DOĞU
İKLİMLENDİRME | HVAC SYSTEMS

ACD

Circular Constant Air Volume Device (CAV)

FOUR SEASONS®

Venues Breathe with DOGU HVAC Systems!

DOGU HVAC founded in 1999, and ever since has been manufacturing energy and cost efficient products as Air Handling Units, Air Distribution & Management & Movement Systems [HVAC Components] and constantly enhancing to provide an integrated solution for well-being. DOGU HVAC's core business products which are subsumed under 4 major groups as Air Handling Units, Heat/Energy Recovery Units, Air Distribution & Management Products and Kitchen Ventilation Equipment are all produced under the compliance with EU standarts. Particularly AHU and HRU-ER units are entitled under the "FOUR SEASONS" brand name for domestic and foreign markets. DOGU HVAC's, headquarter in Izmir/Turkey, operates in a large-sized plant spread over 2 factories, in total area of 45.000 sqm in which 25.000 sqm indoor space that enables DOGU HVAC manufactures 140 various type of products. Additionally, DOGU HVAC has a powerful sales network with 4 sales offices located in İstanbul, Ankara, Antalya and Adana in Turkey as well as authorized dealers in many other countries for sales and after sales operations. DOGU HVAC has been exporting to more than 50 countries.

Thanks to our "Customer Satisfaction","Zero-Defect Policy" motto and reinforced by complete certified products, more than 250 employees. DOGU HVAC R&D center developed exclusive products, such as Double Skin Make-Up Kitchen Hood, Recirculated Laminar Airflow Unit, Single Piece Square Ceiling Diffuser and Ecology Units, for the first time have brought to the sector. DOGU HVAC R&D has the ability to make customized production which can meet the requirement of the customers by means of special software such as "ANSYS FLUENT". DOGU HVAC guaranteed its quality of management by having advantages of ISO 9001, ISO 14001, ISO 18001 certifications. Air Handling Units have EUROVENT, TUV Hygiene [in accordance with DIN1946-4, VDI 6022-1, DIN EN 13053 standarts], CE, TSEK, GOST-R certifications; Fire Dampers have EN 1366-2 and EN 13501-3 CE certifications; Smoke Control Dampers have EN 1366-10 and 12101-8 CE certifications; Kitchen Ventilation Products have TSEK, CE and GOST-R quality certifications.

- ACD – Circular Constant Air Volume Unit is used to control the air flow in projects where comfort and hygiene requirements are high, such as operating theaters, clean rooms, and special processes.
- The desired air volume can be easily changed on the unit with the help of an allen wrench.
- It can stabilize the pressure in the air duct between 20 Pa and 1000 Pa.
- All ACD units produced are calibrated in the HVAC calibration laboratory according to the flow rates specified in the order. In this laboratory, calibration is completed by testing one-to-one field conditions with 7 measuring stations, each of which has different diameters and nominal flow.
- Since it is a completely mechanical system, it does not require any power input. The stabilization of the air flow is based on meeting the pressure changes in the system. When the air flow decreases depending on the pressure and pressure in the duct, the torque acting on the blade of the ACD decreases and the wing opens. With the opening of the blade, the air flow through the duct increases and returns to the calibration value.
- Conversely, when the air flow rate increases, the torque acting on the blade increases and the blade closes. With the closing of the blade, the air flow through the duct decreases and returns to the calibration value.
- The mechanism, which is precisely designed with the calibration spring according to the position of the blade, enables the ACD to work successfully with 10% deviation in the calibrated flow rate.
- It has a specially designed air viscous piston to keep the blade oscillations at a minimum level due to increased turbulence at high pressures.
- It complies with DIN EN 1946/4 and VDI 6022 hygiene standards.

MATERIAL

- The casing is manufactured from galvanized steel sheet as standard. AISI 304 quality stainless case option is available.
- Blades and air-viscous piston made of aluminium.
- Plastic tube for airflow calibration.
- Stainless steel calibration spring.
- Standard duct sealing.
- Blade shaft is AISI 304 stainless, shaft bush is PTFE plastic.

ACCESSORIES

- **Acoustic Insulation:** In order to fulfill the acoustic comfort conditions in the selected product, it is insulated with an optional 19 mm thick foamed rubber. Rubber is surrounded by galvanized sheet metal.

- **GSS_K – Duct Type Circular Silencer:** Silencer option for the sound level to meet the desired comfort conditions available.

