
Isolcell
FIRE PREVENTION

Isolcell

CONTROLLED ATMOSPHERE SINCE 1958

A company from SÜDTIROL

Company profile

ISOLCELL

the oldest company operating in the market of Controlled Atmosphere

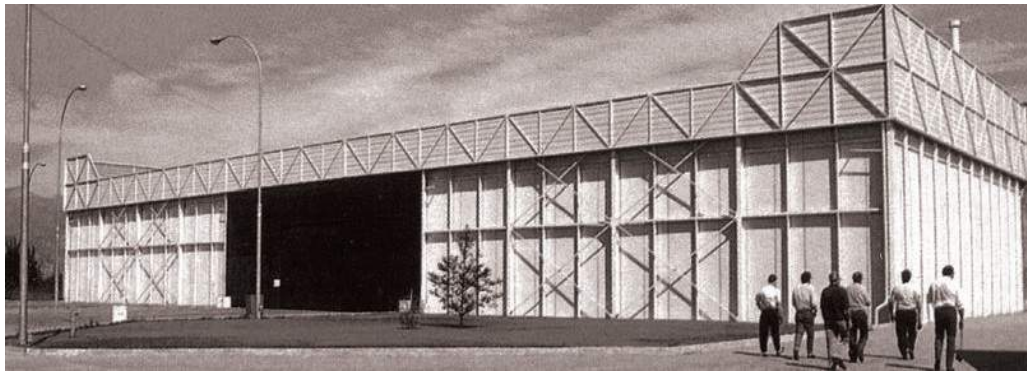
- Founded in 1958
- Part of the “Finanziara Unterland” Group with

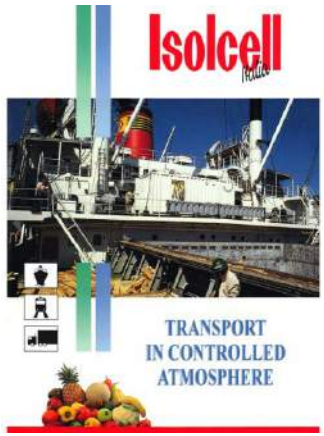
  a turnover of 45M € per year
- Headquarters Laives (Bolzano) | Italy

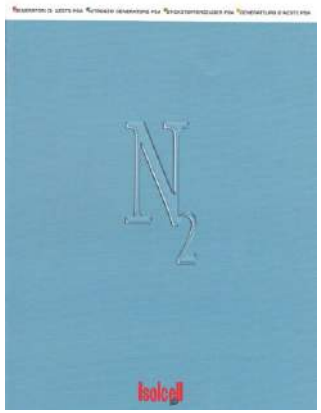
Isolcell
CONTROLLED ATMOSPHERE SINCE 1958

ISOLCELL

60 years of experience







1958	1963	1968	1973	1978	1983	1988	1993	1998	2003	2008

2014

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CONTROLLED ATMOSPHERE SINCE 1958

ISOLCELL

is certified:

- ISO 9001
- ISO 14001
- OHSAS 18001

IQNet

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and its partner
CISQ/IMQ-CSQ
hereby certify that the organization
ISOLCELL ITALIA SPA
VIA MEUCCI 7 - 39055 LAIVES (BZ)
for the following field of activities
Design and realization of machines and plants for treatment and check of atmospheres
has implemented and maintains a
Quality Management System
which fulfills the requirements of the following standard
ISO 9001:2008
Issued on: 2010 - 09 - 10

Registration Number: IT - 25772

Michael Drechsel
President of IQNet

Giovanni Prati
President of CISQ

CSQ

IQNet

CERTIFICATO N. 9190.ISOL
CERTIFICATE N.

ISOLCELL ITALIA SPA

ISO 9001:2008

Progettazione e realizzazione di macchine ed impianti per il trattamento ed il controllo delle atmosfere
Design and realization of machines and plants for treatment and check of atmospheres

2001-12-28 | 2010-09-10 | 2013-12-27

SINCERT

CISQ

Isolcell
CONTROLLED ATMOSPHERE SINCE 1958

A company from SÜDTIROL

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isolcell@isolcell.it - **www.isolcell.com**

QUALITY ISO 9001 ASSURED FIRM

ISO 14001 CERTIFIED ENVIRONMENTAL MANAGEMENT SYSTEM

OCCUPATIONAL HEALTH & SAFETY OHSAS 18001

ISOLCELL

Our philosophy is strongly directed towards Research and Development.

