

**-I Rischi degli Ambienti di Vita-
Ambiente Lavoro
16 Ottobre 2015**

Monitoraggio on-time dei contaminanti negli ambienti di vita
Scenari evolutivi e orientamenti



Dott.Chim.Ivano Battaglia



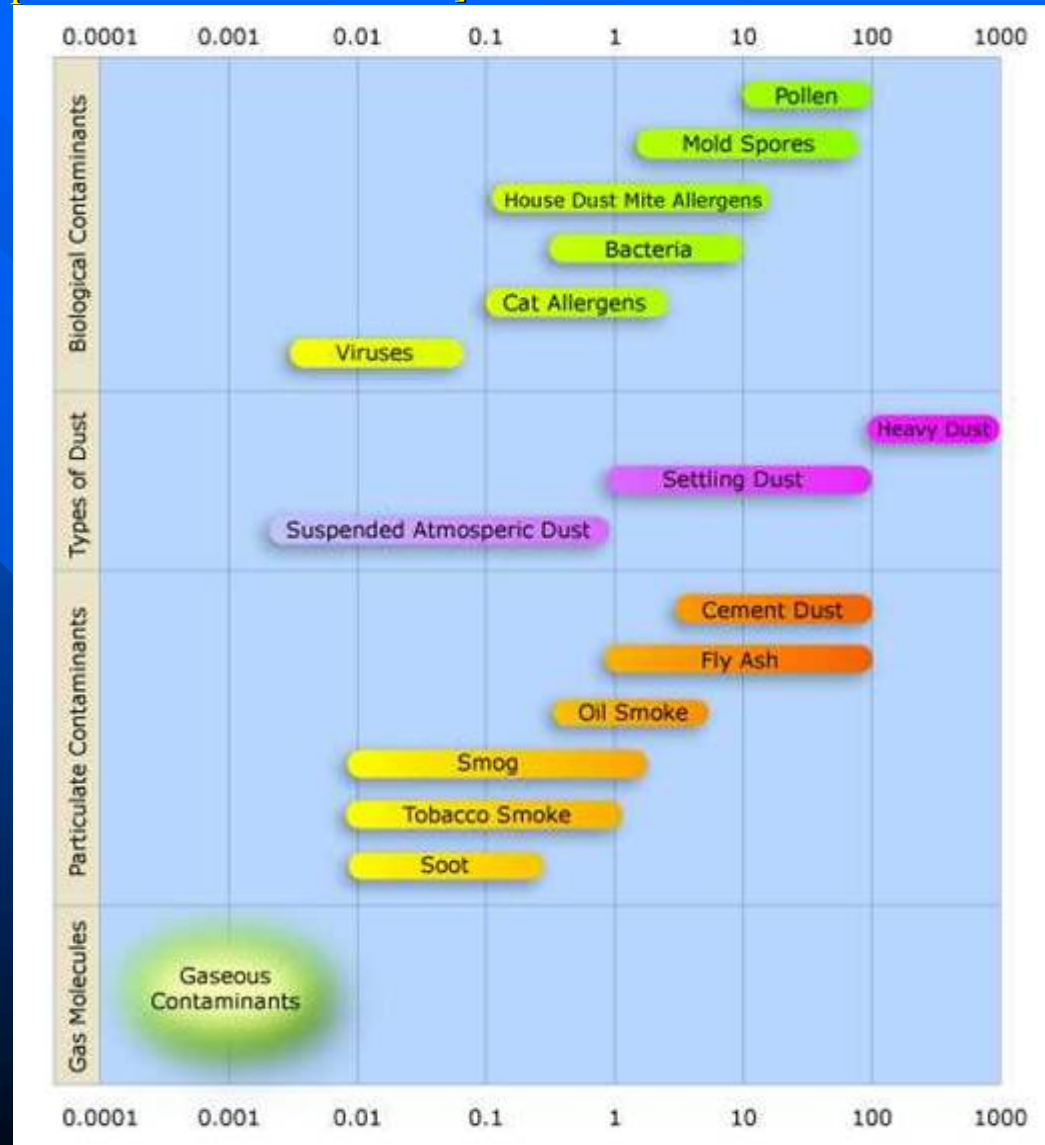
Emissioni

- PM 10

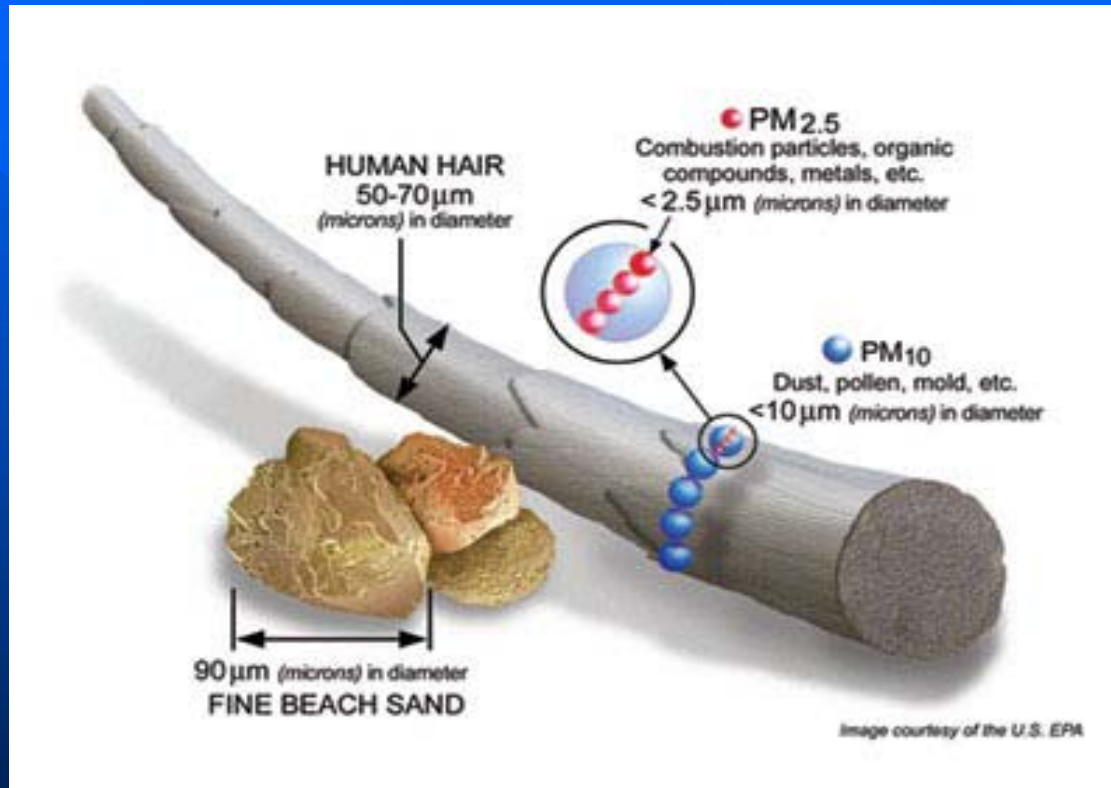


PM-10 / PM-2.5: PM 10 is measure of particles in the atmosphere with a diameter of less than or equal to a nominal 10 micrometers. PM-2.5 is a measure of smaller particles in the air (2.5 micrometers). [<http://www.emsl.com/index.>]

■ PM 10-2.5



Un Capello ,la Sabbia e ... le microParticelle PM 10-2.5





Misurare...



1 nanometro (10^{-9} mt)

