GIEBEL Adsorber®

...setting standards in aeration drying!

VARIO TB

GIEBEL Adsorber® of the VARIO TB series consist of a polycarbonate (VARIO TB-PA), aluminum (VARIO TB-MA) or stainless steel housing (VARIO TB-ME) and can be used for ventilation of transformers. Apply this adsorber, for example in power plants, in substations, in industry as well as traction transformers. The hanging adsorber comply with all applicable DIN standards and offer the user beyond many added values.
Available are these adsorbers among others for ventilation in offshore use under highly corrosive conditions (usage according to corrosion category C5-M) and for usage according to the ATEX product guideline 94/9/EG (ATEX 95).



GIEBEL Adsorber®
designed & produced
in Germany

Transformers







ADSORBER VARIO TB

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VARIO TB-PA VARIO TB-MA VARIO TB-ME

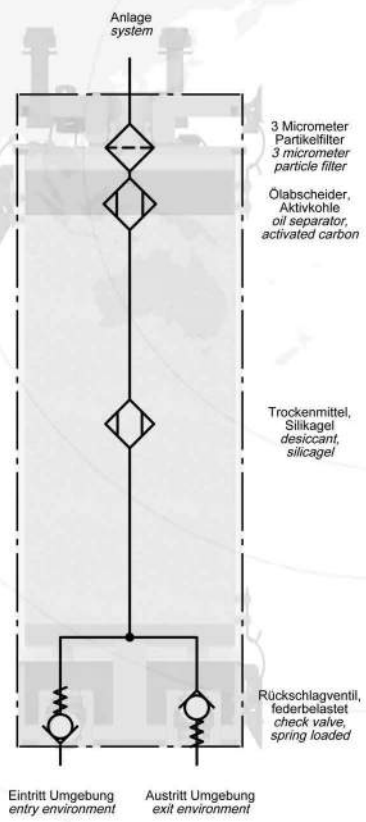


	DV TB 3...-PA	DV TB 5...-PA	DV TB 3...-MA	DV TB 5...-MA	DV TB 3...-ME	DV TB 5...-ME
MATERIALS	Acrylic glass/ Aluminum	Acrylic glass/ Aluminum	Aluminum	Aluminum	Stainless steel V4A	Stainless steel V4A
SEALINGS	NBR (FKM)	NBR (FKM)	NBR (FKM)	NBR (FKM)	FKM (NBR)	FKM (NBR)
USAGE	Disposable/Reusable	Disposable/Reusable	Reusable	Reusable	Reusable	Reusable
ASSEMBLY	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
OPERATION	Pressureless	Pressureless	Pressureless	Pressureless	Pressureless	Pressureless
TEMPERATURE RANGE	-40 .. +70°C	-40 .. +70°C	-40 .. +80°C	-40 .. +80°C	-40 .. +80°C	-40 .. +80°C
FILTER	3µm	3µm	3µm	3µm	3µm	3µm
USE ACCORDING TO ATEX 95	No	No	Yes	Yes	Yes	Yes
USE IN HIGHLY CORROSIVE ENVIRONMENTS	No	No	No	No	Yes	Yes

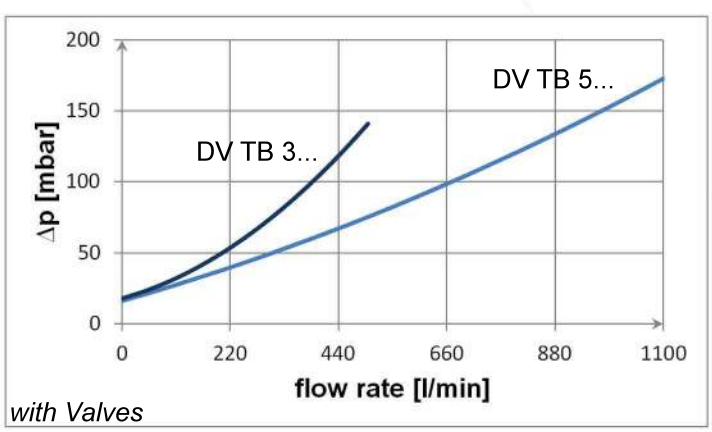
TECHNICAL DESCRIPTION

The adsorber of the VARIO TB-PA, TB-MA and TB-ME series enable the anhydrous ventilation of transformers. The peculiarity lies in the modular construction of the adsorber. The integrated valve system in the receiving part replaces the oil reservoir. Thereby, the silica gel in the adsorber is protected from unnecessary loading and extends the service life of the adsorbent substantially. The desiccant silica gel dehumidifies the air that flows into the transformer. The air is released through the integrated filter even the finest dirt particles. For the assembly of the adsorber at the transformer diverse connections are available according to DIN. All versions of the VARIO TB series have the same basic structure, regardless of their size.

