 m.

Room sketch:



Continued on page 19!



Correction factor K_{fo} free cross-sectional area DID300 face section L_N 1800 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	Nozzle type		
	A	B	C
15	0.90		
20	0.94	0.94	
30	0.96	0.96	0.93
40		0.97	0.94
50			0.95
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	Nozzle type		
	A	B	C
15-50	1		

Cooling

Room air temperature: t_R = 25 °C

Primary air temperature: t_{Pr} = 16 °C

Water flow temperature: t_{WV} = 15 °C

Solution:

from Diagram V:

Sound power level L_{WA} = 38 dB(A)

Pressure drop Δp_t = 60 Pa

nozzle type "C"

from Diagrams III and IV:

Water-side cooling capacity

$\dot{Q}_{WK}$[1] = 440 W

$\dot{Q}_{WK}$[2] = 440 x 0.93 = 410 W

[1] Construction with grille "G" (free area = 70%)

[2] Constr. with perforated plate "LR" (free area = 50%)

from Diagram II:

Primary air cooling capacity $\dot{Q}_{Pr}$ = 380 W

from Diagram I:

Total cooling capacity $\dot{Q}_{ges}$[1] = 820 W

$\dot{Q}_{ges}$[2] = 790 W

from Diagram VI:

Water temp. difference Δt_{WK} = 3.4 K

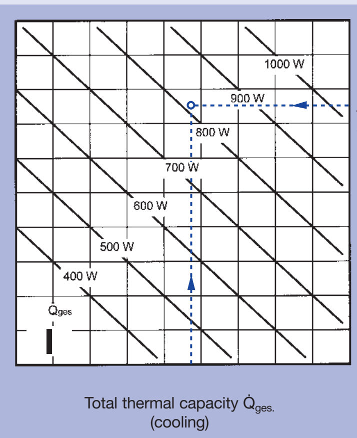
from Diagram VII:

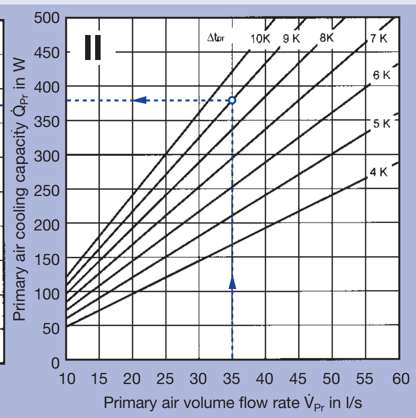
Water pressure drop Δp_W = 2.3 kPa

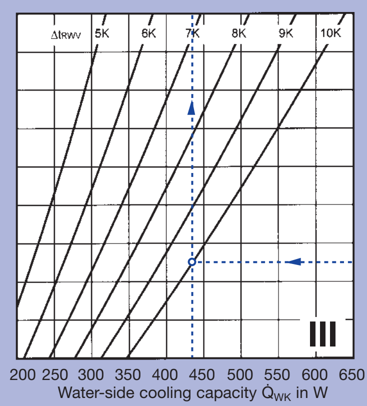
Water volume correction factor F_W = 1.0

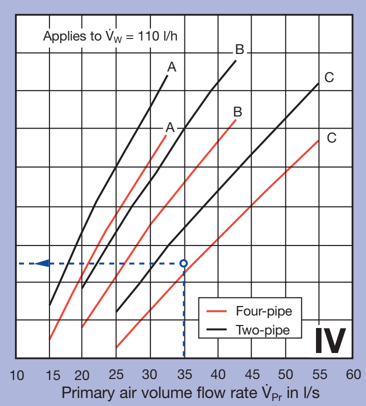
With nominal water volume flow ($\dot{V}_W$ = 110 l/h) equal to actual water volume flow!

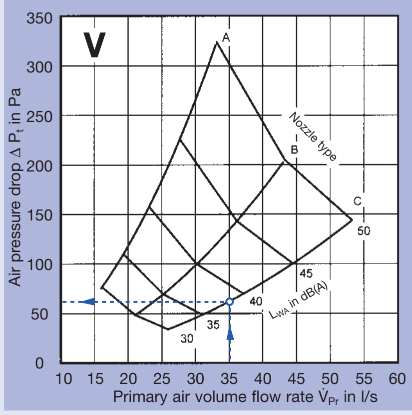
Continued on page 17!

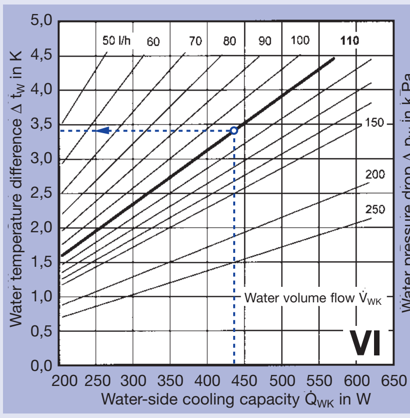


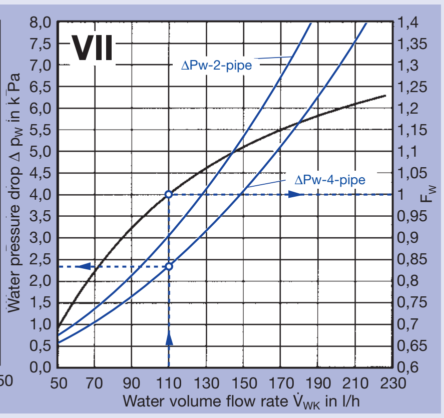












Correction factor K_{fo} free cross-sectional area DID300 face section L_N 1800 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
15	0.90		
20	0.94	0.94	
30	0.96	0.96	0.93
40		0.97	0.94
50			0.95
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
15-50	1		

Heating

Room air temperature: t_R = 20 °C
Primary air temperature: t_{Pr} = 16 °C
Water flow temperature: t_{WV} = 70 °C

Solution:

from Diagram V:
Sound power level L_{WA} = 38 dB(A)
Pressure drop $\Delta\ p_t$ = 60 Pa
nozzle type "C"

from Diagrams III and IV:
Water-side heating capacity $\dot{Q}_{WH}{}^{1)}$ = 1420 W
$\dot{Q}_{WH}{}^{2)}$ = 1420 x 0.93 = 1320 W

1) Construction with grille "G" (free area = 70%)
2) Constr. with perforated plate "LR" (free area = 50%)

from Diagram II:
Primary air capacity (isothermal) $\dot{Q}_{Pr}$ = – 170 W

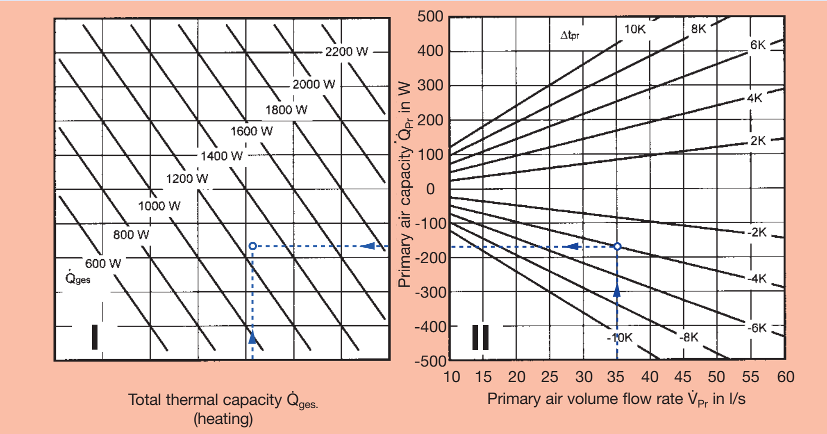
from Diagram I:
Supply air heating capacity
$\dot{Q}_{ges} = \dot{Q}_{WH}{}^{1) \text{ or } 2)} - \dot{Q}_{Pr}$
1) = 1420 – 170 = 1250 W
2) = 1320 – 170 = 1150 W
at $\dot{V}_{WH}$ = 110 l/s
(nominal water volume flow)

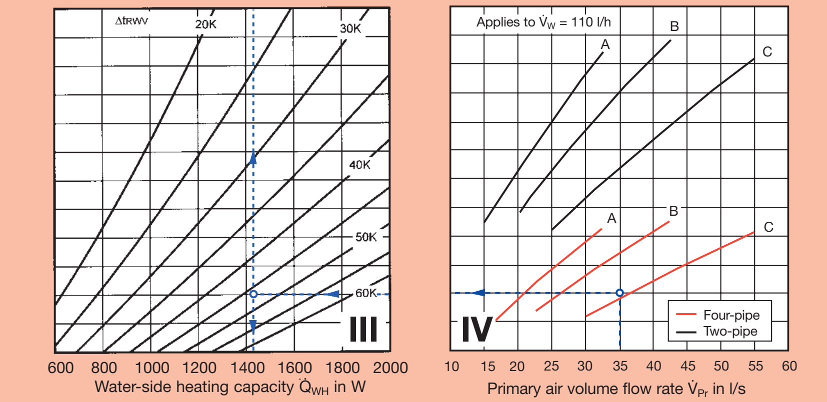
from Diagram VII:
Water pressure drop $\Delta\ p_W$ = 0.5 kPa
Water volume correction factor F_W = 0.93

