Avoiding Production Downtime: Real time ISO 8573-1 Compressed Air Quality Monitoring and Audits

Francisco Lara, Airtec Global

Keynote Speaker

The recording and slides of this webinar will be made available to attendees via email later today.

PDH Certificates will be e-mailed to attendees within 2 days.

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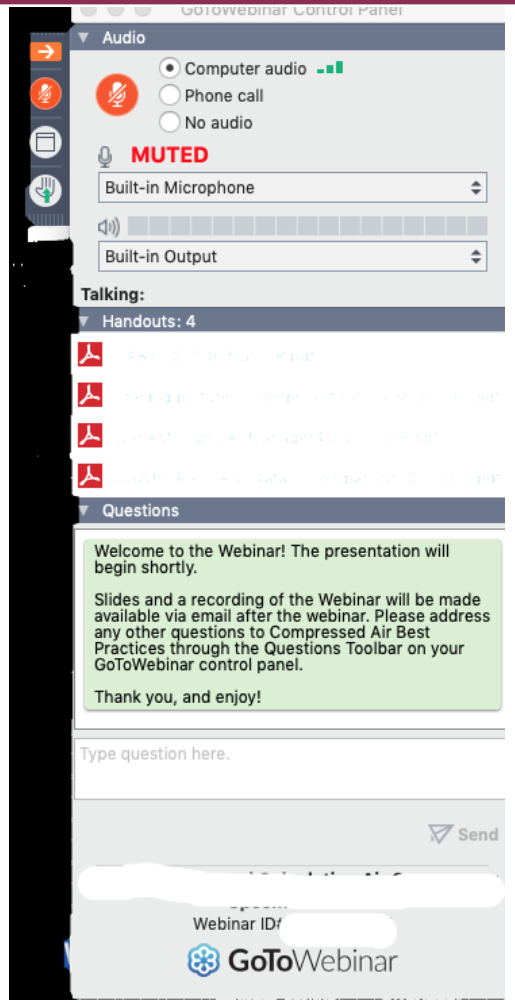
Q&A Format



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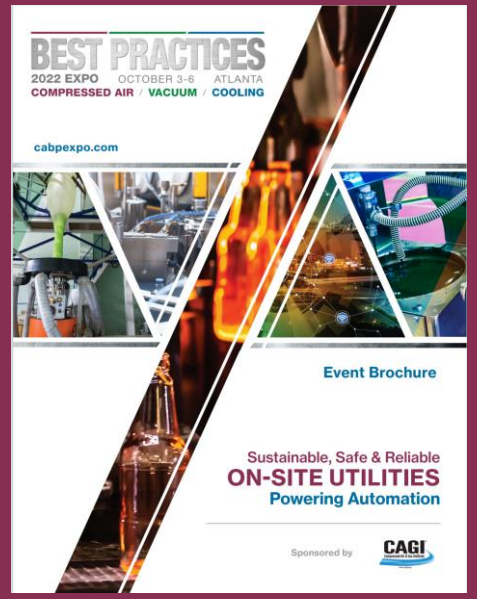
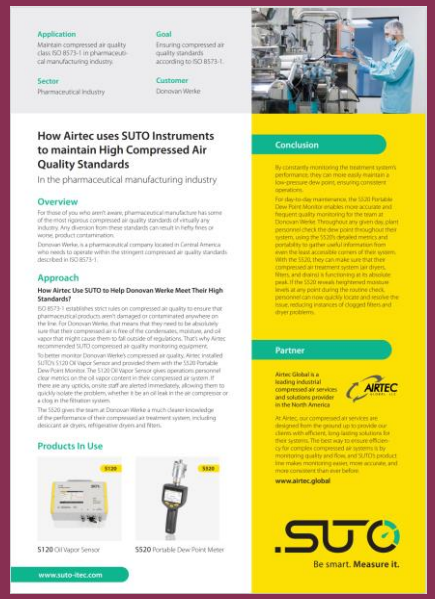
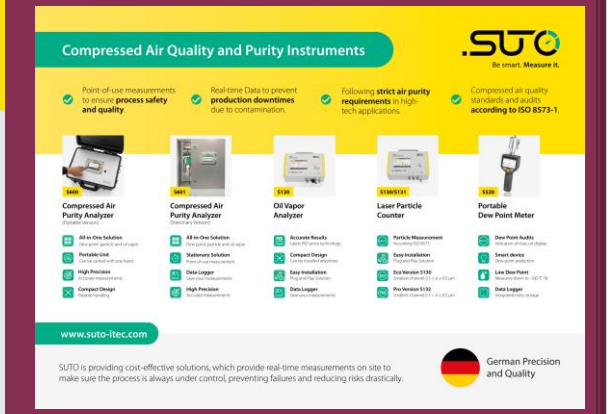
Handouts







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Disclaimer

All materials presented are educational. Each system is unique and must be evaluated on its own merits.

Track 2: Compressed Air Compliance with Quality/Safety Management Systems Featured Presentations

Compressed Air as a Quality/Safety Manufacturing Process Variable – Compliance Verification Tips

Tom Taranto, Principal, Data Power Services

Verifying Compressed Air Dryer/Filter/Drain Performance for Quality Reporting Systems

Nitin G. Shanbhag, President, Mikropor America

Avoiding Quality-Related Production Downtime: Realtime ISO 8573-1 Compressed Air Quality Monitoring and Audits

Simon Gleissner, General Manager, SUTO iTEC

From Air Compressors to Purification: Compressed Air Asset Management

Gorazd Bregar, CEO, CALMS Air

At the end of the webinar, we are having a fun contest for a chance to win a free full conference pass valued at $675!

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Best Practices EXPO Contest

Bryan Kong, Application Engineer, D&W Diesel, played in our contest during our *VFD Vacuum Pumps Do's and Don'ts* Webinar on 8/18 and won a free full conference pass to the Best Practices 2022 EXPO & Conference

Congratulations Bryan!

At the end of the webinar, we are having a fun contest for a chance to win a free full conference pass valued at $675!

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Avoiding Production Downtime: Real time ISO 8573-1 Compressed Air Quality Monitoring and Audits

Introduction by

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About the Speaker

Francisco Lara
Airtec Global

- Manager, Airtec Global
- 10+ years experience in the compressed air industry
- Supervise operations in México and US
- Focused on educating clients to understand the true cost of compressed air and implement optimization

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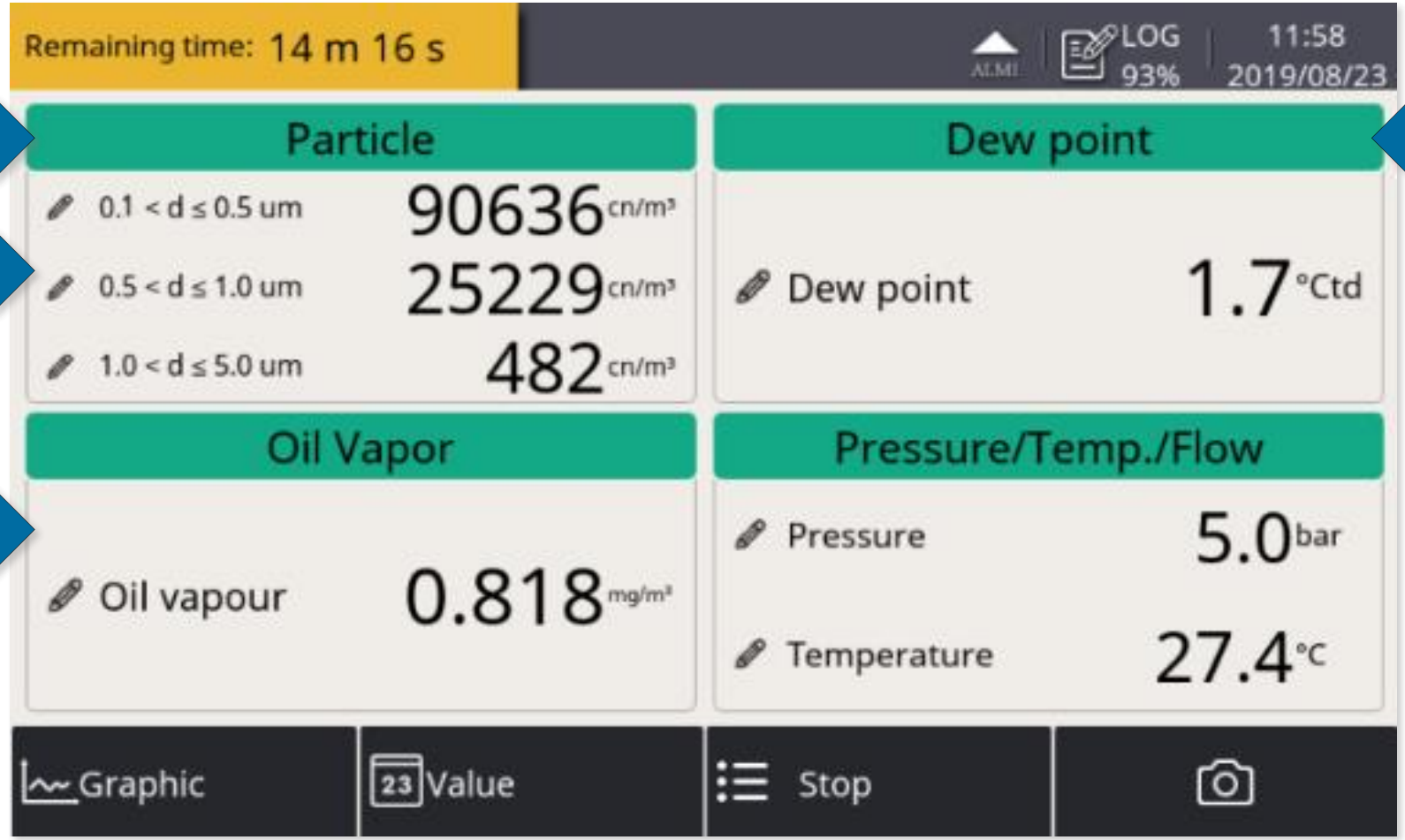
Contaminants in Compressed Air

