

**HYDRAULICS**





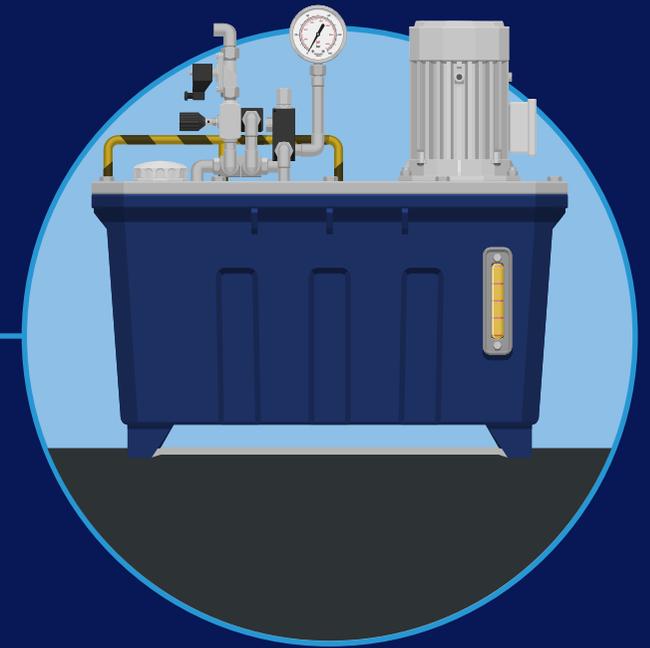
... that you can **avoid nerve-wracking, time-consuming, and costly maintenance work** by making a small change to the design of your hydraulics, do I have your attention?

Today, I will show you **how damage occurs in hydraulic systems and what you can do about it.**

To illustrate this, we accompany the container ship ***MS Adsorbera*** on its journey through the Panama Canal.



There, hydraulic units open and close huge lock gates. Their reliable operation is extremely important, as a failure would result in major financial losses and delivery delays.

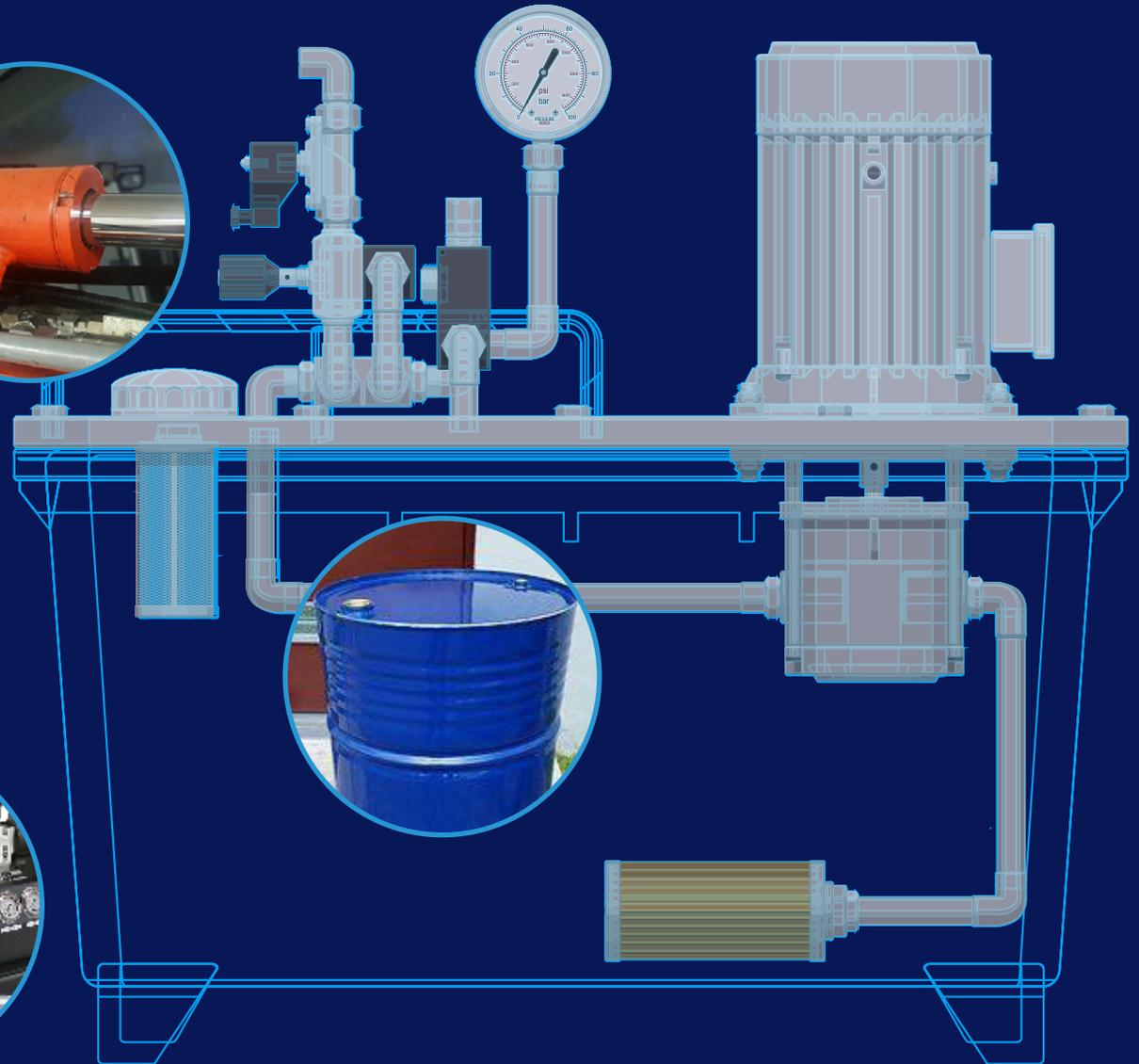


How and where can damage occur in hydraulics?

Almost all **damage begins** slowly and unnoticed **with the ingress of moisture and dust.**

## How and where?

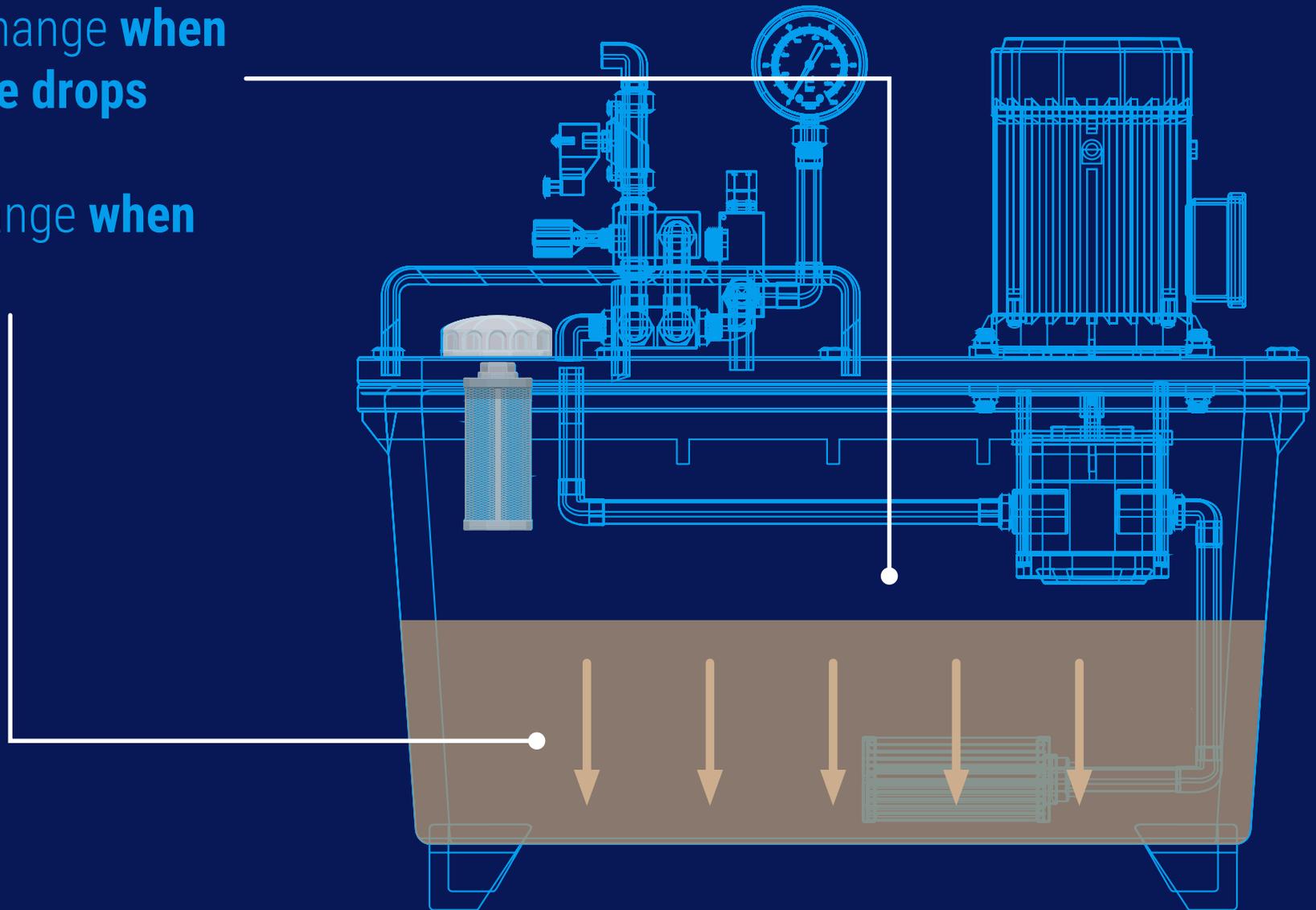
- Fracture in the cooling system
- Leaky screw connections
- Water content in fresh oil
- Lubricating film on the piston rod
- **Breather filter**



