CEDASPE

CEDASPE

DEHYDRATING BREATHERS

Made in Italy

(Model year 2013)

itc Italian Transformer Components

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AIR DEHYDRATING BREATHERS
threaded and/or flanged connection, with mechanical valve
type VCP 10 – 30 & VC 50 - 80 - 100 - 150
for use on mobile transformers or on tanks
and small breather VC 05 (1/2'' thread entry)

1. GENERAL INFORMATIONS

Air dehydrating breathers are transparent hollow cylinder tubes which contain chemically pure silicium salt (silicagel) with coloured indicator. The air breathed inside the transformer due to the thermal contraction of the oil mass, passes through the silicagel.
The silicagel absorbs the humidity, indicating the saturation degree by changing colour as follows:

ORANGE   silicagel completely dry
WHITE   silicagel saturated with humidity

The salt contained in the breather, when saturated, may be easily removed and regenerated by heating it, inside a ventilated oven, at 120° - 150°C, until the colour becomes orange again.
The specific property of the silicagel is its high absorption power of humidity. This is total until the salt has absorbed water for about 15% of its weight, and saturation is reached when the salt has absorbed water for 30 to 40 % of its weight.

2. TECHNICAL FEATURES

The upper and lower parts are made in a non-porous corrosion-proof aluminium alloy casting. The hollow cylinder is made of plexiglas and it is protected by a stainless steel cylinder, with windows which allow the visual control of the silicagel colour.
On the bottom side of the breather, a mechanical valve prevents continuous air contact with the silicagel and allows the air to pass in both direction (inlet or outlet) only when there is pressure deficiency or excess inside the transformer.
Pressure values for air passage into the dehumidifier are:

   0.003 kg/cm^2 inlet , or 0.005 kg/cm^2 outlet

The hollow container and the mechanical valve are separated by a drilled plate with a labyrinth system, which have the double purpose of diffusing inlet air uniformly, and of avoiding that any salt dust may damage the closing system.

3. DRAWINGS AND TECHNICAL DATA

On the following drawings (PAG5.55, PAG5.56A) are shown all the breathers of VC series.

4. PROTECTION OF OUTER SURFACES

Outer surfaces in aluminium alloy are covered with a double coat of high protective paint against all weather conditions, and temperature between – 40°C and + 100°C. All the screws are made in mild steel zinkplated; upon request in stainless steel.

5. CHOICE OF THE BREATHER SIZE (or maintenance interval) FOR USE ON TRANSFORMERS

The choice of the breather size (or maintenance interval) is directly related to the quantity of the silicagel contain.

The mass of silicagel necessary for the proper functioning is given approximately by a function of 6 variable quantities, listed here following:
- Mass of oil "V" inside the transformer , denominated in dm3 or in litres.
- Average temperature of the air in the environment where the transformer is installed, denominated in °C
- Average Humidity of the air in the environment where the transformer is installed, denominated in %.
- Average thermal cycle " Δ t " of the transformer, denominated in °C, to be calculated as difference between the minimum and the maximum temperatures reached by the oil inside the transformer within a time period.
- Average duration of thermal cycle " T " denominated in hours , to be calculated as the time interval between two thermal cycles.
- Maintenance interval " M " denominated in days.

From the saturated steam table for water (see next pages), depending from the average temperature and humidity of the air, it is possible to calculate the quantity of water " A "(denominated in gram) for each m3 of air which enter inside the transformer.
Now, using the following formula, we are ready to calculate the quantity of silicagel (denominated in Kg) necessary for the proper functioning of the transformer:

Mass of silicagel =(127,056 x 10-9 x V x Δ t x A x M) : T   [kg]

It is important to note that the result of above formula is only a first approximation value, due to the simplification related to the average values considered as constant values for the duration of the thermal cycles between two following maintenance intervals.

It is also evident that shortening the maintenance interval, the average conditions used in the formula simulate more exactly the true conditions of the transformer during its working life (i.e. the average temperature of the air for 30 days in January has a statistic scattering degree lower than the average temperature for 90 days in Dec/Jan/Feb); same comments must be done for humidity, thermal cycle duration and temperature

Only two data may be easily fixed without doubt: mass of oil inside the transformer and maintenance interval.