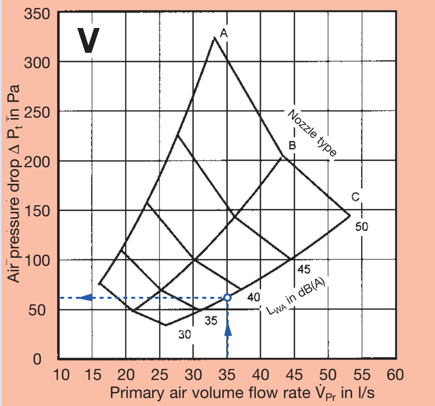
for $\dot{V}_{WH}$ = 90 l/h
this means:
$\dot{Q}_{ges} = F_W \cdot \dot{Q}_{WH} - \dot{Q}_{Pr}$
1) = 0.93 x 1420 1) – 170 = 1150 W
2) = 0.93 x 1320 1) – 170 = 1060 W

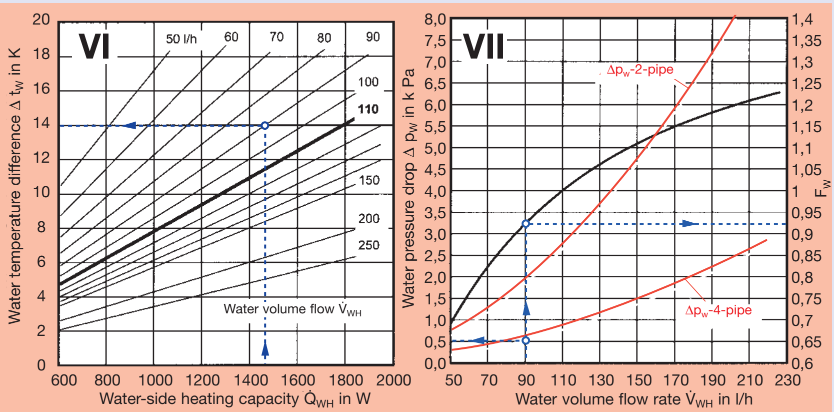
from Diagram VI:
Water temp. difference $\Delta\ t_{WH}$ = 14 K

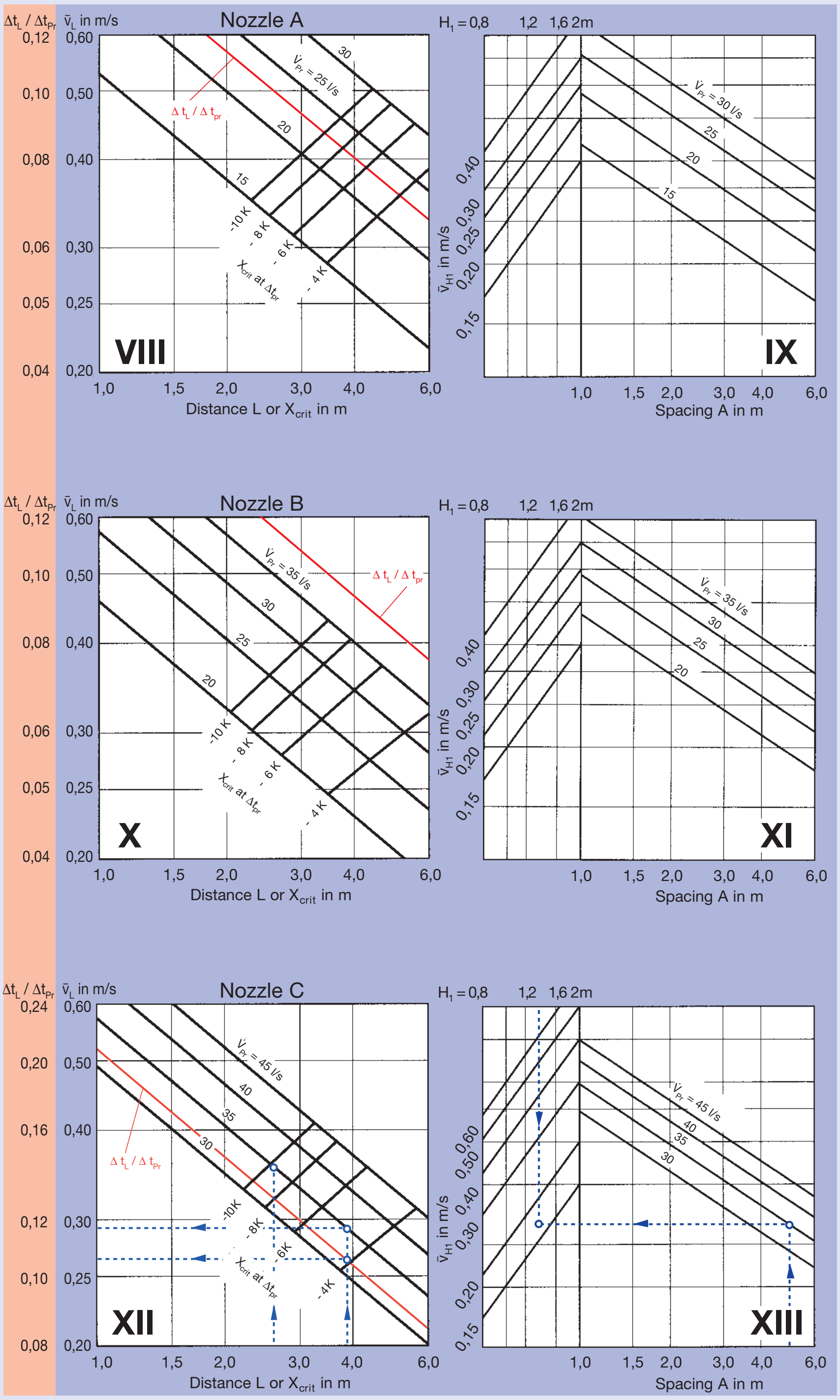
Continued on page 18!











Solution:

from Diagram XII:

X_{crit} = 2.6 m (– 9 K)

L = X + H_1 = 2.5 + 1.3 = 3.8 m

$\bar{v}_L$ = 0.29

$\Delta t_L / \Delta t_{Pr}$ = 0.11

Δt_L = 9 x 0.11 = – 1 K

from Diagram XIII:

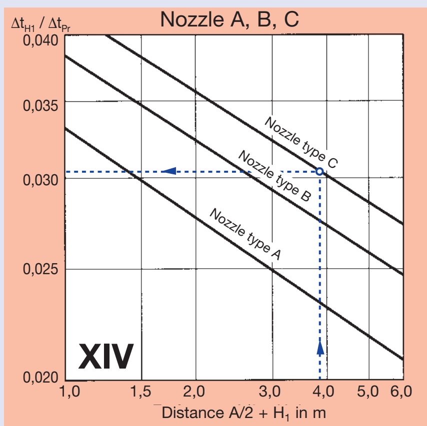
$\bar{v}_{H1}$ = 0.17 m/s

from Diagram XIV:

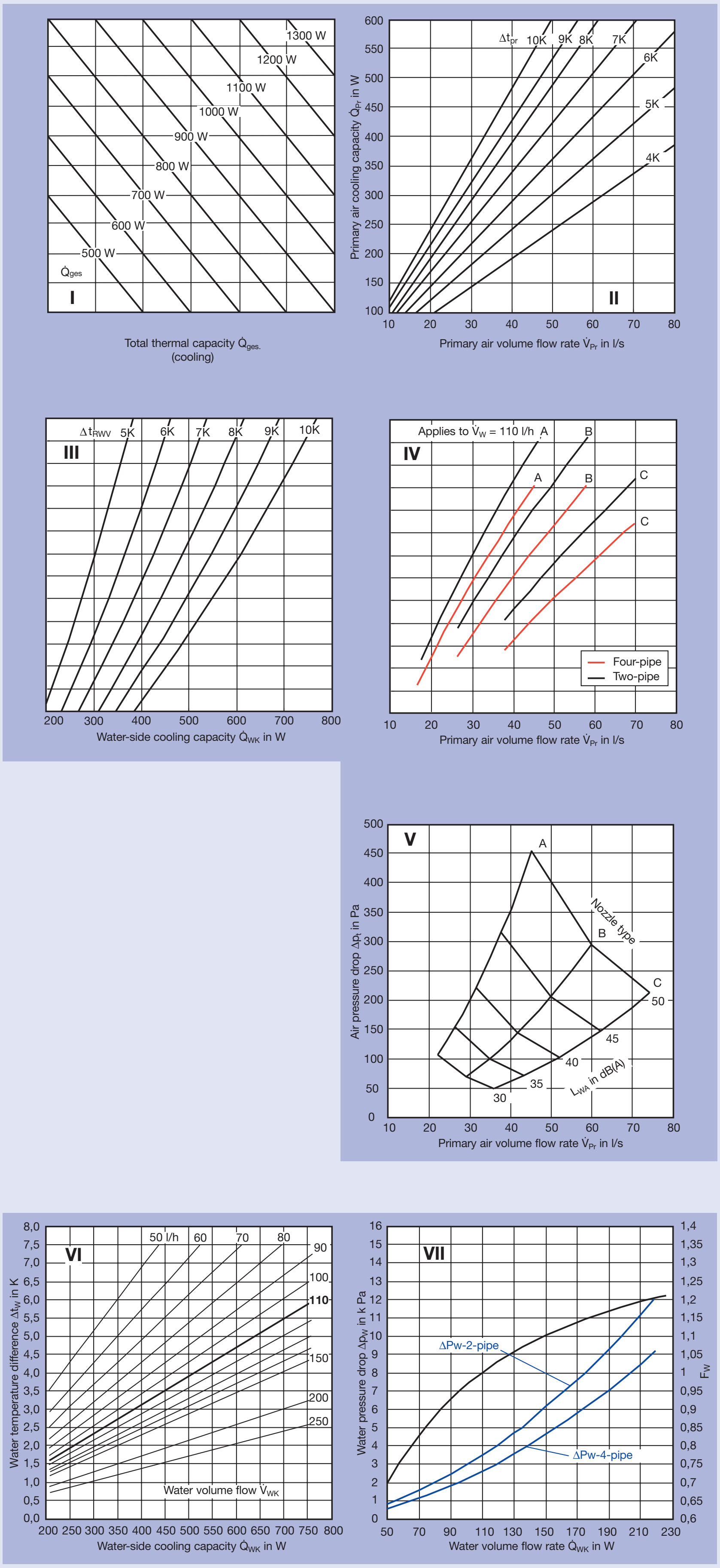
L $= \frac{A}{2} + H_1 = \frac{5}{2} + 1.3 = 3.8$ m
(at A = 5 m)