FLOW CHART VARIO TB



PRESSURE DIFFERENCE



with Valves

OPTIONAL AVAILABLE ...

- ... with other desiccants.
- ... without active carbon.
- ... with various connections.
- ... as mobile version for vehicles.

VERSIONS

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VARIO TB-PA



	DV TB 300-PA	DV TB 310-PA	DV TB 320-PA	DV TB 330-PA	DV TB 500-PA	DV TB 510-PA	DV TB 520-PA	DV TB 530-PA	DV TB 550-PA	DV TB 560-PA
Usage	Not refillable	Refillable	Not refillable	Refillable	Not refillable	Refillable	Not refillable	Refillable	Not refillable	Refillable
Transformer output [MVA]	5		10		20		40		80	
Transformer oil volume [l]	2500		5000		10000		20000		40000	
Total weight [kg]	3,3	3,6	4,1	4,3	5,6	5,8	7,3	7,4	8,7	9,0
Adsorbents weight [kg]	0,9	1,0	1,6	1,5	2,1	2,1	3,5	3,3	4,6	4,6
Height [mm]	305	304	405	404	322	320	442	440	542	540
Housing diameter [mm]	110	110	110	110	150	150	150	150	150	150
Screw diamter [mm]	150	150	150	150	184	187	184	187	184	187
Connection	DIN 42562 • DIN 42567 • DIN 42567 A • DIN 42567 B									
Valves [IN-OUT]	1-1	1-1	1-1	1-1	2-2	2-2	2-2	2-2	2-2	2-2
Materials	PMMA & AL	PMMA & AL	PMMA & AL	PMMA & AL	PC & AL	PC & AL	PC & AL	PC & AL	PC & AL	PC & AL
Sealing	NBR	NBR	NBR	NBR	NBR	NBR	NBR	NBR	NBR	NBR

VARIO TB-MA



	DV TB 310-MA	DV TB 330-MA	DV TB 510-MA	DV TB 530-MA	DV TB 560-MA
Usage	Refillable	Refillable	Refillable	Refillable	Refillable
Transformer output [MVA]	5	10	20	40	80
Transformer oil volume [l]	2500	5000	10000	20000	40000
Total weight [kg]	3,5	4,5	6,5	8,2	10,0
Adsorbents weight [kg]	1,0	1,6	2,4	3,5	4,8
Height [mm]	301	401	331	431	531
Housing diameter [mm]	110	110	150	150	150
Screw diamter [mm]	150	150	192	192	192
Connection	DIN 42562 • DIN 42567 • DIN 42567 A • DIN 42567 B				
Valves [IN-OUT]	1-1	1-1	2-2	2-2	2-2
Materials	AL	AL	AL	AL	AL
Sealing	NBR	NBR	NBR	NBR	NBR

VARIO TB-ME



	DV TB 310-ME	DV TB 330-ME	DV TB 510-ME	DV TB 530-ME	DV TB 560-ME
Usage	Refillable	Refillable	Refillable	Refillable	Refillable
Transformer output [MVA]	5	10	20	40	80
Transformer oil volume [l]	2500	5000	10000	20000	40000
Total weight [kg]	6,7	8,0	12,3	14,7	17,2
Adsorbents weight [kg]	1,0	1,6	2,4	3,5	4,8
Height [mm]	301	401	331	431	531
Housing diameter [mm]	108	108	150	150	150
Screw diamter [mm]	150	150	192	192	192
Connection	DIN 42562 • DIN 42567 • DIN 42567 A • DIN 42567 B				
Valves [IN-OUT]	1-1	1-1	2-2	2-2	2-2
Materials	SS 316L/316Ti	SS 316L/316Ti	SS 316L/316Ti	SS 316L/316Ti	SS 316L/316Ti
Sealing	FKM	FKM	FKM	FKM	FKM

RESISTANCE

VARIO TB-PA

suitable for

- all insulating oils
- all mineral oils
- all organic oils
- most hydraulic oils
- most gear oils
- various hardener

VARIO TB-MA

moreover for

- flame retardant fluids (fuels, solvents, ...)
- flame retardant hydraulic oils (SKYDROL, ...)
- break fluids
- Isocyanates

VARIO ME

also suitable for

- highly alkaline cleaners
- sulfuric acid
- hydrogen sulfide

BUILD UP & ADDED VALUE

GIEBEL Adsorber®

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DIN-CONNECTIONS

Modular design with all connections. Applicable DIN standards are met, thus ensuring compatibility with the transformer.