For a better understanding, we show here following three examples of the choice of quantity of silicagel necessary for the same transformer installed in three different places, but with the same thermal cycle and maintenance interval:

Average thermal cycle "Δ t "	20 °C
Average duration of thermal cycle T	8 hours
Maintenance interval M	90 days
Mass of oil V	10000 dm³

The mass of silicagel necessary foe a good functioning of the transformer will be:

1° CASE: Transformer installed in normal European condition:
- Average air temperature   20 °C
- Average humidity   60 %
- Silicagel mass   2,95 kg
Suggested size of the breather: size VC30

2° CASE: Transformer installed in tropical climate:
- Average air temperature   30 °C
- Average humidity   90 %
- Silicagel mass   7,77 kg
Suggested size of the breather: size VC100

3° CASE: Transformer installed in desert condition:
- Average air temperature   35 °C
- Average humidity   40 %
- Silicagel mass   4,50 kg
Suggested size of the breather: size VC50

6. CHOICE OF THE BREATHER SIZE (or maintenance interval) FOR USE ON TANKS

The choice of the breather size (or maintenance interval) is directly related to the quantity of the breather silicagel contain. The mass of silicagel necessary for the proper functioning is given approximately by a function of 5 variable quantities, listed here following:

A) Volume of air V inlet for each cycle, denominated in dm³ or in litres
B) Average temperature of the air in the environment where the tank is installed, denominated in °C
C) Average Humidity of the air in the environment where the tank is installed, denominated in %
D) Number of cycles C per day
E) Maintenance interval M denominated in days

From the saturated steam table for water (see next page), depending from the average temperature and humidity of the air, it is possible to calculate the quantity of water A (denominated in grams) for each m³ of air which enter inside the tank. Now, using the following formula, we are ready to calculate the quantity of silicagel (denominated in Kg) necessary for the proper functioning of the breather:

$$\text{Mass of silicagel} = 6.7 \times 10^{-6} \times V \times A \times C \times M \; [\text{kg}]$$

It is important to note that the result of above formula is only a first approximation value, due to the simplification related to the average values considered as constant values for the duration of the cycles between two following maintenance intervals.

It is also evident that shortening the maintenance interval, the average conditions used in the formula simulate more exactly the true conditions in which the breather is working (i.e. the average temperature of the air for 30 days in January has a statistic scattering degree lower than the average temperature for 90 days in dec./Jan./Feb.); same comments must be done for humidity and temperature.

Only two data may be easily fixed without doubt: volume of air inlet and maintenance interval.

For a better understanding, we show here following three examples of the choice of quantity of silicagel necessary for the same tank installed in three different places, but with the same cycle and maintenance interval; the following conditions shall be the same in all the tree cases:

Number of cycles per day C	2
Maintenance interval M	90 days
Volume of air inlet V	150 dm³

The mass of silicagel necessary for a good functioning of the breather will be:
1° CASE: Tank installed in normal European condition:
    - Average air temperature   20 °C
    - Average humidity   60 %
    - Silicagel mass   1.86 kg
    Suggested size of the breather: size VC30

2° CASE: Transformer installed in tropical climate:
    - Average air temperature   30 °C
    - Average humidity   90 %
    - Silicagel mass   4.96 kg
    Suggested size of the breather: size VC50

3° CASE: Transformer installed in desert condition:
    - Average air temperature   35 °C
    - Average humidity   40 %
    - Silicagel mass   2.86 kg
    Suggested size of the breather: size VC30

7. MANUFACTURING PROGRAM

We propose a full range of dehydrating breathers for power transformers, starting from 1 kg silicagel contain up to 15 kg;
All our models are identified with two letters 'VC' followed by two figures which represent the quantity (denominated in hg) of silicagel contain, with this scale in kg 0,5; 1 ; 3   ; 5 ; 10 ; 15.
All these breathers can be connected to the tube coming from the conservator by means of a threaded connection or by means of a flange.
Starting from size VC50 all the breathers are fitted with a side support which enable to make a bolted connection to a wall or to a rack.
The dehydrating breathers, complete with salts are despatched in sealed packages in order to avoid alteration of the dry state of silicagel. Upon request, we supply also empty breathers with silicagel filling packed separately in ermetic bags, or even without filling, if the customer wants to manage silicagel separately from the breathers.