$\Delta t_{H1} / \Delta t_{pr}$ = 0.03 K

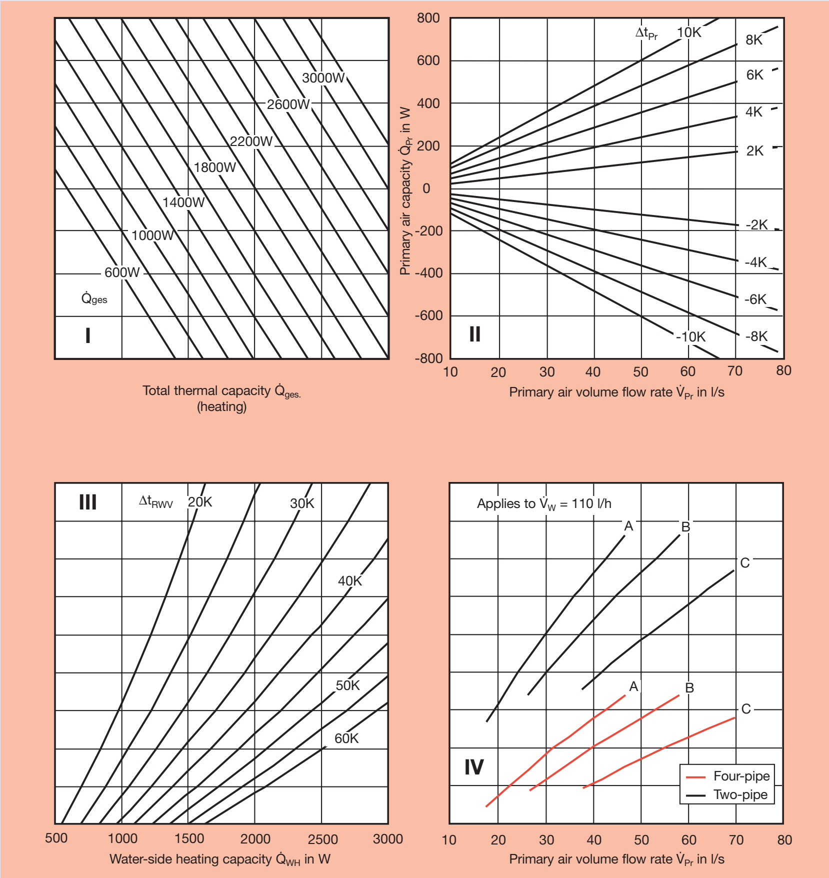
Δt_{H1} = 9 x 0.03 = -0.27 K

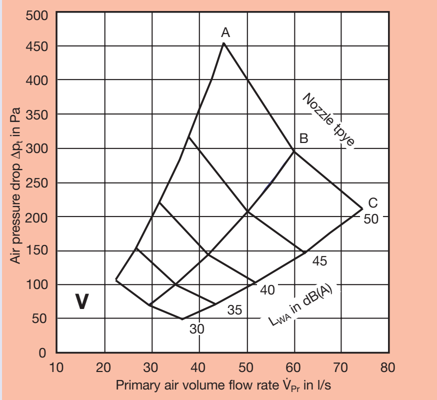


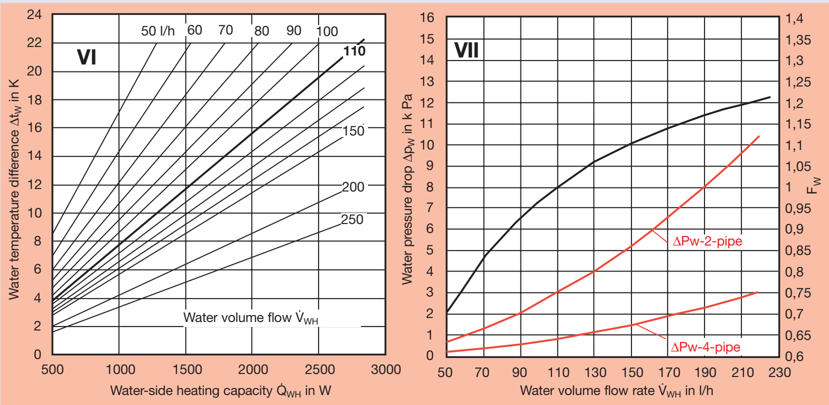
Correction factor K_{fo} free cross-sectional area DID300 face section L_N 2100 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
20	0.92		
30	0.96	0.96	
45	0.97	0.97	0.94
45		0.97	0.95
65			0.95
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
20-65	1		



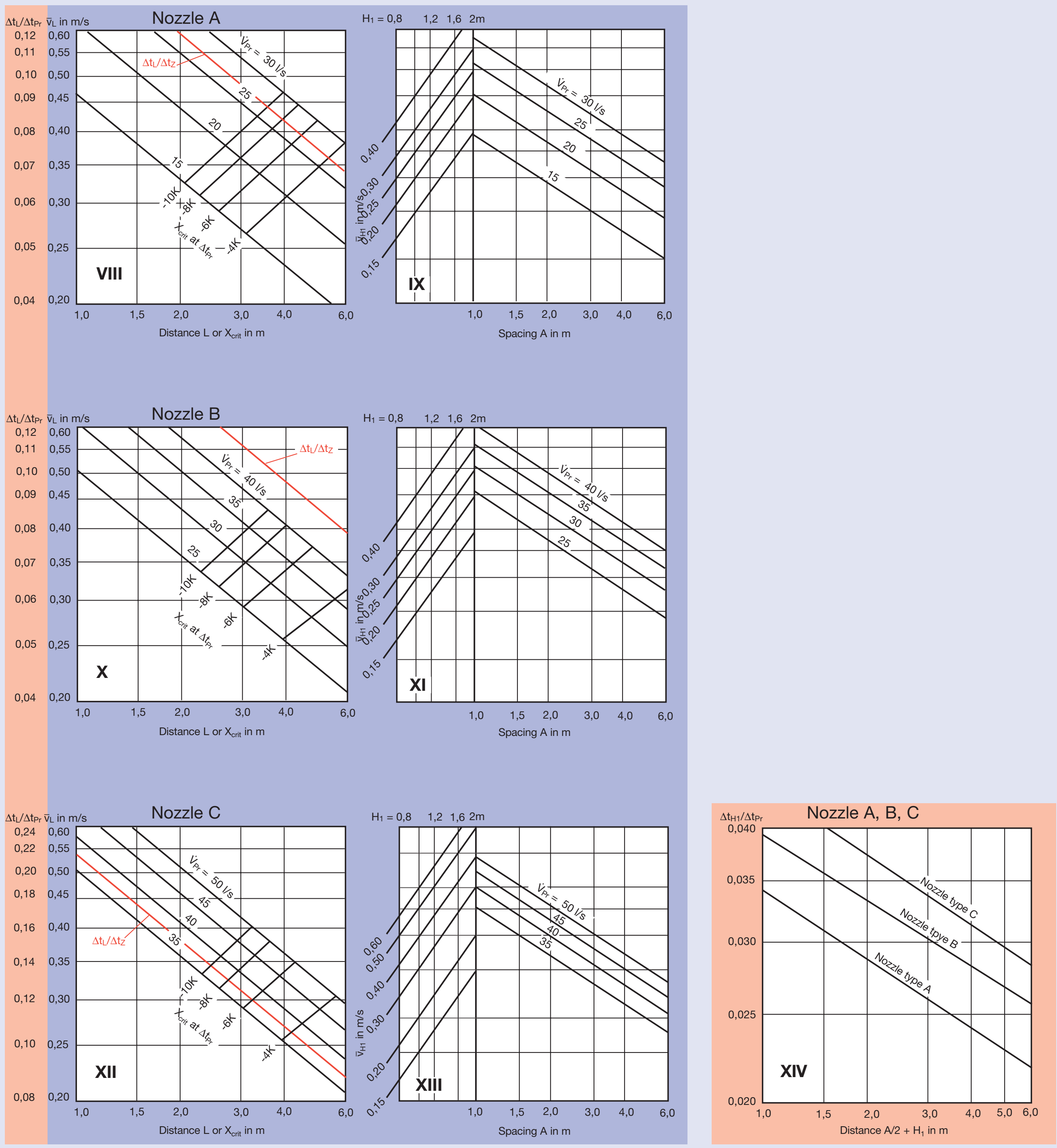
Correction factor K_{fo} free cross-sectional area DID300 face section L_N 2100 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
20	0.92		
30	0.96	0.96	
45	0.97	0.97	0.94
45		0.97	0.95
65			0.95
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
20-65	1		