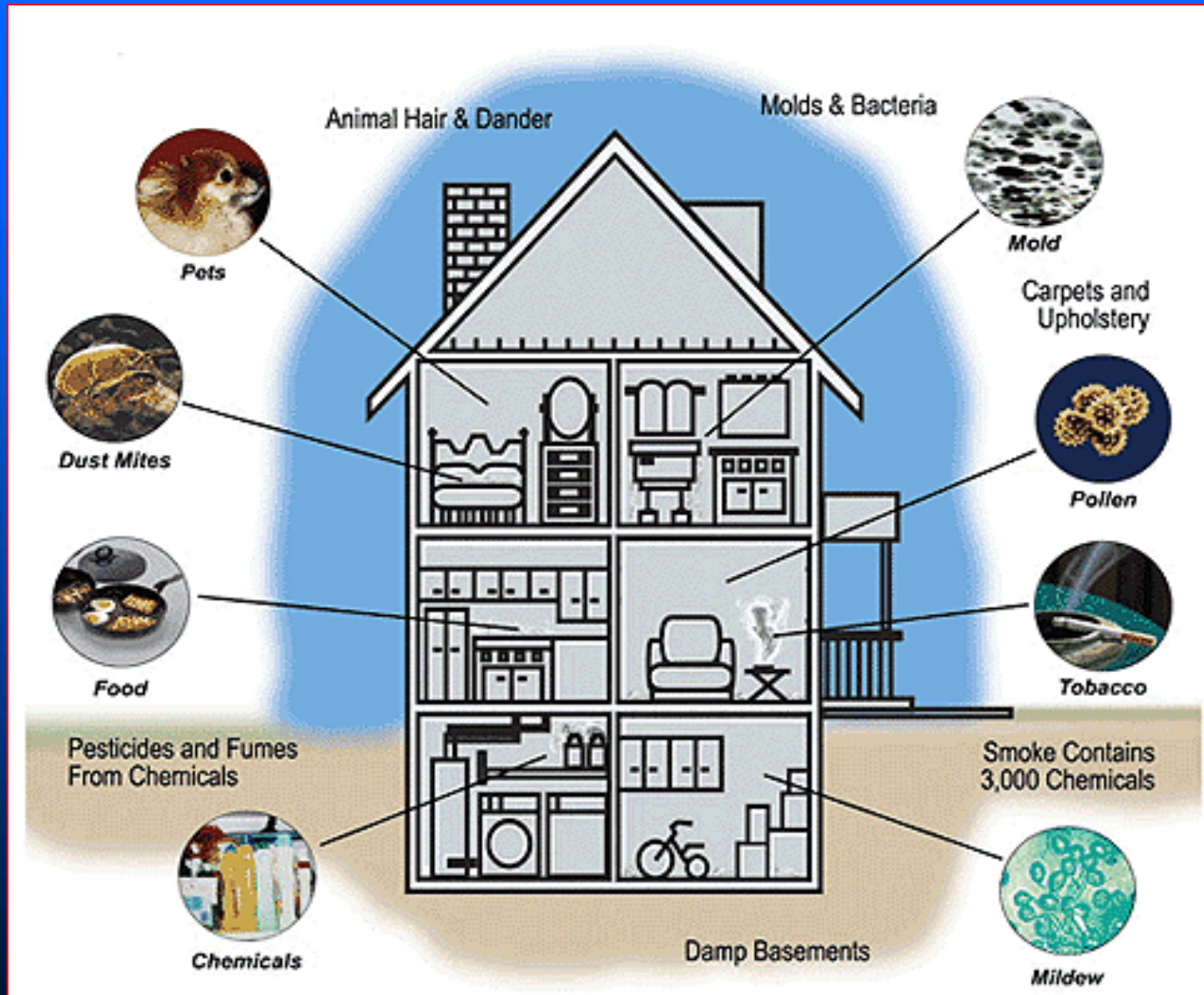
1 mt







BUILDING <> CHEMICAL



**‘..IT IS NOT A MATTER OF OVERREACTION
IT IS ABOUT QUALITY OF LIFE’**





- **UNI** - Ente Nazionale Italiano di Unificazione – associazione privata senza scopo di lucro , riconosciuta dallo Stato e dall’Unione Europea. Elabora, approva e pubblica le **Norme Tecniche** volontarie – “**Norme UNI**” – per i settori industriali, commerciali e del terziario (tranne in quelli elettrico ed elettrotecnico).
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 - **CEN** (Comunità Europea) e
 - **ISO** (Int.Stand.Organ.,Mondiale).



ISO 16000 - Indoor Air Quality

- Part 29 IAQ - Test Methods for VOC detectors (def.)
- Part 26 IAQ - Sampling strategy for CO₂ monitoring (def.)
- Part 34 IAQ - Strat. for the meas. airborne particles (draft)
- Part 37 IAQ - Strat. for meas. PM 2,5 particles (draft)