REFILLABLE

Easy to refill for low operating cost. The reusable adsorber can be filled with new desiccant. Operating costs can be reduced and so the adsorber can be used over a long period.



FILTER

The supply air is purified by a 3 micron dust filter disc inside the adsorber. This prevents dust and dirt particles from entering the transformer.

SELF REGENERATION

Fine oil mist is added to the disposable version of an activated carbon bulk and in the reusable version by the activated carbon discs. Even fine oil aerosols will be adsorbed. In addition, the service life of the adsorber can be extended by multiples successfully.





HOUSING

The adsorber of the VARIO TB series are available in three different housing materials. This high-quality acrylic glass, solid aluminum and stainless steel are eligible for use under extreme conditions.

DESICCANT

Efficient desiccant with harmless color indicator from orange to green or colorless. The silica gel can adsorb up to 40% of its own weight of water.





TENSIONING CLAMP

Simple and time-saving disassembly of the adsorber by opening the three clamping bracket. No tools required.

NO OIL RESERVOIR

The integrated valve system replaces the oil reservoir. The result is a low-maintenance handling of the dehumidifier. New silica gel can be changed in the refillable-version or the adsorber part can be changed in the disposable version.



VALVES

A high-quality valve system is installed in the receiving part. This prevents the adsorber loads during shutdowns of the plant. Furthermore, extending the useful life of the adsorber considerably.