8. ORDER INSTRUCTIONS

As said, the identification of a model start with two letters VC followed by two figures which represent the weight of silicagel inside the breather
    Few example, to make it completely clear:
    VC 50   Breather with 5 kg silicagel contain
    VC150   Breather with 15 kg silicagel contain
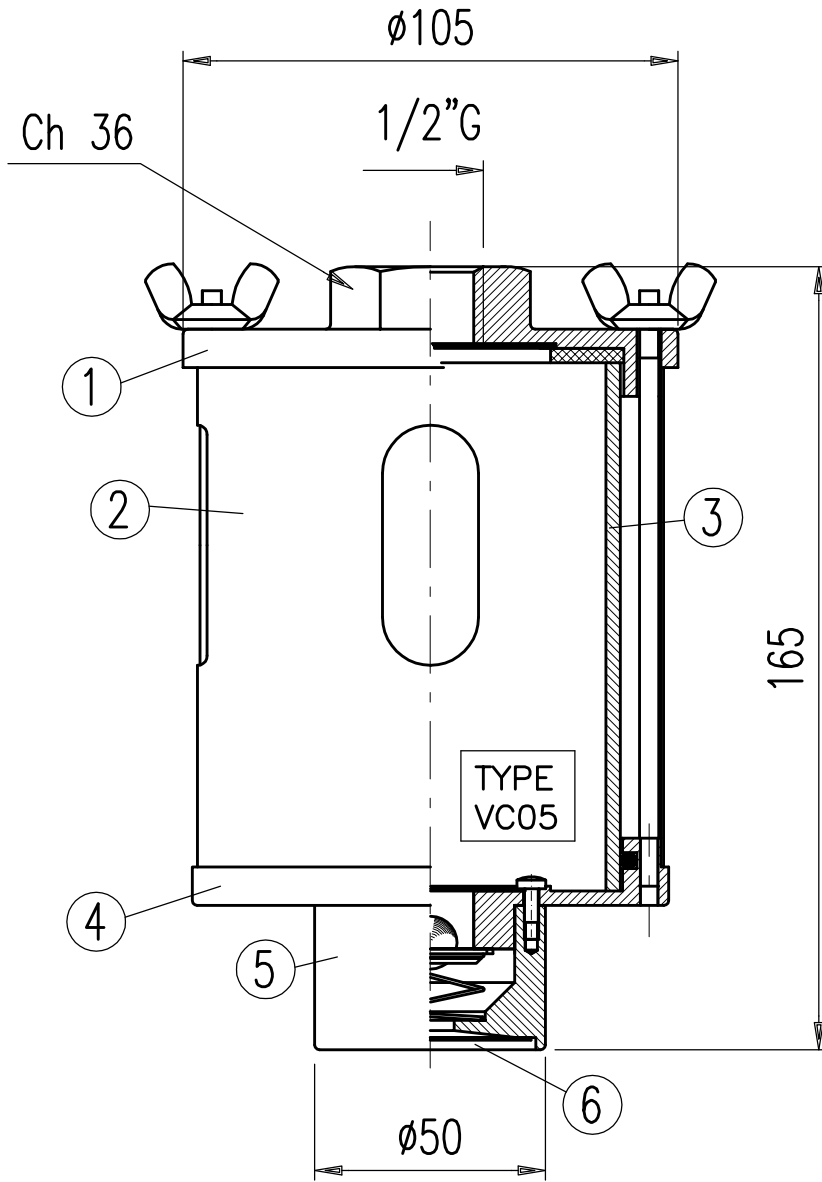   Special instruction must be indicated separately.

9. SATURATED STEAM TABLE FOR WATER

Showing the mass of water, in gram (10^{-3} kg), contained in one cubic meter of air (related to the air temperature and the air humidity).

AIR TEMPERATURE   **AIR HUMIDITY [%]**

°C	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	0.49	0.98	1.47	1.96	2.45	2.94	3.43	3.92	4.40	4.90
5	0.68	1.36	2.04	2.72	3.40	4.08	4.76	5.44	6.10	6.80
10	0.94	1.87	2.82	3.76	4.70	5.64	6.58	7.52	8.50	9.40
15	1.28	2.56	3.84	5.12	6.40	7.68	8.96	10.20	11.50	12.80
20	1.72	3.44	5.16	6.88	8.60	10.30	12.00	13.80	15.50	17.20
25	2.29	4.58	6.87	9.16	11.45	13.70	16.00	18.30	20.60	22.90
30	3.02	6.04	9.05	12.10	15.10	18.10	21.10	24.10	27.20	30.20
35	3.94	7.88	11.80	15.80	19.70	23.60	27.60	31.50	35.40	39.40
40	5.08	10.20	15.30	20.40	25.40	30.50	35.60	40.70	45.80	50.90
50	8.27	16.50	24.80	33.10	41.40	49.60	57.80	66.20	74.40	82.70
60	13.00	26.00	39.00	52.00	65.00	78.00	91.00	104.00	117.00	130.00

ø105

1/2"G

Ch 36

TYPE
VC05

165

ø50

① ② ③ ④ ⑤ ⑥

A4 (210x297)

LMT [(0,0) (196,286)]

FILE = 3602   .DWG

REV. 00 DTD 08/03/12

		VC05
Silicagel	Volume	0,48 dm³
	Quantity	0,35 kg
Weight	Full	1,25 kg
	Empty	0,90 kg

Pos	Descrizione / Description
1	Coperchio / Top cap
2	Protezione acciaio inox / Stainless steel housing
3	Contenitore trasparente dei sali / Gel container (transparent)
4	Coperchio inferiore / Bottom cap
5	Valvola meccanica / Mechanical valve
6	Presa d'aria / Air intake