Contaminants in Compressed Air



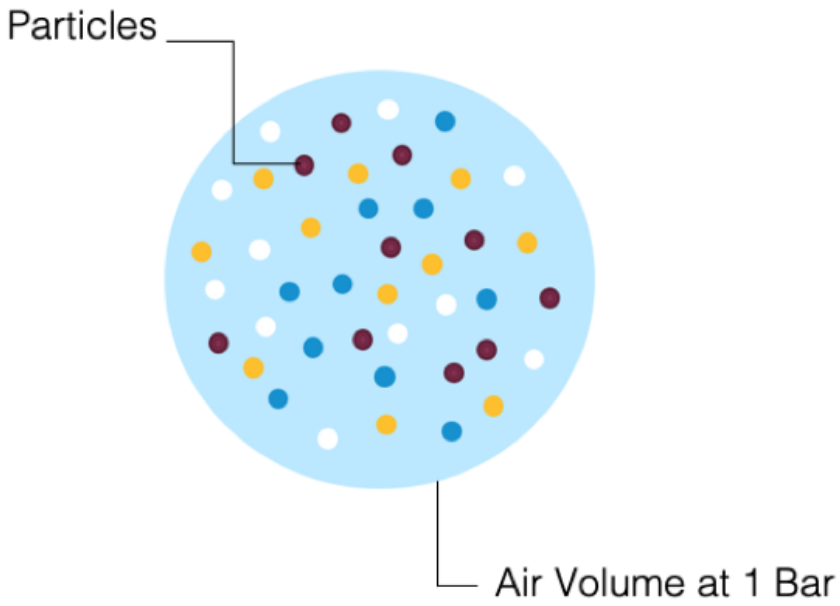
Rust

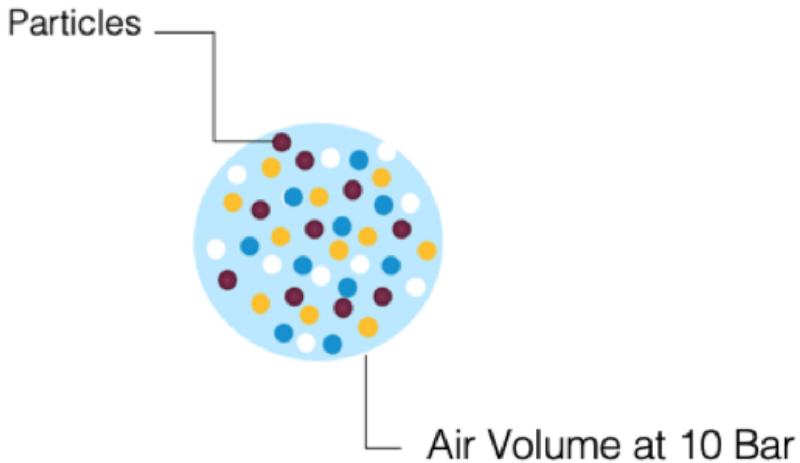
Pollen & Dust

Hydrocarbons

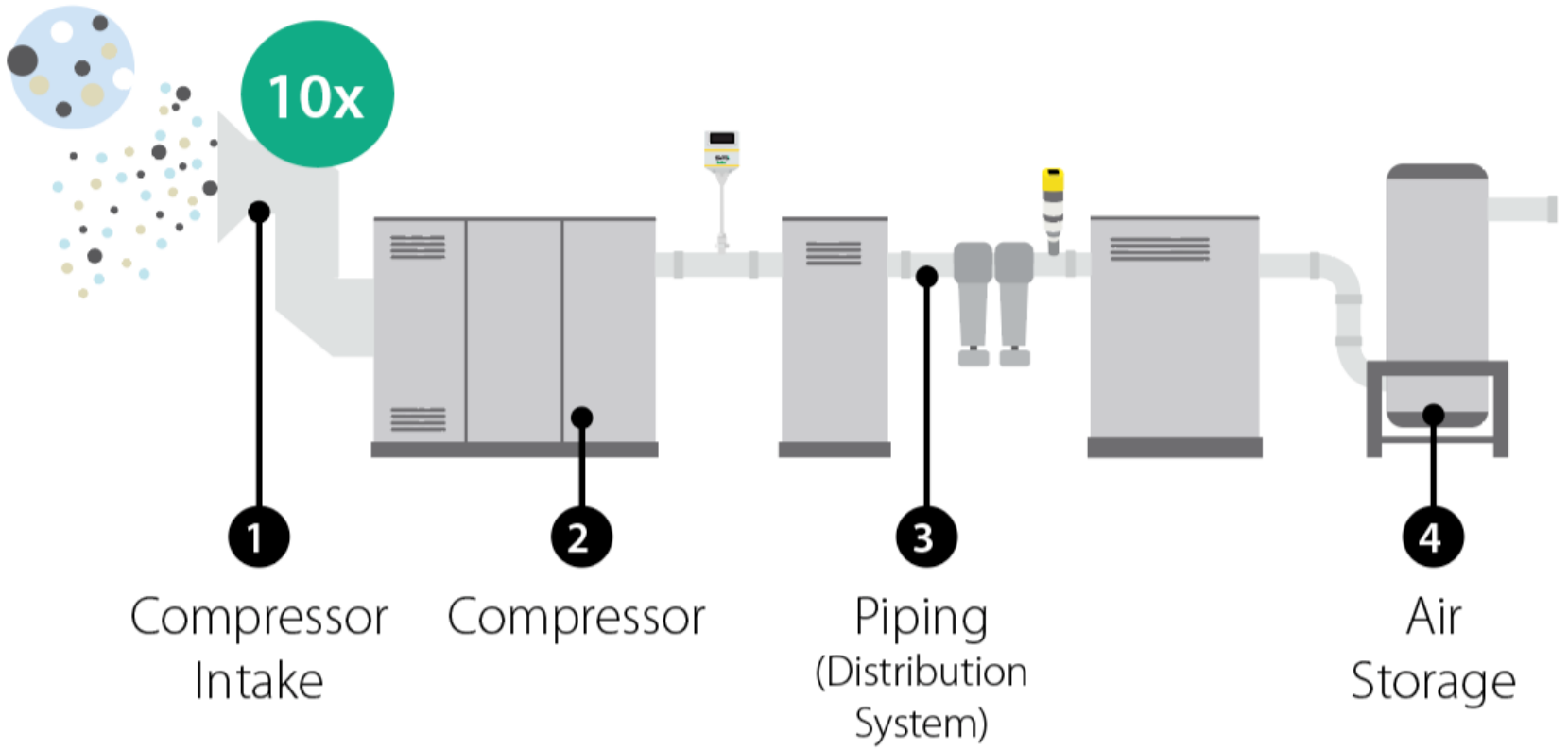
Moisture

Other Sources of Compressed Air Contaminants





Other Sources of Compressed Air Contaminants



Oil Free Compressors

- Can still carry oil if there is a leak in the cooling system.

- Particle, hydrocarbons and organic matter that the inlet air filter cannot keep out.