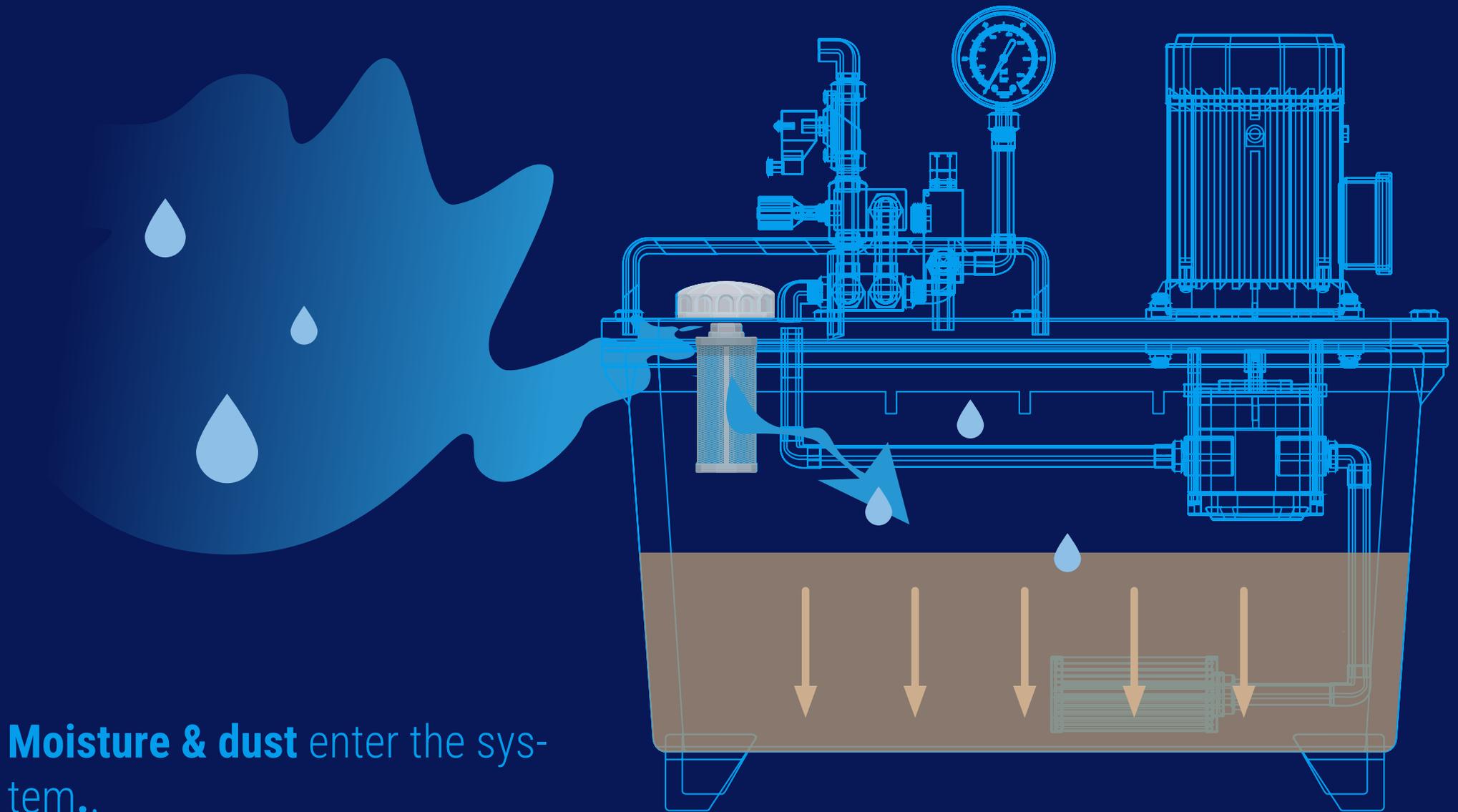
Filter cap: **Air flows in.**

Passive air exchange **when the temperature drops**

Active air exchange **when removing oil**

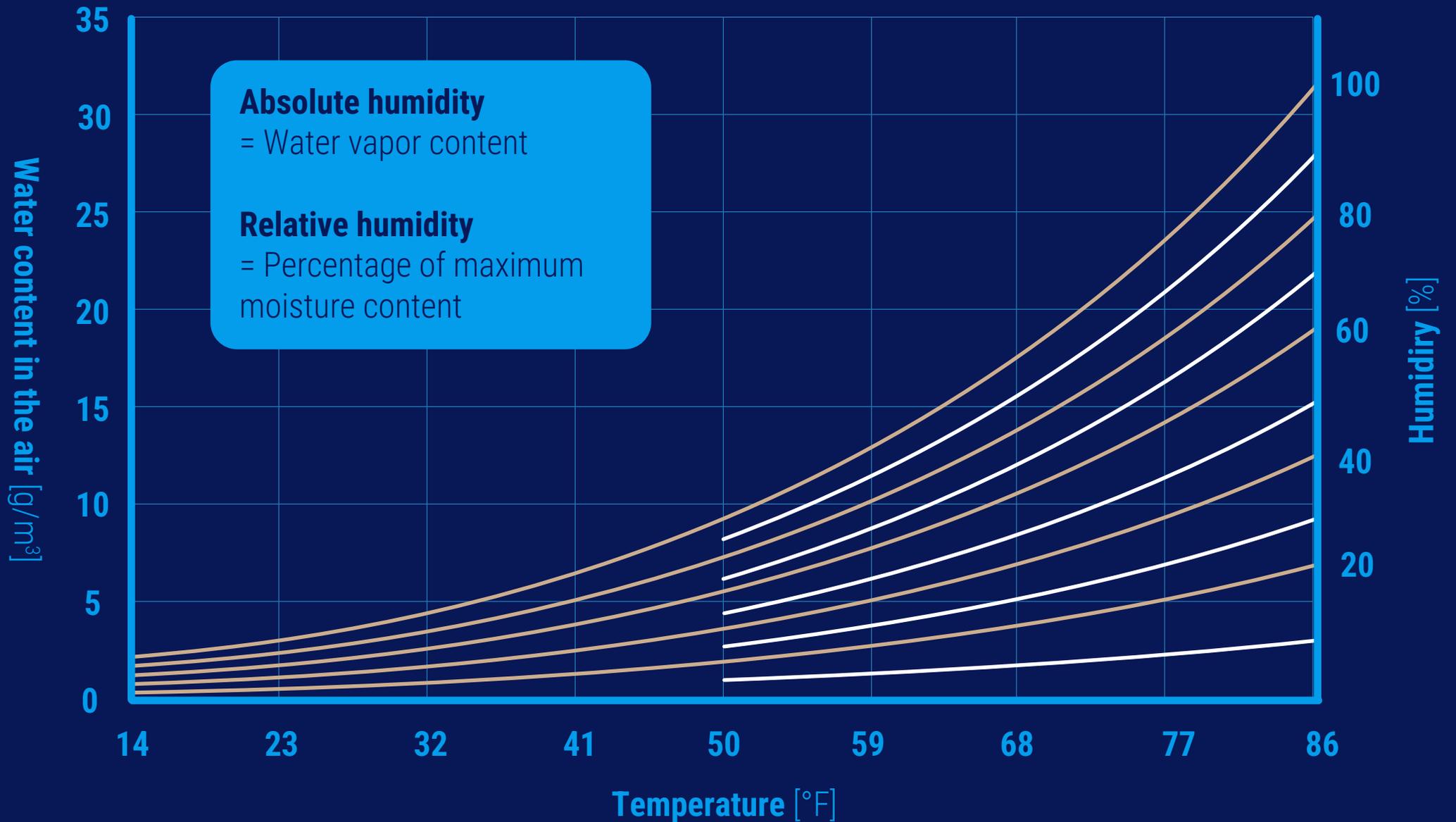


Filter cap: **Air flows in.**

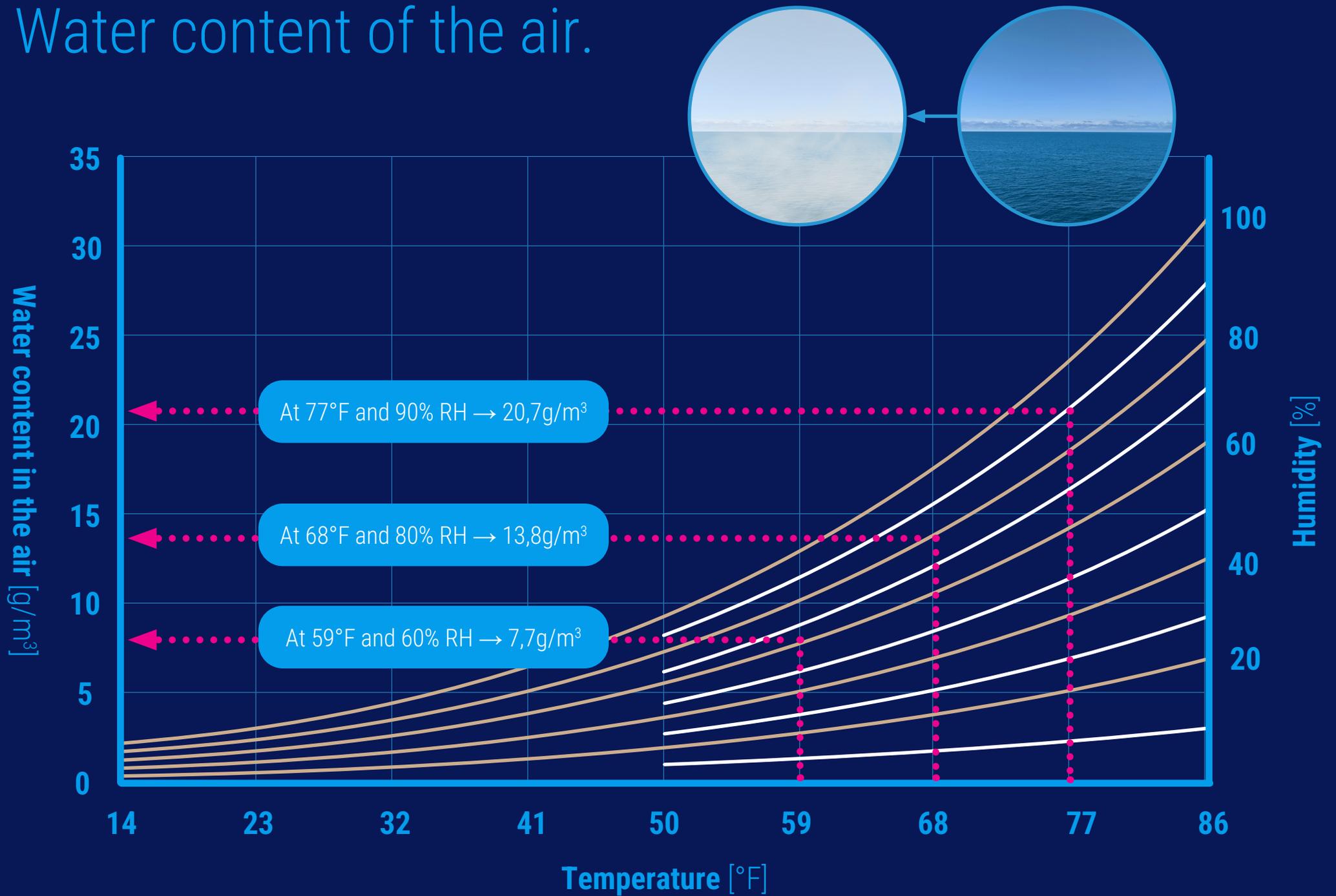


**Moisture & dust** enter the system..

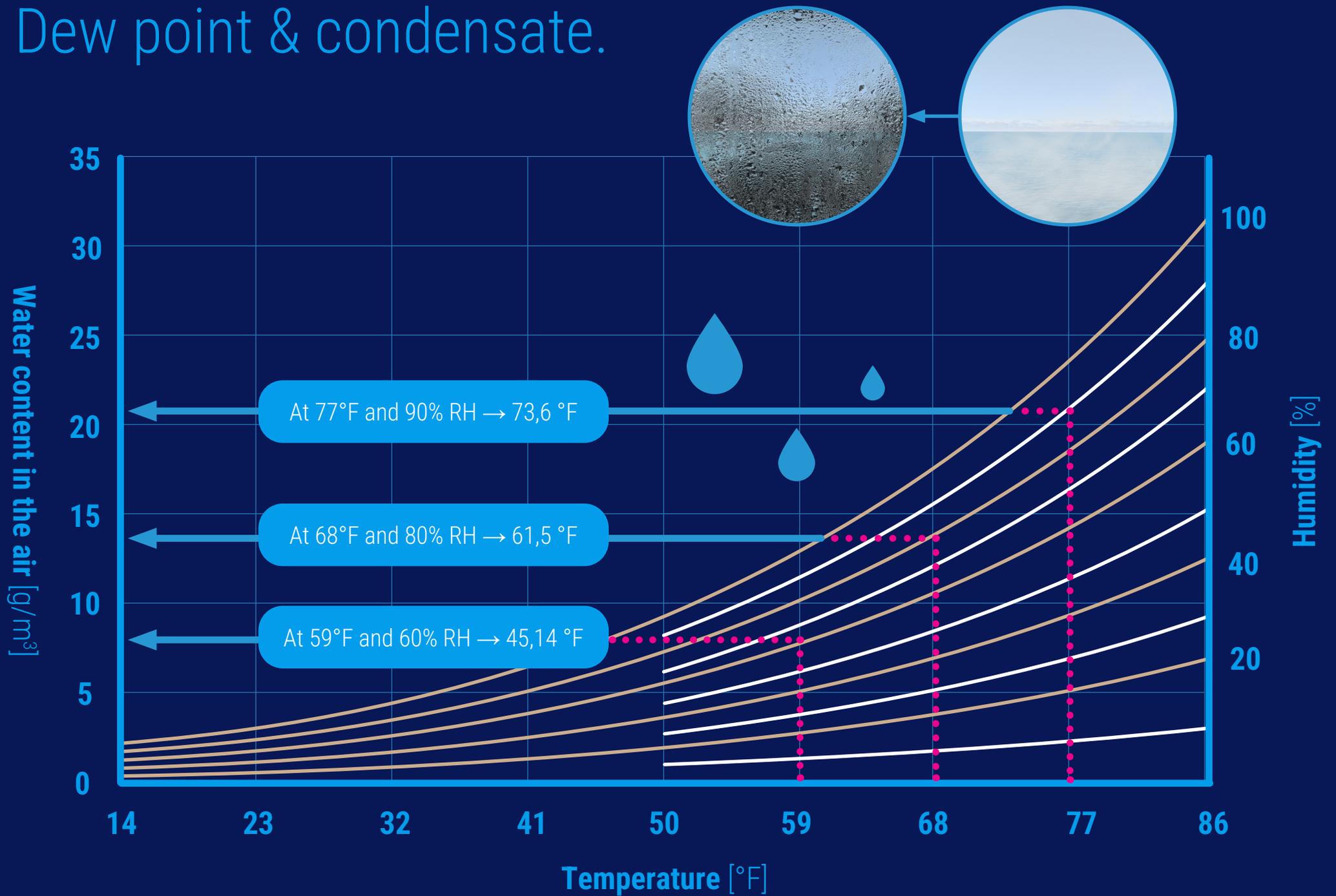
# Humidity.



# Water content of the air.



# Dew point & condensate.

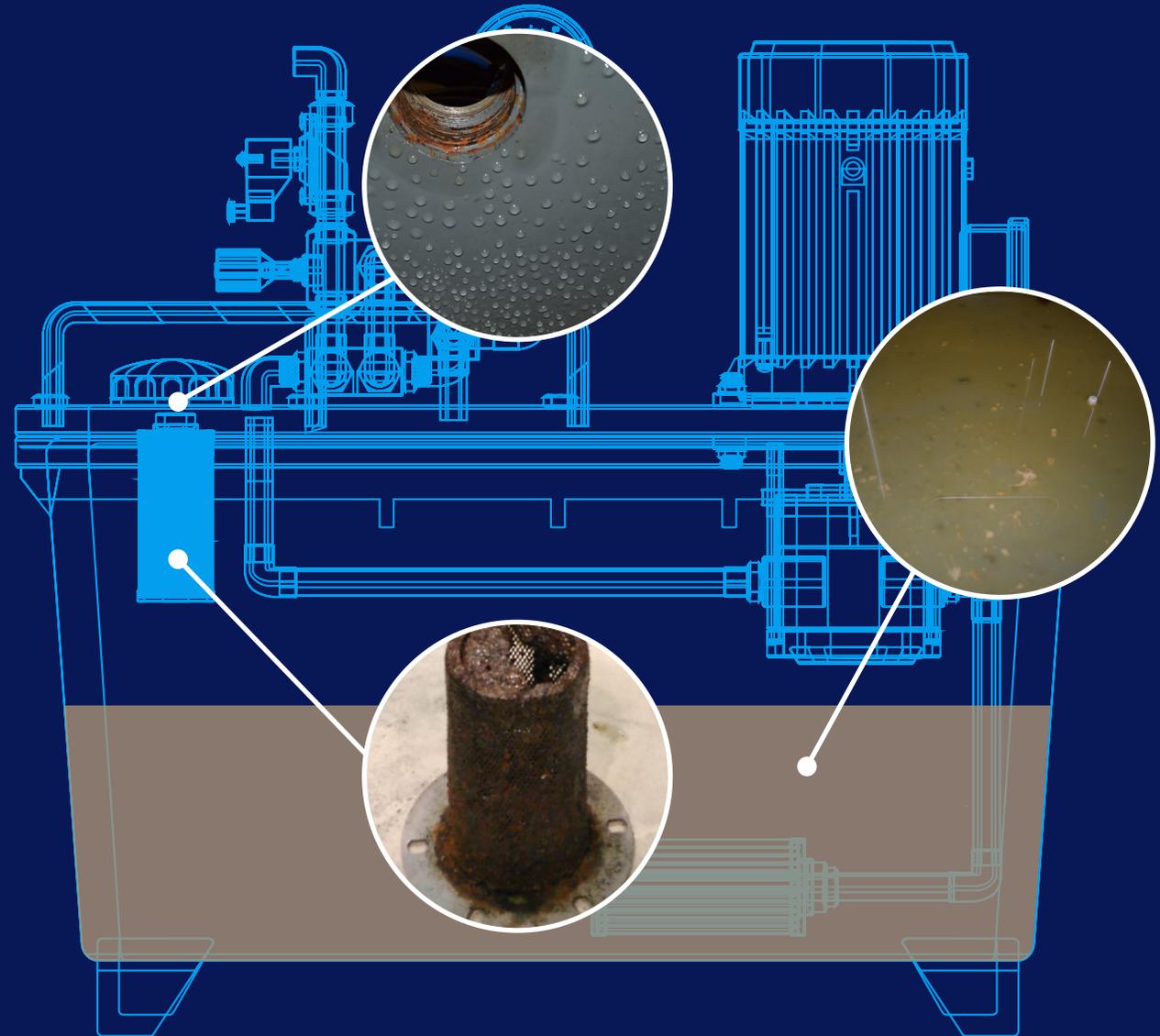


# A dangerous combination: Diluted oil, dust & rust

Water changes the viscosity, lubricity, and shear stability of the oil and promotes the breakdown of additives.

Dust particles form sludge deposits.

Rust triggers a chain reaction in diluted oil, forming free radicals that attack the hydrocarbon chains.