Dim. in mm; EX PAG. 5.55

Titolo	Data	08/03/12	Dis. Nr
Breather type VC05	Scala	====	3602
	Dis.		
CEDASPE	Visto		

A4 (210x297)

LMT [(0,0) (196,286)]

FILE = 3600 .DWG

REV 01 DTD 31/03/16
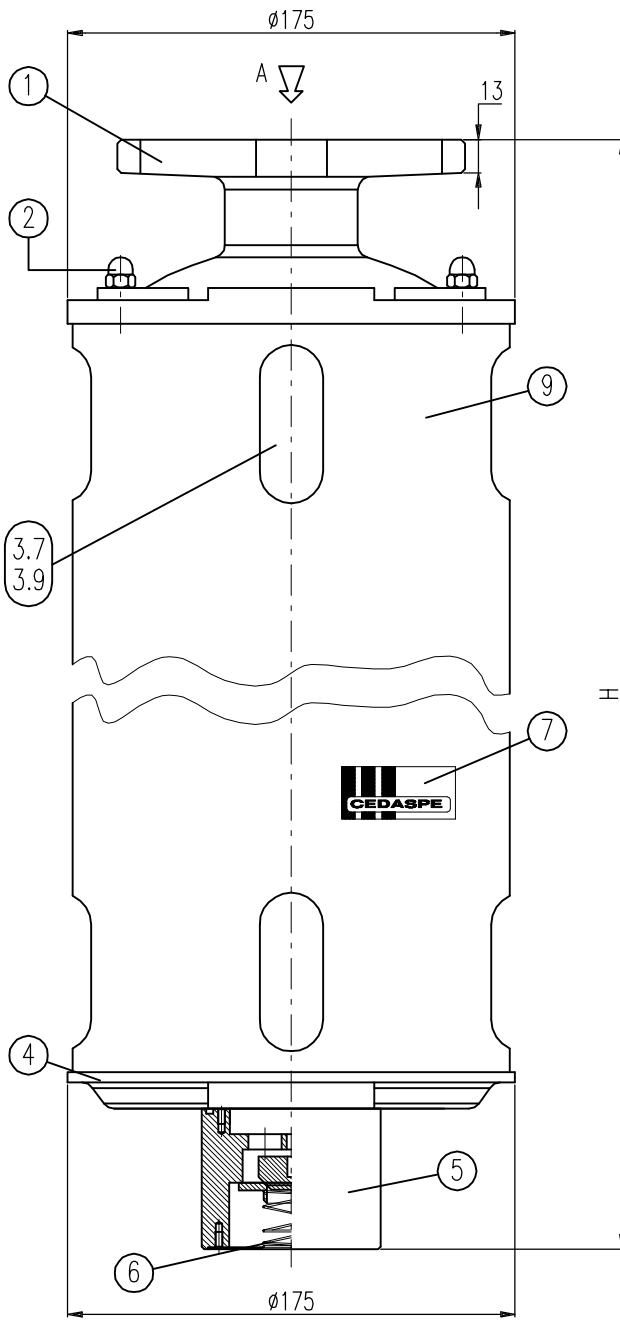
Pos.	Description
1	Top cap
2	Domed nuts M6 DIN1587
3.7	Gel container (Glass)
3.9	Gel container (PMMA)
4	Bottom cap
5	Mechanical valve
6	Air intake
7	Data plate

ø175

A

13

Double fixation:
– DN25/PN10 4 holes flange
or
– DIN42562 3 holes flange

View "A"

14

ø14

Seat for OR6200

ø120

ø85

ø115

120°

H

ø175

13
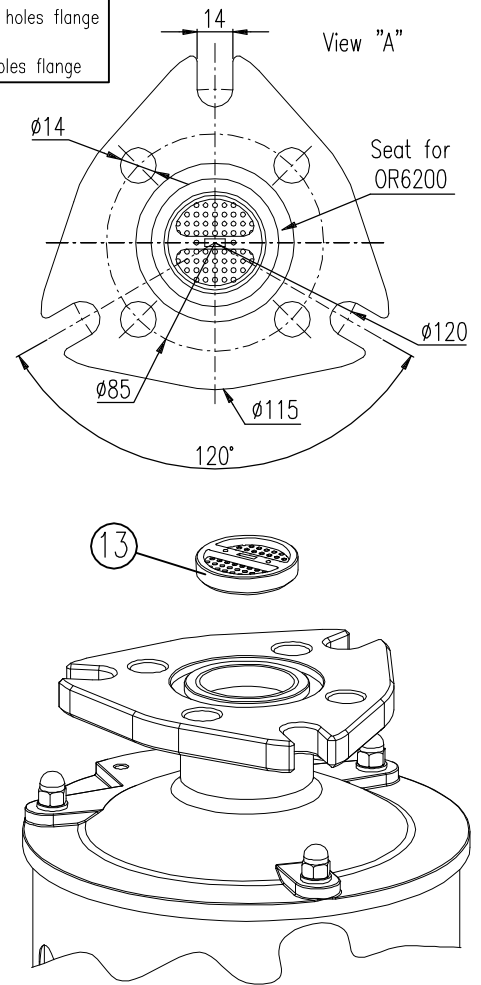
Type	Transf. oil (Kg)	H (mm)	Gel conteiner material	G.W. Empty (Kg)	Silicagel Q.ty	Silicagel Vol.
VCP 10	3500	240	PMMA	2.5	1 Kg	1.35 dm^3
			Glass			
VCP 30	10000	445	PMMA	5	3 Kg	4.05 dm^3
			Glass			