Supply Side Optimization

- Avoid having saturated filters
- Better preparing for corrective maintenance
- Avoid rust buildup in compressed air piping system
- Reduce risk of shutting down for corrective maintenance

Demand Side Optimization

- Avoid contamination on final product
- Increasing production tools lifespan
- To comply with ISO 8573-1 standards
- Reduce risk of production line shut down
- Spend less money on replacing air filters

Home Appliances Industry

SITUATION

- Costly welding mechanism kept failing when closed circuit was activated due to moisture in the system.

SOLUTION

- Stationary dew point monitoring solution with a programmed alarm system.

Pharmaceutical Industry

SITUATION

- Very large batch of vaccine vials was discarded when oil content was found inside after blow off cleaning process.

SOLUTION

- Stationary compressed air quality analyzing system to monitor, oil vapors, particles and dew point.

Automotive Industry

SITUATION

- Clay prototype for luxury car manufacturer collapsed due to oil content in clay costing millions of euro.

SOLUTION

- Stationary compressed oil vapor sensor system providing constant real time data.

Meat Packing Industry

SITUATION

- Large batch of meat contaminated and discarded due to impurities found after packaging.

SOLUTION

- Compressed air particle counter to monitor air quality before packaging process and maintain industry quality standards.

Oil & Gas Industry

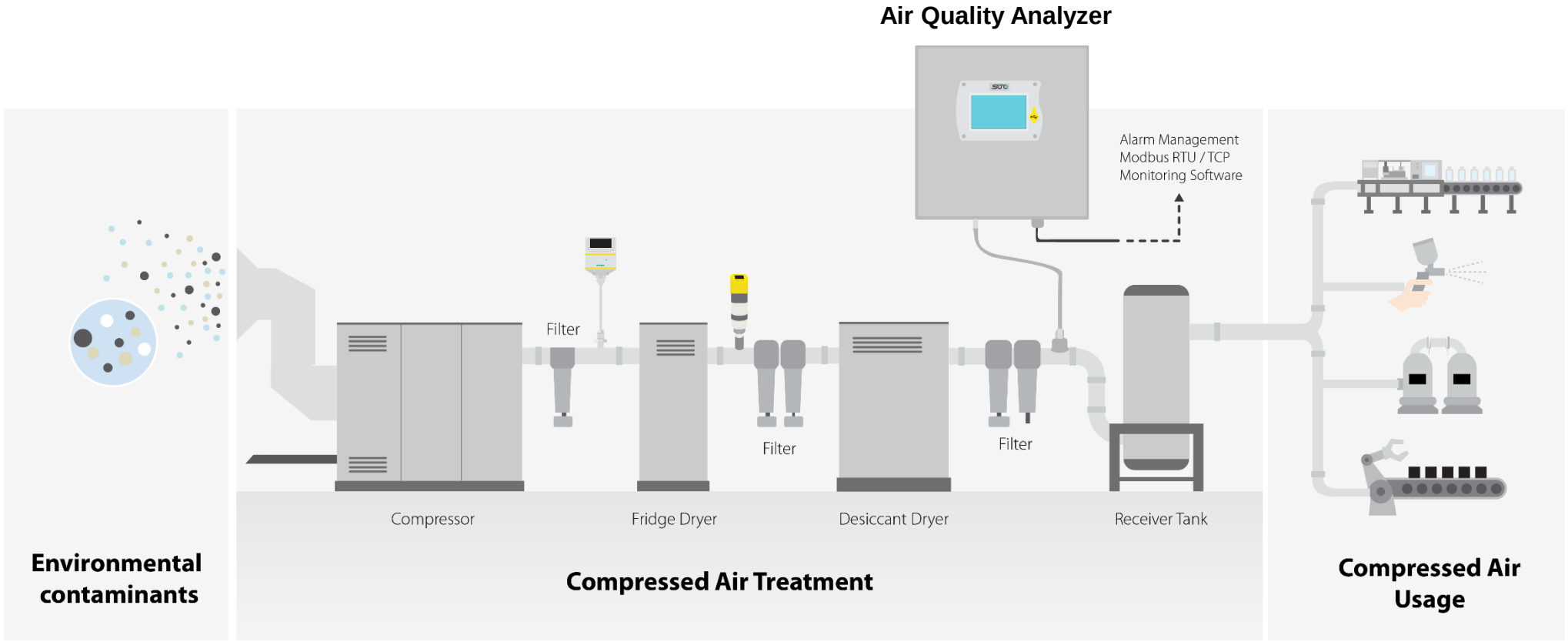
SITUATION

- Compressed air filter membranes for offshore facilities get saturated. Thousands of USD are spent for replacing and warranty.

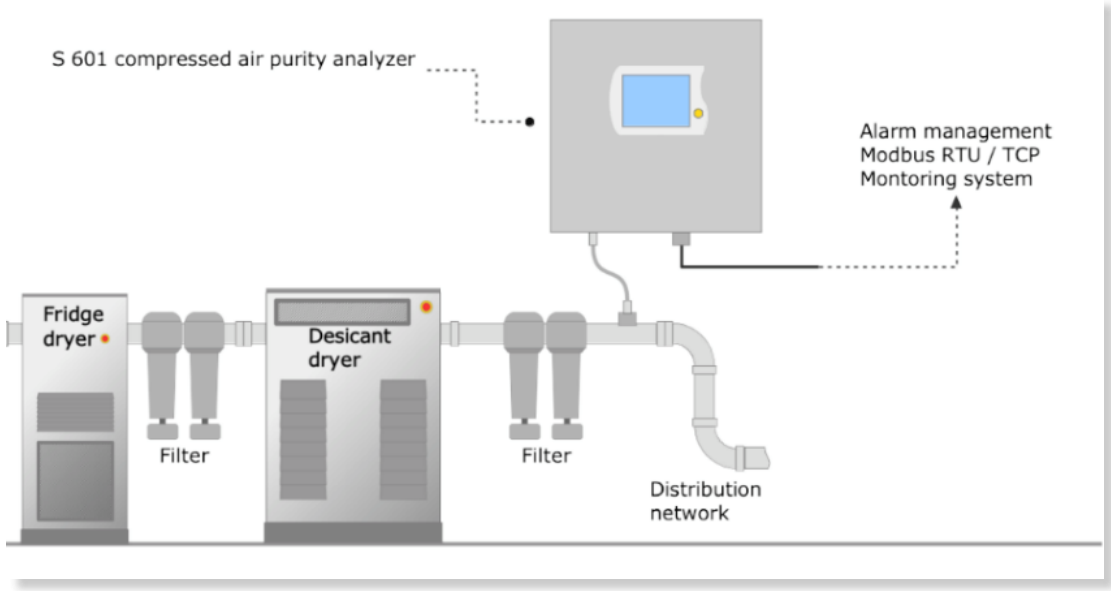
SOLUTION

- Portable compressed air monitoring solution with 4G connectivity to remotely monitor. Saving time and money on visiting these facilities.

Where and How to Install



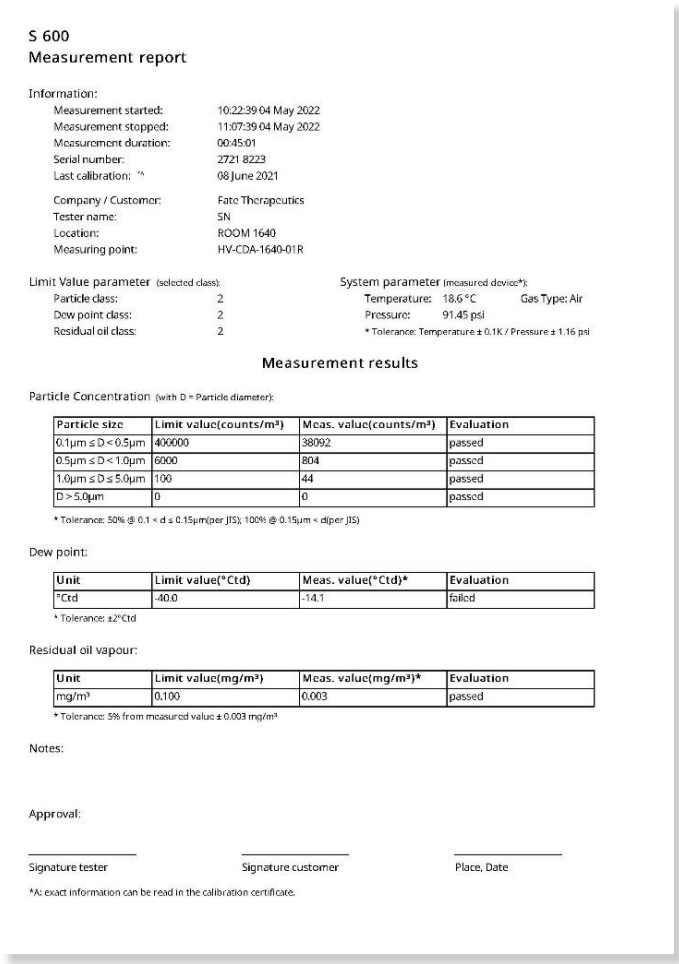
Fixed Unit vs Portable Unit



- For constant monitoring and data gathering at generation system
- Connectivity to BMS System
- To monitor quality at point of use and different locations throughout the plant
- 4G Remote data visualization