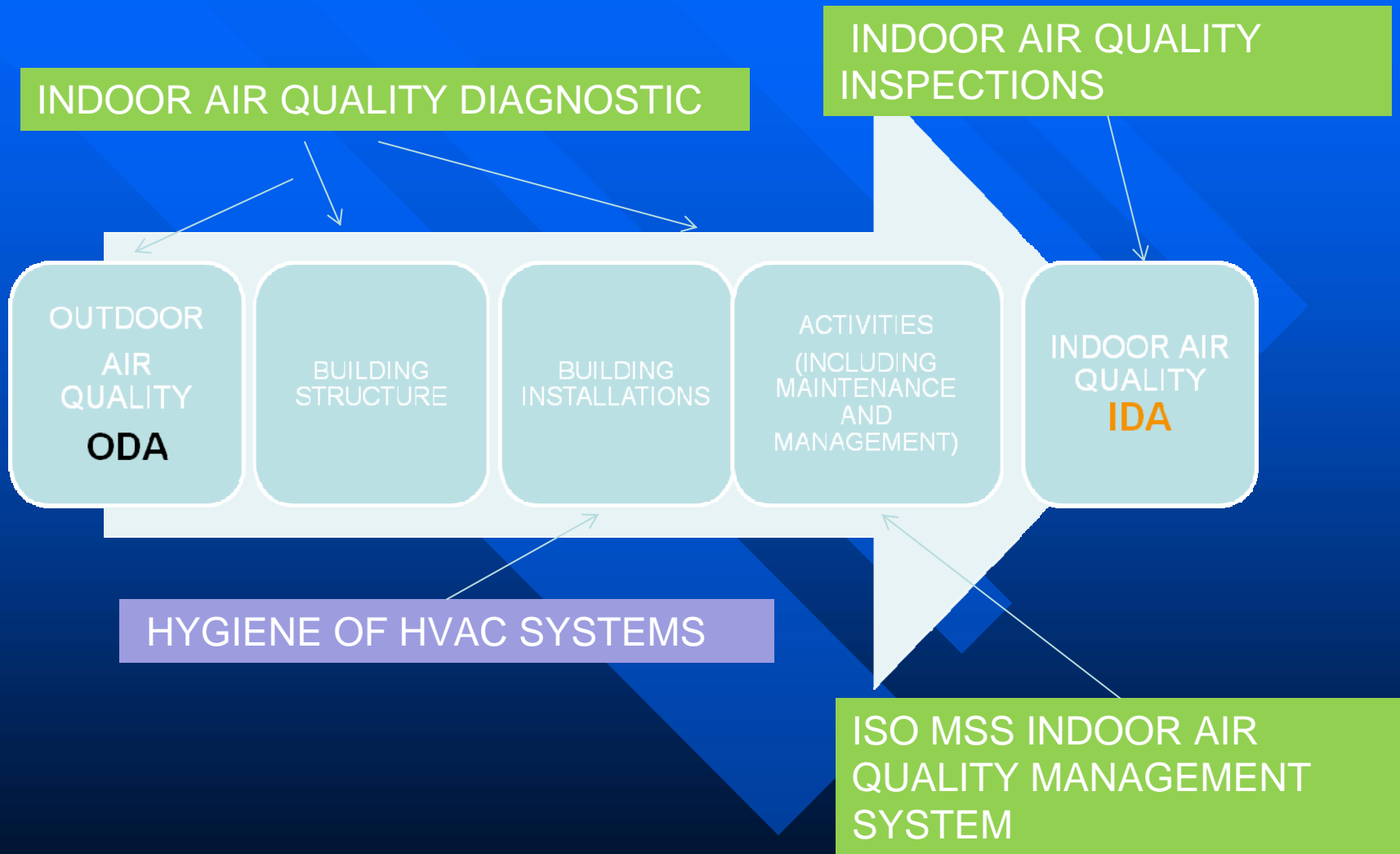
ISO 16000 – I.A.Q.MSSt

ISO-MSSt

Management System Standard



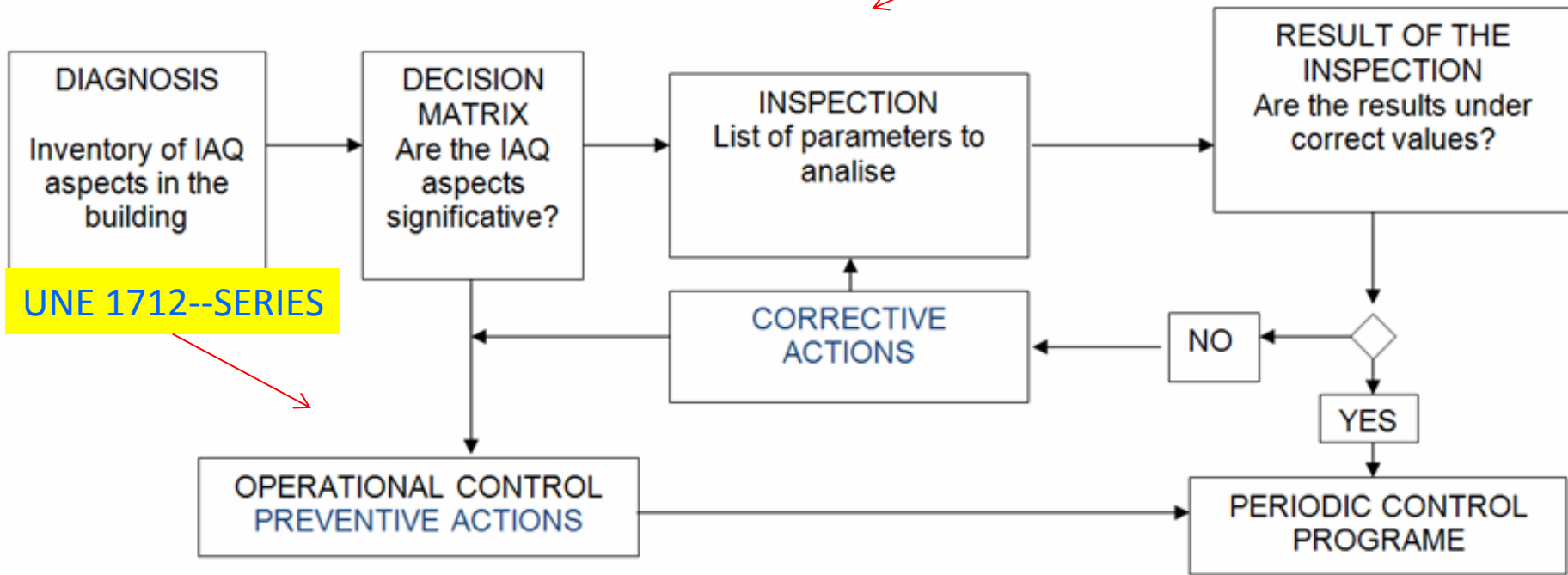
THE ISO APPROACH



PROCESS OF IAQ CONTROL THROUGH UNE 171 STANDARD SERIES

UNE 171330 PART 1

UNE 171330 PART 2
ISO 16000 SERIES



UNE 171330 IAQ MANAGEMENT



Indoor air — — Part 34: Strategies for the measurement of airborne particles (PM 2,5 fraction)

Introduction

Airborne particulate matter (colloquially known as 'fine dust') plays a role not only outdoors, but is also significant in terms of hygiene, especially indoors. People in industrialized countries spend most of the day indoors. Particles are either transported into indoor air from outdoor environments or the particles directly result from indoor sources like smoking, DIY, burning candles, residential wood burning, cooking, using printers etc. The concentration, composition, and size distribution of airborne particulate matter in indoor environments strongly depend on parameters such as the room size, relative humidity, air exchange rate, air flow conditions, and sink effects on surfaces (e.g., walls, ceilings, floor coverings, furnishings). In addition, particles already sedimented are temporarily transferred again to the air through various activities, and can be inhaled. Depending on the particular case, all this can result in highly variable levels of indoor fine dust pollution that are not easily ascertained or assessed in terms of their impact on health.

In the ISO 16000 series, the following rooms are understood to constitute indoor spaces: dwellings with living rooms, bedrooms, work rooms, sport rooms, cellars, kitchens and bathrooms; work spaces or workstations in buildings not subject to controls under industrial safety legislation in terms of airborne pollution (e.g. offices, shops); public buildings (e.g. restaurants, theatres, cinemas and other function rooms) and the passenger compartments of vehicles and all public transport systems (buses, trains, aircraft).