Titolo
**Traditional single Breathers
new VCP 10 ÷ 30 series**
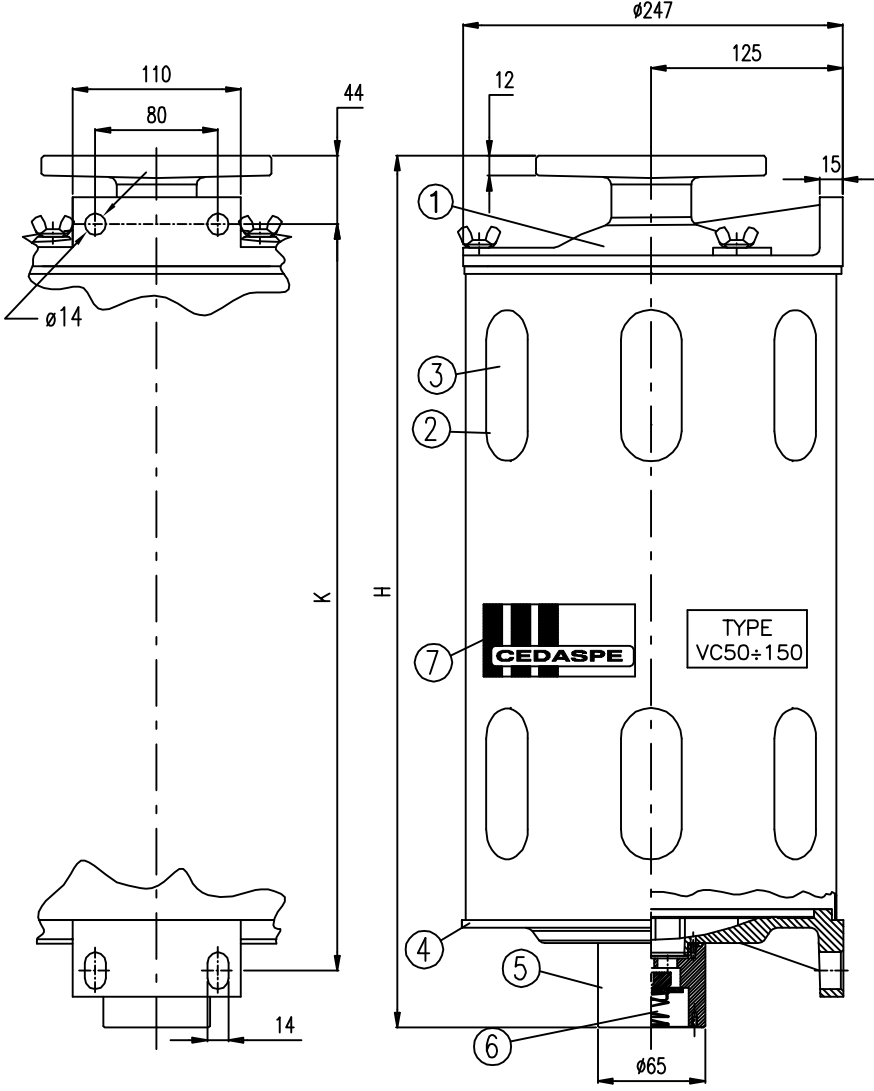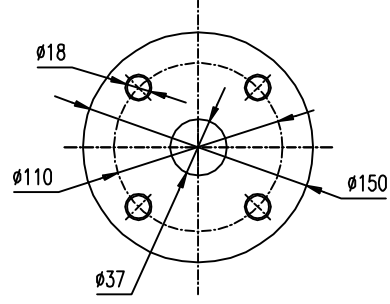
CEDASPE

Data	08/03/12	Dis. Nr
Scala	1:3	
Dis.		3600
Visto		1

5.56.A

ø18
ø110
ø37
ø150

ø247
125
12
15

110
80
44
ø14

K
H

① Coperchio
② Protezione acciaio inox
③ Contenitore trasparente dei sali
⑦ CEDASPE