Compressed Air Quality Audits

- Accurate same day results
- ISO 8573-1 compliance
- Measurements from 1 to 24 hrs
- No need to wait days for lab results
- Choose class 1 to 5 on ISO 8573-1
- Portable unit – Plug & Play



S 600
Measurement report

Information:

Measurement started:	10:22:39 04 May 2022
Measurement stopped:	11:07:39 04 May 2022
Measurement duration:	00:45:01
Serial number:	2721 8223
Last calibration: *A	08 June 2021
Company / Customer:	Fate Therapeutics
Tester name:	SN
Location:	ROOM 1640
Measuring point:	HV-CDA-1640-01R

Limit Value parameter (selected class):

Particle class:	2
Dew point class:	2
Residual oil class:	2

System parameter (measured device*):
Temperature: 18.6 °C Gas Type: Air
Pressure: 91.45 psi
* Tolerance: Temperature ± 0.1K / Pressure ± 1.16 psi

Measurement results

Particle Concentration (with D = Particle diameter):

Particle size	Limit value(counts/m³)	Meas. value(counts/m³)	Evaluation
0.1µm ≤ D < 0.5µm	400000	38092	passed
0.5µm ≤ D < 1.0µm	6000	804	passed
1.0µm ≤ D ≤ 5.0µm	100	44	passed
D > 5.0µm	0	0	passed

* Tolerance: 50% @ 0.1 < d ≤ 0.15µm(per JIS); 100% @ 0.15µm < d(per JIS)

Dew point:

Unit	Limit value(°Ctd)	Meas. value(°Ctd)*	Evaluation
°Ctd	-40.0	-14.1	failed

* Tolerance: ±2°Ctd

Residual oil vapour:

Unit	Limit value(mg/m³)	Meas. value(mg/m³)*	Evaluation
mg/m³	0.100	0.003	passed

* Tolerance: 5% from measured value ± 0.003 mg/m³

Notes:

Approval:

Signature tester | Signature customer | Place, Date

*A: exact information can be read in the calibration certificate.

ZERTIFIKAT ◆ CERTIFICATE ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Industrie Service

CERTIFICATE

TÜV SÜD Industrie Service GmbH hereby confirms SUTO iTEC GmbH situated at Werkstrasse 2, 79426 Buggingen/Deutschland, that the product

Portable Compressed Air Purity Analyser S 600 / AirCheck⁴

is suitable for measurements in industrial environment.

The equipment fulfills the requirements for analyzing the following process data:

- **Particle:** **ISO EN DIN 14644-1 / DIN 8573 / GMP Annex1**
- **Dew point:** **DIN 8573**
- **Oil vapor:** **ZLG / AIM 07120604**
- **Pressure:** **DIN 1301**
- **Temperature:** **DIN 60751**
- **Air germ accumulation:** **GMP Annex1**

The basic concept for issuing the certificate is for assessing and evaluating the test-point of the product design, workmanship, usage-functionality and technical documentation as well as the GMP-Equipment qualification documents.

The implementation of the testing and certification is carried out by TÜV SÜD Industrie Service GmbH.

Certificate Nr.: 2475654-01
Report-Nr.: 2475654-1
Valid till: July 2018

Dipl.-Ing. (FH) Walter Ritz
Berlin, 06. October 2017
TÜV SÜD Industrie Service GmbH
Wittestraße 30, Haus L, 13509 Berlin

About the Speaker

Thomas Fischer
SUTO-iTEC

- CEO & Founder of SUTO iTEC
- 35 years experience in R&D of Measurement Technologies
- Born 1960 in Germany
- Master Electronics Engineering
- Lives in Hong Kong & Shenzhen since 1999

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ISO 8573

Compressed Air - Contaminants & Purity

Introduction and Overview

25. August 2022

Thomas Fischer

ISO

INTERNATIONAL STANDARD

ISO 8573-1

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Topic

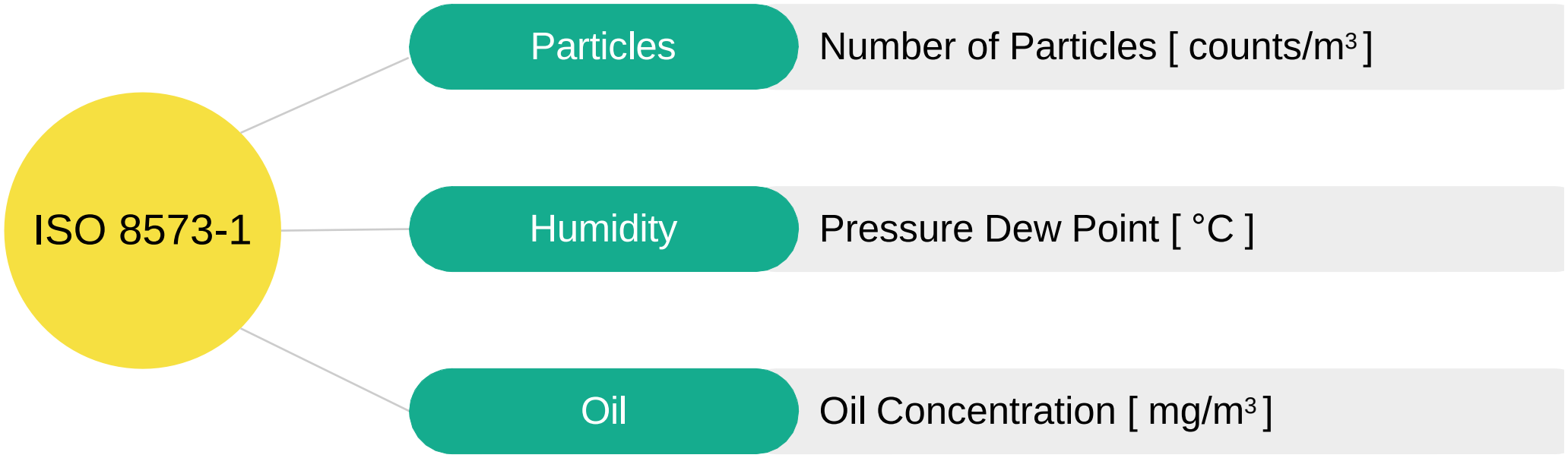
1. Introduction to ISO 8573
2. ISO 8573-1 Purity Classes
3. Oil Measurement ISO 8573 Part 2 and 5
4. Humidity Measurement ISO 8573 Part 3
5. Particle Measurement ISO 8573 Part 4
6. Summary