- Isolcell owns more than thirty international patents (European and/or PCT).
- We cooperate with different universities and research centers, for which, on request, we develop purpose made solutions.
- Our company is also a Research Institute accredited by the Ministry of University and Scientific Research.

Ministero dell'Università e della Ricerca Scientifica e Tecnologica

DIPARTIMENTO PER LO SVILUPPO E IL POTENZIAMENTO DELLE ATTIVITA' DI RICERCA
ANAGRAFE NAZIONALE DELLE RICERCHE

Roma, lì 14 giugno 2000
Prot. n. 330/52/8

ISOLCELL ITALIA S.P.A.
VIA A. MEUCCI, 7
39055 LAIVES (BZ)

Oggetto: **Iscrizione schedario Anagrafe Nazionale Ricerche, attribuzione Codice Definitivo**

In relazione alla richiesta di iscrizione allo schedario della Anagrafe Nazionale delle Ricerche si comunica che è stato attribuito il codice definitivo:

51159GTF

Detto codice dovrà essere riportato in tutti gli atti previsti dalla normativa vigente in tema di finanziamenti per la ricerca scientifica e tecnologica.

Il Responsabile dell'ufficio

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CONTROLLED ATMOSPHERE SINCE 1958

ISOLCELL

product sectors

Isolcell STORAGE

Isolcell OENOLOGY

Isolcell FIRE PREVENTION

Isolcell INDUSTRY

Isolcell CULTURAL HERITAGE

Isolcell CONTROLLED ATMOSPHERE SINCE 1958

N_2 FIREFIGHTER : a real sense of security

Isolcell
FIRE PREVENTION

Summary

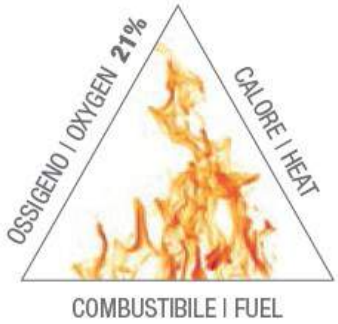
Summary

1. Concept –oxygen reduction priciple

CONCEPT OF PREVENTION

The oxygen content in the atmosphere is reduced by adding inert gas (nitrogen-enriched air) to the atmosphere.

As a result, in the modified atmosphere fire cannot start.