GSS_K – Duct Type Circular Silencer

STANDARD SIZES

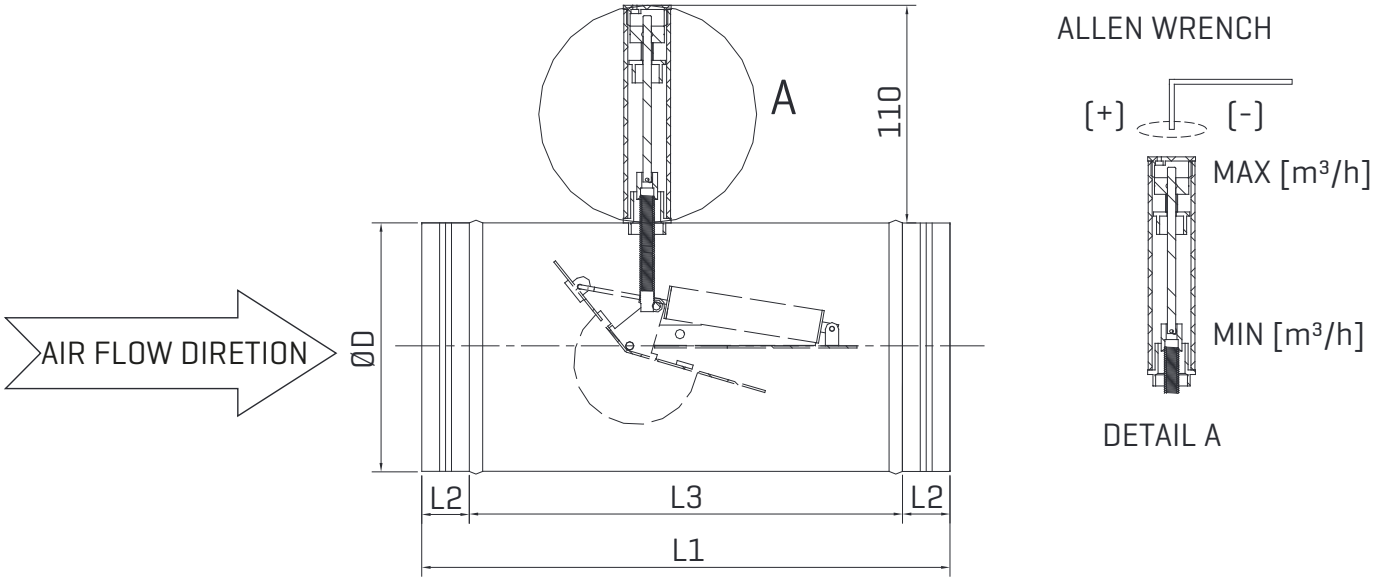


Table 1. Standard Dimensions

Sizes [mm]	ØD [mm]	L1-Total [mm]	L2 [mm]	L3 [mm]	Vmin [m³/h]	Vmax [m³/h]
ACD- 100	98	240	50	140	50	250
ACD- 125	123	240	50	140	80	400
ACD- 150	148	240	50	140	115	575
ACD- 160	158	250	50	150	130	700
ACD- 200	198	280	50	180	200	1000
ACD- 250	248	280	50	180	350	1650
ACD- 300	298	380	50	280	450	2400
ACD- 315	313	380	50	280	540	2700
ACD- 355	353	450	50	350	690	3400
ACD- 400	398	450	50	350	880	4400

Note: When the duct velocity is less than 2m/s, the flow rate adjustment deviation will be ±20%.
Flow adjustment is made from the calibration tube with a 2 mm allen wrench.

PERFORMANCE DATA

VELOCITY & MINIMUM PRESSURE LOSS DATA

Table 3. Velocity & Minimum Static Pressure Loss Data

Air Velocity [m/s]	Pressure Drop [Pa]
2	32
3	40
4	49
5	60
6	73
7	90
8	110
9	135
10	166

FLOW FIELD TABLE

Table 3. Flow Field Table

Sizes	Flow Field [m²]
ACD- 100	0,008
ACD- 125	0,012
ACD- 150	0,018
ACD- 160	0,020
ACD- 200	0,031
ACD- 250	0,049
ACD- 300	0,071
ACD- 315	0,078
ACD- 355	0,099
ACD- 400	0,126