TYPE
VC50÷150

14

④
⑤
⑥
ø65

Pos	Descrizione / *Description*
1	Coperchio / *Top cap*
2	Protezione acciaio inox / *Stainless steel housing*
3	Contenitore trasparente dei sali / *Gel container (transparent)*
4	Coperchio inferiore / *Bottom cap*
5	Valvola meccanica / *Mechanical valve*
6	Presa d'aria / *Air intake*
7	Targhetta d'identificazione / *Data plate*

Data plate

	VC 50−F	VC80−F	VC 100−F	VC 150−F
K	320	410	578	760
H	405	495	660	840

VC 50−F	VC 80−F	VC 100−F	VC 150−F		
6,70 dm³	10,70 dm³	13,50 dm³	21,00 dm³	Volume	Silicagel
5,00 kg	8,00 kg	10,00 kg	15,00 kg	Quantity	
12,50 kg	16,50 kg	19,00 kg	26,00 kg	Full	G.W. (Kg)
7,00 kg	7,50 kg	9,00 kg	10,00 kg	Empty	

Dim. in mm; Scala 1:5

FILE = 3601 .DWG   A4 (210x297)   LMT [(0,0) (196,286)]
REV. 02 DTD 31/03/16
La CEDASPE S.p.A. si riserva a termini di legge la proprietà del presente disegno con divieto di riprodurlo o comunicarlo a terzi senza sua autorizzazione.

Titolo: Breathers type VC50−F ÷ VC150−F
Data 08/03/12
Scala 1:5
Dis.
Visto
Dis. Nr 3601
CEDASPE
1 2

REV 00 DTD 24/05/12

FILE = 3633 .DWG

LMT [(0,0) (196,286)]   A4 (210x297)

500

300±5

210±5

L±10   H   K

80
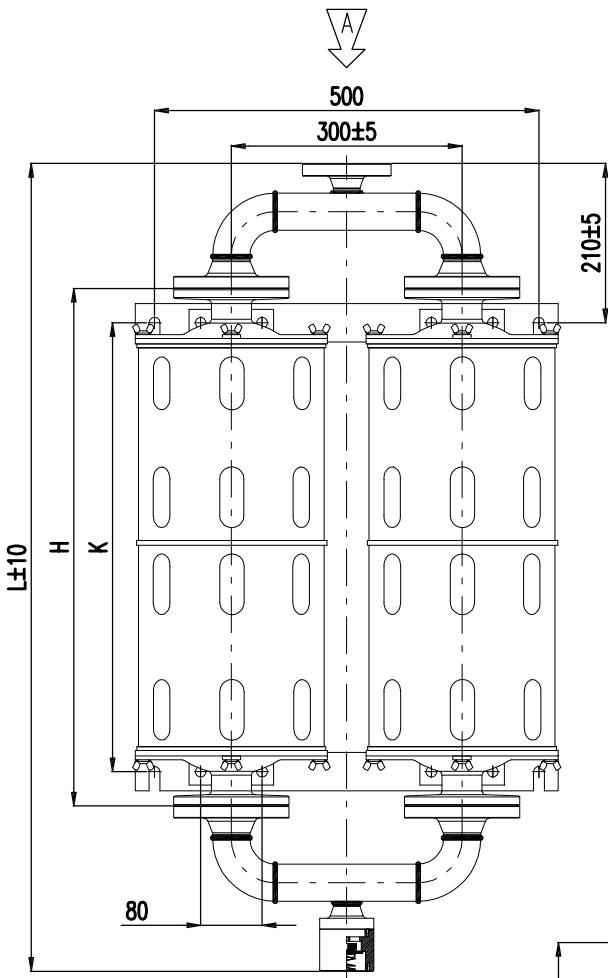
3	VC450 (3 x VC150-M)	1210	747	853	45 Kg
2	VC300 (2 x VC150-M)	1210	747	853	30 Kg
1	VC200 (2 x VC100-M)	1030	567	673	20 Kg
Pos.	Breather	L	K	H	Q.ty of Silicagel

ø115   ø85   ø14

View "A"
Scale 1:2

800

300±5   300±5

210±5

L±10   H   K

80

CEDASPE

Titolo		Data	24/05/12	Dis. Nr
Multiple assembly breathers VC series		Scala	1:10	3633
		Dis.		
		Visto		

A4 (210x297)

LMT [(0,0) (196,286)]