ISO 16000-37 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 6, *Indoor air*.

ISO 16000 consists of the following parts, under the general title *Indoor air* — :

- *Part 1: General aspects of sampling strategy*
- *Part 2: Sampling strategy for formaldehyde*
- *Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air — Active sampling method*
- *Part 4: Determination of formaldehyde — Diffusive sampling method*
- *Part 5: Sampling strategy for volatile organic compounds (VOCs)*
- *Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA® sorbent, thermal desorption and gas-chromatography using MS or MS-FID*
- *Part 7: Sampling strategy for determination of airborne asbestos fibre concentrations*
- *Part 8: Determination of local mean ages of air in buildings for characterizing ventilation conditions*
- *Part 9: Determination of the emission of volatile organic compounds from building products and furnishing — Emission test chamber method*
- *Part 10: Determination of the emission of volatile organic compounds from building products and furnishing — Emission test cell method*
- *Part 11: Determination of the emission of volatile organic compounds from building products and furnishing — Sampling, storage of samples and preparation of test specimens*
- *Part 12: Sampling strategy for polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and polycyclic aromatic hydrocarbons (PAHs)*
- *Part 13: Determination of total (gas and particle-phase) polychlorinated dioxin-like biphenyls (PCBs) and polychlorinated dibenzo-p-dioxins/dibenzofurans (PCDDs/PCDFs) — Collection on sorbent-backed filters*