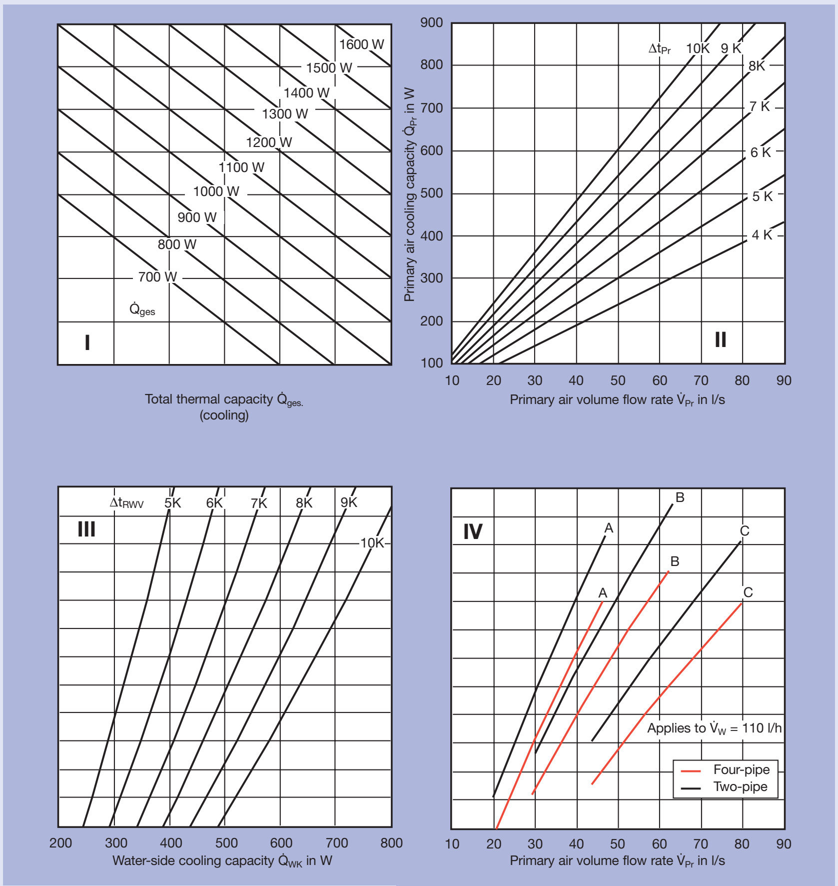


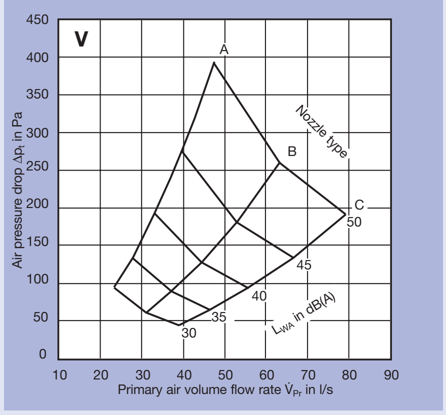


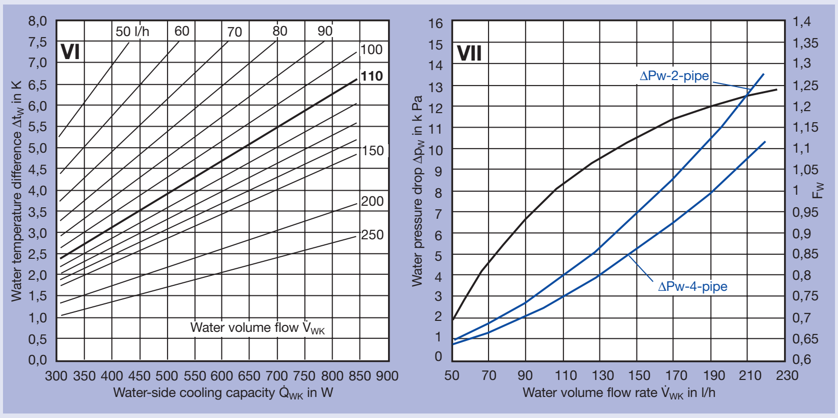
Aerodynamic data DID300 $L_N = 2100$



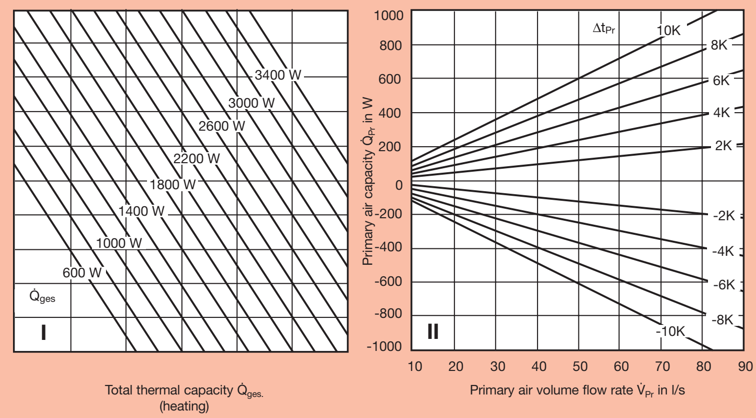
Correction factor K_{fo} free cross-sectional area DID300 face section L_N 2400 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle tpye**		
	A	B	C
20	0.90		
30	0.95	0.95	
40	0.96	0.96	0.93
60		0.97	0.95
80			0.96
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	B	C
20-80	1		

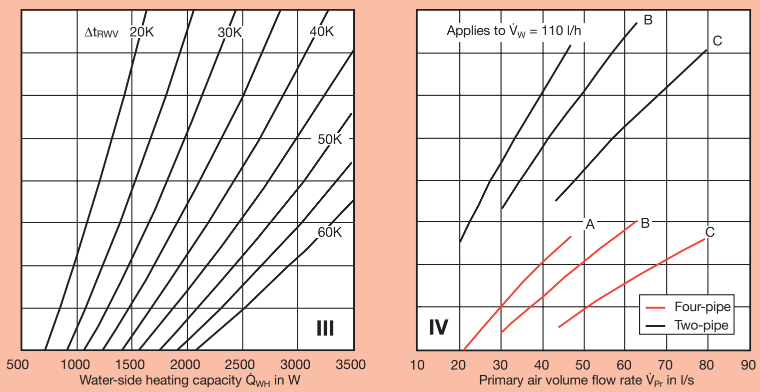


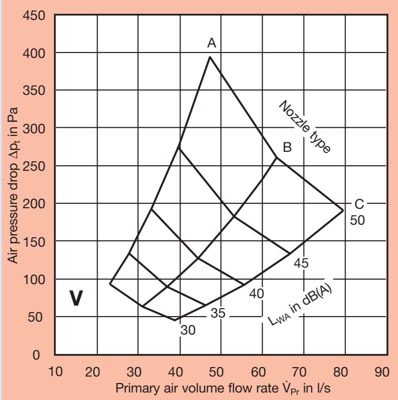


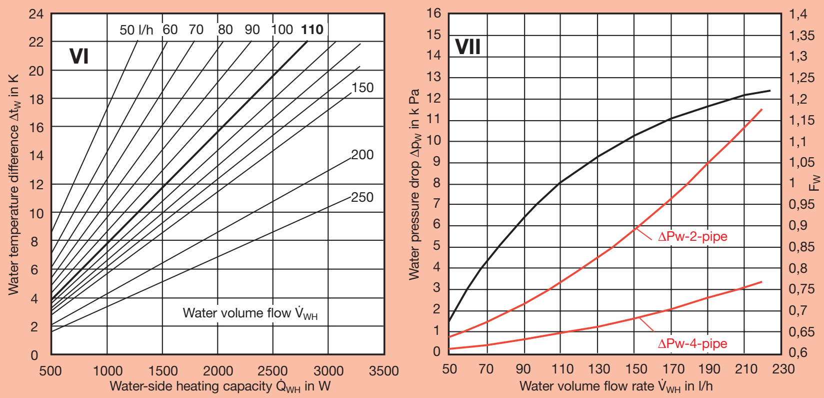


Correction factor K_{fo} free cross-sectional area DID300 face section L_N 2400 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
20	0.90		
30	0.95	0.95	
40	0.96	0.96	0.93
60		0.97	0.95
80			0.96
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
20-80	1		