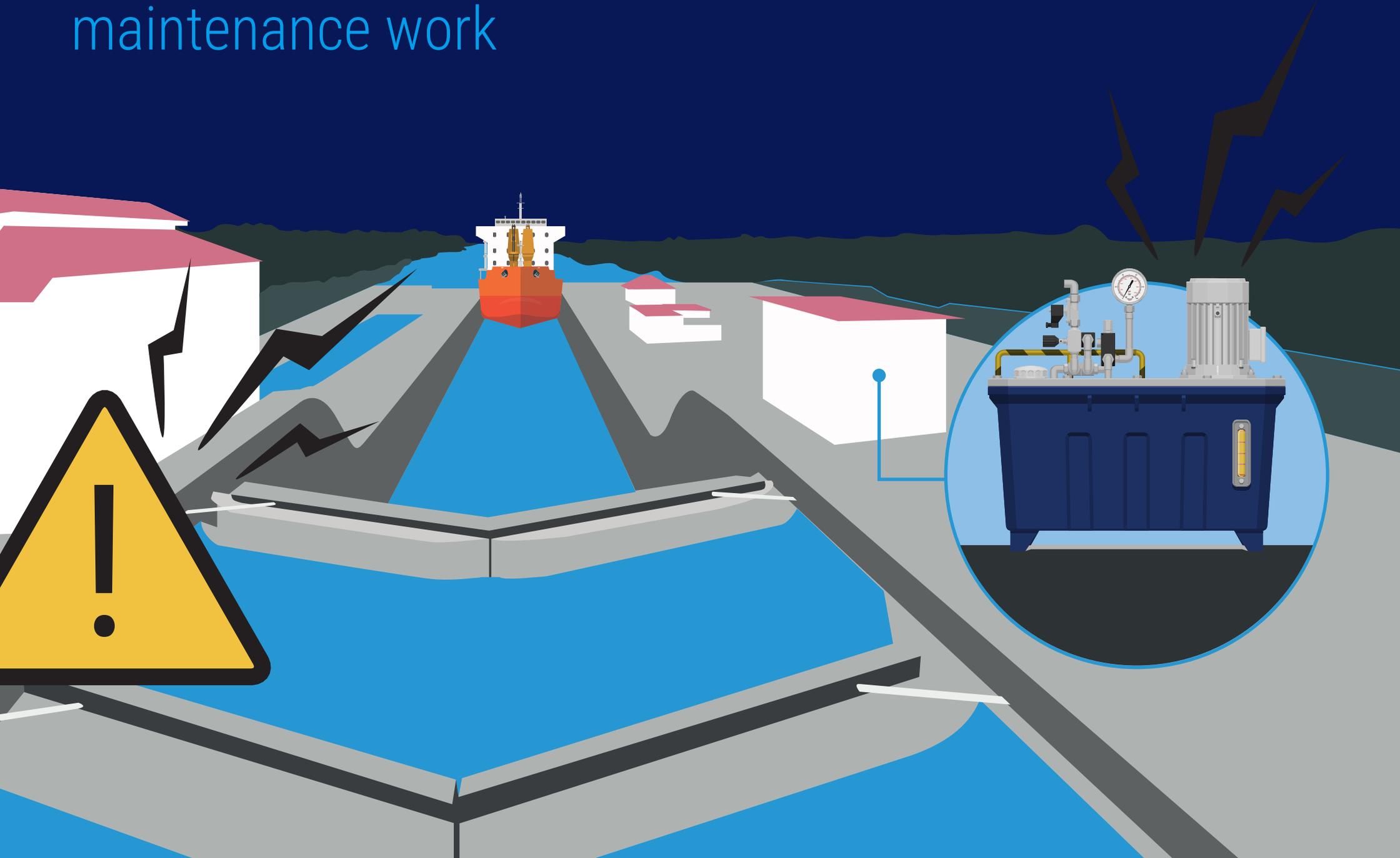
... on the way through your system.

Friction points are no longer supplied with the necessary amount of hydraulic oil - Abrasion & wear  
- Viscous oil puts strain on drive units - reduces efficiency

Residues clog valves, sludge formation increases filter requirements, increasing acidification increases the risk of corrosion and attacks the seals.



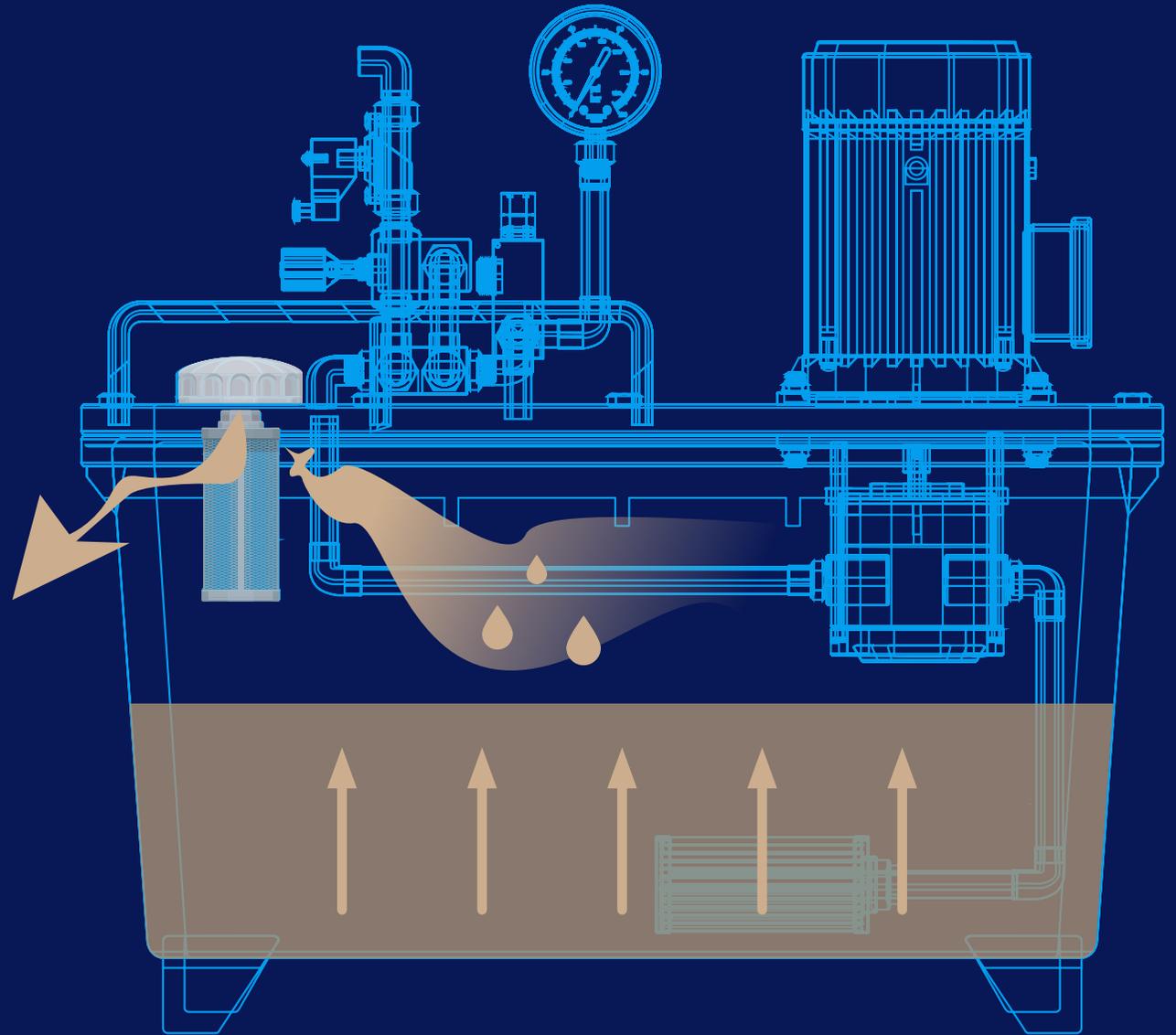
The real annoyance: downtime, lost revenue, and maintenance work



# Another problem: **escaping oil mist.**

**Oil vapors** are released into the ambient air when the system exhales.

Norms such as TA Luft are not being complied with – a danger to humans and the environment.



The solution: **adsorbers** that filter dirt and moisture from the supply air and oil mist from the exhaust air.



**Breather dryers**



**Oil mist separators**

# When does it make sense to use an adsorber?

## Breather dryer

## Oil mist separator

### Environment

- High humidity > 70% RH
- High temperature > 77°C
- Temperature fluctuations of approx. 18°F