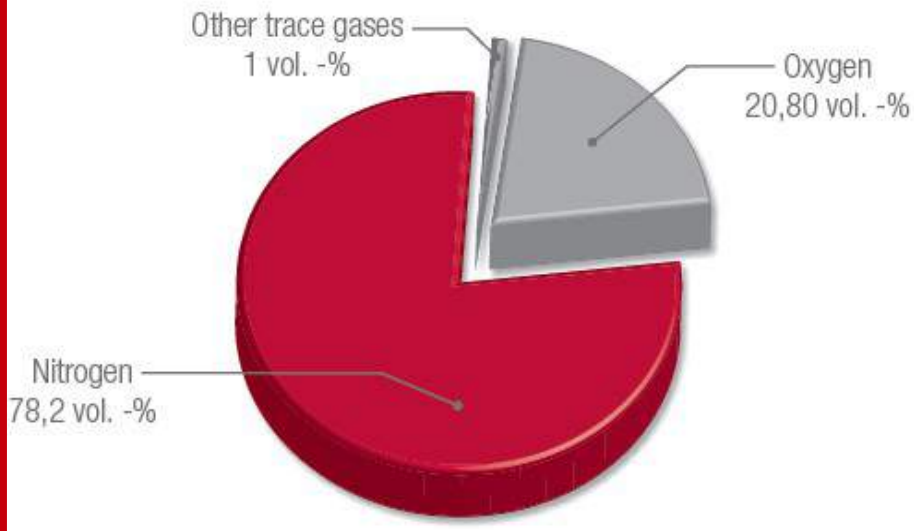


Isolcell FIRE PREVENTION

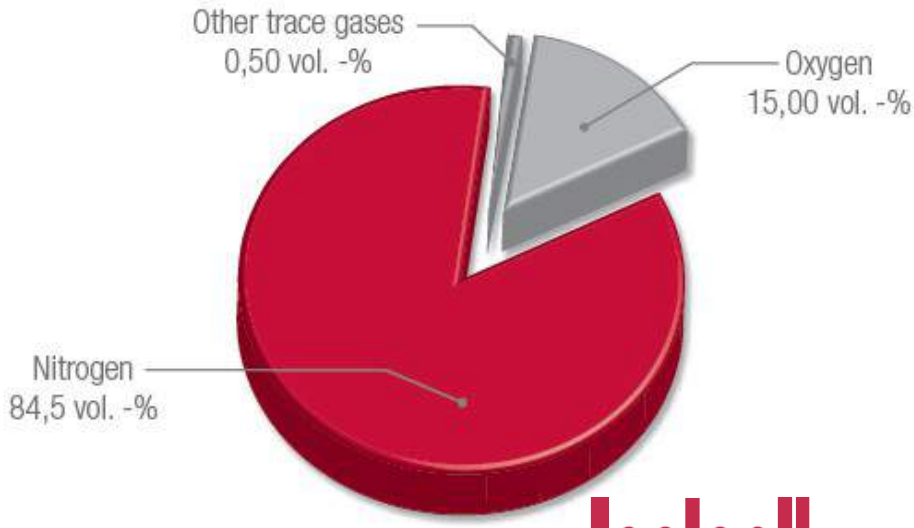
THE MODIFIED ATMOSPHERE

- ORS (oxygen reduction system)
- N2 Firefighter® method is to create an atmosphere in the areas to be protected with a reduced oxygen content compared to normal conditions and maintain it
- To prevent a fire from breaking out, the oxygen content of the air merely has to be lowered by 15 %*

Natural atmosphere



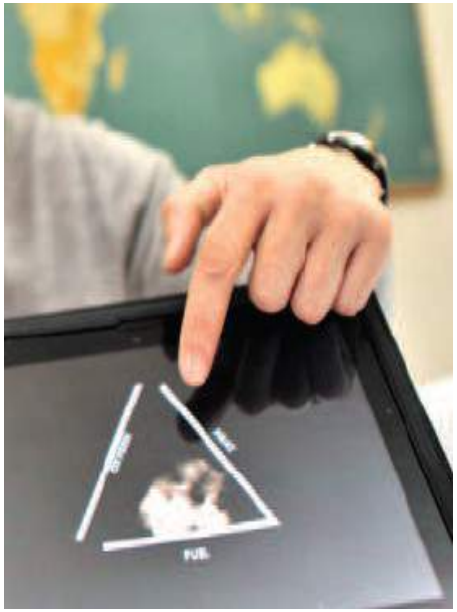
Atmosphere with oxygen 15 vol.-%



*depends on the material to be protected

RESEARCH ROOM

The air is thin, but not a dangerous for human beings. This is not the place for a fire to take hold.



NITROGEN GENERATOR

Different technologies for nitrogen productions.