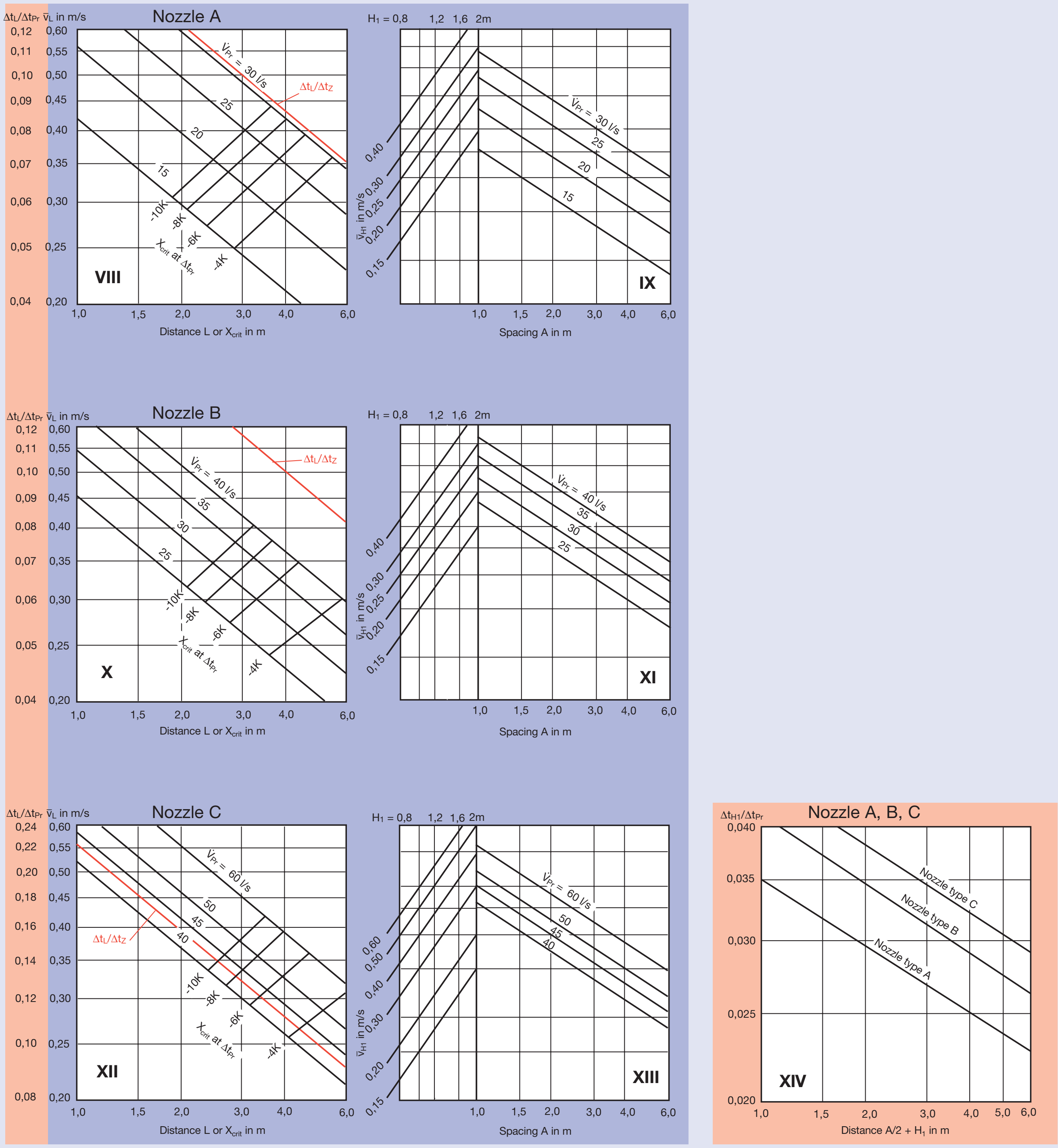






Aerodynamic data

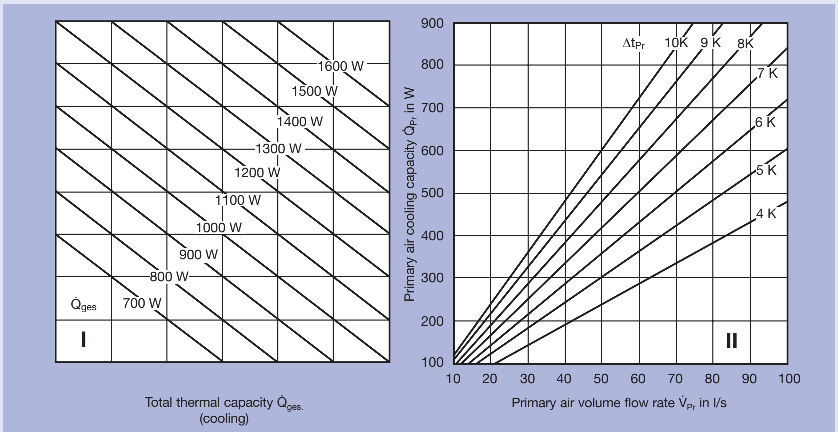
DID300 $L_N = 2400$

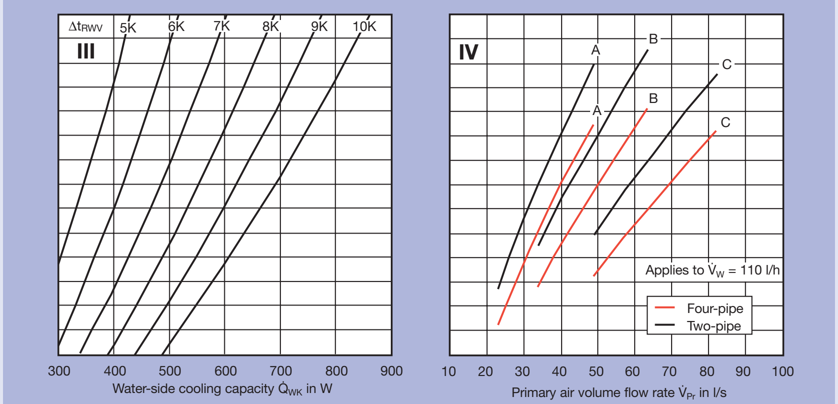


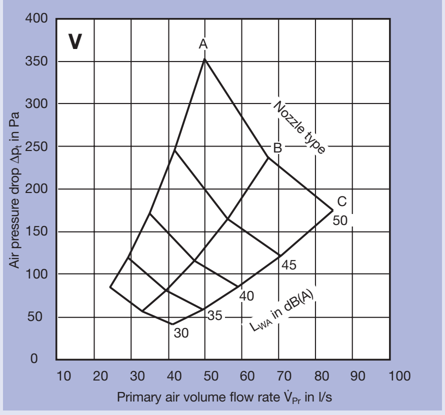
Technical data – cooling

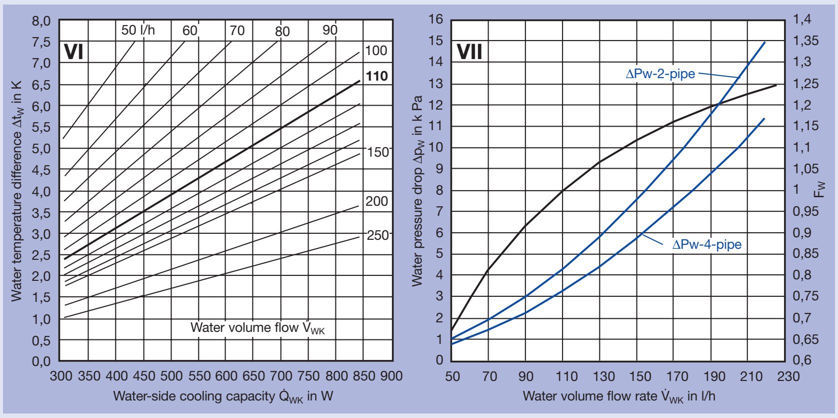
DID300 L_N = 2700

Correction factor K_{fo} free cross-sectional area DID300 face section L_N 2700 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
25	0.92		
35	0.95	0.95	
50	0.97	0.97	0.93
60		0.97	0.94
80			0.95
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
25-80	1		