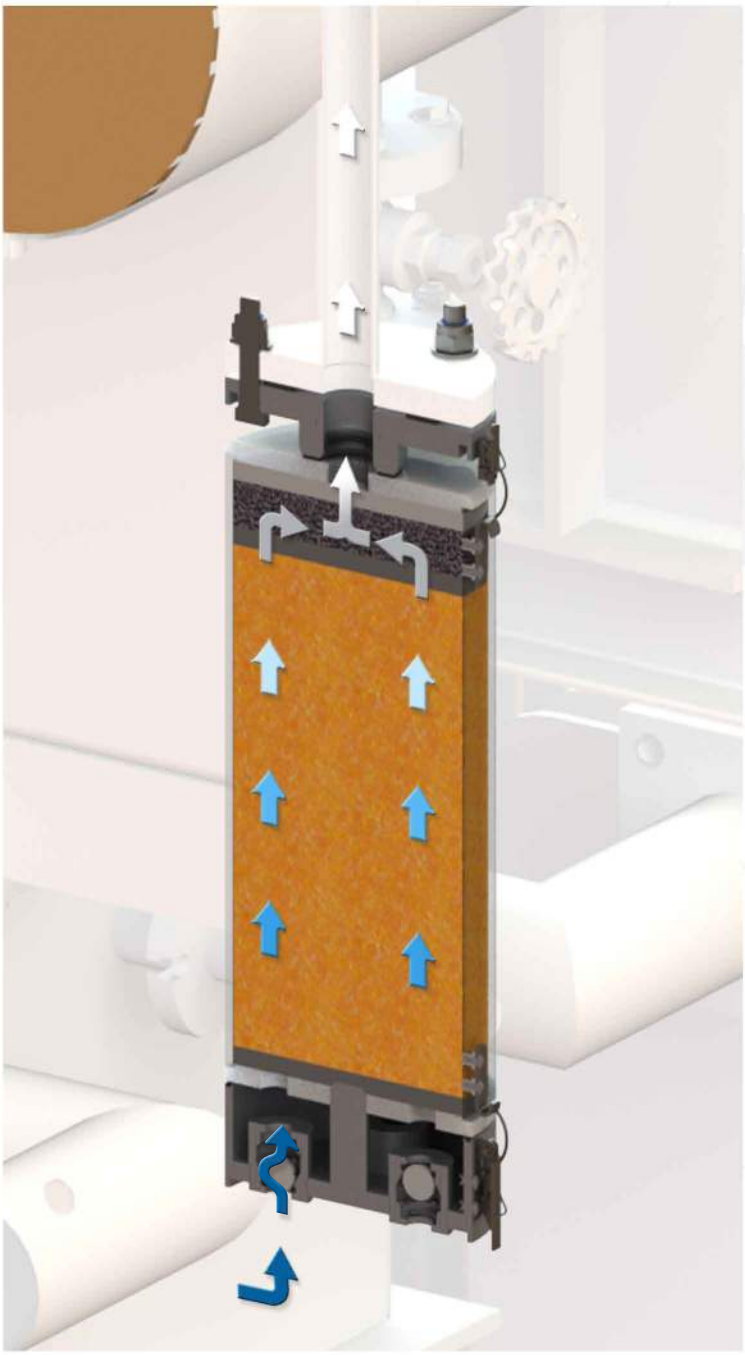


PROCESS

GIEBEL Adsorber®
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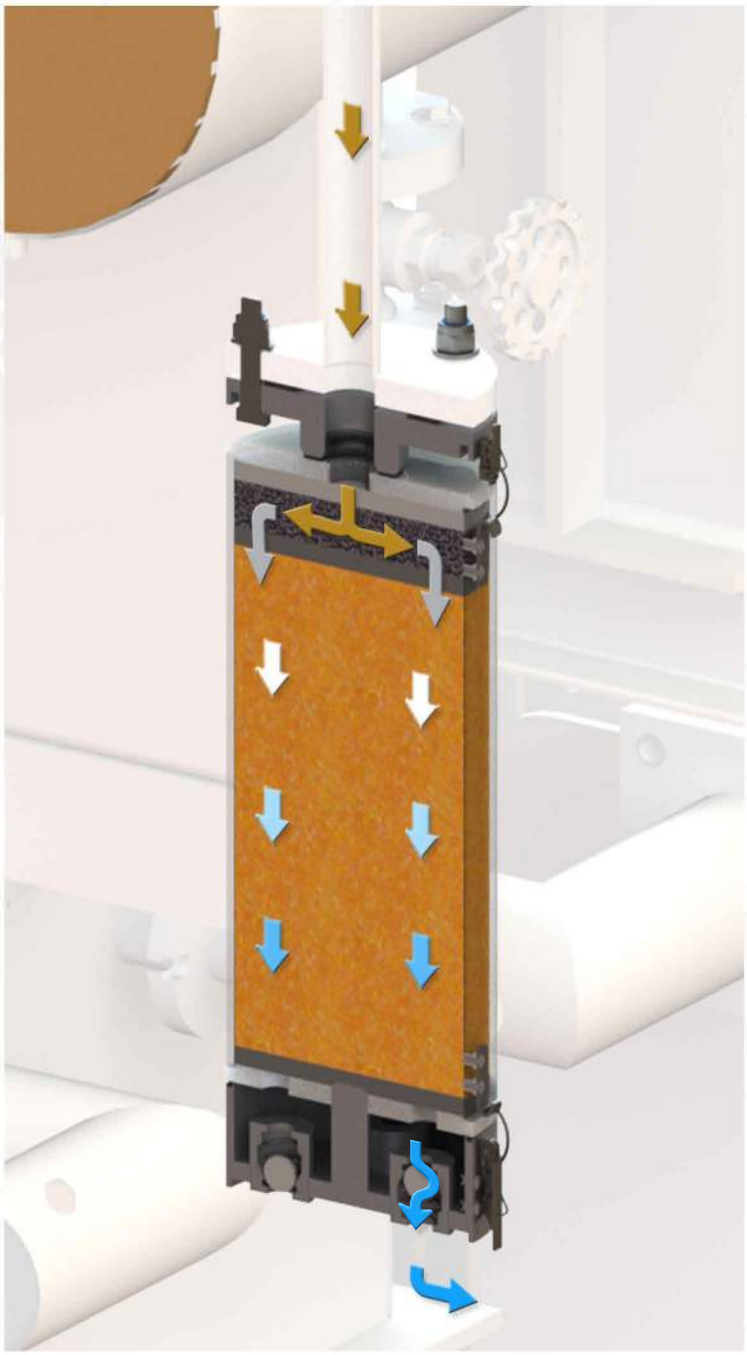
DRYING OF SUPPLY AIR
ADSORPTION

As soon as the transformer cool down, moist ambient air is sucked in. This flows through the adsorber inside the transformer. The valves open from about 6 mbar, so that during downtime of the transformer, no moist ambient air loads the desiccant. By the receiving part, the supply air is swirled and flowed through the adsorber evenly. The large silica gel bulk dries the fresh air and turns from orange to green or colorless. By the integrated 3µm filter unit, the air is purified and freed of dirt particles.