PSA NIMOS technology

MEMBRANE technology

ADOX® technology

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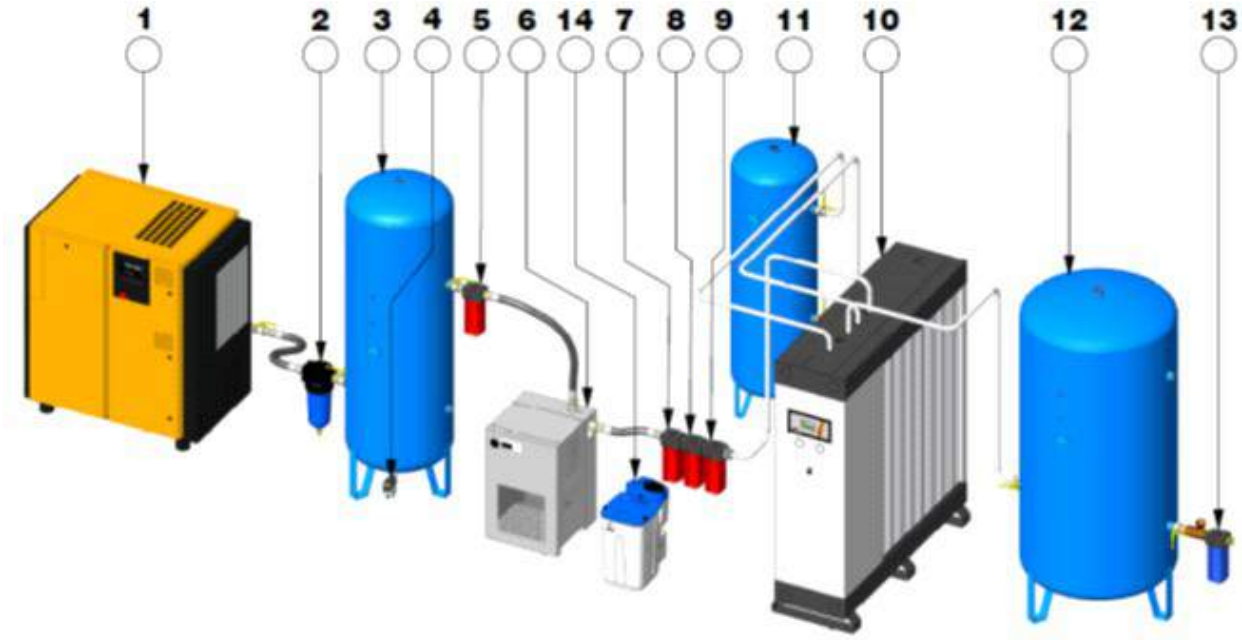
FIRE PREVENTION

PSA NIMOS (Pressure Swing Adsorption) technology

- Adsorption process with carbon molecular sieves
- Operating pressure: approx. 7-10 bar

1. Compressor
2. Water separator
3. Air tank
4. Electronic condensate discharge
5. Pre filter
6. Air dryer
7. Fine filter
8. Microfilter
9. Activated carbon filter
10. Nitrogen generator
11. Process tank
12. Nitrogen buffer
13. Dust filter
14. Separating dispersed condensates



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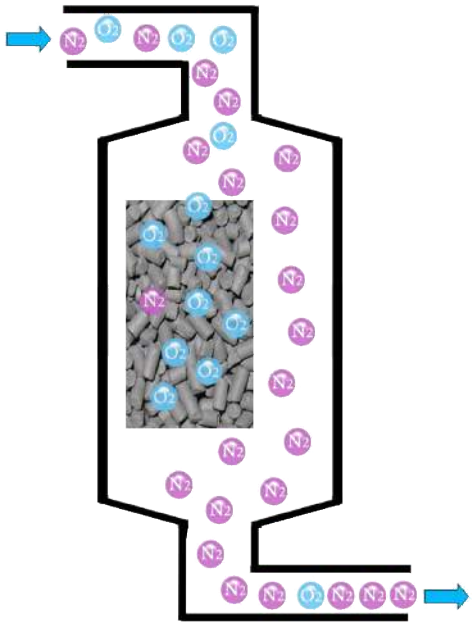
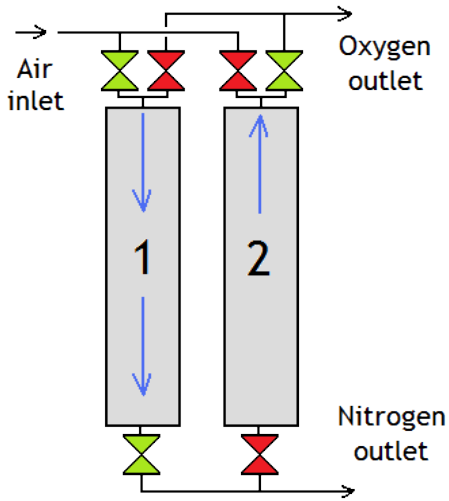
GENERATION PHASE