- Part 14: Determination of total (gas and particle-phase) polychlorinated dioxin-like biphenyls (PCBs) and polychlorinated dibenzo-p-dioxins/dibenzofurans (PCDDs/PCDFs) — Extraction, clean-up and analysis by high-resolution gas chromatography and mass spectrometry
- Part 15: Sampling strategy for nitrogen dioxide (NO₂)
- Part 16: Detection and enumeration of moulds — Sampling by filtration
- Part 17: Detection and enumeration of moulds — Culture based method
- Part 18: Detection and enumeration of moulds — Sampling by impaction
- Part 19: Sampling strategy for moulds
- Part 21: Detection and enumeration of moulds — Sampling from materials
- Part 23: Performance test for evaluating the reduction of formaldehyde concentrations by sorptive building materials
- Part 24: Performance test for evaluating the reduction of volatile organic compound (except formaldehyde) concentrations by sorptive building materials
- Part 25: Determination of the emission of semi-volatile organic compounds by building products — Micro-chamber method
- Part 26: Sampling strategy for carbon dioxide (CO₂)
- Part 27: Determination of settled fibrous dust on surfaces by SEM (scanning electron microscopy) (direct method)
- Part 28: Determination of odour emissions from building products using test chambers
- Part 29: Test methods for VOC detectors
- Part 30: Sensory testing of indoor air
- Part 31: Measurement of flame retardants and plasticizers based on organophosphorus compounds — Phosphoric acid ester
- Part 32: Investigations of constructions on pollutants and other hygienic factors — Inspections

The following parts are in preparation:

- Part 33: Determination of phthalates with GC/MS
- Part 34: General strategies for the measurement of airborne particles
- Part 35: Measurement of polybrominated diphenylether, hexabromocyclododecane and hexabromobenzene
- Part 36: Test method for the reduction rate of airborne bacteria by air purifiers using a test chamber
- Part 37: Strategies for the measurement of PM 2.5

FINAL
DRAFT

INTERNATIONAL
STANDARD

ISO/FDIS
16000-29



ISO/TC 146/SC 6

Secretariat: DIN

Voting begins on:
2014-02-05

Voting terminates on:
2014-04-05

Indoor air —

Part 29: Test methods for VOC detectors

Air intérieur —

Partie 29: Méthodes d'essai pour détecteurs de composés organiques volatils (COV)

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ISO/TC 146/SC 6 N

Date: 2013-05-27

ISO/CD 16000-34

ISO/TC 146/SC 6/WG 20

Secretariat: DIN

Indoor air — — Part 34: Strategies for the measurement of particles (PM 2,5 fraction)

Air intérieur — — — — —

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ISO/TC 146/SC 6 N

Date: 2014-02-20

ISO/CD 16000-37

ISO/TC 146/SC 6/WG 21

Secretariat: DIN

Indoor air — — Part 37: Strategies for the measurement of PM 2.5

Air intérieur — — — — —

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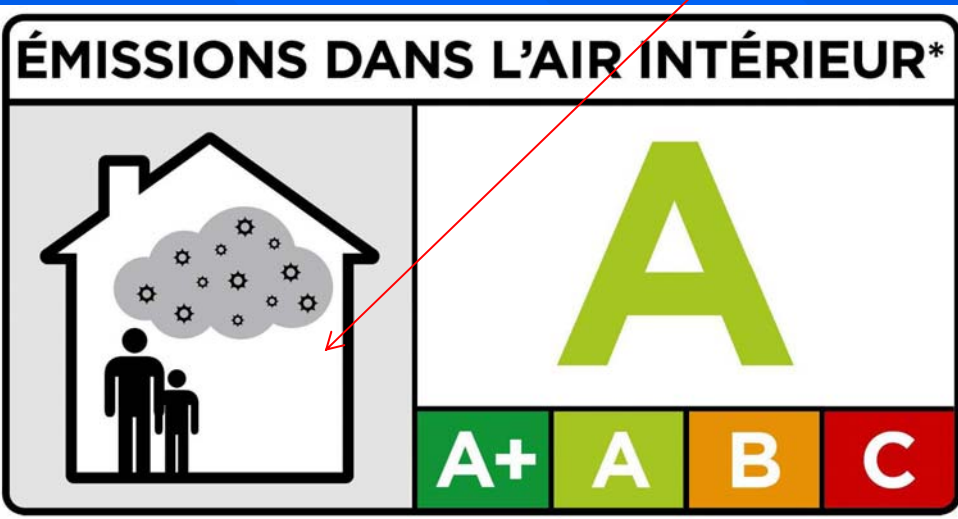
“Indoor Air Quality”...→



- Migliorare le **condizioni abitative**,
- Migliorare la **qualità della vita**
- **Diminuire le malattie**
e
- **PRODURRE SALUTE.**



SCOPE: DIMINISH THE EMISSIONS OF THE MATERIALS, INSTALLATIONS, ACTIVITIES, etc...