- High oil mist emission

### System

- Hygroscopic oils
- Sensitive systems

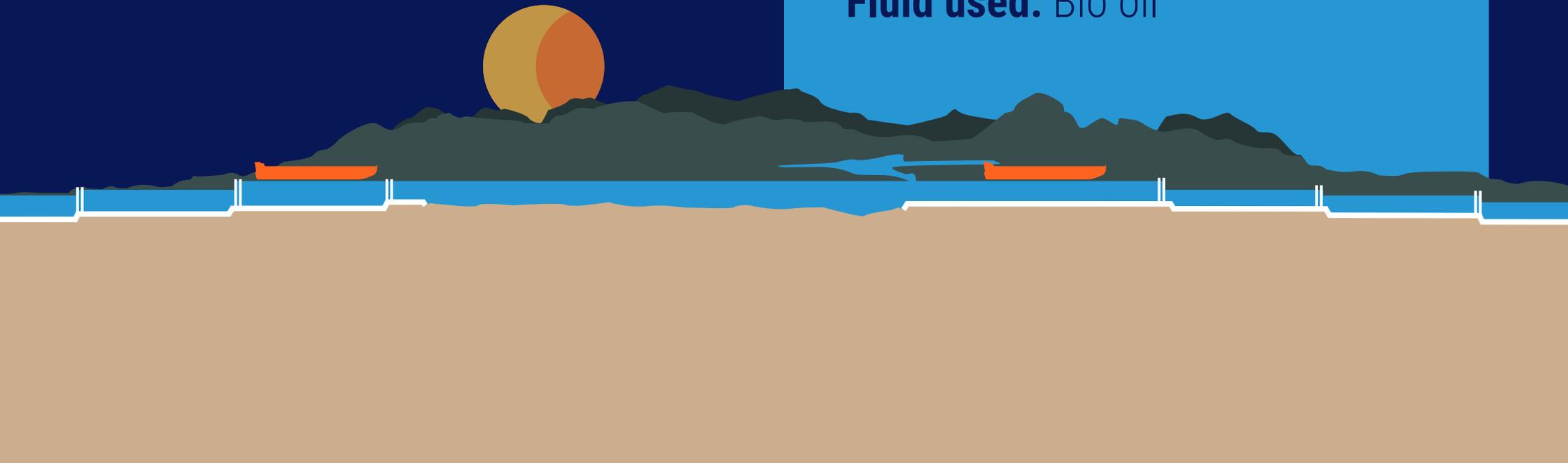
- Compliance with TA Luft

# Conditions at the Panama Canal

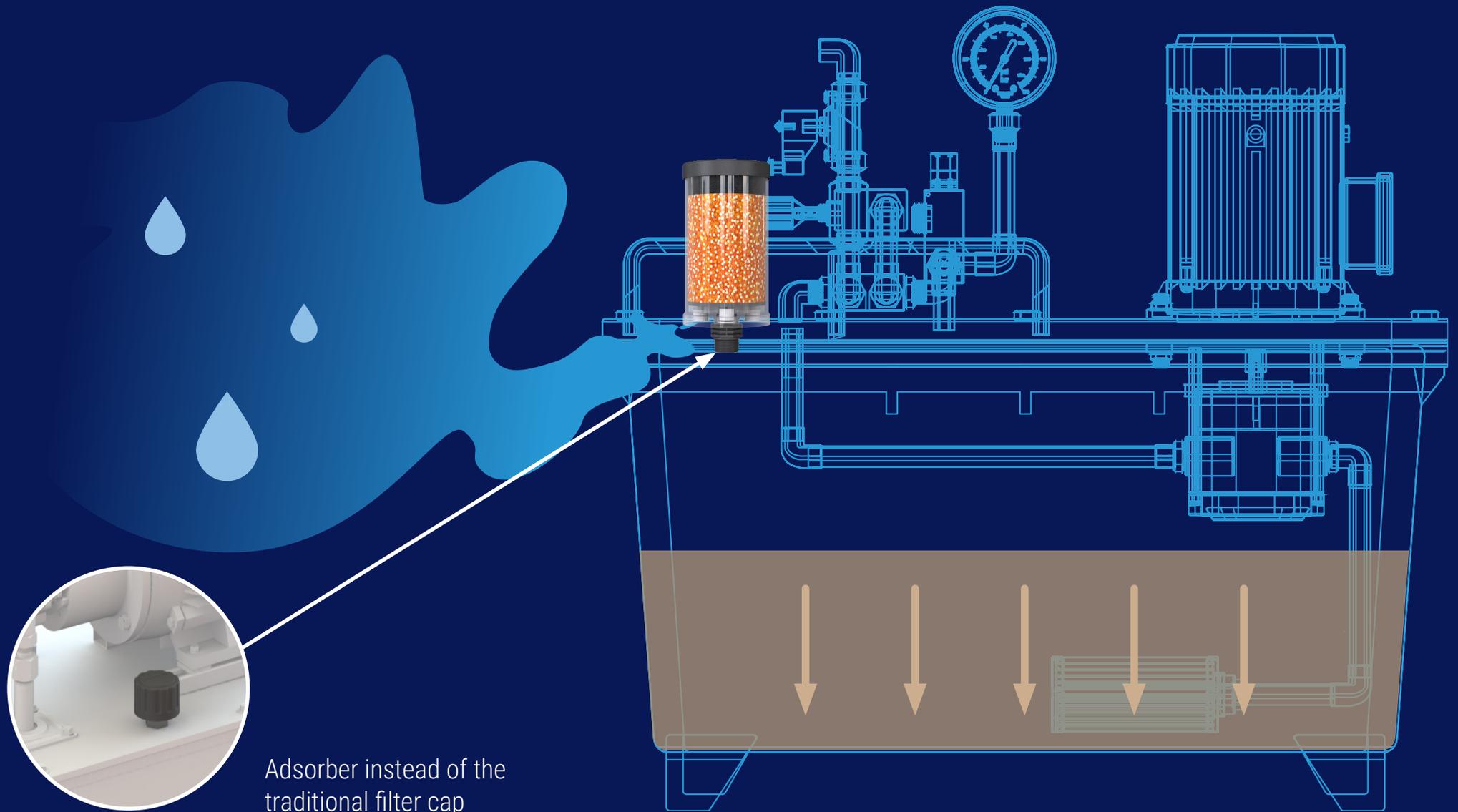
**Temperatures:** 75-88°C

**Humidity:** 78-80% in the dry season, 90% in the rainy season

**Fluid used:** Bio oil



# The air flow through the **GIEBEL Adsorber®**.

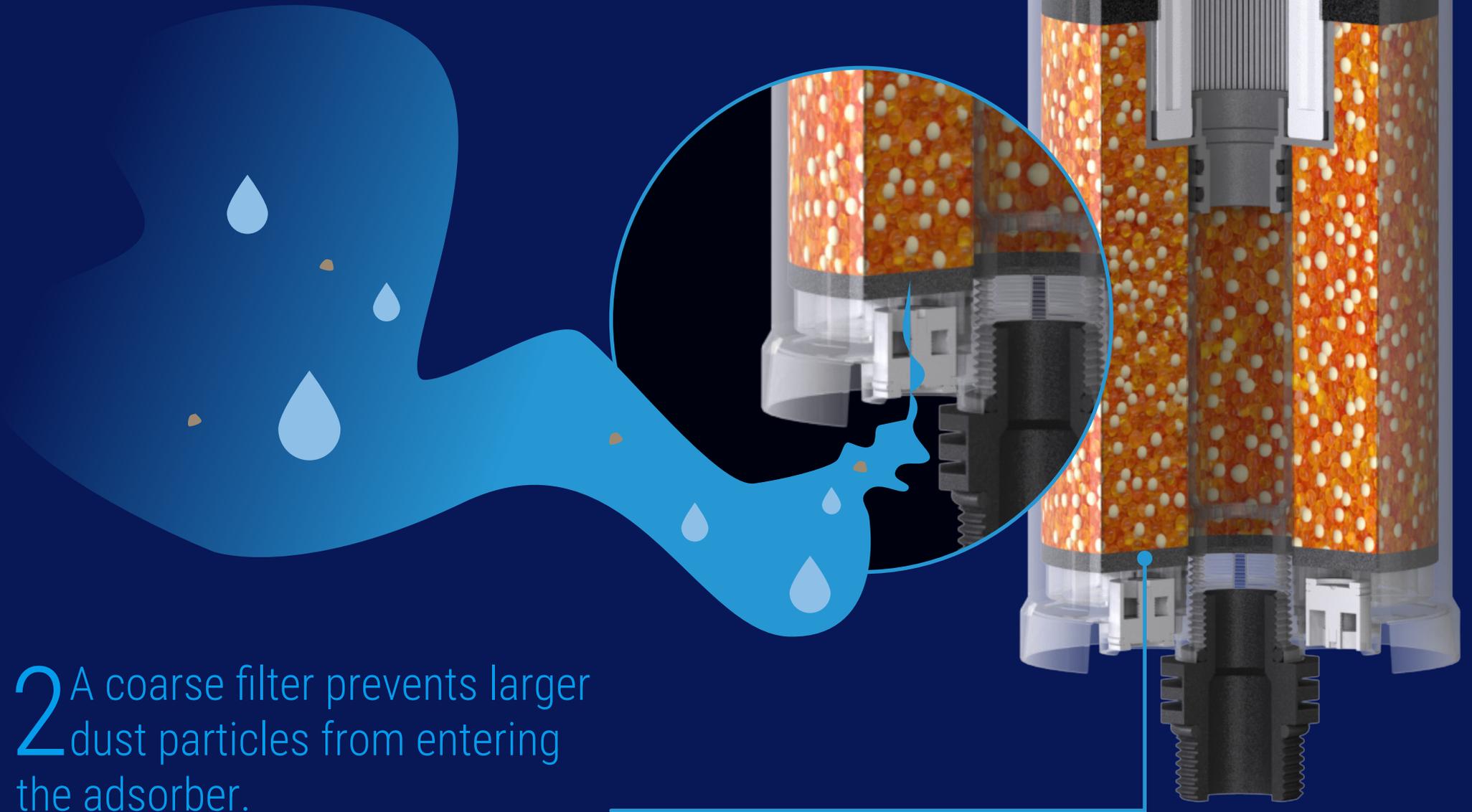


Adsorber instead of the  
traditional filter cap

This is what happens inside the **breather dryer**.

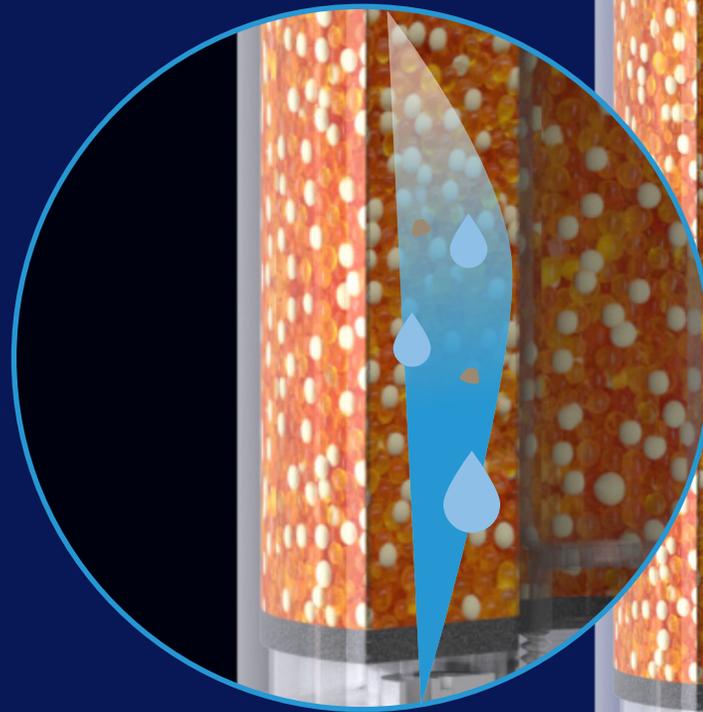


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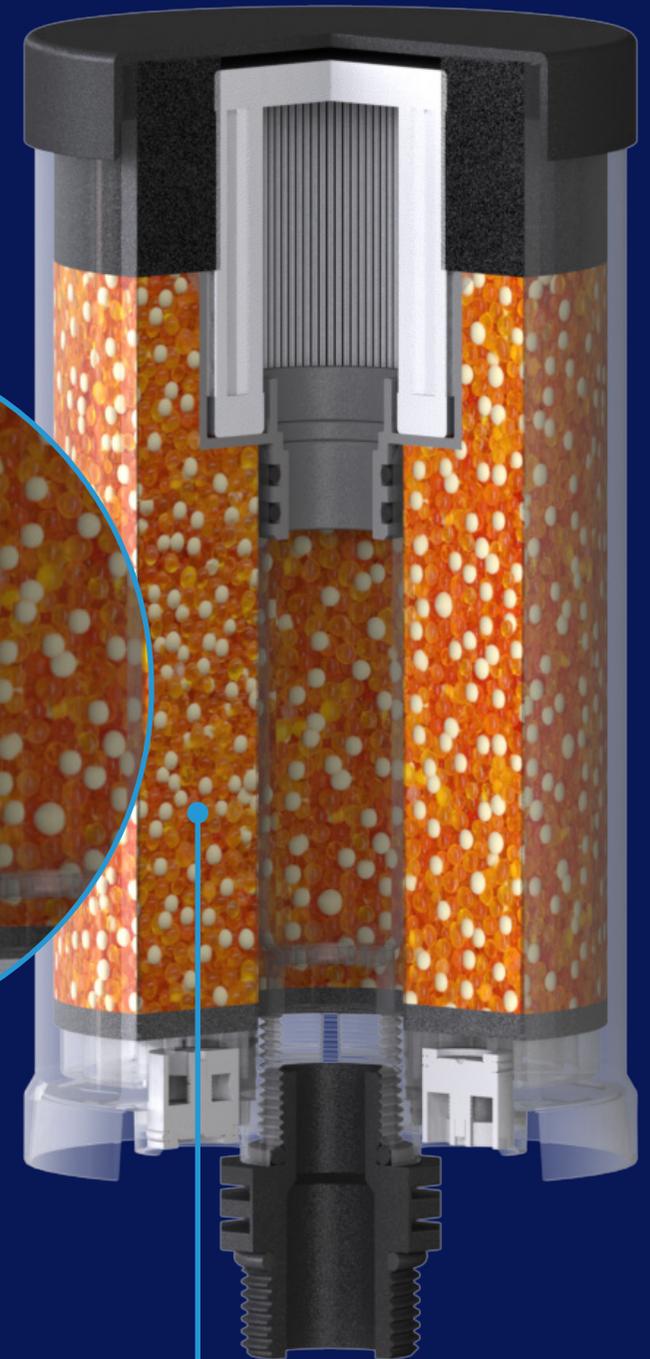


# This is what happens inside the **breather dryer**.

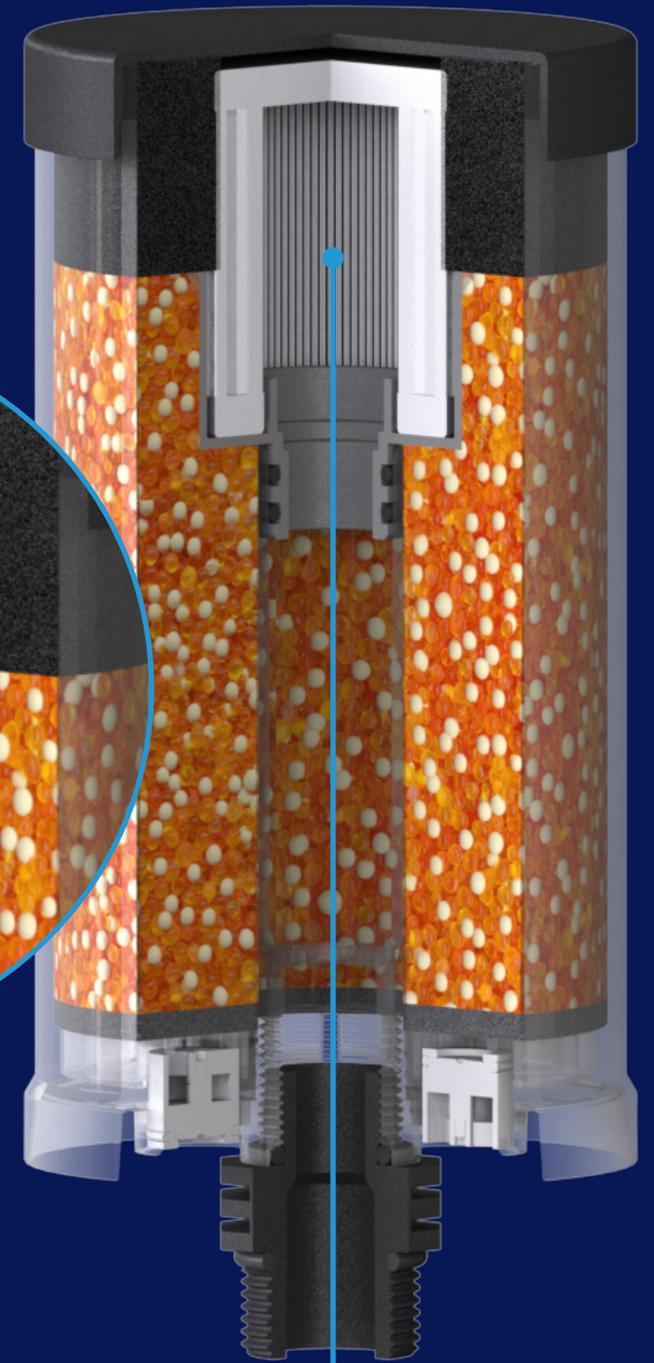
- High water absorption
- High-contrast indicator
- Can be used at high temperatures
- Can be used at low humidity levels



**3** The GIEBEL Xdry® desiccant, consisting of orange-green silica gel and 13X molecular sieve, removes moisture from the air.

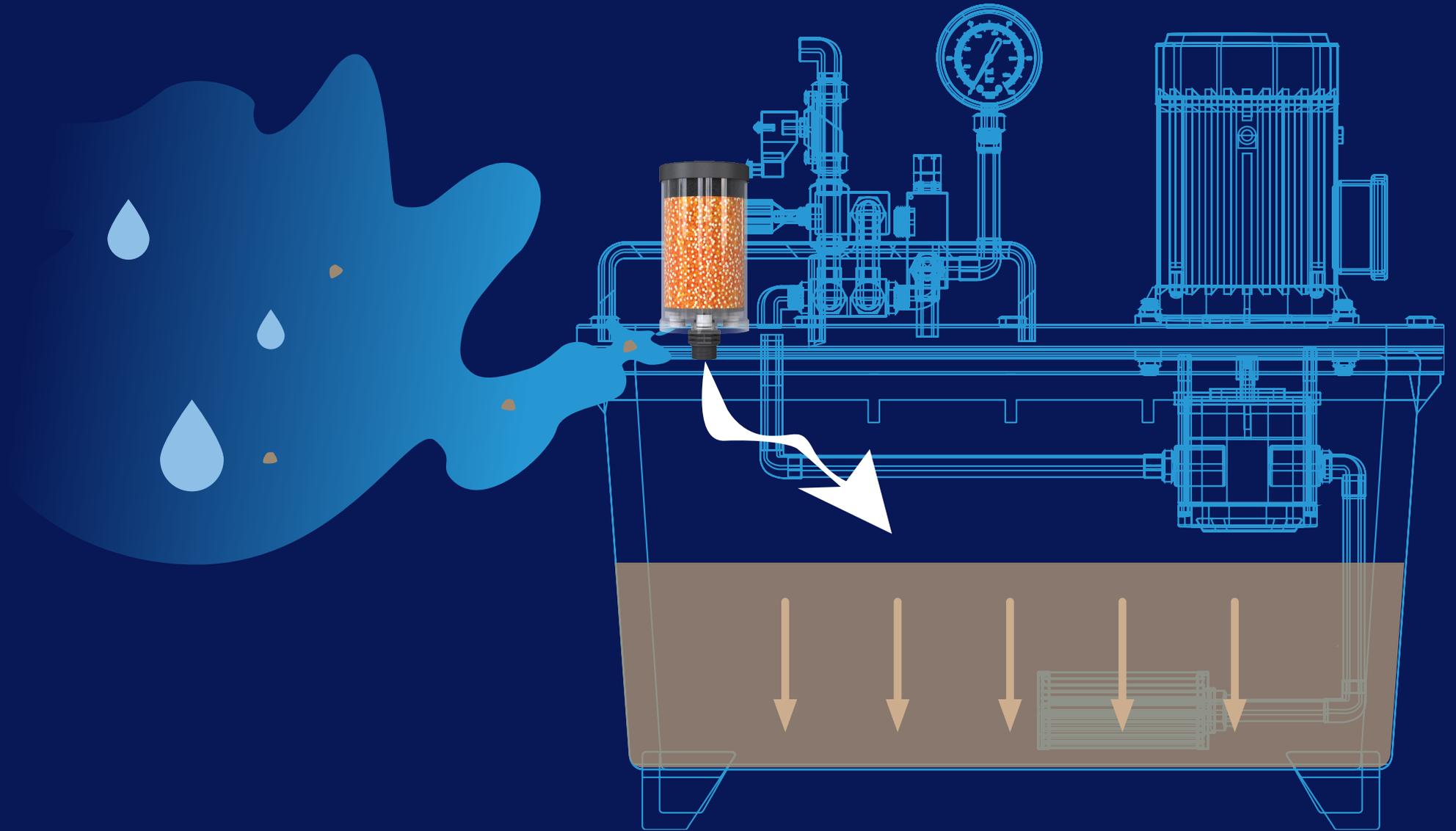


This is what happens inside the **breather dryer**.