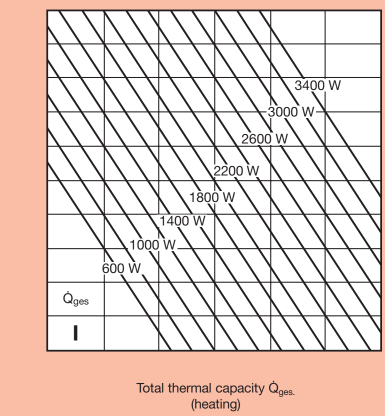


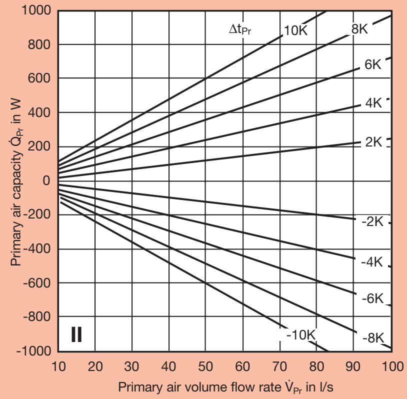


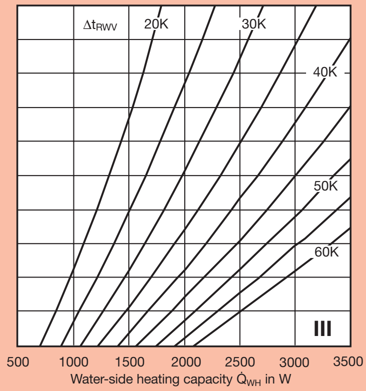


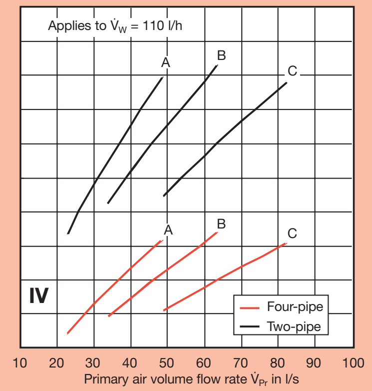


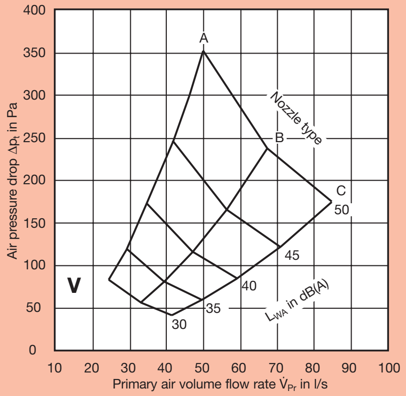
Correction factor K_{fo} free cross-sectional area DID300 face section L_N 2700 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type** A	B	C
25	0.92		
35	0.95	0.95	
50	0.97	0.97	0.93
60		0.97	0.94
80			0.95
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type** A	B	C
25-80	1		