Introduction

ISO 8573-1: Part 1 defines Compressed Air Purity Classes

Introduction

ISO 8573-1: Part 1 defines Compressed Air Purity Classes



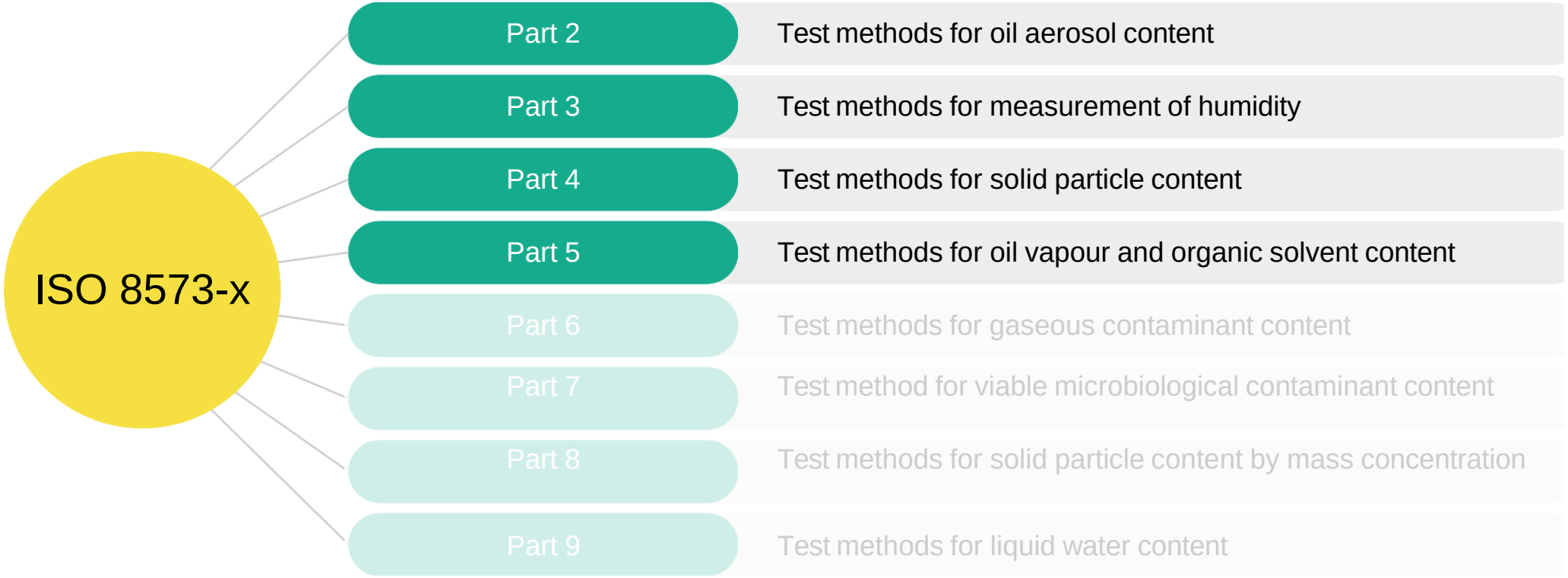
Introduction

ISO 8573-1: Part 1 defines Compressed Air Purity Classes

Class	Particles			Pressure Dew Point	Oil Concentration
	cn/m3			°C (°F)	mg/m3
	0.1 < d ≤ 0.5 µm	0.5 < d ≤ 1.0 µm	1.0 < d ≤ 5.0 µm		
0	As specified by the equipment user or supplier and more stringent than class 1				
1	≤ 20 000	≤ 400	≤ 10	≤ - 70.0 (- 94.0)	≤ 0.01
2	≤ 400 000	≤ 6 000	≤ 100	≤ - 40.0 (- 40.0)	≤ 0.1
3	not specified	≤ 90 000	≤ 1 000	≤ - 20.0 (- 4.0)	≤ 1
4	not specified	not specified	≤ 10 000	≤ + 3.0 (+ 37.4)	≤ 5
5	not specified	not specified	≤ 100 000	≤ + 7.0 (+ 44.6)	> 5
6	X	X	X	≤ + 10.0 (+ 50.0)	X

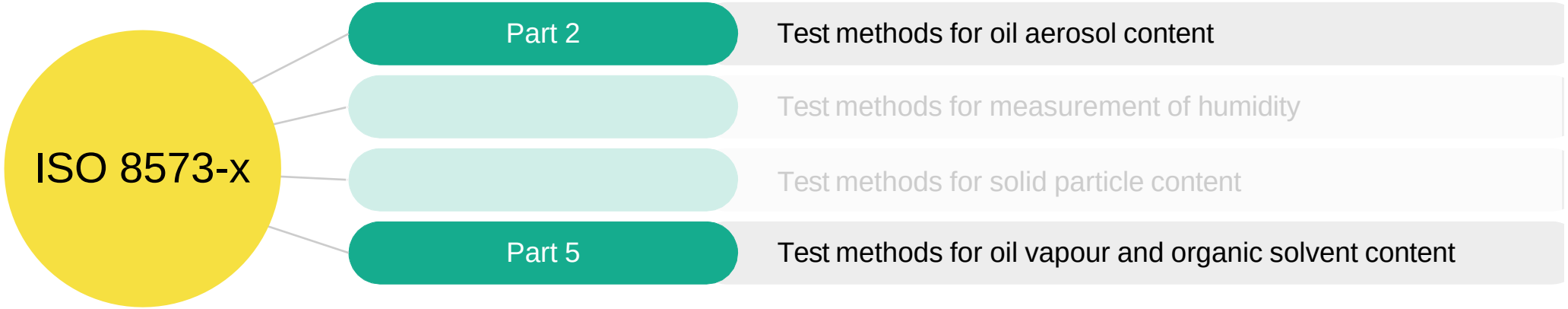
Introduction

ISO 8573-x: Parts 2 - 9 are providing informations, procedures and recommendations to measure these parameters

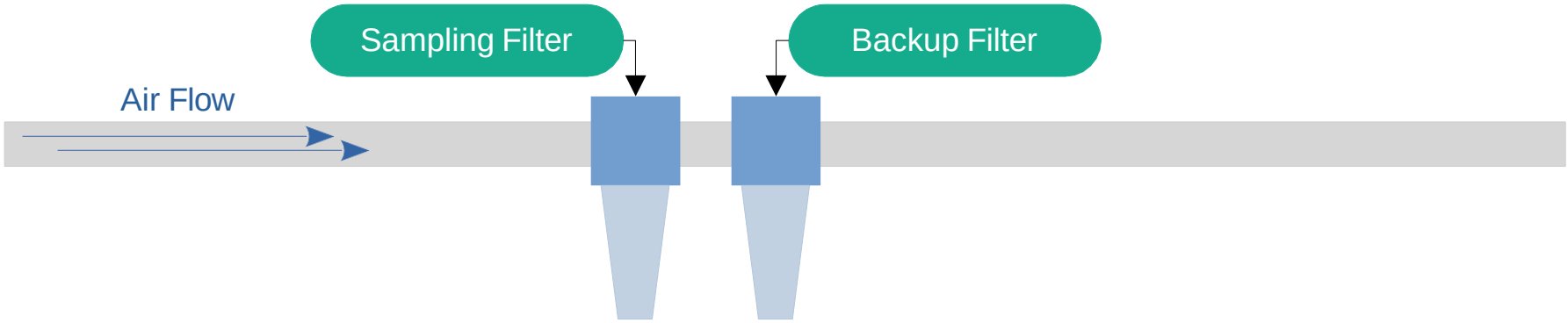


Oil Measurement

Oil Measurement: ISO 8573 Part 2 & Part 5
Test Methods for **Oil Aerosol** and **Vapour**



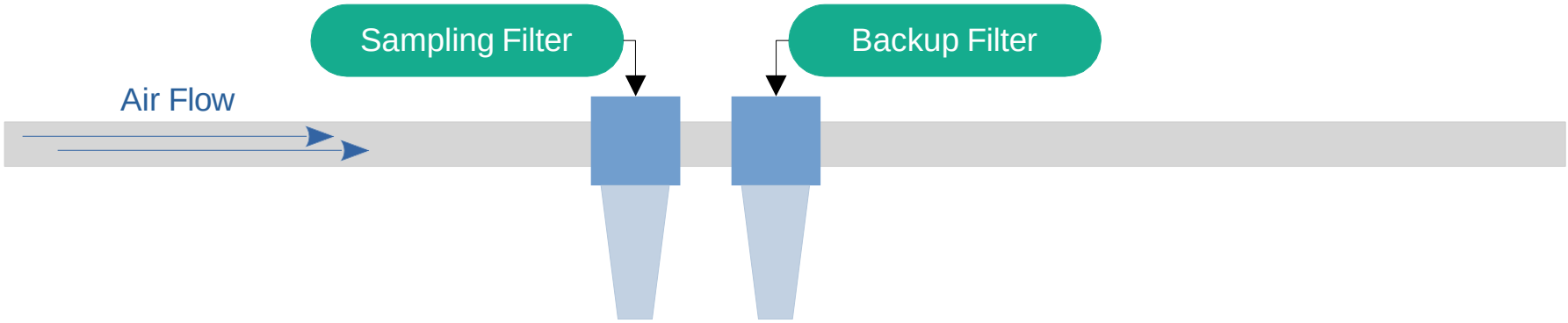
ISO 8573-2: Test methods for oil aerosol content



Method A:

- Filter must be high efficiency coalescing filter according ISO 12500-1
- Collects all oil aerosols
- Separate oil from water to determine oil mass