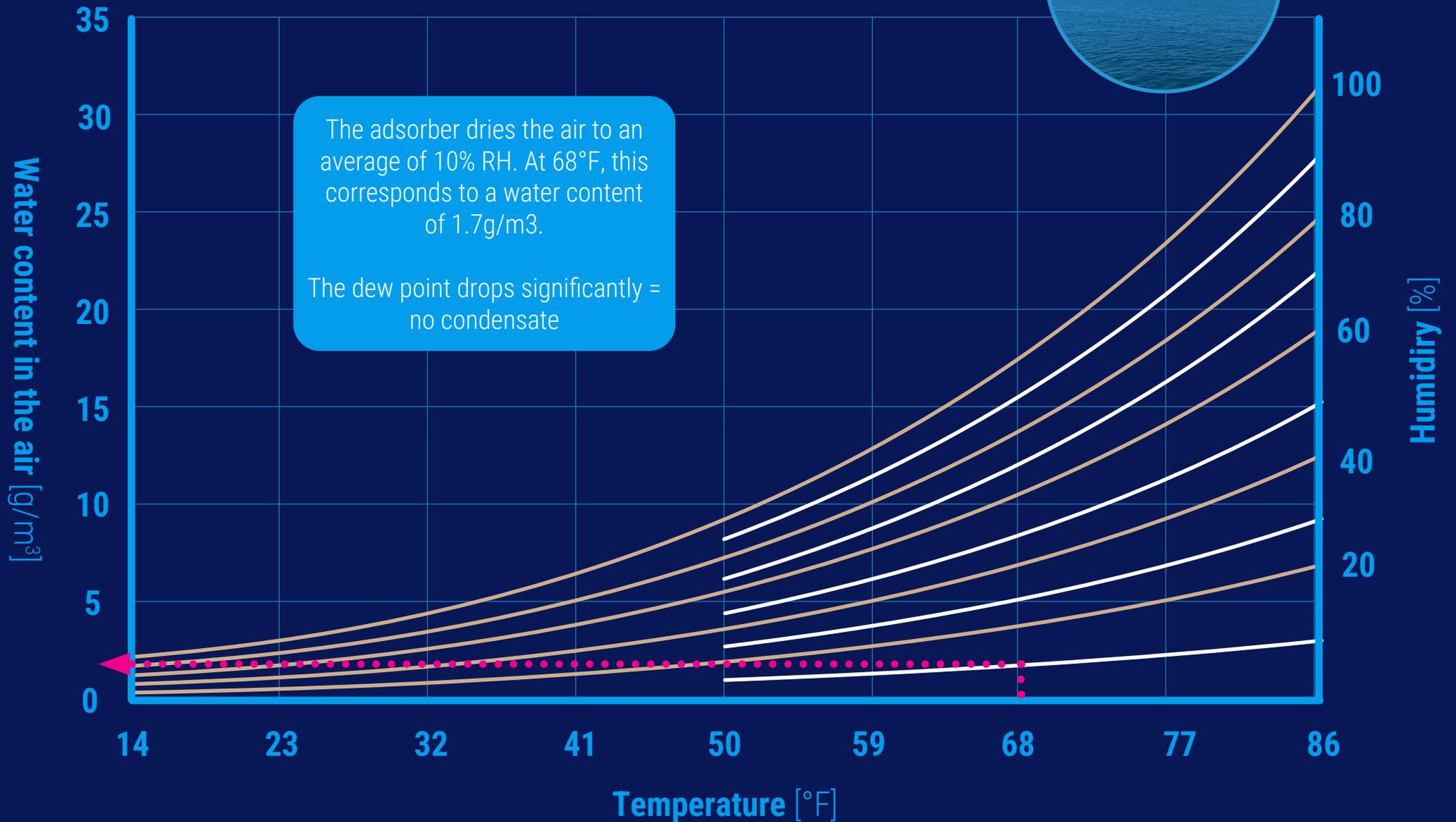


**4** A 3µm filter filters out the finest dust particles from the supply air.

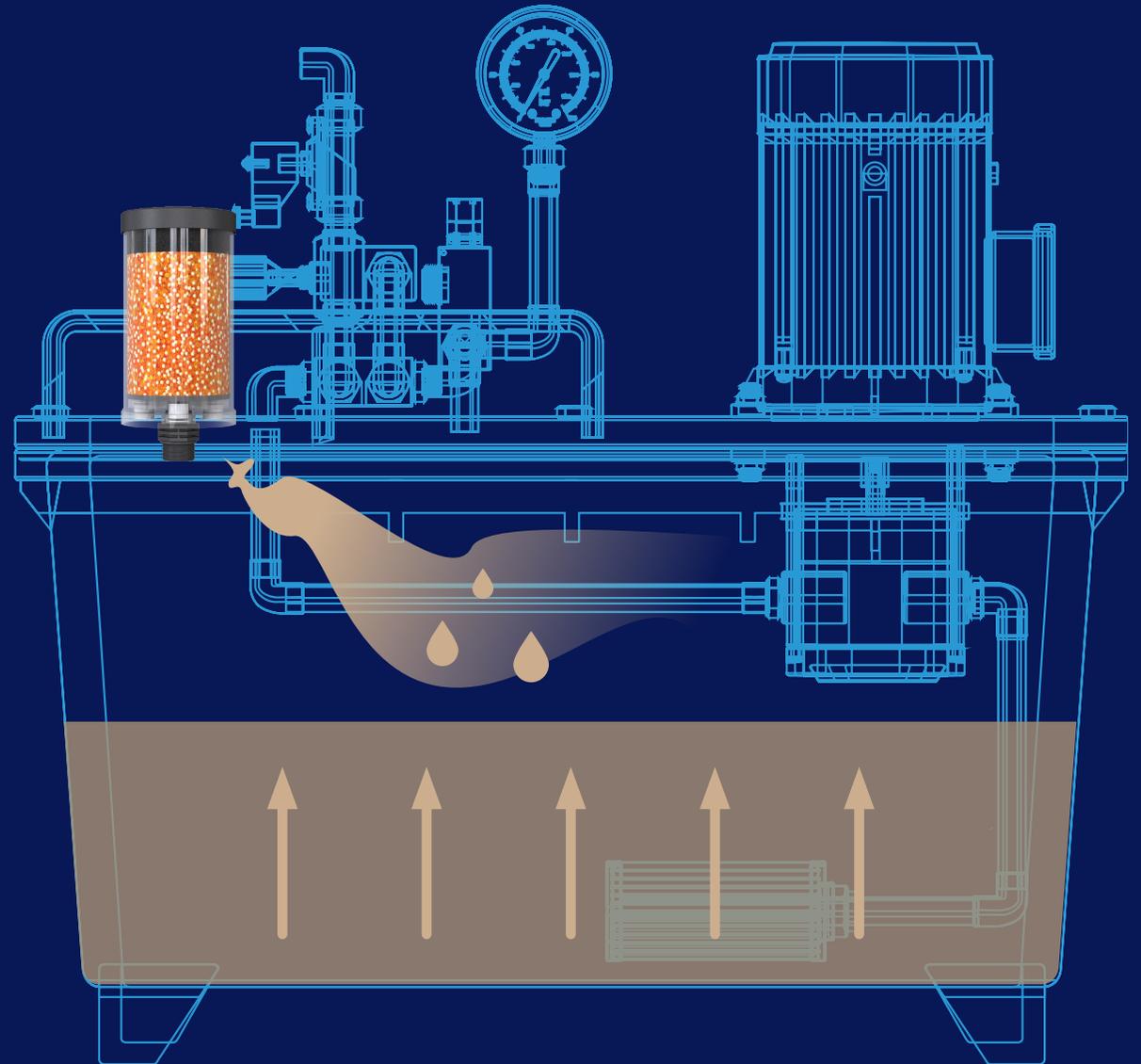
**Result:** Clean & dry supply air.



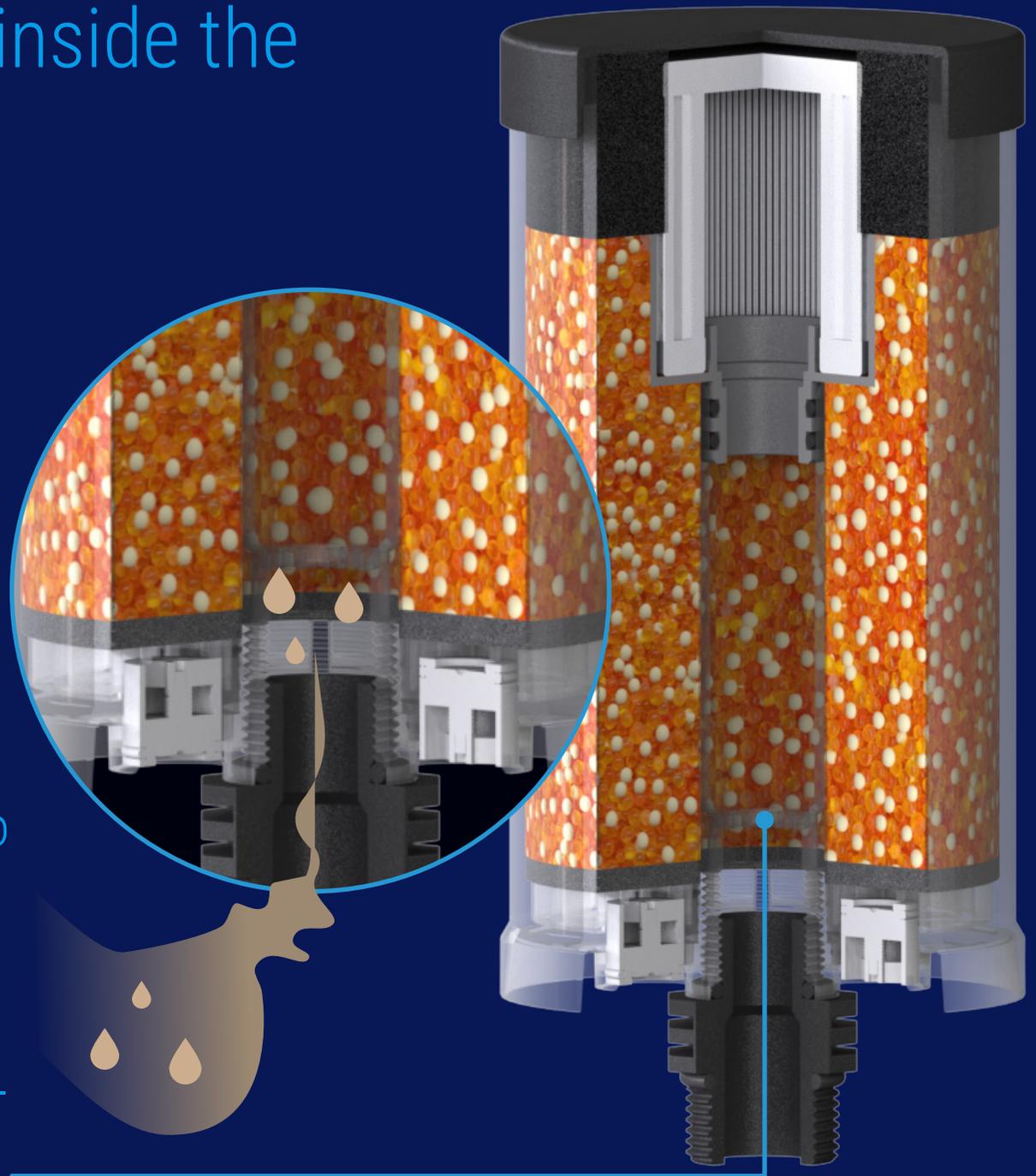
# Dew point with adsorber



The air flow out of the system through a **GIEBEL Adsorber®**.



This is what happens inside the **Breather dryer.**

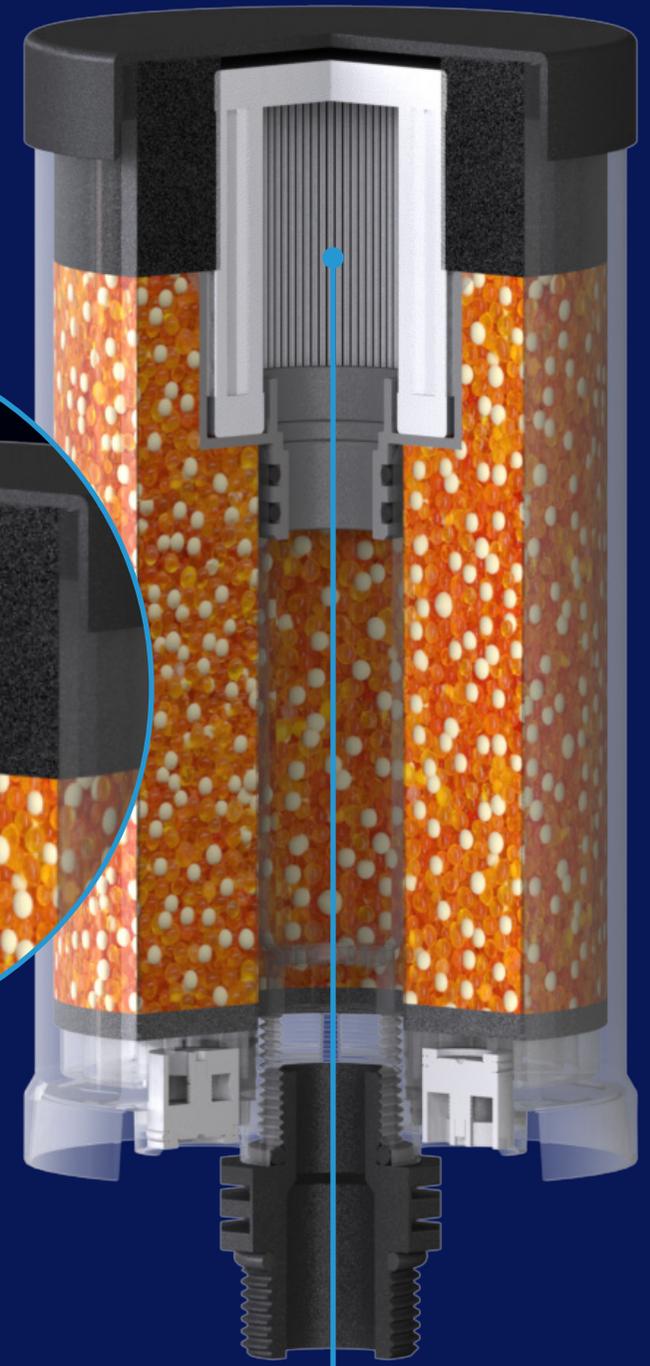


1 Oil-laden exhaust air flows into the adsorber. A grid prevents the oil from spilling into the adsorber. It also ensures that no desiccant can trickle into the system during refilling.