FILE = 3538 .DWG

REV 01 DTD 17/07/12

To Conservator

Threaded tube

Flange Adaptor

F

ØG

45°

K

E
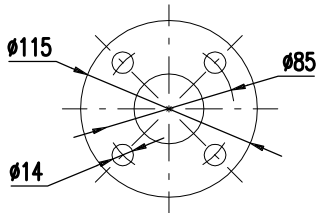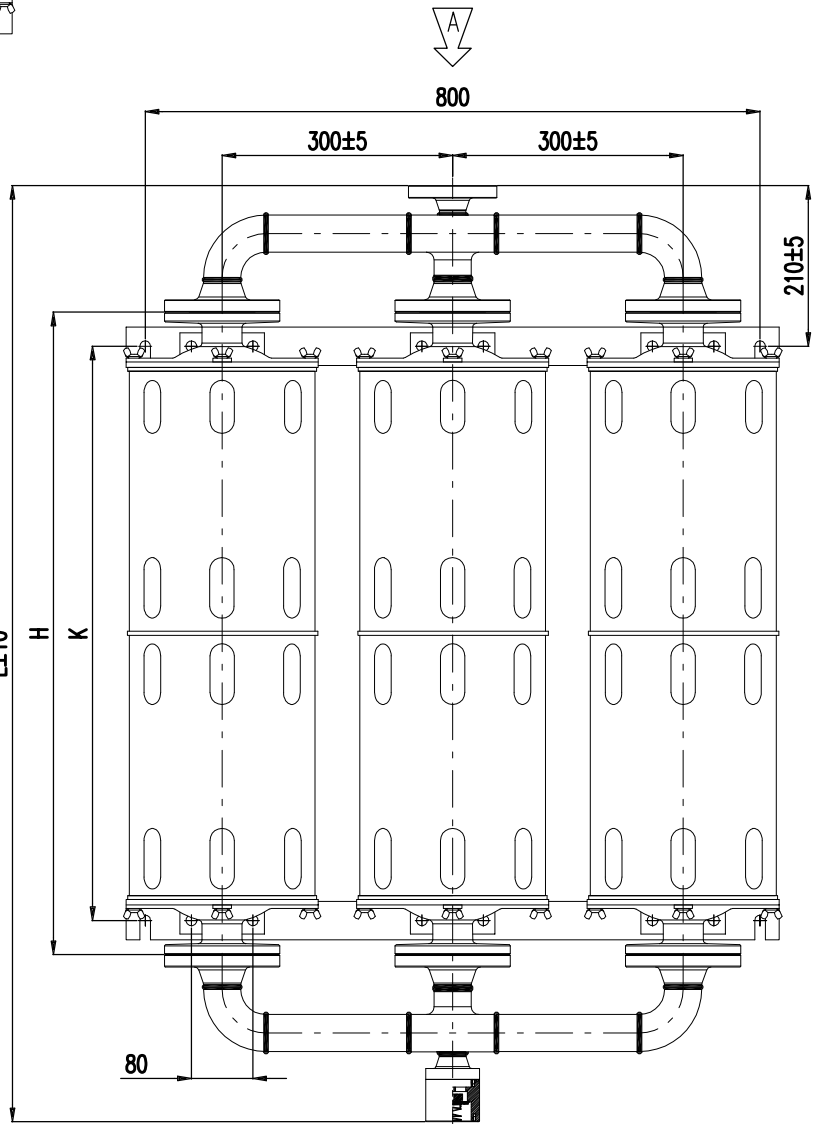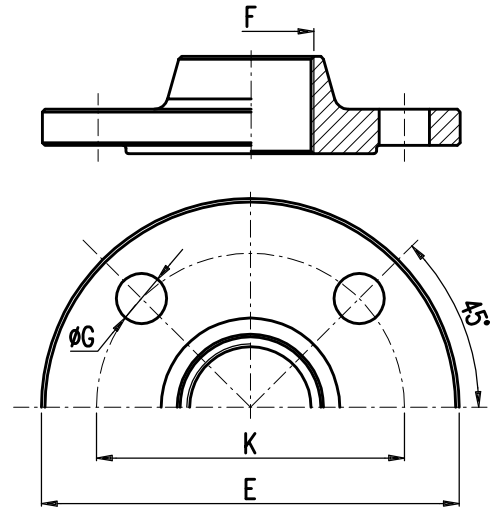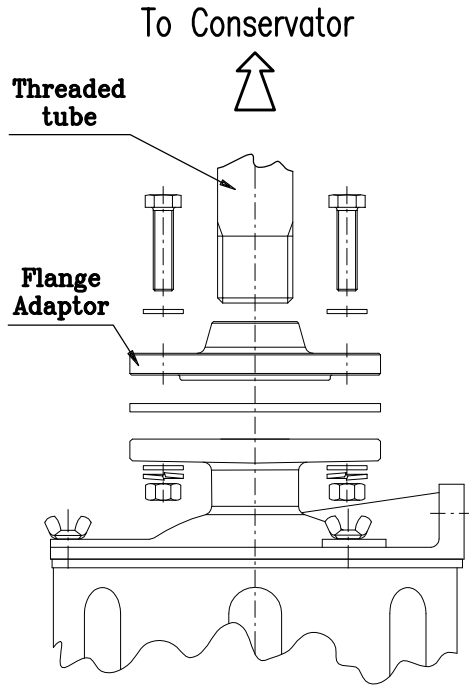
3	115	85	1"1/2 G	14	VEP27−29−37−37	Ex VE30/VE4−EL	Flange adaptor to 1"1/2 BSP pipe
2	115	85	1"G	14	VEP01 ÷ VEP07	Ex VE10	Flange adaptor to 1" BSP pipe
1	150	110	1"1/2 G	18	VE50 ÷ VE150	Ex VE50...150−A1	Flange adaptor to 1"1/2 BSP pipe
Pos.	E	K	F	ØG	Type of breathers	Ex breathers	Note