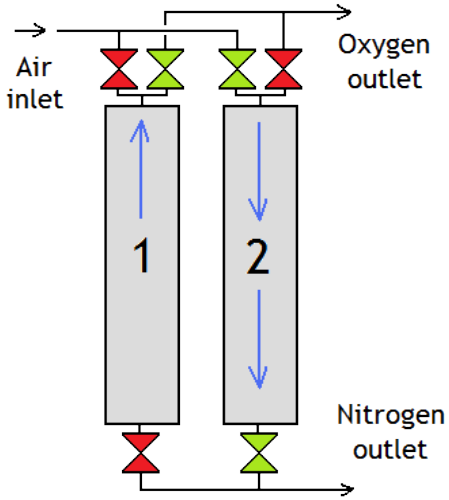
- The concentration of oxygen in the CMS increase with the time
- After a specific time of generation the CMS is saturated of oxygen
- When the CMS is saturated will not absorb any more oxygen, this fact determinate the duty cycle of the nitrogen generator
- A “cleaning” of the carbon is needed

RIGENERATION PHASE

- During the rigeneration phase the CMS doesn't generate nitrogen
- Two tanks are needed in order to have a constant nitrogen production rate
- While the first tank is in the regeneration phase the second one is in the generation phase





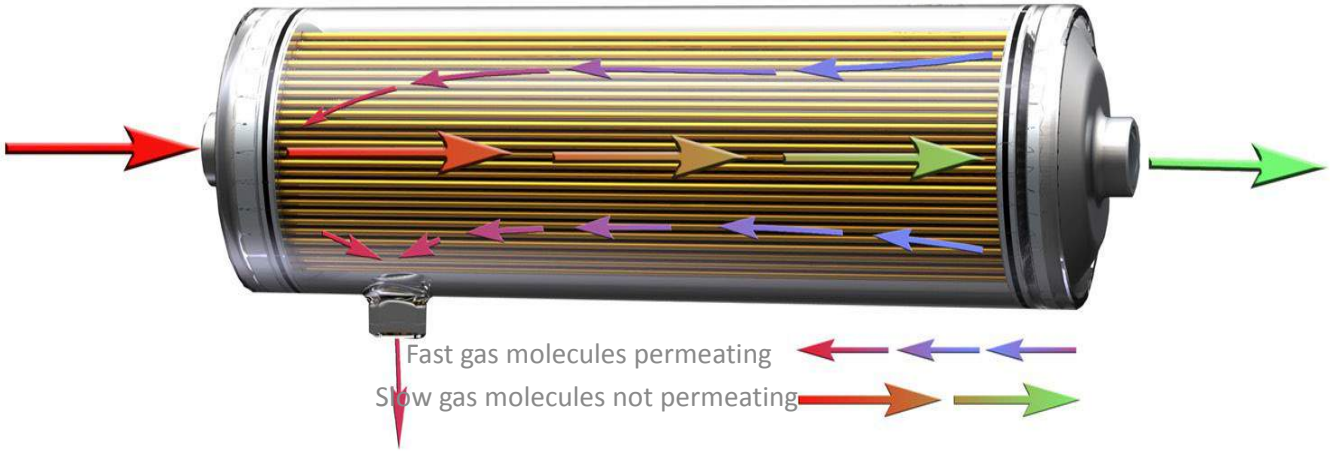


Tank 1 in generation phase

Tank 2 in regeneration phase

MEMBRANE technology

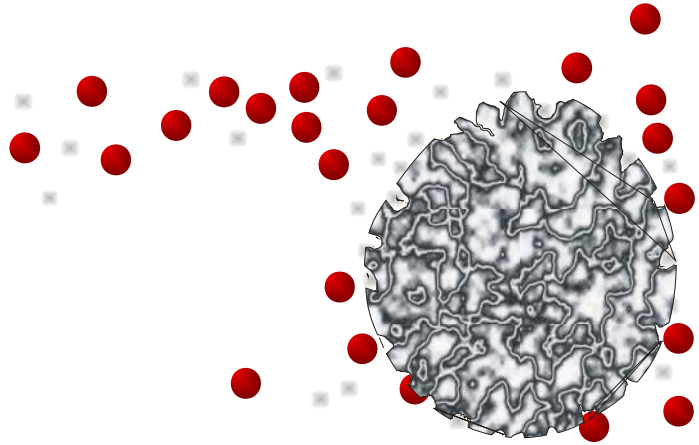
- Filtering the nitrogen using a hollow fiber membrane
- Operating pressure: approx. 7,5 – 13 bar