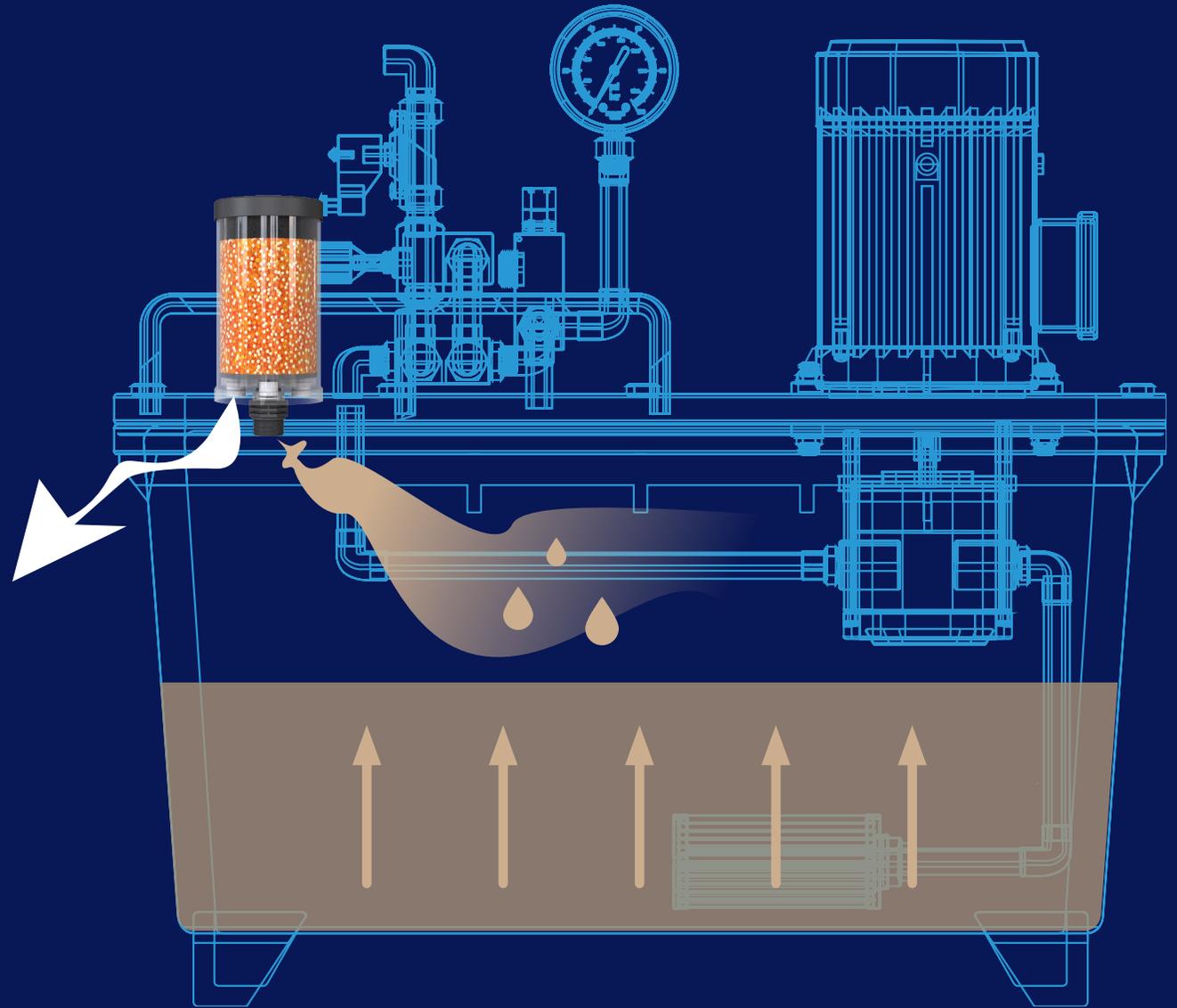
This is what happens inside the **Breather dryer.**



2 A layer of activated carbon absorbs the finest oil droplets and oil aerosols and prevents them from entering the desiccant bed.



Result: Clean exhaust air.





**Transits:** 32-38 ships per day

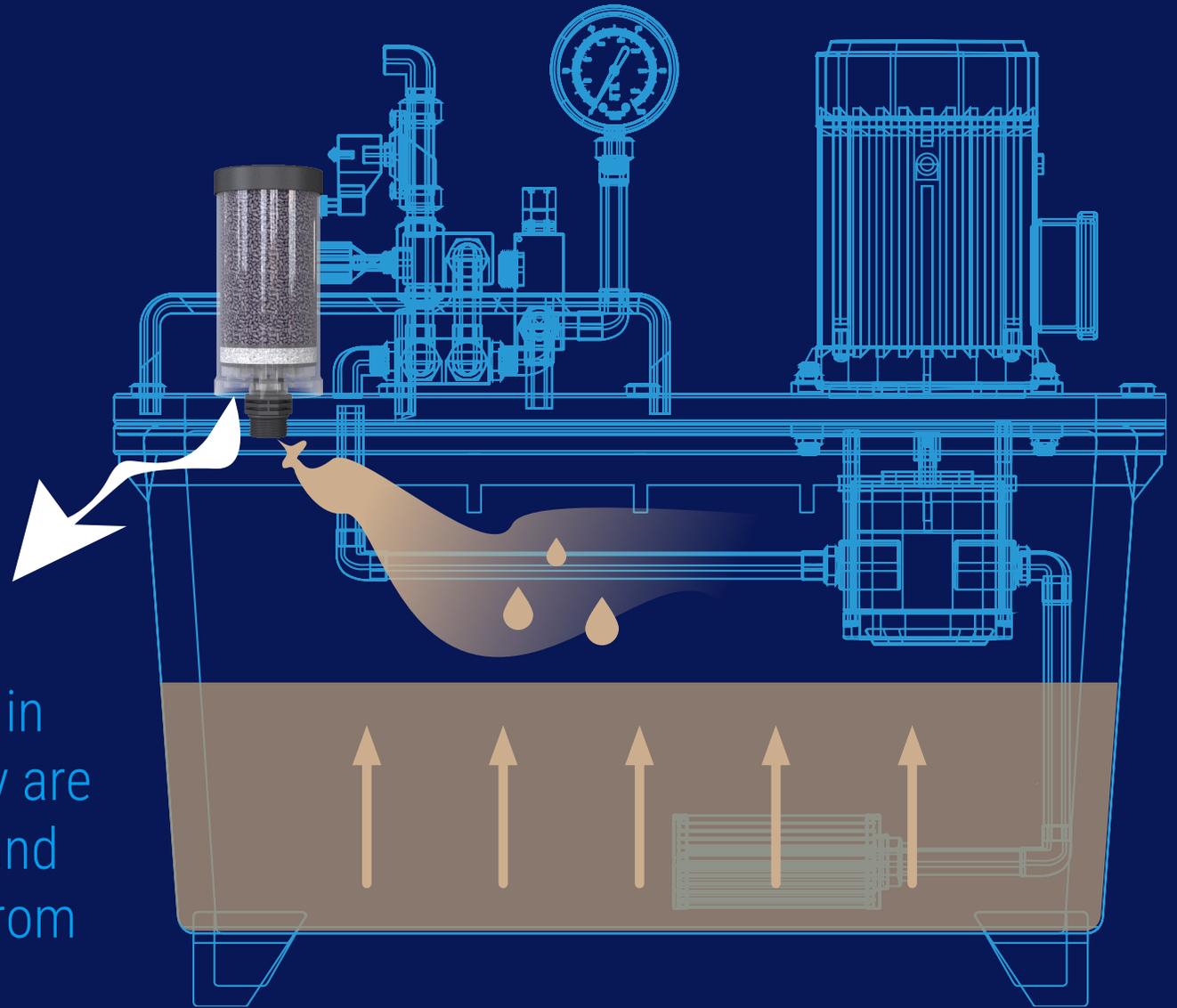
**Price per container ship:** depending on size, US\$80,000-450,000, with ULCVs sometimes even more expensive

**Fee revenue in 2024:** \$3.38 billion

For shipping companies, however, the journey through the Panama Canal is still 5-10% cheaper than the alternative route, which is 15,000 km longer.

Smooth-running hydraulics & clear sailing!

For heavy oil mist: **VG-D**



Oil mist separators are used in cases of heavy oil mist. They are filled with activated carbon and filter the finest oil particles from the exhaust air.

# Loading breather dryer.



## Unloaded

The adsorber is completely orange in color.

This means that it has adsorbed little or no moisture so far.



## Loaded from above

The adsorber is green at the top and orange at the bottom.

This means that the adsorber has mainly dried the outgoing air. There was a high level of moisture in the system.



## Loaded from below

The adsorber is orange at the top and green at the bottom.

This means that the adsorber has mainly dried the incoming air. The system is reliably protected.



## Fully loaded

The adsorber is completely green.

This means it is time to replace the adsorber or desiccant. The adsorber has reached its maximum absorption capacity!

# Loading Oil mist separator.



## Unloaded

The silica gel layer is white in color.

This means that it has adsorbed little or no oil mist so far.



## Fully loaded

The silica gel layer is brown in color.

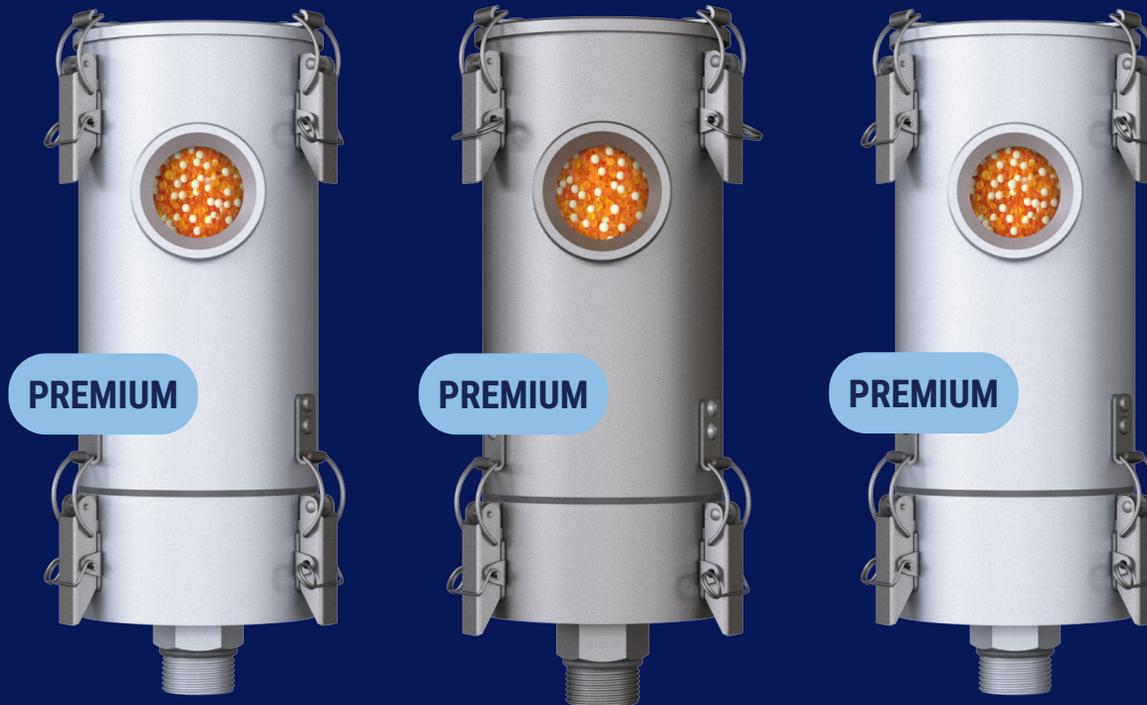
This means it is time to replace the adsorber or activated carbon. The oil mist separator has reached its maximum absorption capacity!

# Breather dryers - Basic & Eco.



ADSORBER	VV-D	VV-DV	VV-R	VV-RV
<b>Operating fluids</b>	Hydraulic oils, mineral oils, biodegradable oils, highly flammable and low flammability liquids			
<b>Refillable</b>	✗	✗	✓	✓
<b>Vents</b>	✗	✓	✗	✓
<b>ATEX</b>	✗	✗	✗	✗
<b>Offshore</b>	✓	✓	✓	✓

# Breather dryers - Premium.



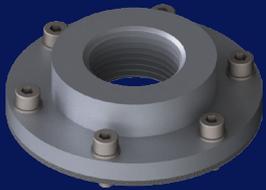
ADSORBER	MA-RV (FKM)	ME-RV (FKM)	MA-RV (EPDM)
<b>Operating fluids</b>	Hydraulic oils, mineral oils, biodegradable oils, highly flammable and low flammability liquids		Skydrol, HyJet IV/V, brake fluids
<b>Refillable</b>	✓	✓	✓
<b>Vents</b>	✓	✓	✓
<b>ATEX</b>	✓	✓	✓
<b>Offshore</b>	✓	✓	✓

# Ölnebelabscheider - Basic & Eco.



ADSORBER	VG-D	VG-R
<b>Operating fluids</b>	Hydraulic oils, mineral oils, biodegradable oils, highly flammable and low flammability liquids	
<b>Refillable</b>	✗	✓
<b>Vents</b>	✗	✗
<b>ATEX</b>	✗	✗
<b>Offshore</b>	✓	✓