To Conservator

Tube

OLD Flange

NEW Flange Adaptor

NBR O−Ring (OR6200)

10

Flange gasket

Breathers VEL & VEP series

N°3/4 Screws M12x25

Pos. 4 for breathers VEP27−29−37−39
Flange adaptor DN25 to DN40/PN10 (Ex VE30/VE4−EL)

N°4 Studs M16 h=35mm

N°4 Holes M12

45°

ø44
ø85
ø110
ø150
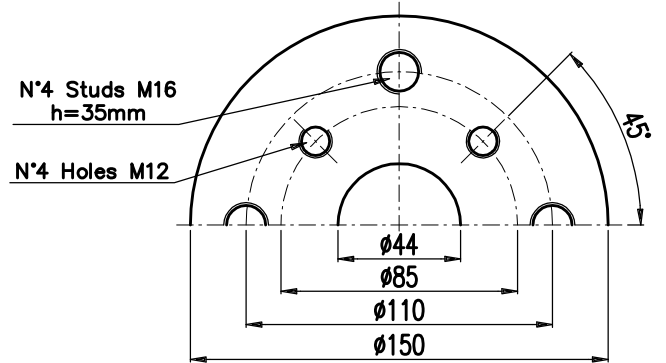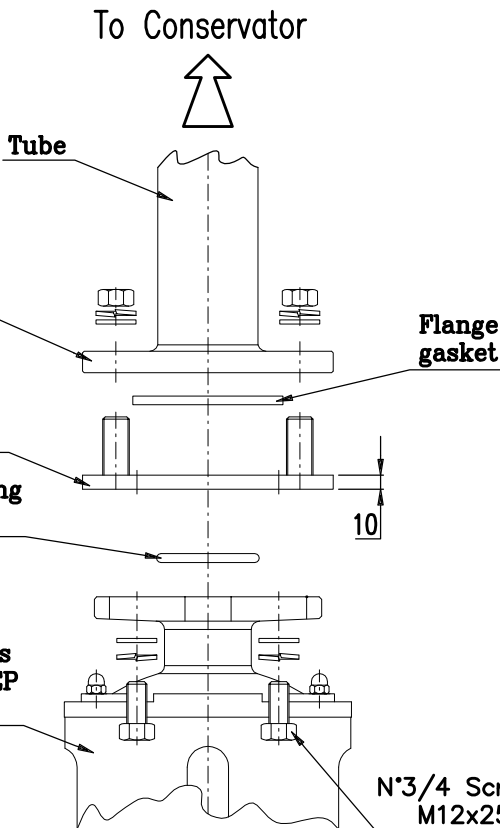
Pos. 5 for breathers VEP01 ÷VEP07
Flange adaptor to DN25/PN6 (Ex VE10)

N°4 Studs M10 h=30mm

N°3 Holes M12

ø44
ø115
ø75
ø120
120°
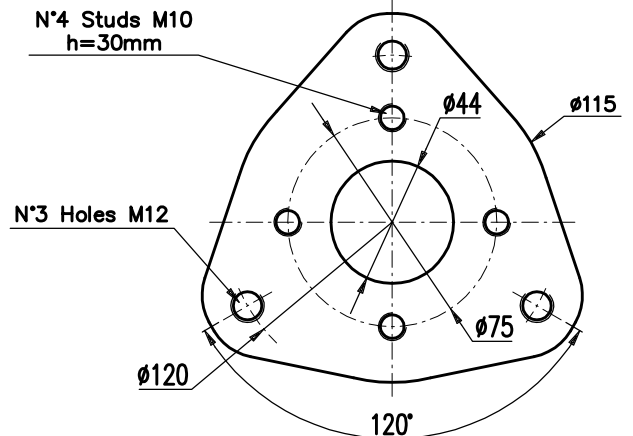
Ex PAG.5.50.C

Titolo
Special flange adaptor for breathers

30/09/11

Scala ====

Dis.

Visto

Dis. Nr

3538

CEDASPE

1