ISO 8573-2: Test methods for oil aerosol content



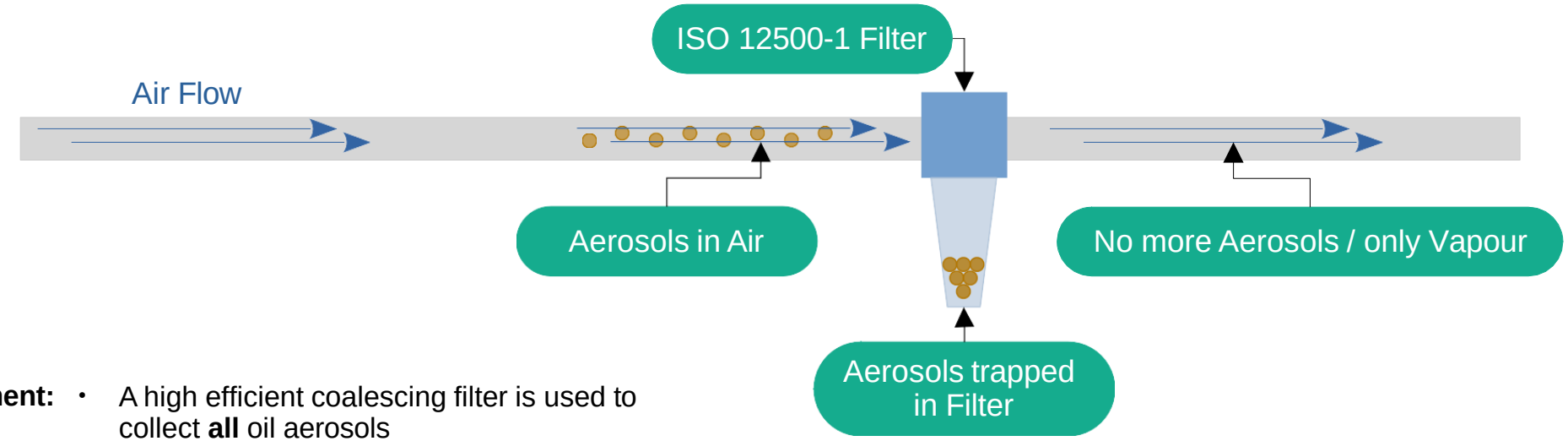
Method A:

- Filter must be high efficiency coalescing filter according ISO 12500-1
- Collects all oil aerosols
- Separate oil from water to determine oil mass

Disadvantage:

- No real time monitoring
- Need to cut the pipe to be installed
- External lab needed
- Can detect > 1 mg/m3 → only for Class 3 of worse
- 50… 200 h of sampling

ISO 8573-2: Test methods for oil aerosol content

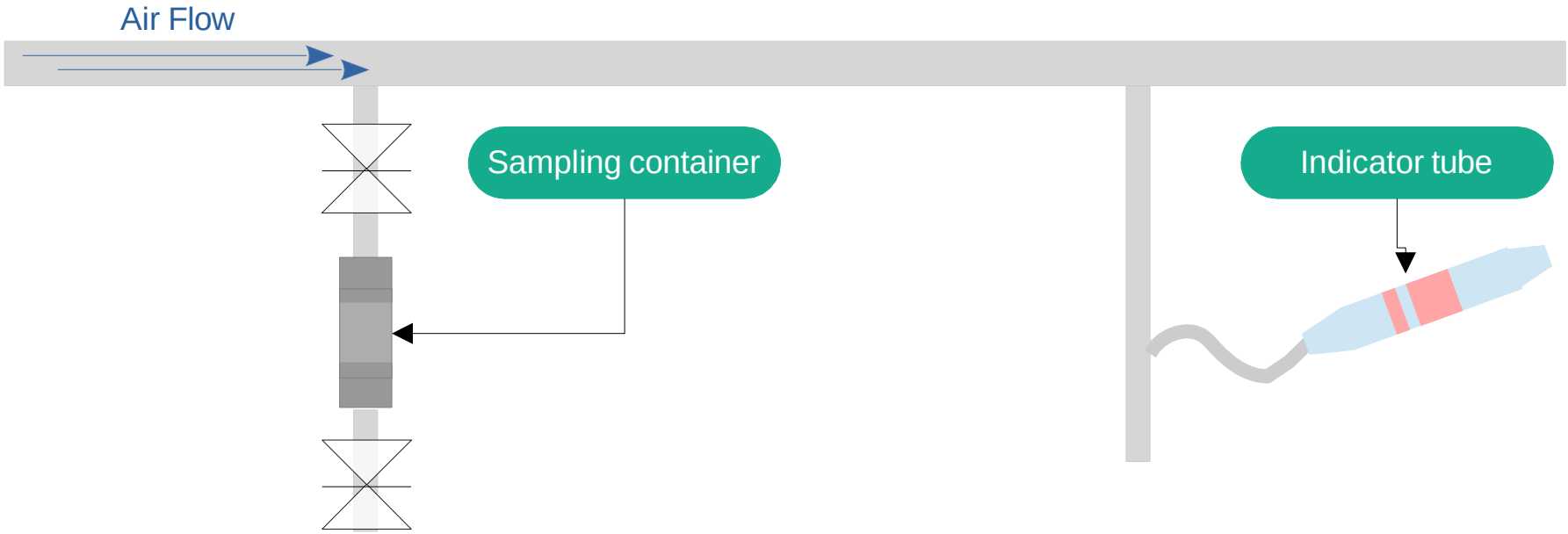


Statement:
- A high efficient coalescing filter is used to collect **all** oil aerosols

Practically:
- After such a filter, no aerosols should exist anymore
- Only leftover is **vapour**

Result:
- **We have to measure the Oil Vapour as most important parameter**

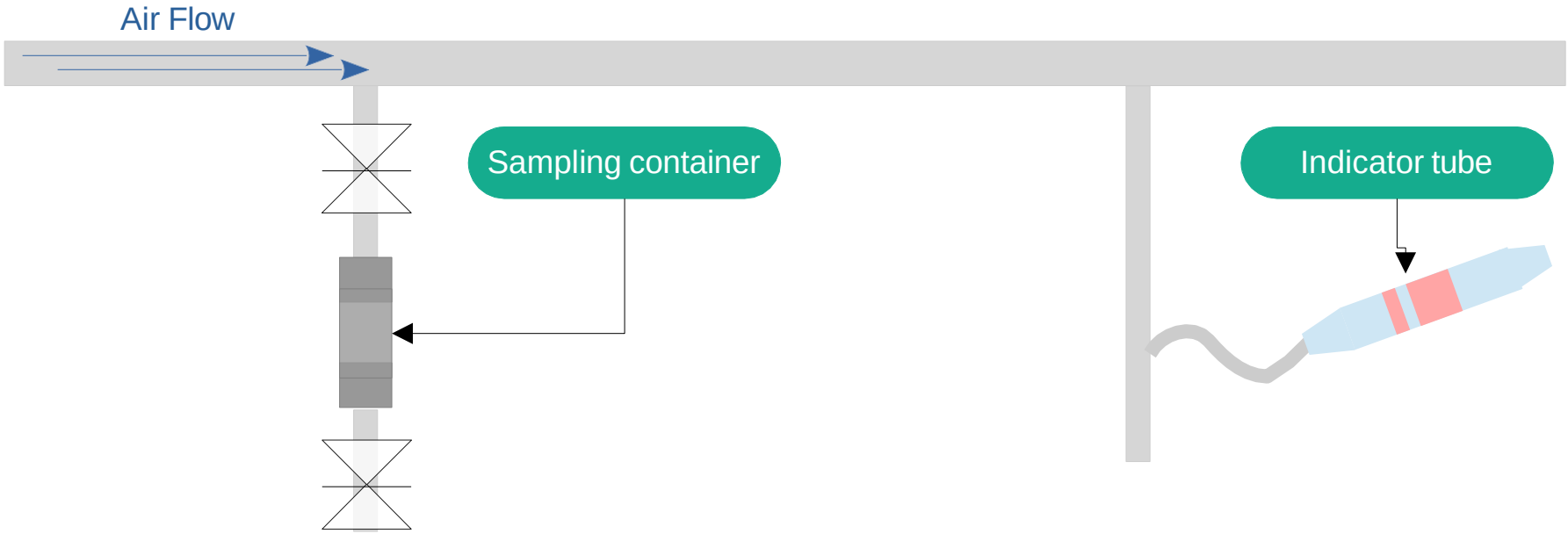
ISO 8573-5: Test methods for oil vapor



Method A:
- Using sealed sampling containers
- Analyze gas in external laboratory

Method B:
- Using indicator tubes

ISO 8573-5: Test methods for oil vapor



Method A:

- Using sealed sampling containers
- Analyze gas in external laboratory

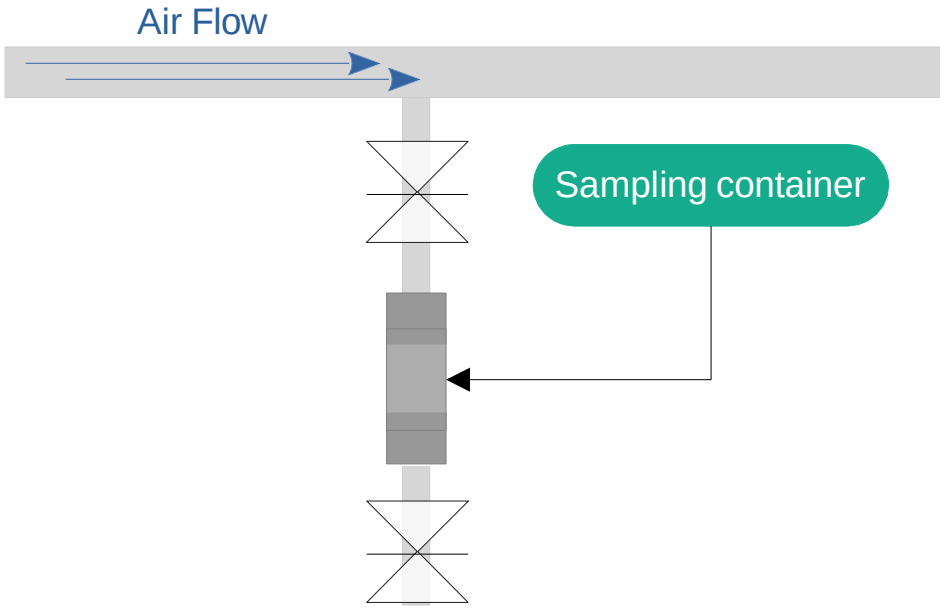
Method B:

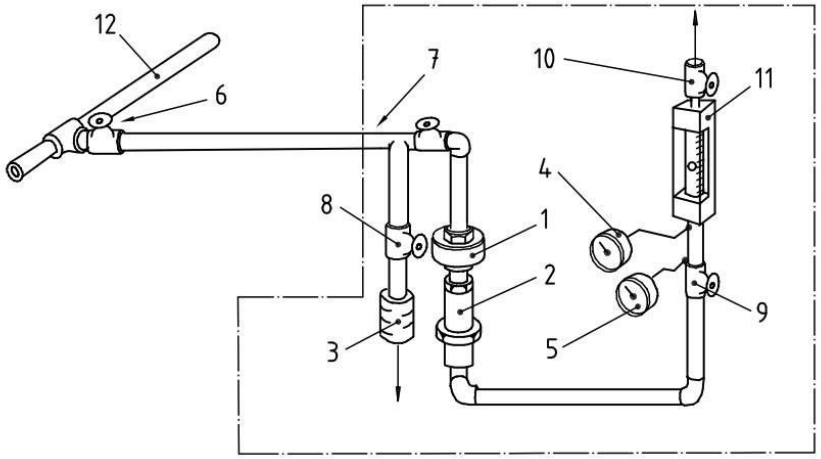
- Using indicator tubes

Fact:

- Accuracy +/- 20%
- only suited for > 0.1 mg/m3
- indication → not a measurement

ISO 8573-5: Test methods for oil vapor





Real installation schematic as in ISO 8573-5

Method A:

- Using sealed sampling containers
- Analyze gas in external laboratory

Disadvantage:

- No real time monitoring
- External lab needed → Gas chromatography
- Invasive installation
- High risk of contamination of Sampling container

Oil Measurement

ISO 8573: Oil measurements in compressed air system

Summary

- All described methods involve an external laboratory
- No live monitoring possible at all → Results within weeks
- Invasive installations
- After high efficient coalescing filters Aerosols should not exist → Oil Vapor measurement

Oil Measurement

ISO 8573: Oil measurements in compressed air system

Summary

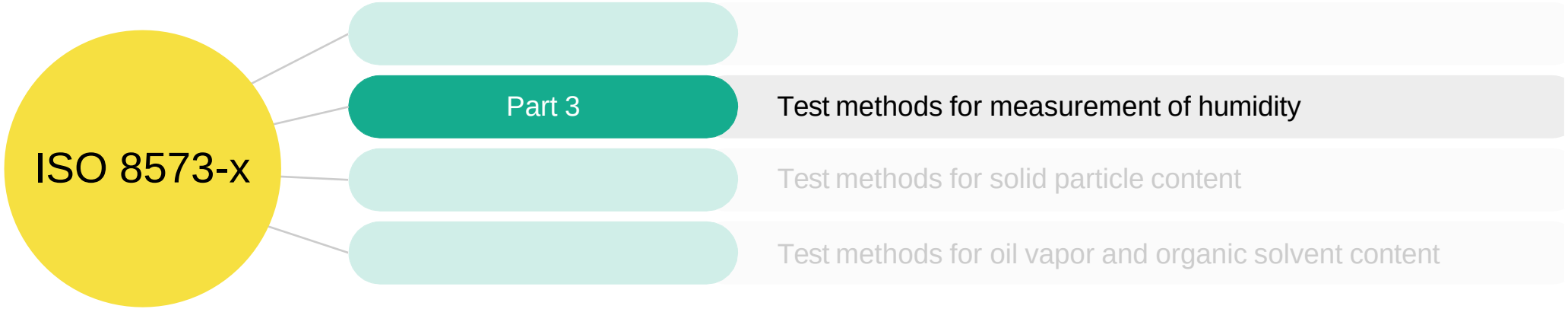
- All described methods involve an external laboratory
- No live monitoring possible at all → Results within weeks
- Invasive installations
- After high efficient coalescing filters Aerosols should not exist → Oil Vapor measurement

Solution

- Oil vapor is most critical parameter to be measured
- PID Sensors are well suited to measure oil vapor
- Instant results → Live monitoring
- Easy to install
- No external laboratory needed

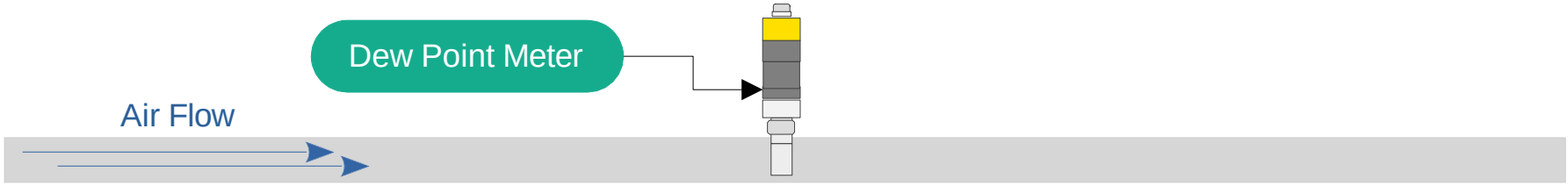
Humidity / Dew Point Measurement

Dew Point Measurement: ISO 8573 Part 3
Test Methods for measurement of **Humidity**



Humidity / Dew Point Measurement

ISO 8573-3: Test methods for measurement of humidity



Methods:

- Humidity is measured as pressure dew point
- Several methods are mentioned for different ranges of pressure dew point
- Electrical sensors based on capacitance

Important:

- Pressure Dew Point to be measured (not Atmospheric Dew Point)
- Pressure to which the dew point refers must be stated → Pressure sensor needed

Humidity / Dew Point Measurement

ISO 8573-3: Test methods for measurement of humidity

Summary

- Described methods are state of the art since 50 years +
- Pressure Dew Point shall be measured
- Sensor should measure lower than -70 °C Td for Class 1
- Pressure at which the dew point was measured must be stated

Humidity / Dew Point Measurement

ISO 8573-3: Test methods for measurement of humidity

Summary

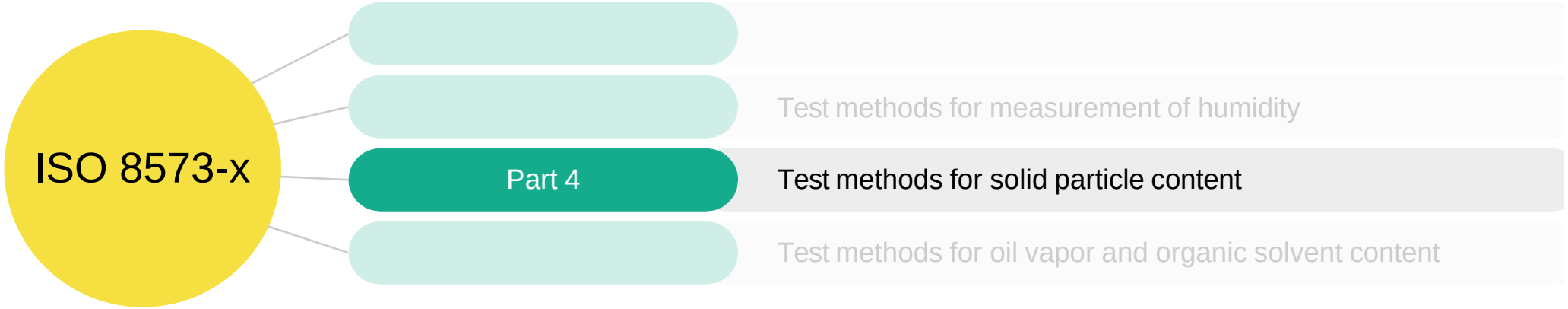
- Described methods are state of the art since 50 years +
- Pressure Dew Point shall be measured
- Sensor should measure lower than -70 °C Td for Class 1
- Pressure at which the dew point was measured must be stated