Soluzioni strumentali per il monitoraggio di

VOCs ,CO2 ,Formaldeide e PM 10-2.5 in ambienti indoor



Annex ISO 16000 :equivalent meas. IAQ

'La qualità dell'aria indoor: la situazione italiana, i riferimenti, i controlli e le tecnologie'



News

IAQ Monitor

Qualità dell'aria negli ambienti di vita



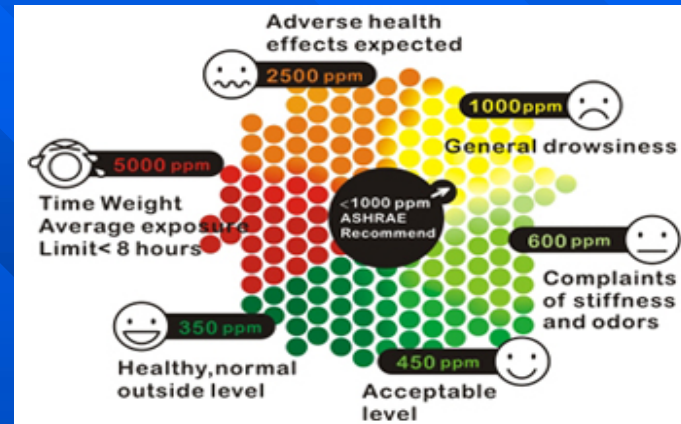
monitoraggio di CO₂

- ✓ Un **ambiente di vita/di lavoro** confortevole migliora il benessere delle persone,
- ✓ La **CO₂** presente negli ambienti confinati è un importante parametro per monitorare la qualità dell'aria,
- ✓ Elevate **concentrazioni di CO₂** si possono produrre velocemente quando molte persone si trovano in ambienti chiusi.



CO2 - Biossido di Carbonio

- ✓ E' un costituente naturale dell'atmosfera (300ppm)
- ✓ Gas inodore e incolore



- ✓ Un eccessivo aumento di CO2 negli ambienti chiusi associato a scarsa ventilazione può causare mal di testa, sonnolenza, perdita di concentrazione

Valori di CO2 Indoor



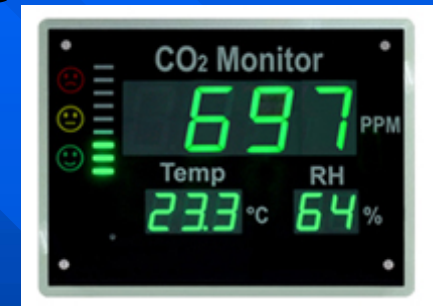
<u>DESCRIZIONE</u>	<u>VALORI USUALI</u> (ppm)	<u>VALORI STANDARD</u> (ppm)
■ Special Indoor Air Quality	< 400	(350)
■ High Indoor Air Quality	400 - 600	(500)
■ Medium Indoor Air Quality	600 – 1000	(800)
■ Low Indoor Air Quality	> 1200	(1200)

Rif. Normativa Europea UNI EN ISO 16000-26

Caratteristiche di 1° LIAQ Monitor



- ✓ Valori di CO2, Temperatura, Umidità in real time
- ✓ Range di Misura fino a 3000ppm
- ✓ Disponibile nella versione 58' o (A4)





Caratteristiche IAQ Monitor

- ✓ Ampio display a LED con tre segnali luminosi



< 800 ppm



800-1200ppm



> 1200 ppm



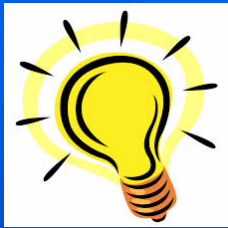
In linea con Normativa di Riferimento Europea per la qualità dell'aria in ambienti di vita **UNI EN ISO 16000-26**

In pratica..

- IAQ Monitor, grazie al display di facile lettura e il design innovativo, è ideale per il controllo della qualità dell'aria in luoghi pubblici come aeroporti, palestre, sale conferenze, ipermarket....