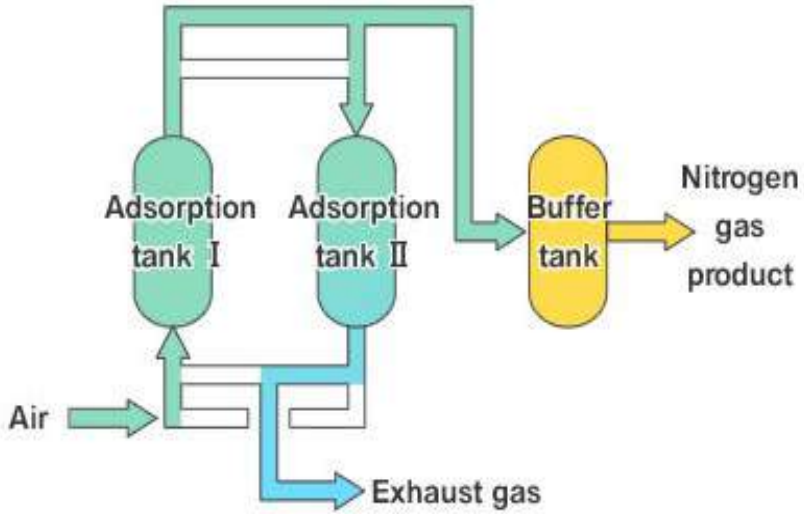


ADOX® (Vacuum Pressure Swing Adsorption) technology

Patent EP0880903-A1

- Adsorption process with carbon molecular sieves
- Operating pressure: approx. 1-2 bar

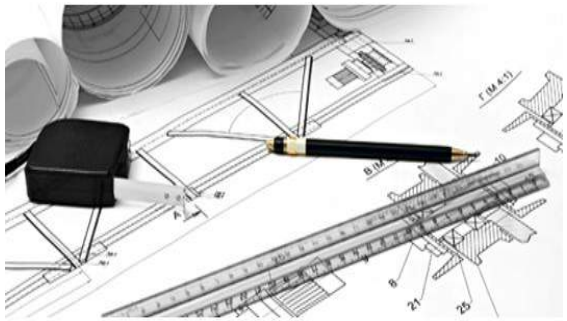




NITROGEN GENERATOR

All the range of our nitrogen generators are designed, developed, manufactured by us.