SOUND PRESSURE LEVEL DATA

Table 4. Sound Pressure Level Table

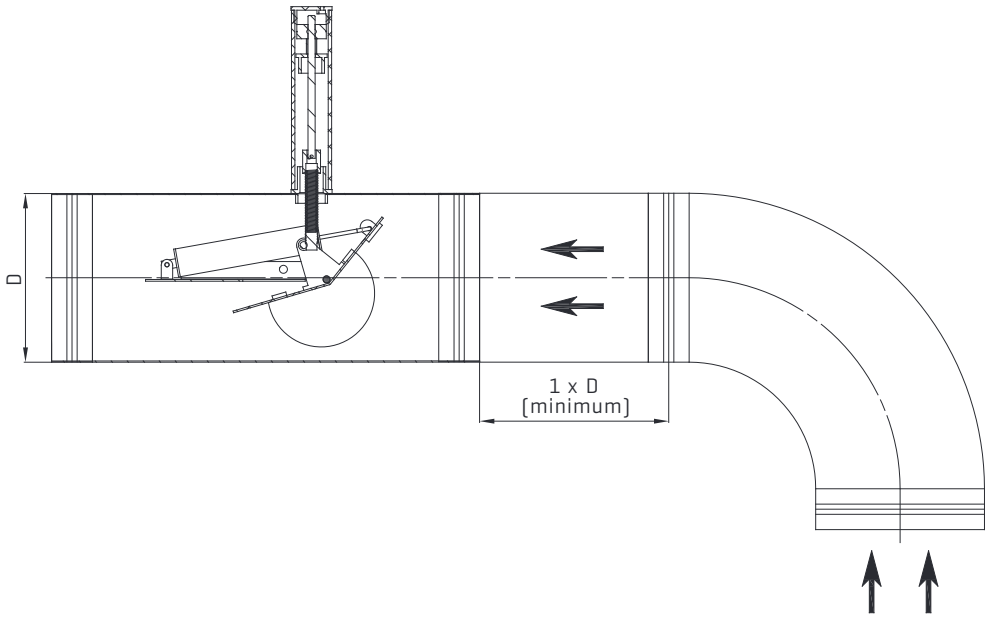
Size [mm]	Air Velocity [m/s]	Flow Rate [m³/h]	Flow Sound Pressure Level [dB(A)]			Sound Pressure Level Emitted from the Case [dB(A)]	
			Differential Pressure Value [Pa]				
			100	200	500	Un-Insulated	Acoustic Isolated
100	2	60	26	33	38	<15	<15
	4	120	33	40	45	23	<15
	6	170	37	44	49	29	18
	8	230	41	48	53	33	22
	10	290	44	51	56	36	25
125	2	90	29	36	41	<15	<15
	4	180	36	43	48	21	<15
	6	270	40	47	52	27	16
	8	360	43	50	55	31	19
	10	450	46	53	58	34	22
150	2	130	33	40	45	27	<15
	4	260	37	44	49	34	23
	6	390	40	47	52	39	28
	8	510	42	49	54	42	32
	10	640	43	50	55	44	35
160	2	150	33	40	45	27	16
	4	290	37	44	49	34	24
	6	440	40	47	52	39	29
	8	580	42	49	54	42	32
	10	730	43	50	55	44	35
200	2	230	34	41	46	26	14
	4	460	38	45	50	34	23
	6	680	40	47	52	39	28
	8	910	42	49	54	42	32
	10	1140	44	51	56	45	35
250	2	360	36	43	48	28	18
	4	710	37	44	49	35	26
	6	1060	38	45	50	40	30
	8	1420	39	46	51	43	33
	10	1770	39	46	51	45	36
300	2	510	33	40	45	28	17
	4	1020	35	42	47	36	25
	6	1530	37	44	49	40	31
	8	2040	38	45	50	44	34
	10	2550	39	46	51	46	37
315	2	570	33	40	45	35	26
	4	1130	35	42	47	43	33
	6	1690	37	44	49	47	37
	8	2250	38	45	50	50	40
	10	2810	39	46	51	52	412
355	2	720	26	33	38	42	34
	4	1430	33	40	45	49	40
	6	2140	37	44	49	53	43
	8	2850	41	48	53	56	45
	10	3570	44	51	56	59	47
400	2	910	40	47	52	42	31
	4	1810	42	49	54	49	39
	6	2720	43	50	55	53	43
	8	3620	44	51	56	56	47
	10	4530	44	51	56	59	49

Note: Data were obtained according to the VDI 2081 standard.