REGENERATION ADSORBENTS
DESORPTION

The transformer heats up, so that the dry and oily exhaust air is pushed out of the transformer. Oil vapors contained in the air are adsorbed by an activated carbon disc or activated carbon bed. This will take neither oil aerosols into the ambient air, even in the adsorber. The dry, oil-free air regenerates the desiccant again, which prolongs the service life of the adsorber considerably. The silica gel turns partially orange again.



ADSORBER MAINTENANCE

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PROCEDURE FOR **REUSABLE**-ADSORBERS

1. Turn off the transformer.
2. Remove receiving part by opening the tensioning clamps.
3. Remove the absorber by opening the clamps on the transformer.
4. Open the cover and remove it from the adsorber.
5. Remove the cover gasket and replace it with new one.
6. Remove dust filter disc.
7. Remove activated carbon disc(s) and empty desiccant.
8. Remove the lower foam disc also.
9. Install new foam disc.
10. Fill in fresh desiccant.
    While filling in of the desiccant easily beat with a soft object (eg thenar) against the housing to compress the silica gel bulk.
12. Insert new dust filter disc, and then close the cover.
13. Install new O-ring between the adsorber and connection and close the tensioning clamps.
12. Install new O-ring between the absorber and the receiving part and then close it with the tensioning clamps.



PROCEDURE FOR **DISPOSABLE**-ADSORBERS

1. Turn off the transformer.
2. Remove receiving part by opening the tensioning clamps.
3. Remove the absorber by opening the clamps.
4. Hang new adsorber part on the transformer and close the tensioning clamps.
5. Install new O-ring between the absorber and the receiving part and then close it with the tensioning clamps.

REPLACEMENT PARTS

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ADSORBER	DISPOSABLE ADSORBER PART	REUSABLE SPARE PARTS KIT
DUO-VARIO TB 300-PA	Adsorber part DV TB 301-PA	
DUO-VARIO TB 310-PA		Spare parts kit DV TB 313-PA
DUO-VARIO TB 320-PA	Adsorber part DV TB 321-PA	
DUO-VARIO TB 330-PA		Spare parts kit DV TB 333-PA
DUO-VARIO TB 500-PA	Adsorber part DV TB 501-PA	
DUO-VARIO TB 510-PA		Spare parts kit DV TB 513-PA
DUO-VARIO TB 520-PA	Adsorber part DV TB 521-PA	
DUO-VARIO TB 530-PA		Spare parts kit DV TB 533-PA
DUO-VARIO TB 550-PA	Adsorber part DV TB 551-PA	
DUO-VARIO TB 560-PA		Spare parts kit DV TB 563-PA
DUO-VARIO TB 310-MA		Spare parts kit DV TB 313-MA
DUO-VARIO TB 330-MA		Spare parts kit DV TB 333-MA
DUO-VARIO TB 510-MA		Spare parts kit DV TB 513-MA
DUO-VARIO TB 530-MA		Spare parts kit DV TB 533-MA
DUO-VARIO TB 560-MA		Spare parts kit DV TB 563-MA
DUO-VARIO TB 310-ME		Spare parts kit DV TB 313-ME
DUO-VARIO TB 330-ME		Spare parts kit DV TB 333-ME
DUO-VARIO TB 510-ME		Spare parts kit DV TB 513-ME
DUO-VARIO TB 530-ME		Spare parts kit DV TB 533-ME
DUO-VARIO TB 560-ME		Spare parts kit DV TB 563-ME



ADSORBER PART

Build up
- Adsorbents
- Activated carbon
- Dust filter disc
- Sealing

preassembled in the housing and air-tight packed



SPARE PARTS KIT

Content
- Adsorbents
- Activated carbon discs
- Dust filter disc
- Sealings

single and air-tight packed



DESICCANT INDIVIDUALLY

Content
- Adsorbents

air-tight packed

ORDER OF REPLACEMENT PARTS

For a permanent operational readiness of the absorber and thus the hydraulic power unit and the transmission, make sure that there is always a spare parts package or a replacement adsorber in stock.