News 2015



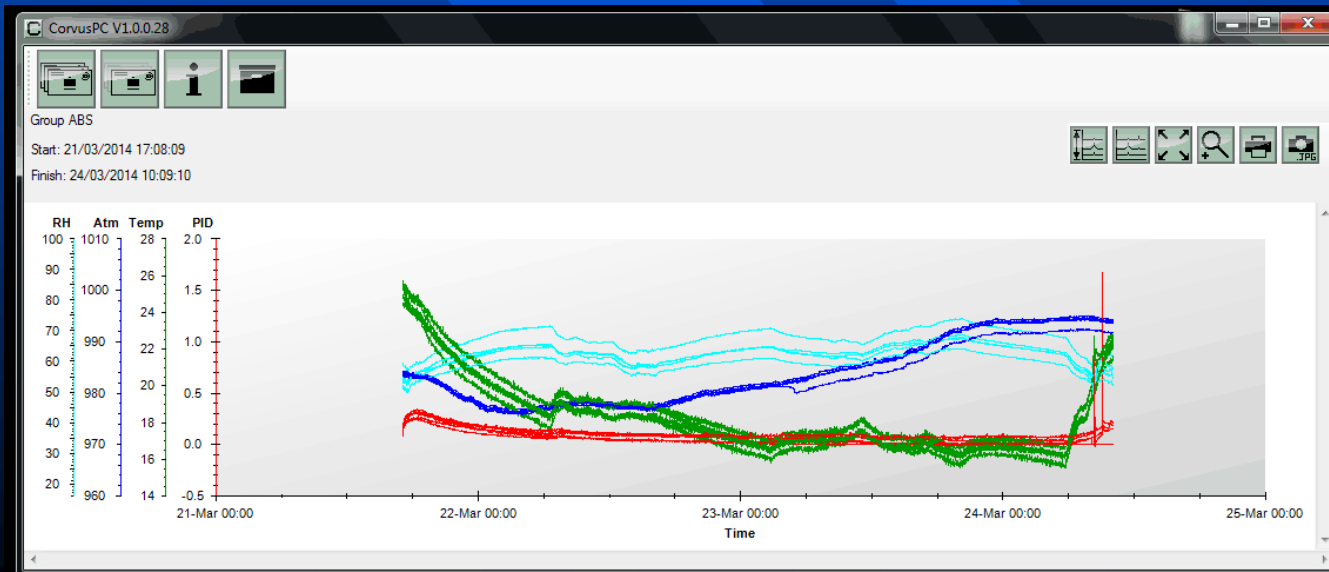
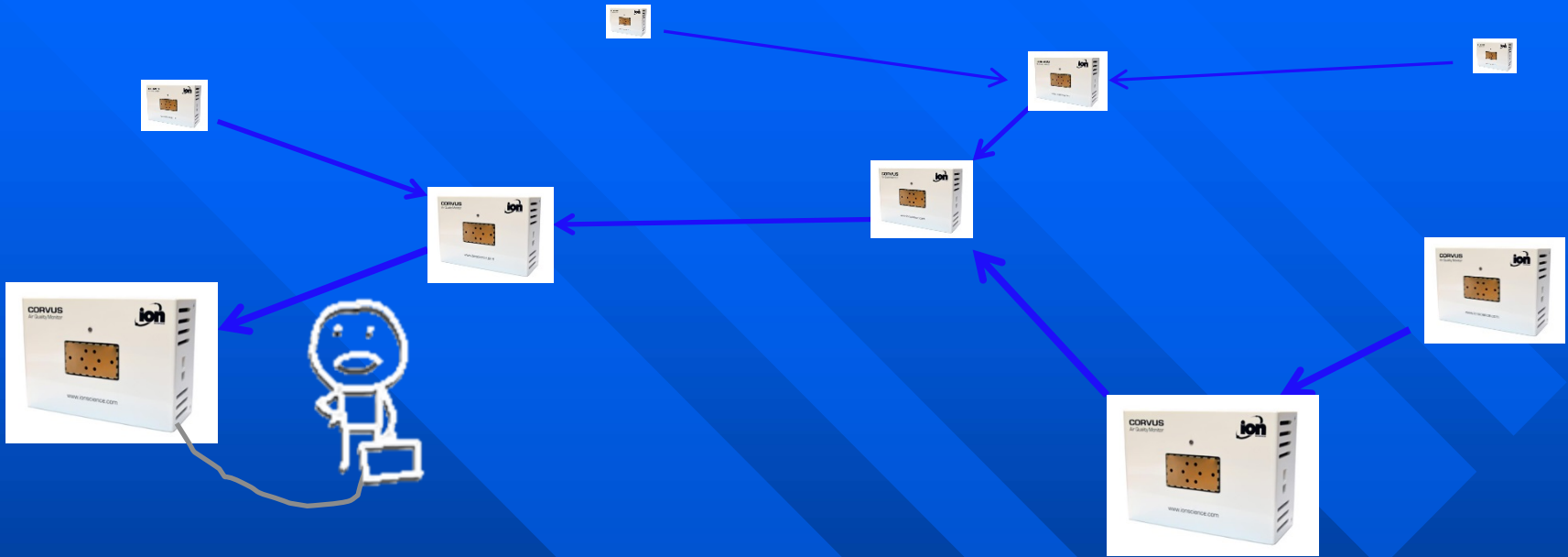
Corvus

VOCs measurement to ppb levels

- + Temperature
- + Relative humidity
- + Barometric pressure
- + Wireless network



Corvus: connettività wireless





Casi di applicazioni in ambienti indoor

Dott. Gianluigi De Gennaro
Dott.ssa Annalisa Marzocca

- Valutazione sui tempi di risposta del dispositivo
- Riproducibilità strumentale
- Coerenza dei dati di VOC con i parametri meteorologici
- Stabilità della connessione e trasferimento dati
- Idoneità per studi outdoor
- Calibrazione del dispositivo in campo