Solution

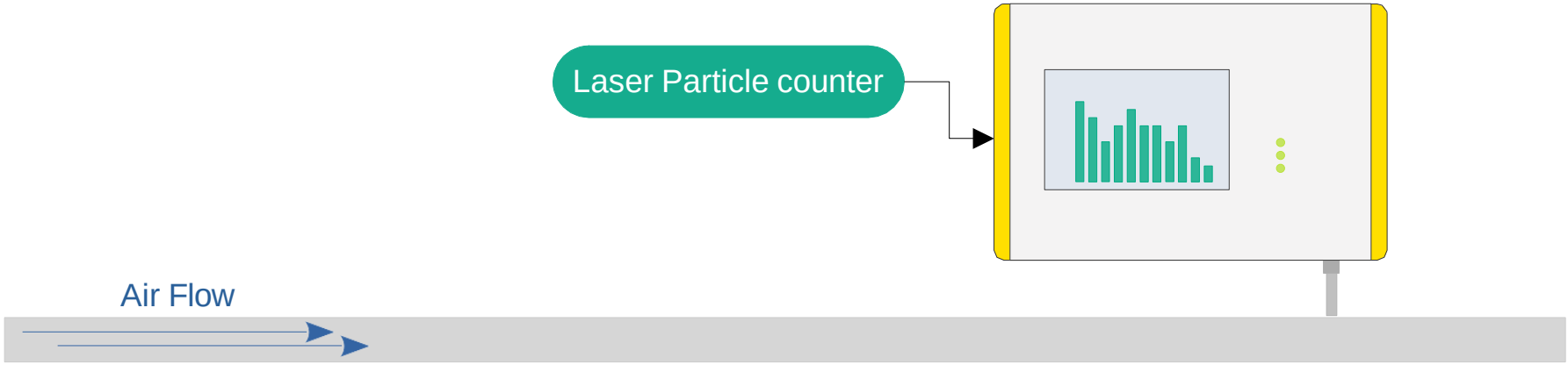
- Dew Point Transmitter with electrical sensor
- Accuracy over whole range < -70 °C Td
- Instant results → Live monitoring
- Easy to install
- Integrated pressure sensor

Particle Measurement

Particle Measurement: ISO 8573 Part 4
Test Methods for **Solid Particle Content**



ISO 8573-4: Test methods for solid particle content



Methods:

- **A:** Sampling disc sampling and sizing/counting by light optical microscopy
- **B:** Sampling disc sampling and sizing/counting by scanning electron microscope
- **C:** Optical particle sizing and counting instrument: **Laser particle counter**

Method A:
→ only for > 5.0 µm
→ not suitable for Class 0… 5
→ External laboratory
→ No live monitoring

Method B:
→ External laboratory
→ No live monitoring

Method C:
→ Live Monitoring
→ State of the art
→ Easy to use

ISO 8573-4: Test methods for solid particle content

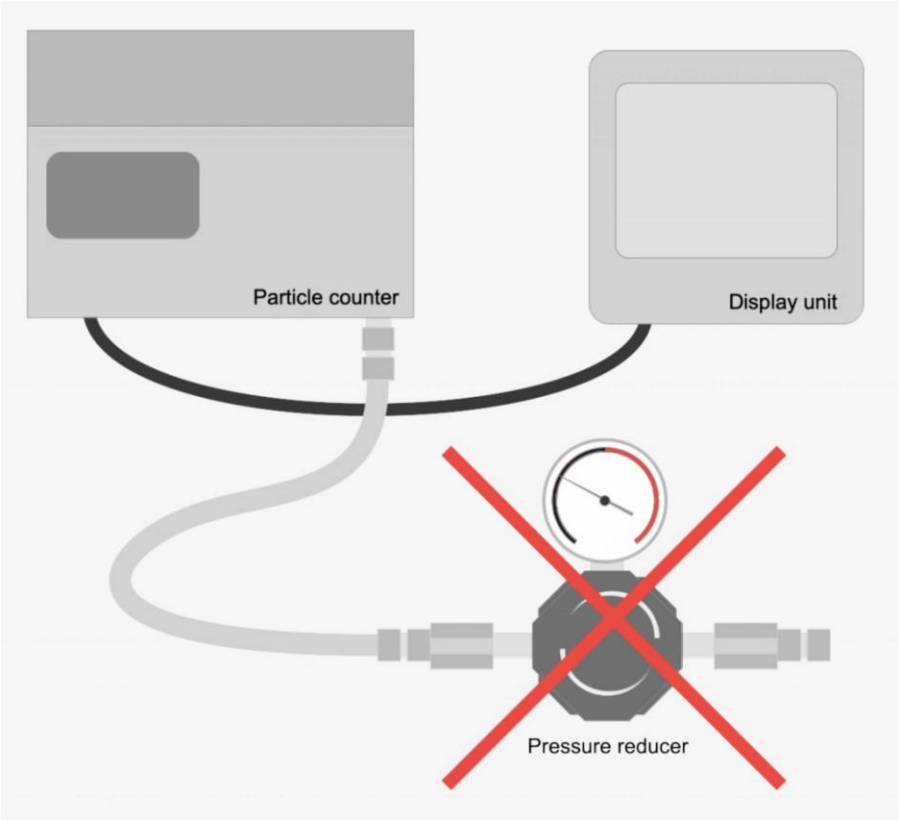
Statements:

- ISO 8573-4 states:
- "a standard **flow control or ball valve should not be used to reduce the pressure** prior to the point of measurement"

ISO 8573-4: Test methods for solid particle content

Statements:

- ISO 8573-4 states:
- "a standard **flow control or ball valve should not be used to reduce the pressure** prior to the point of measurement"
- "**Pressure regulators shall not be used** in place of a compressed air diffuser **to reduce the pressure** and obtain a sample of air"
- "**Pressure regulators are typically not suitable to be used**… due to particle shedding"
- Compressed Air diffusers should be used to reduce the pressure



ISO 8573-4: Test methods for solid particle content

Summary

- Laser particle counters are well suited
- Make sure the range matches with ISO 8573-1 [$0.1 < d \leq 0.5\ \mu m$ | $0.5 < d \leq 1.0\ \mu m$ | $1.0 < d \leq 0.5\ \mu m$ | $5.0 < d$]
- Do not use Pressure reducer in front of instrument
- Only Laser particle counter offer live monitoring

Particle Measurement

ISO 8573-4: Test methods for solid particle content

Summary

- Laser particle counters are well suited
- Make sure the range matches with ISO 8573-1 [$0.1 < d \leq 0.5\ \mu m$ | $0.5 < d \leq 1.0\ \mu m$ | $1.0 < d \leq 0.5\ \mu m$ | $5.0 < d$]
- Do not use Pressure reducer in front of instrument
- Only Laser particle counter offer live monitoring

Solution

- Laser particle counter
- Must have internal or external pressure diffuser
- Instant results → Live monitoring
- Easy to install

ISO 8573 Summary

ISO 8573

- Part 1 defines the purity classes
- Parts 2 - 9 recommending measurement methods
- Often the methods do not offer Live monitoring
- Often external laboratory needed
- Often not practical and invasive
- Not easy to use

ISO 8573 Summary

ISO 8573

- Part 1 defines the purity classes
- Parts 2 - 9 recommending measurement methods
- Often the methods do not offer Live monitoring
- Often external laboratory needed
- Often not practical and invasive
- Not easy to use

Oil Measurement

- ISO 8573 Part 2 & 5 not practical and invasive
- All methods need an external lab
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ISO 8573 Summary

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Particle Measurement

- Sampling disc method not practical
- Laser particle counters are suited
- Never use pressure reducers in front of instrument
- Internal / external pressure diffuser needed

ISO 8573 Summary

ISO 8573

Measurement solutions are available!

Easy to use

Reliable results

Live Monitoring

Thank you

German Precision
and Quality

Contact: Thomas Fischer - thomas.fischer@suto-itec.com

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Please submit your answer in the questions box.

What contributes to Compressed Air PARTICLE Contamination?

A	• Rust
B	• Hydrocarbons
C	• Moisture

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*By entering you are giving permission to announce your name if you are a winner

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Avoiding Production Downtime: Real time ISO 8573-1 Compressed Air Quality Monitoring and Audits

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