# Accessories for **installation.**



## Flange adapters

for easy adsorber installation on existing bolt circles



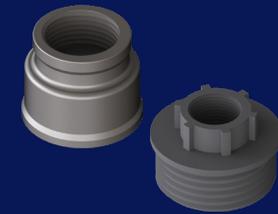
## Wall mounts

for flexible adsorber installation in confined spaces



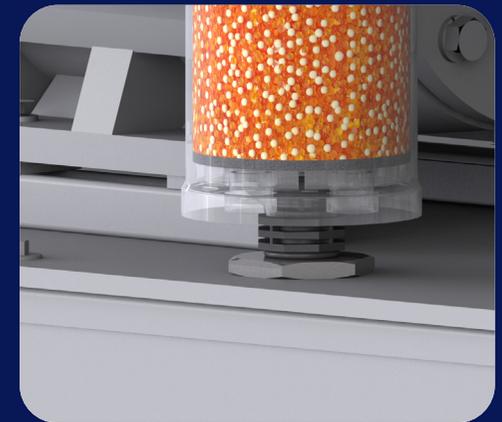
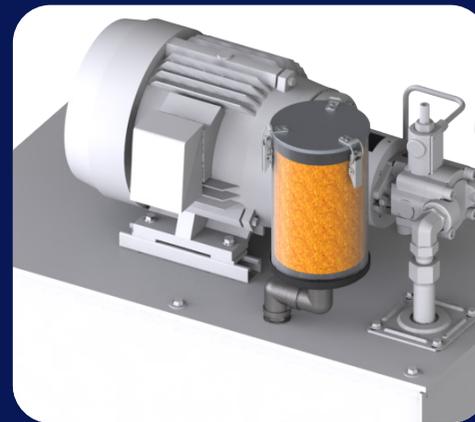
## Mounting adapters

for offset or horizontal adsorber installation in confined spaces



## Adapters, sleeves, and reducers

for easy adsorber installation on existing threads



# Accessories for **maintenance**.



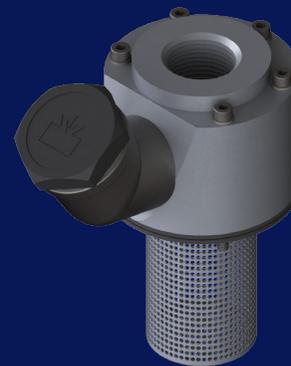
**Sensors**

for monitoring the adsorber loading status



**Suction lances**

for connecting barrel pumps and bypass filter systems



**Filling adapters**

for refilling oil during absorber operation



# Accessories for **protection.**



**Oil demisters**

for protection against high oil emissions



**Pressure adapters**

for maintaining the tank preload during adsorber operation



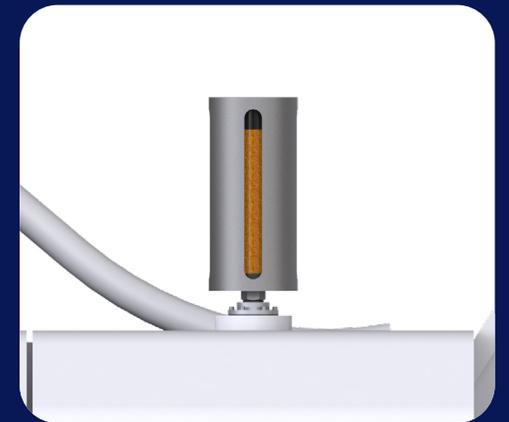
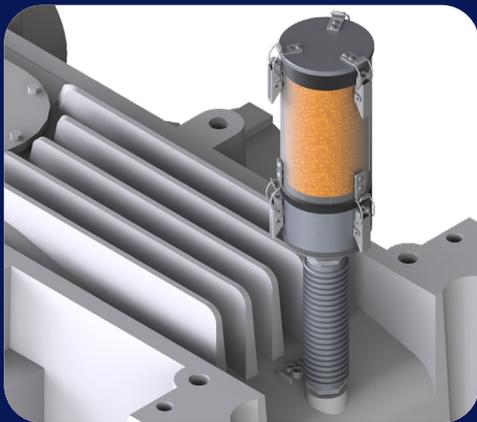
**Protection adapters**

for monitoring and limiting pressure build-up

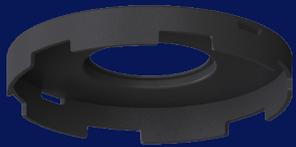


**Protection hoods**

for protection against strong vibrations and stone chips



# Accessories for **protection**.



## **Valve Protection**

for protecting the valve part  
from water

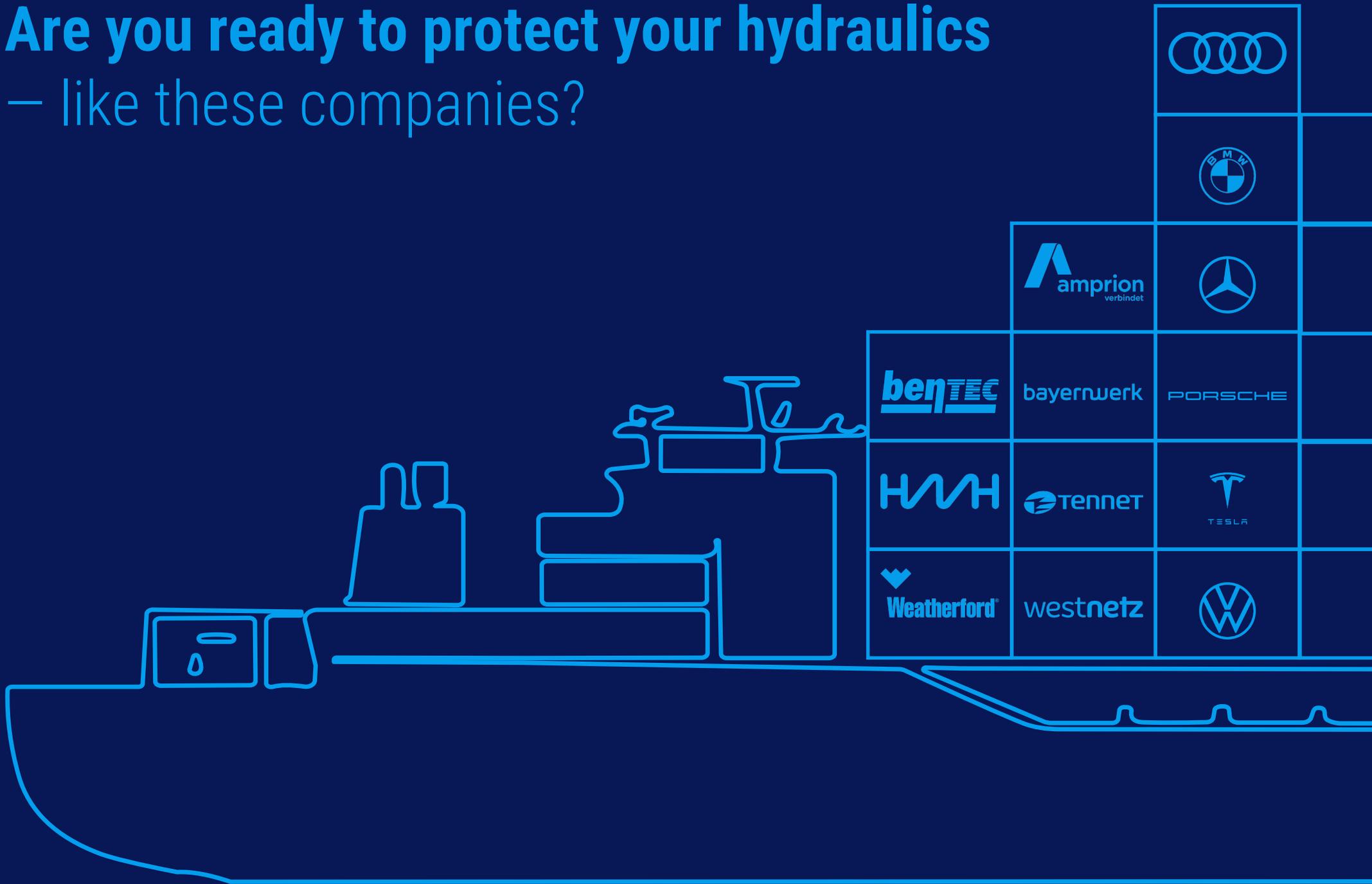


**16,000 companies** keep their equipment dry and clean with GIEBEL Adsorbers®.

This prevents **13,200 liters** of water from causing damage to machines and storage tanks each year and prevents **900 liters** of oil in the form of aerosols from endangering people and the environment.

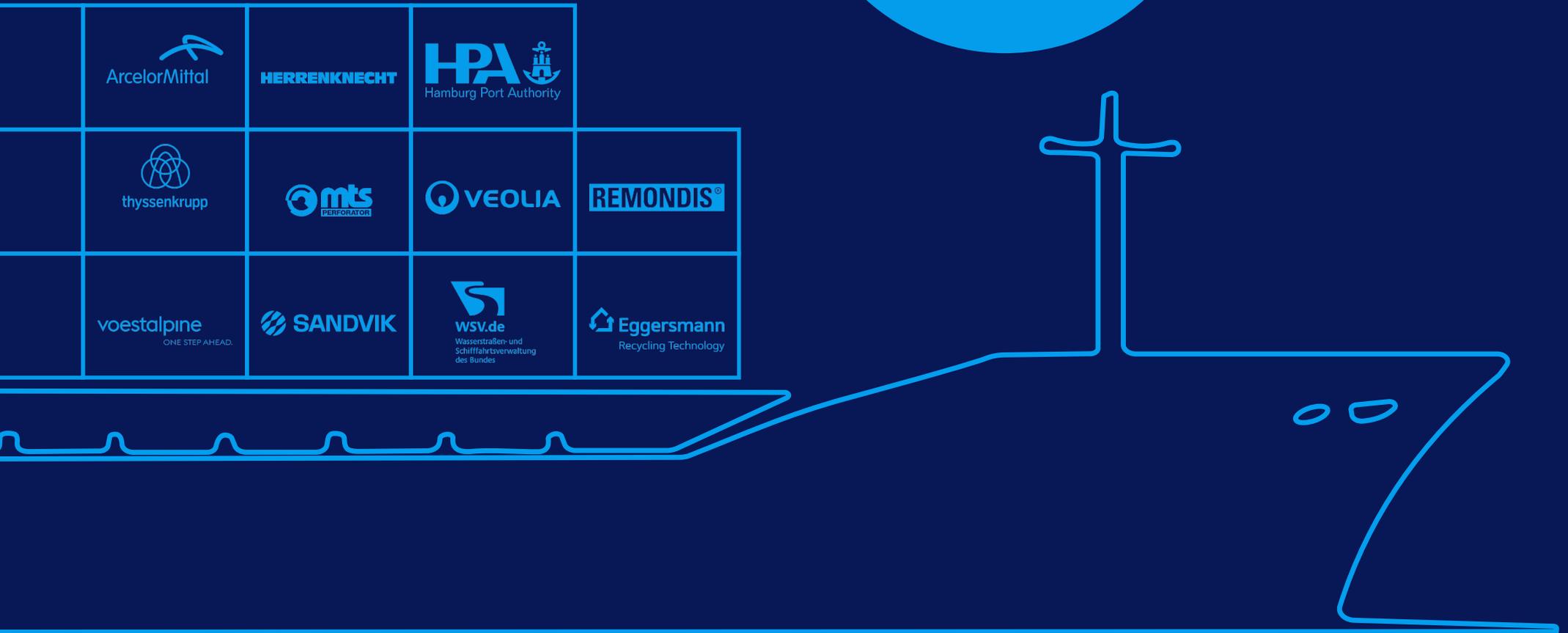
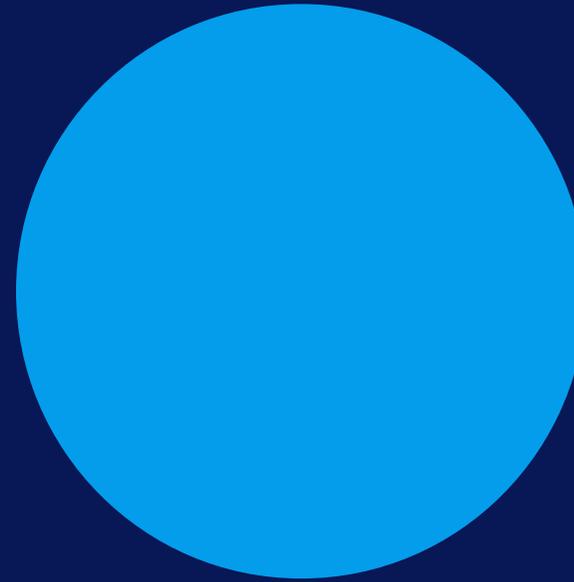
# Are you ready to protect your hydraulics

– like these companies?





# Get on board!



  
ArcelorMittal

**HERRENKNECHT**

**HPA**   
Hamburg Port Authority

  
thyssenkrupp

  
**mts**  
PERFORATOR

  
**VEOLIA**

**REMONDIS**<sup>®</sup>

voestalpine  
ONE STEP AHEAD.

  
**SANDVIK**

  
**WSV.de**  
Wasserstraßen- und  
Schiffahrtsverwaltung  
des Bundes

  
**Eggersmann**  
Recycling Technology

# Lift bridge.

Lifting the bridge / filling cylinders

**Tank size:** 5000l

**Oil:** synthetic esters

**Operation:** 10x per day



VV-RV 5L

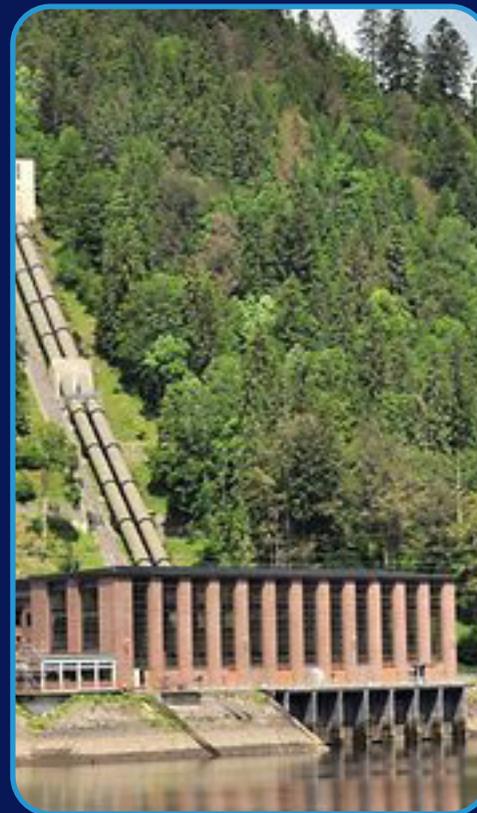
# Hydroelectric power station.