The time until complete color change from orange to green and thus the service life of the adsorber will depend on several factors:

- Number and duration of through-air and treatment intervals.
- Air flow volume and flow velocity, relative humidity of the ambient air.
- Temperature of the ambient air and to be ventilated medium.

ACCESSORIES



CONNECTING FLANGE

- Connecting two adsorbers
- Service life extension
- Stainless steel-version



HUMIDITY SENSOR

- Remote monitoring of adsorber loading
- Sensory transmission of the degree of saturation

DESICCANT FOR TRANSFORMERS

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The desiccant used in a dehumidifier adsorbs the moisture from the air and stores these. Thus, the user can recognize whether the incoming air is sufficiently dried, possess this desiccant, mainly silica gels or dry beads, a color indicator.

In this way it is ensures that the humid ambient air is dried sufficiently strong and prevent condensation at low temperatures. As long as a layer of orange, or blue silica gel is in the adsorber, it is active and ready for use. If the entire bed to be discolored, further drying by the decreased binding forces of the silica gel is no longer guaranteed. The silica gel must be regenerated or replaced.

COLOR CHANGE IN THE ADSORBER

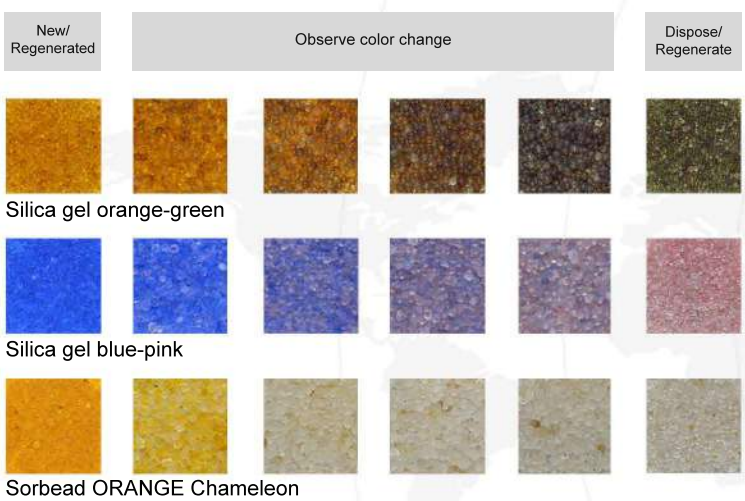
Unloaded



Partially loaded

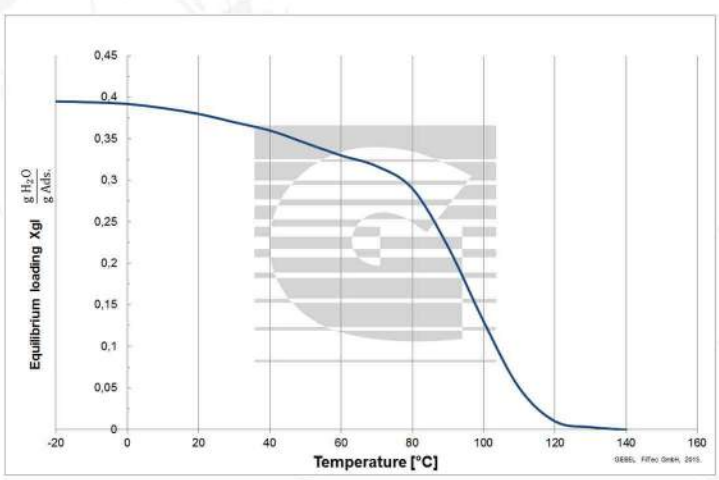


COLOR CHANGE OF SILICA GEL



REGENERATION

Silica gels and dry beads can be regenerated relatively well after full charge. The desorption is the standard method by increasing the temperature and requires the supply of power. In the case of silica gels the optimal regeneration temperature is 121°C and should not be exceeded because of the contained color indicators. Up to this temperature, the water adsorption capacity decreases with increasing temperature, indicating an optimal operating temperature of about 60°C.



DISPOSAL

After completion of the useful life, the device should be disposed in accordance with the relevant statutory provisions. Metal and plastic parts should be separated and disposed. The loaded desiccant can be disposed of with household waste.
Silica gel is not classified as dangerous according to European Union legislation (Regulation EC No. 1272/2008). According to EC Directives (67/548 / EEC and 1999/45 / EC) it does not require labeling. Silica gel does not belongs to the health and environmentally hazardous substances.

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