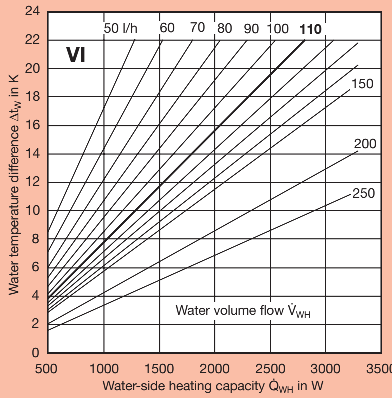


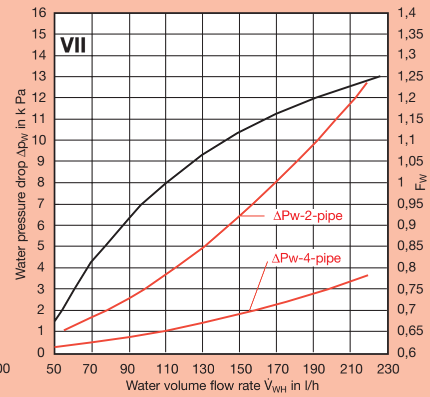






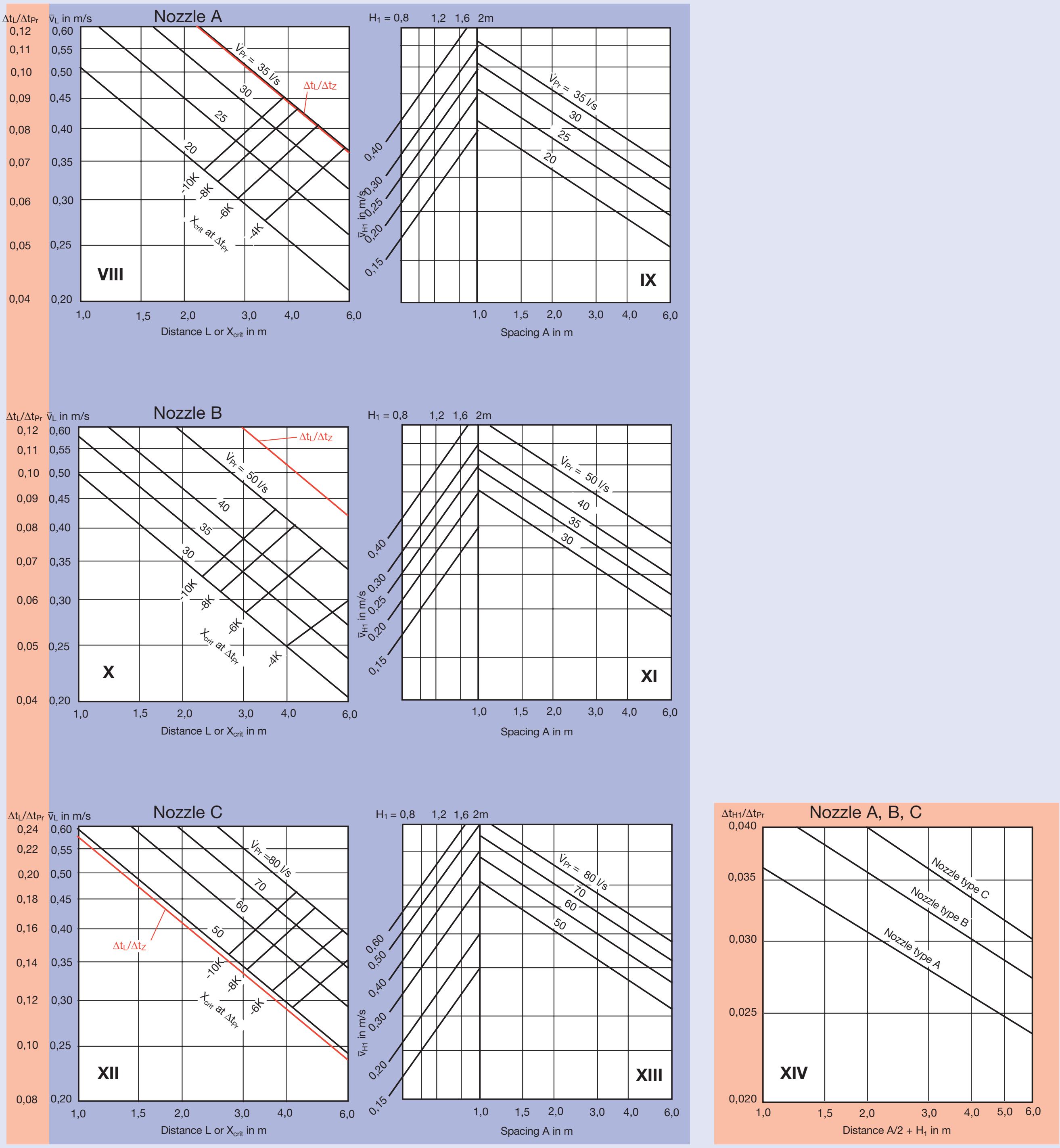




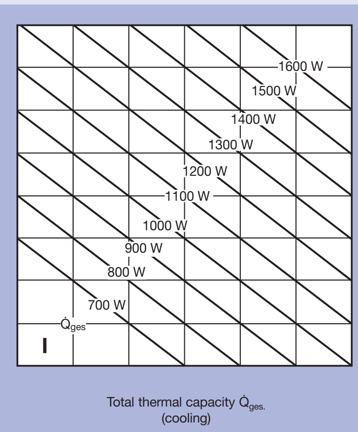


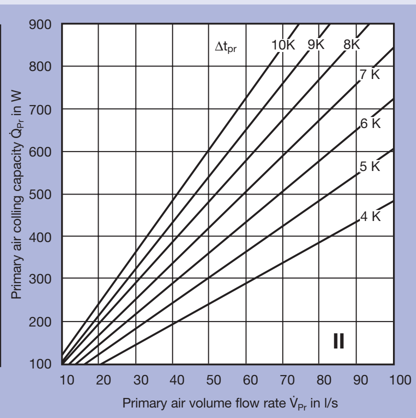
Aerodynamic data

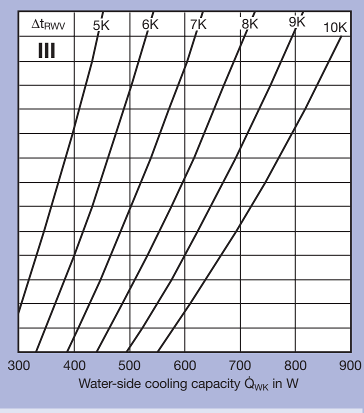
DID300 L_N = 2700

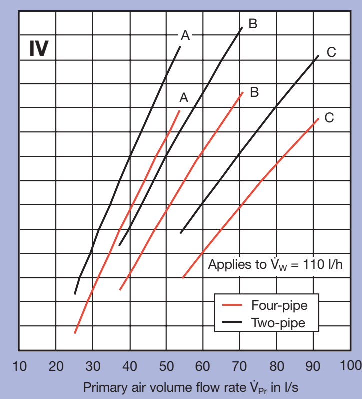


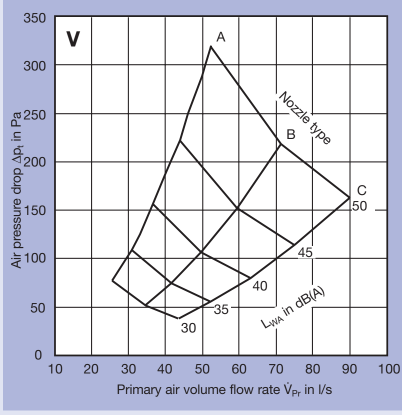
Correction factor K_{fo} free cross-sectional area DID300 face section L_N 3000 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
25	0.90		
40	0.95	0.95	
60	0.97	0.97	0.94
70		0.97	0.94
90			0.95
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type**		
	A	**B**	**C**
25-90	1		

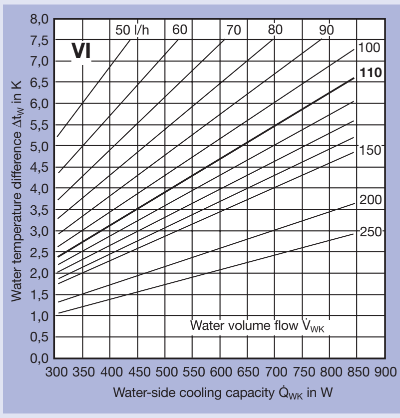


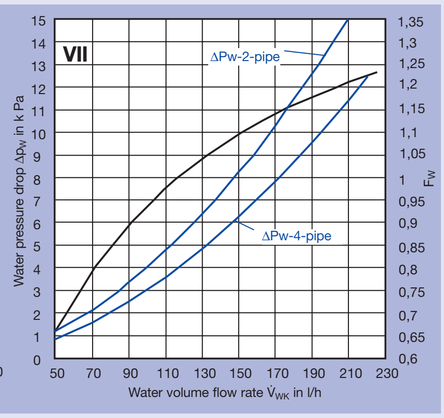




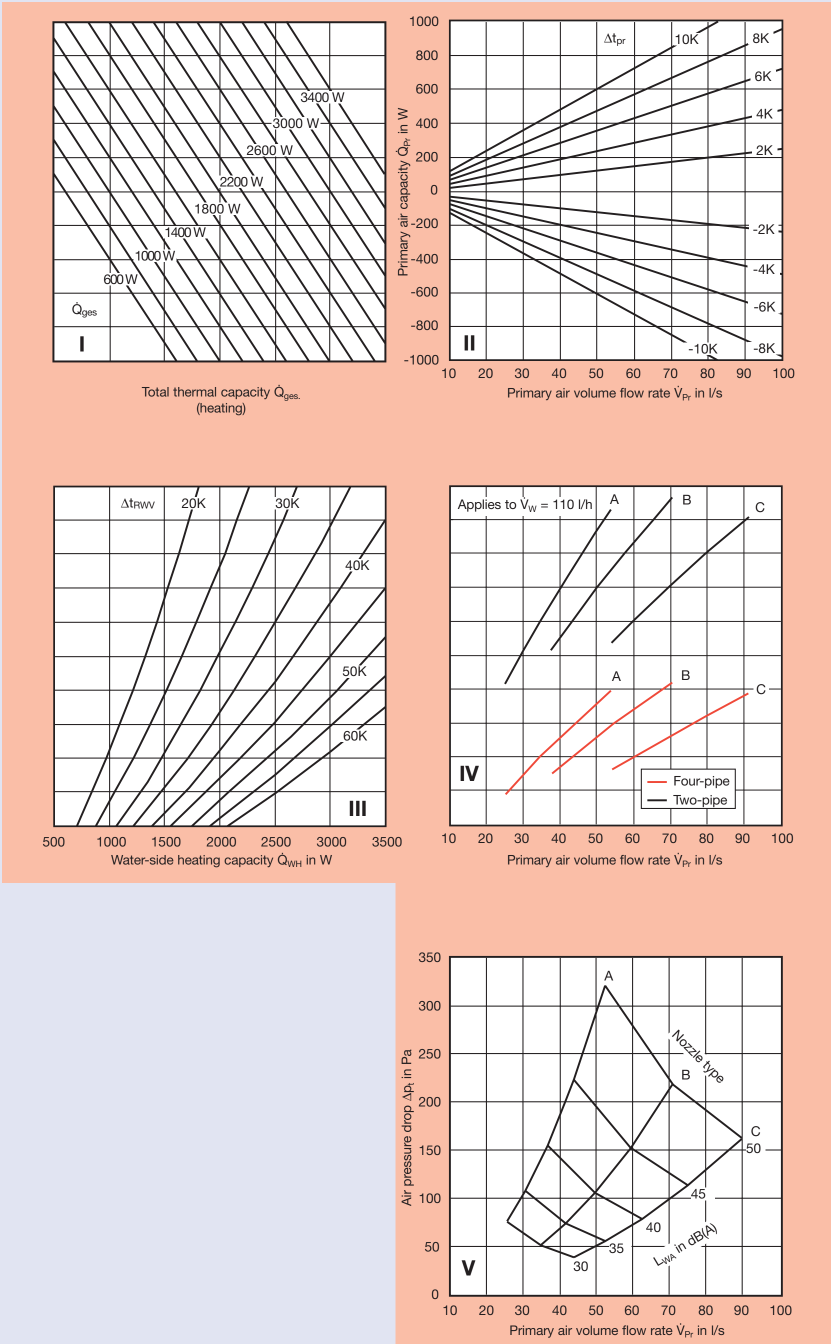


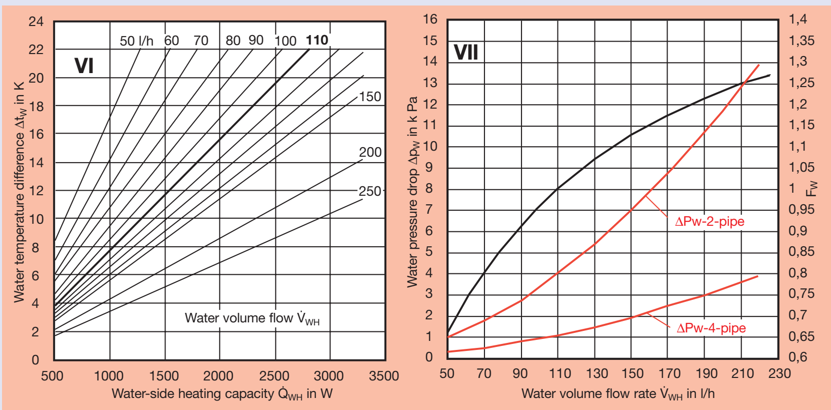


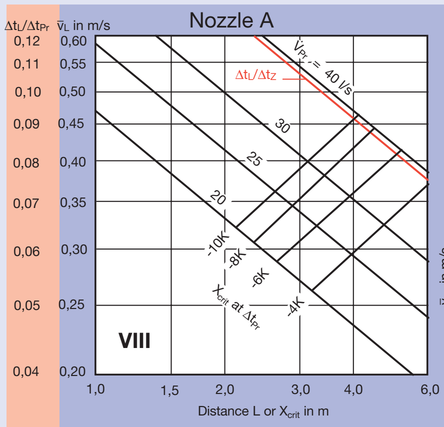




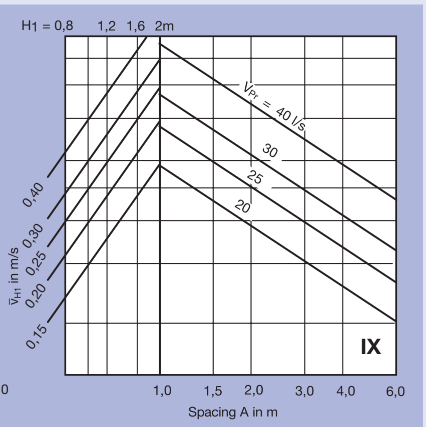
Correction factor K_{fo} free cross-sectional area DID300 face section L_N 3000 mm			
Free area = 50% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type** A	**Nozzle type** B	**Nozzle type** C
25	0.90		
40	0.95	0.95	
60	0.97	0.97	0.94
70		0.97	0.94
90			0.95
Free area = 70% Primary air $\dot{V}_{Pr}$ in l/s	**Nozzle type** A	**Nozzle type** B	**Nozzle type** C
25-90	1		