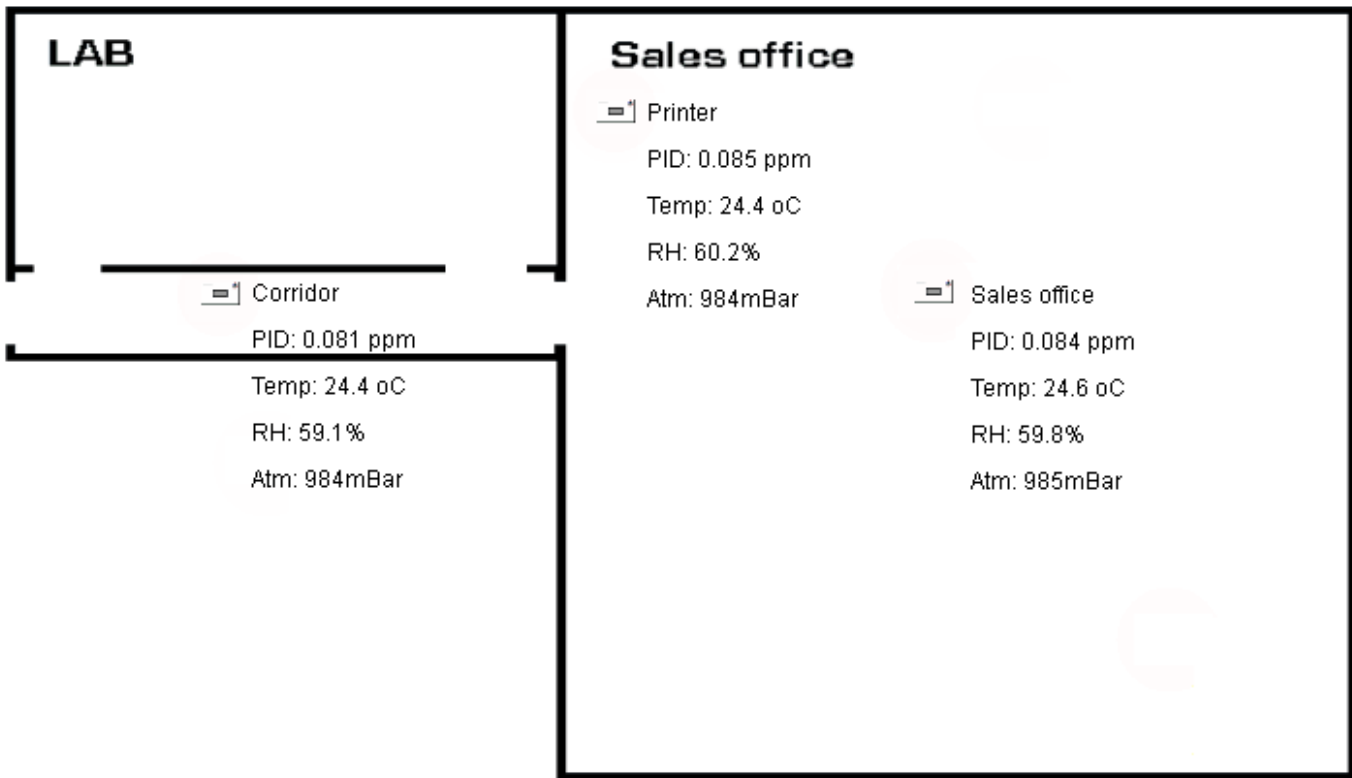


Group ABS

Peak 2.0 ppm



- Corvus
- Corridor**
- Printer
- Sales office



10 samples

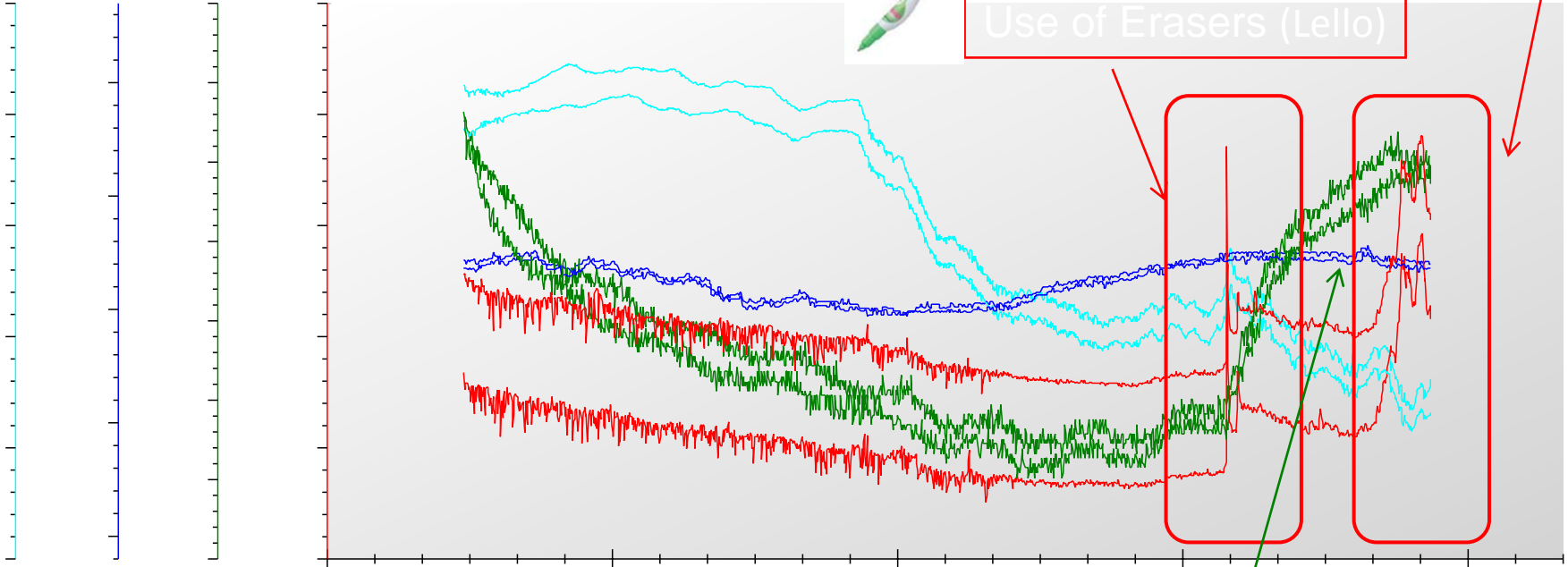
Tutti i parametri



Ore 15.00
flexible use of nearby
laboratory



Use of Erasers (Lello)



RH 80
Atm
Temp 25
PID 0.3
Ore 10.30
Accensione condizionatore
Aumento T, diminuzione RH
Aumento TVOC di fondo

Misura di PM 10-4-2.5 con sistema ottico



Feinstaubmonitore und Aerosolspektrometer

Fidas® 200/210



IMMISSION



ARBEITSPLATZ

Fidas® mobile



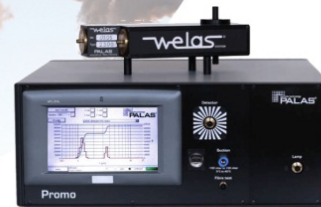
INNENRAUM



EMISSION



Fidas® 100



Promo® 2000/3000





"Il nostro ambiente, il nostro futuro" Tongbram Mahesh Singh

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