## Turbine lubrication

**Tank size:** 1000l

**Oil:** synthetic esters

**Operation:** Continuous operation, oil circulation lubrication



**VV-RV 5M**

# Paper machine.

## Central lubrication system

**Tank size:** 800l

**Oil:** Mineral oil HLP46

**Operation:** Continuous operation, oil circulation lubrication



**VV-R 5M**

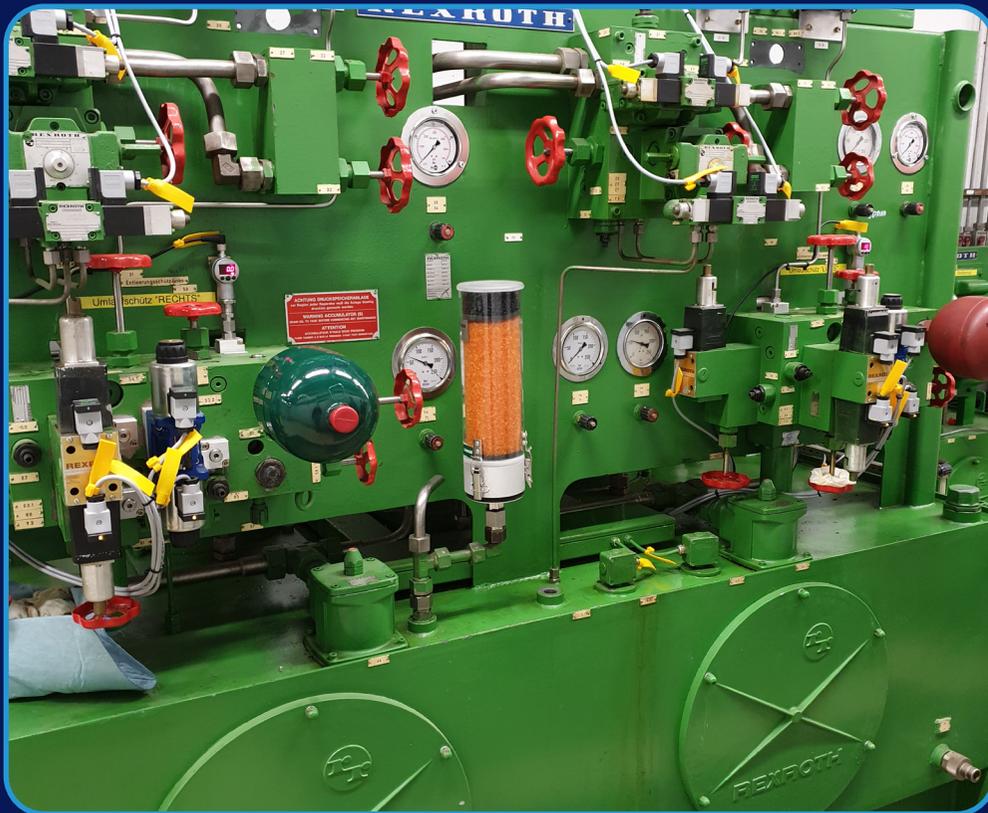
# Lock.

Moving the gates / filling cylinders

**Tank size:** 600l

**Öl:** Mineral oil HLP46

**Betrieb:** 20-40x per day



VV-DV 3L

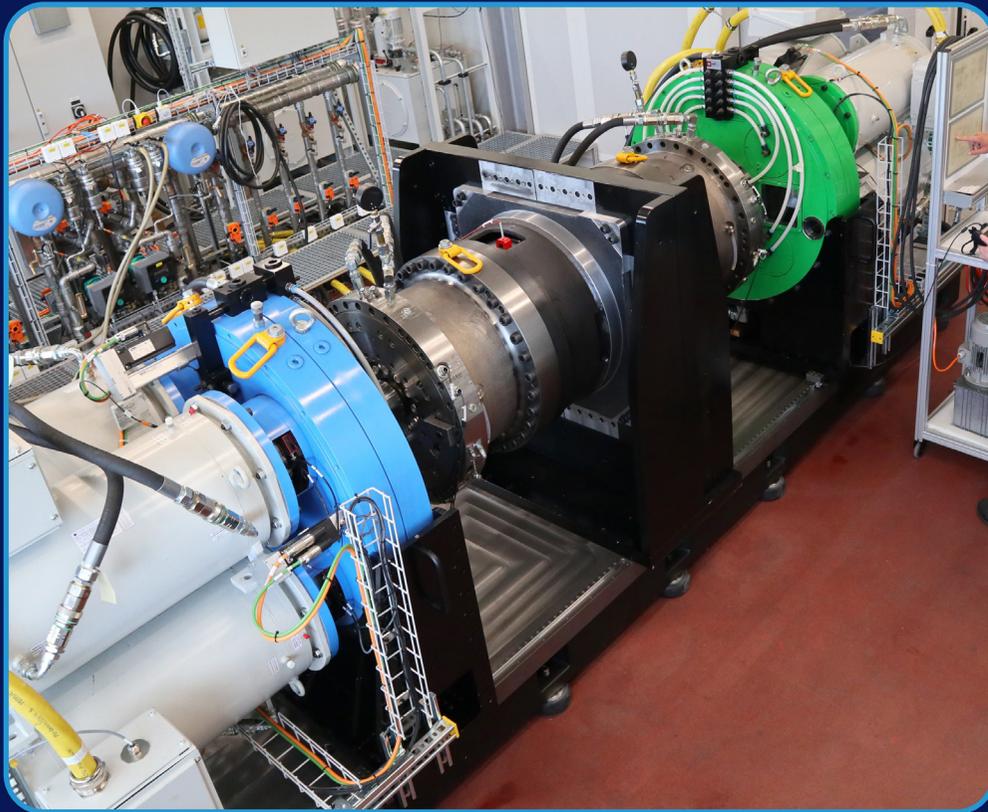
# Test bench.

Lubrication test gearbox Automotive

**Tank size:** 150l

**Oil:** Mineral oil HLP46

**Operation:** Continuous use, protection against oil mist



VG-D 3L

# Portal lift truck.

Brake cooling & steering

**Tank size:** 55l

**Oil:** Mineral oil HLP46

**Operation:** Shift work, outdoor work, pendulum motion



VV-DV 2L

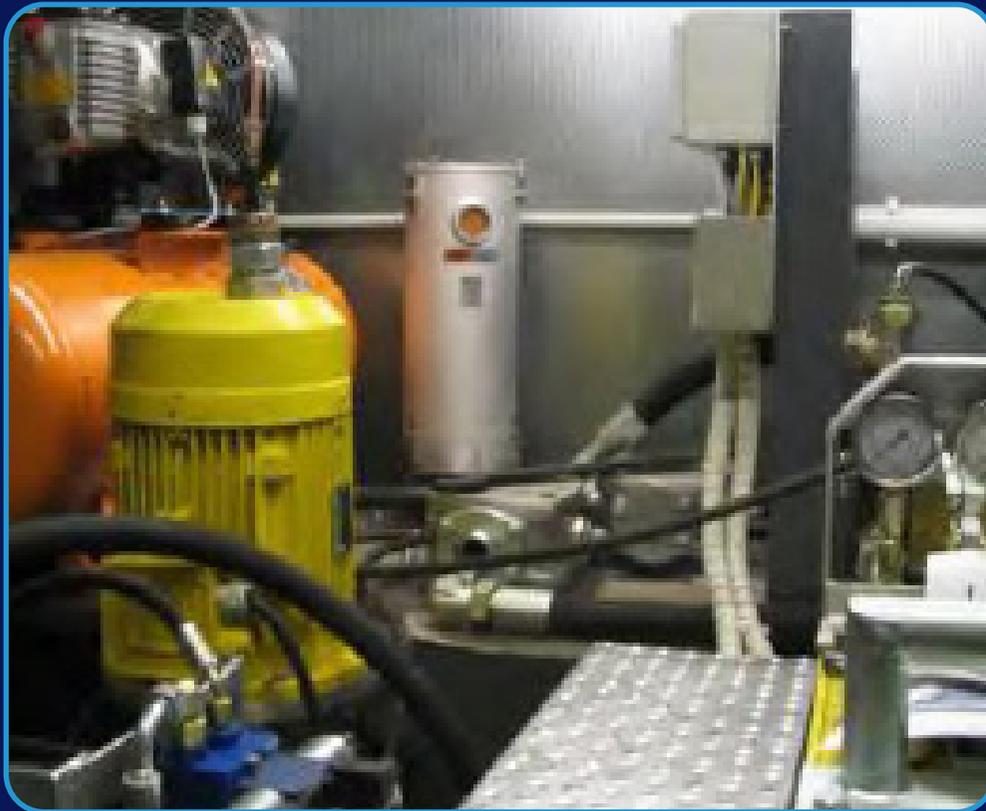
# Tunnel boring machine.

Feed drill head

**Tank size:** 400l

**Oil:** Mineral oil HLP46

**Operation:** Continuous throughout operation, low pendulum



**MA-RV 3M**

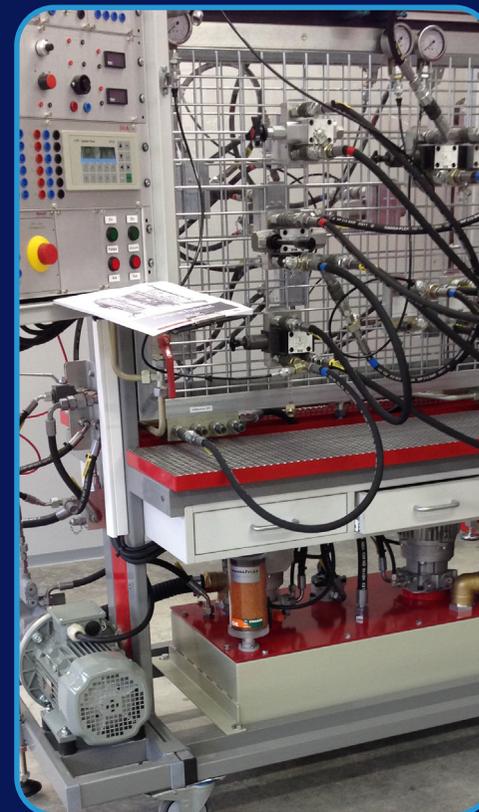
# Training facility.

Training / Presentation

**Tank size:** 10l

**Oil:** Mineral oil HLP46

**Operation:** Rarely, during training



VV-DV 2L

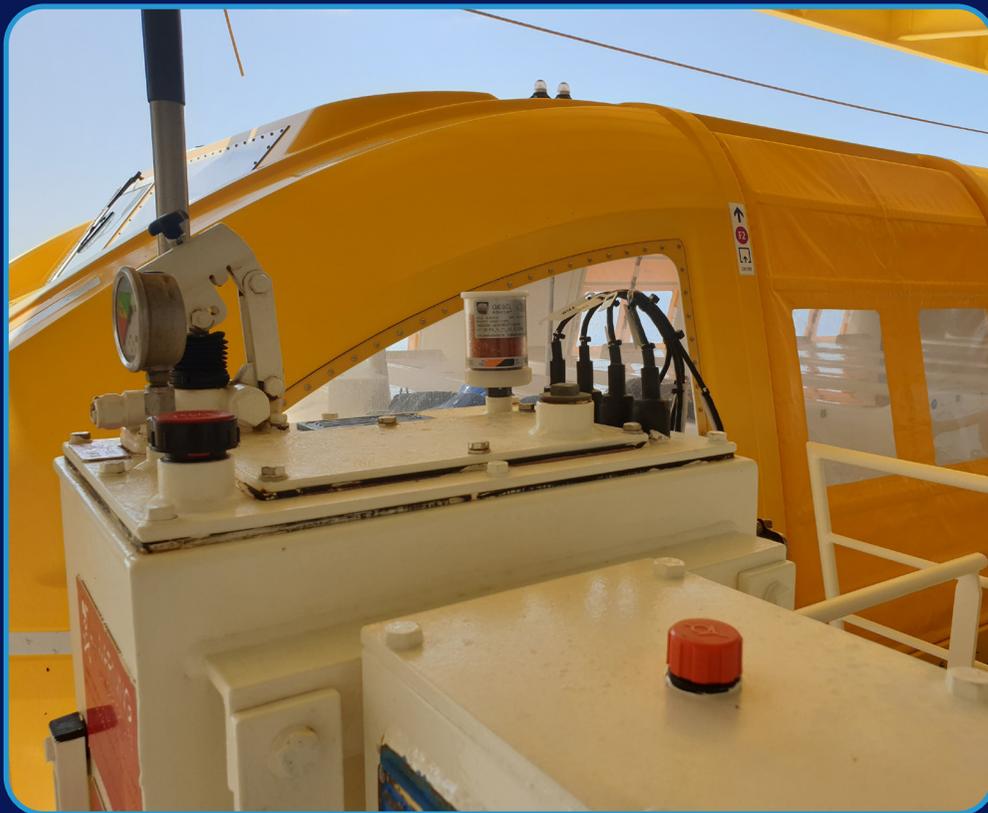
# Cruise ship.

Lowering the lifeboats

**Tank size:** 60l

**Oil:** Biodegradable oil

**Operation:** During tests & possibly in an emergency



VV-DV 1L

# Injection molding machine.

Closing the casting tools

**Tank size:** 6000l

**Oil:** Mineral oil HLP46

**Operation:** Continuous operation, approx. every 100 seconds



VV-R 5L

# Excavator.

Earthmoving / Cylinder strokes

**Tank size:** 200l

**Oil:** Biodegradable oil

**Operation:** Continuous use, outdoor use, harsh conditions



**MA-R 3M +**  
Valve adapter 0,5 bar

# Carousel.

Movement of cylinders

**Tank size:** 1000l

**Oil:** Mineral oil HLP46

**Operation:** Continuous use during the season, outdoor use, harsh conditions



**VV-DV 3L**  
Wall mount  
Flange adapter

# Mobile machine.

Movement of the container

**Tank size:** 200l

**Oil:** Mineral oil HLP46

**Operation:** Little movement, long periods of standing, outdoor use, harsh conditions, mobile



VV-DV 3M

# Garbage compactor.

Cylinder of the trash compactor

**Tank size:** 2500l

**Oil:** Mineral oil HLP46

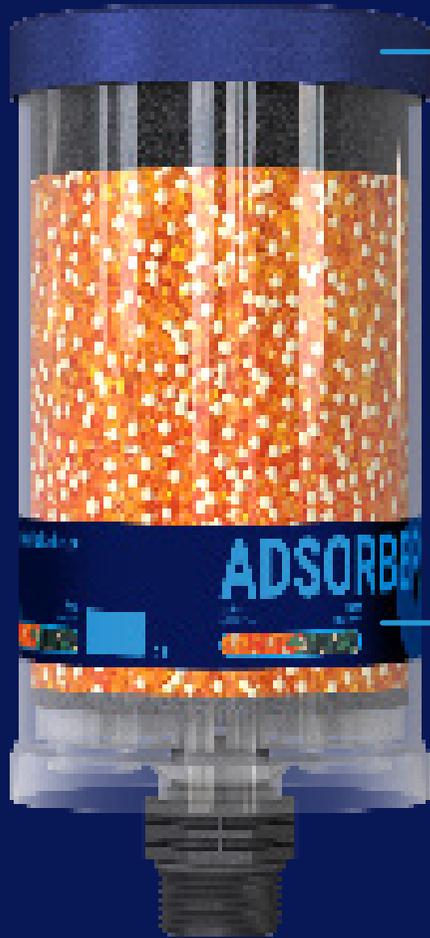
**Operation:** Continuous operation during shifts, dirty environment, significant temperature fluctuations



VV-RV 5LL

# GIEBEL Extras.

Custom design

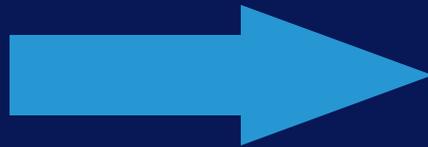


• Colored adsorber cap

• Your own label to match your corporate design

# GIEBEL Extras.

Send & Refresh



For participants in the **GIEBEL Send & Refresh** System, we prepare loaded adsorbers at low cost.

You save money and operate your systems more sustainably!

**No machine** has to die  
due to **corrosion**.

[www.giebel-adsorber.de](http://www.giebel-adsorber.de)