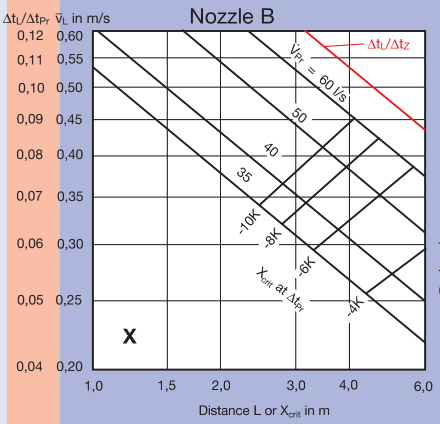




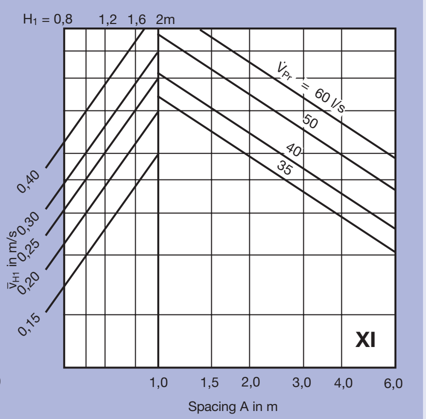
Nozzle A
Δt_L/Δt_Pr
v̄_L in m/s
0,12 0,11 0,10 0,09 0,08 0,07 0,06 0,05 0,04
0,60 0,55 0,50 0,45 0,40 0,35 0,30 0,25 0,20
V̇_Pr = 40 l/s
30
25
20
Δt_L/Δtz
-10K
-8K
-6K
-4K
X_crit at Δt_Pr
VIII
1,0 1,5 2,0 3,0 4,0 6,0
Distance L or X_crit in m



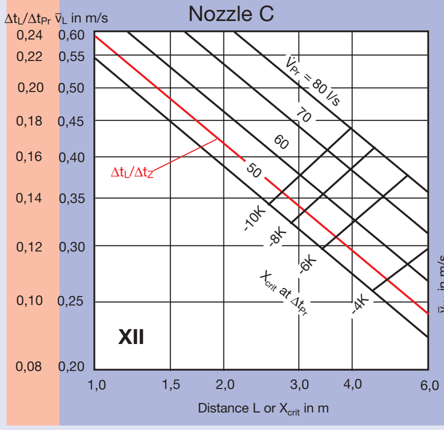
H1 = 0,8 1,2 1,6 2m
v̄_H1 in m/s
0,40 0,30 0,25 0,20 0,15
V̇_Pr = 40 l/s
30
25
20
IX
1,0 1,5 2,0 3,0 4,0 6,0
Spacing A in m



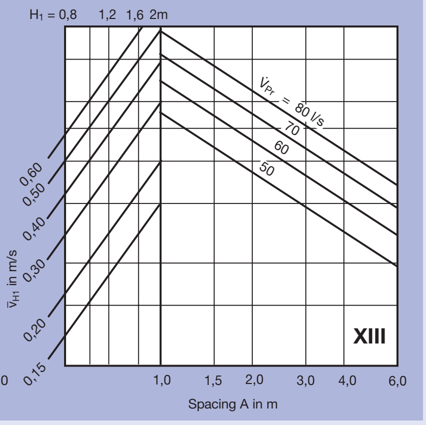
Nozzle B
Δt_L/Δt_Pr
v̄_L in m/s
0,12 0,11 0,10 0,09 0,08 0,07 0,06 0,05 0,04
0,60 0,55 0,50 0,45 0,40 0,35 0,30 0,25 0,20
V̇_Pr = 60 l/s
50
40
35
Δt_L/Δtz
-10K
-8K
-6K
-4K
X_crit at Δt_Pr
X
1,0 1,5 2,0 3,0 4,0 6,0
Distance L or X_crit in m



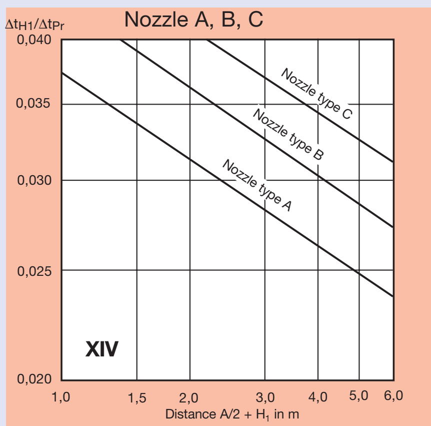
H1 = 0,8 1,2 1,6 2m
v̄_H1 in m/s
0,40 0,30 0,25 0,20 0,15
V̇_Pr = 60 l/s
50
40
35
XI
1,0 1,5 2,0 3,0 4,0 6,0
Spacing A in m



Nozzle C
Δt_L/Δt_Pr
v̄_L in m/s
0,24 0,22 0,20 0,18 0,16 0,14 0,12 0,10 0,08
0,60 0,55 0,50 0,45 0,40 0,35 0,30 0,25 0,20
V̇_Pr = 80 l/s
70
60
50
Δt_L/Δtz
-10K
-8K
-6K
-4K
X_crit at Δt_Pr
XII
1,0 1,5 2,0 3,0 4,0 6,0
Distance L or X_crit in m



H1 = 0,8 1,2 1,6 2m
v̄_H1 in m/s
0,60 0,50 0,40 0,30 0,20 0,15
V̇_Pr = 80 l/s
70
60
50
XIII
1,0 1,5 2,0 3,0 4,0 6,0
Spacing A in m



Nozzle A, B, C
Δt_H1/Δt_Pr
0,040 0,035 0,030 0,025 0,020
Nozzle type C
Nozzle type B
Nozzle type A
XIV
1,0 1,5 2,0 3,0 4,0 5,0 6,0
Distance A/2 + H1 in m

Specification text

The active chilled beam type DID300, suitable for dealing with high internal thermal loads using a combination of air and water, comprises a casing with integral primary air duct fitted with two sets of induction nozzles, size related to primary air flow rate. Below the primary air duct are two coils which can optionally be fitted with condensate trays. The induction grille below the coils can be either a perforated plate or a bar grille.
The coils can be used either for a heating or cooling operation (2-pipe system) as well as a heating and cooling operation (4-pipe system). In the mixing section of the unit the conditioned secondary air is mixed with the primary air and discharged horizontally (coanda effect) into the room via slots. The unit comprises external casing, edge profiles and suspension lugs.

The end of the casing can be fitted with optional support angles which are supplied loose. Control components can be supplied loose.

Materials:
The casing, primary air duct and perforated plate induction grille are made of galvanised steel sheet, the induction bar grille, side frames and end frames are made of extruded aluminium profiles. The casing as standard has a galvanised surface – coil is untreated, optionally casing and coil can be dip coated in black (RAL 9005), visible surfaces of the induction grille completely powder-coated in pure white (RAL 9010) or optionally in another colour of the RAL colour scale.
The discharge nozzles are made of black plastic, the coil of copper pipes with formed aluminium fins. The flexible hose, available as an accessory, is made of special plastic with a stainless steel sheathing.

Order Code

These codes do not need to be completed for standard products.

DID300-G-2-A-MHR / 1800 x 1500 / KW / 0 / P1 / RAL 9016 / G1

Induction grille:
Bar (grille) G
Perforated plate (round-hole sheet metal) LR

Coils:
Two-pipe 2
Four-pipe 4

Nozzle options A, B, C

For casing arrangements see page 4

L_1* (mm)	L_N* (mm)
1200	1200, 1500, 1800
1500	1500, 1800, 2100
1800	1800, 2100, 2400
2100	2100, 2400, 2700
2400	2400, 2700, 3000
2700	2700, 3000
3000	3000

*L_1 = Total length (diffuser face)
L_N = Nominal length

0 without condensate tray
KW with condensate tray

Not used

0 Standard finish
Entire visible surfaces powder-coated to RAL 9010 (GE 50%) 1)
P1 Powder-coated
to RAL 9006 (GE 30%) 1)
other RAL colours (GE 70%) 1)

State colour

Casing and coil:
0 Standard
Casing and coil:
G1 dip-coated according to RAL 9005
Casing:
G2 dip-coated according to RAL 9005

1) GE = Gloss level!
2) For water connection Ø 12 mm!

Note:
L_1 dimensions of 1200 ... 3000 mm possible
L_N dimensions only standard lengths
L_1 max. 7 mm shorter than L_N

Accessories:
FS12-A /500 (see table)
AW = Support angles

Accessories: Flexible hose (FS12)2) (cf. page 5)

Possible connections		
both ends	combination	Length in mm
FS12-S	FS12-S/U	
FS12-U	FS12-S/A	500, 750, 1000
FS12-A	FS12-U/A	

Order example

Manufacture: TROX
Type: DID300-G-2-A-MHR/1800x1500/KW/P1/RAL9016/G1