INSTALLATION

It is mounted to the duct by considering the air flow direction arrow on the ACD. The ACD product design complies with the EN 13180 standard for duct connections such as elbows, tees and reducers.

Minimum channel length after elbows



Minimum duct length after duct equipment such as Te - Reduction

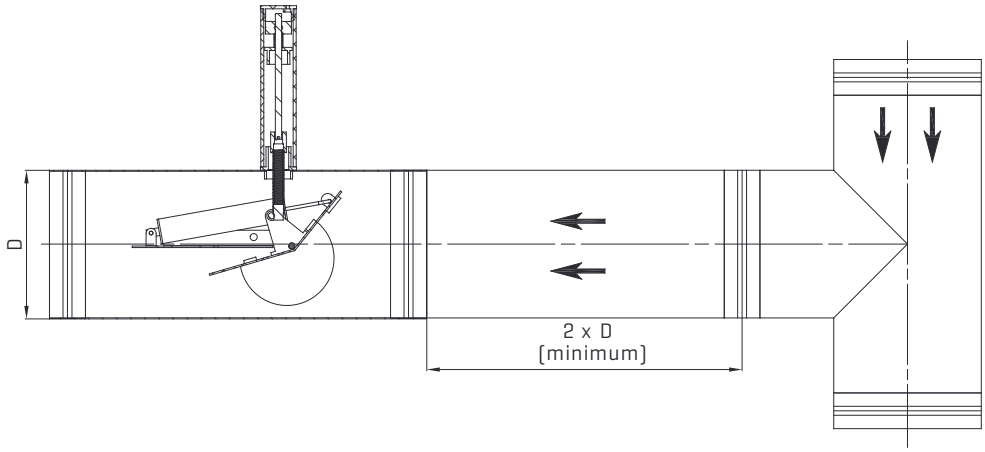


Table 5. Minimum Duct Length Table

Fastener	Minimum Duct Length
Elbow	1 x D
Other duct equipment (Duct equipment such as T-joint, reduction)	2 x D
Fire Damper	2 x D
Silencer	2 x D

Note: It should be taken into account that turbulence will prevent the correct operation of the constant flow rate adjustment mechanism in cases where no additional channels are placed.

PRODUCT SELECTION

Example: The total air flow to be blown into the room is determined as 7500 m^3/h. 10 ACD units will be used in the supply line. Make the product selection.

The air flow rate that will pass through the ACD will be 7500/10 = 750m^3/h. ACD sizes to be selected accordingly Table 1. Dimensions between Ø200 and Ø355 can be selected from the Standard Dimensions Table.

From Table 3:

Flow area is 0.031 m^2 for ACD-200 and 0.099m^2 for ACD-355.

Velocity and minimum static pressure loss from the selected flow rate according to these areas:

ACD-200: Speed = 750/3600/0.031= 6.72 m/s Minimum Static Pressure Loss (Table 2) = 82 Pa

ACD-355: Speed = 750/3600/0.099 = 2.1 m/s Minimum Static Pressure Loss (Table 2) = 32 Pa

Table 4. Sound Pressure Level Table is used by interpolation to evaluate sound pressure levels and additional acoustic insulation.

Sound data for values obtained with the selection of ACD – 200 and air velocity of 6.72 m/s:

Flow sound pressure level 41 dB(A)(100Pa), 48 dB(A)(200Pa), 53 dB(A)(500Pa)

Sound pressure level emanating from the case whic is non-insulated: 40 dB(A)

Sound pressure level emanating from the case which is acoustically isolated: 29 dB(A)

Sound data for 2.1 m/s air velocity in ACD – 355 selection:

Flow sound pressure level 26 dB(A)(100Pa), 33 dB(A)(200Pa), 38 dB(A)(500Pa)

Sound pressure level emanating from the case without acoustic insulation: 35 dB(A)

Sound pressure level from the acoustically insulated case

PRODUCT ORDER CODE

ACD.< A >.KG.< B >.< C >

A	Raw Material Type	
	GAL	Galvanised
	PAS	Stainless Steel
B	**Insulation**	
	00	No insulation
	04	Acoustic Insulation
C	**Product Size [mm]**	
	0100	100 mm
	0125	125 mm
	0150	150 mm
	0160	160 mm
	0200	200 mm
	0250	250 mm
	0300	300 mm
	0315	315 mm
	0355	355 mm
	0400	400 mm

Sample Coding; ACD.GAL.KG.00.0250

NOTES


We make the difference with
140 different types of products.
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