Summary



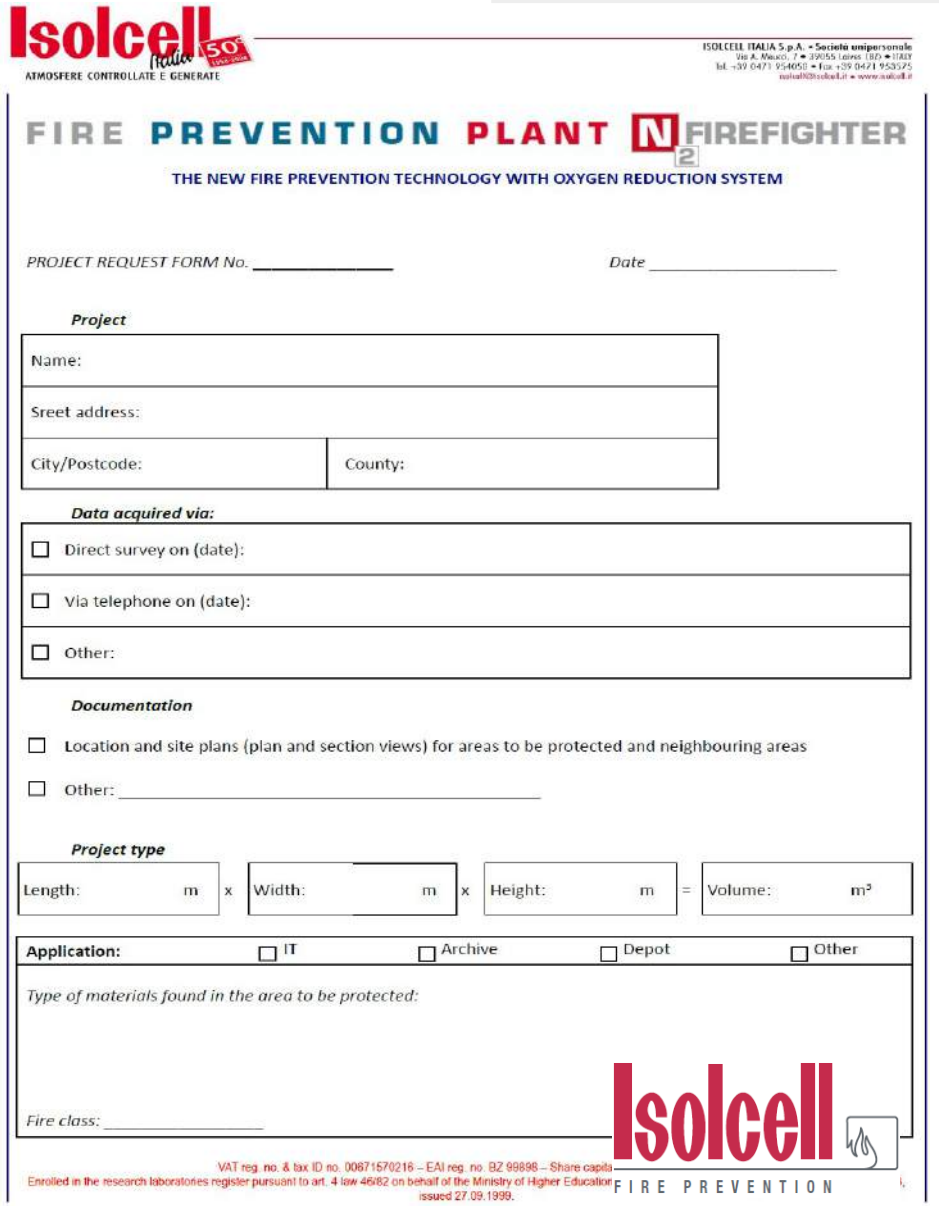
2. Project –system design criteria

DOCUMENTATION AND CALCULATION

- Data required
  - Filling of the N2 Firefighter® Questionnaire
  - Floor Plan
  - Use of N2 Firefighter® ORS calculation program
- Results
  - Nitrogen demand – definition of nitrogen generators machine
  - Operation time
  - Definition and installation of the ORS components compliant with the normative

QUESTIONNAIRE

- The customer has to fill the questionnaire in all its parts
  - Volume of the protected area
  - Application, type of structure
  - Type of materials in the area to be protected, Fire class
  - Environmental conditions
  - Tightness test
  - Entrance / exit type and frequency
  - Air conditioning concept



Isolcell Italia 50 1964-2014
ATMOSFERE CONTROLLATE E GENERATE

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isolcell@isolcell.it • www.isolcell.it

FIRE PREVENTION PLANT N2 FIREFIGHTER

THE NEW FIRE PREVENTION TECHNOLOGY WITH OXYGEN REDUCTION SYSTEM

PROJECT REQUEST FORM No. _____ Date _____

Project

Name:	
Sreet address:	
City/Postcode:	County:

Data acquired via:

- ☐ Direct survey on (date):
- ☐ Via telephone on (date):
- ☐ Other:

Documentation

- ☐ Location and site plans (plan and section views) for areas to be protected and neighbouring areas
- ☐ Other: _____

Project type

Length: m	x	Width: m	x	Height: m	=	Volume: m³

Application: ☐ IT ☐ Archive ☐ Depot ☐ Other

Type of materials found in the area to be protected:

Fire class: _____

VAT reg. no. & tax ID no. 00871570216 – EAI reg. no. BZ 99898 – Share capita
Enrolled in the research laboratories register pursuant to art. 4 law 46/82 on behalf of the Ministry of Higher Education issued 27.09.1999.

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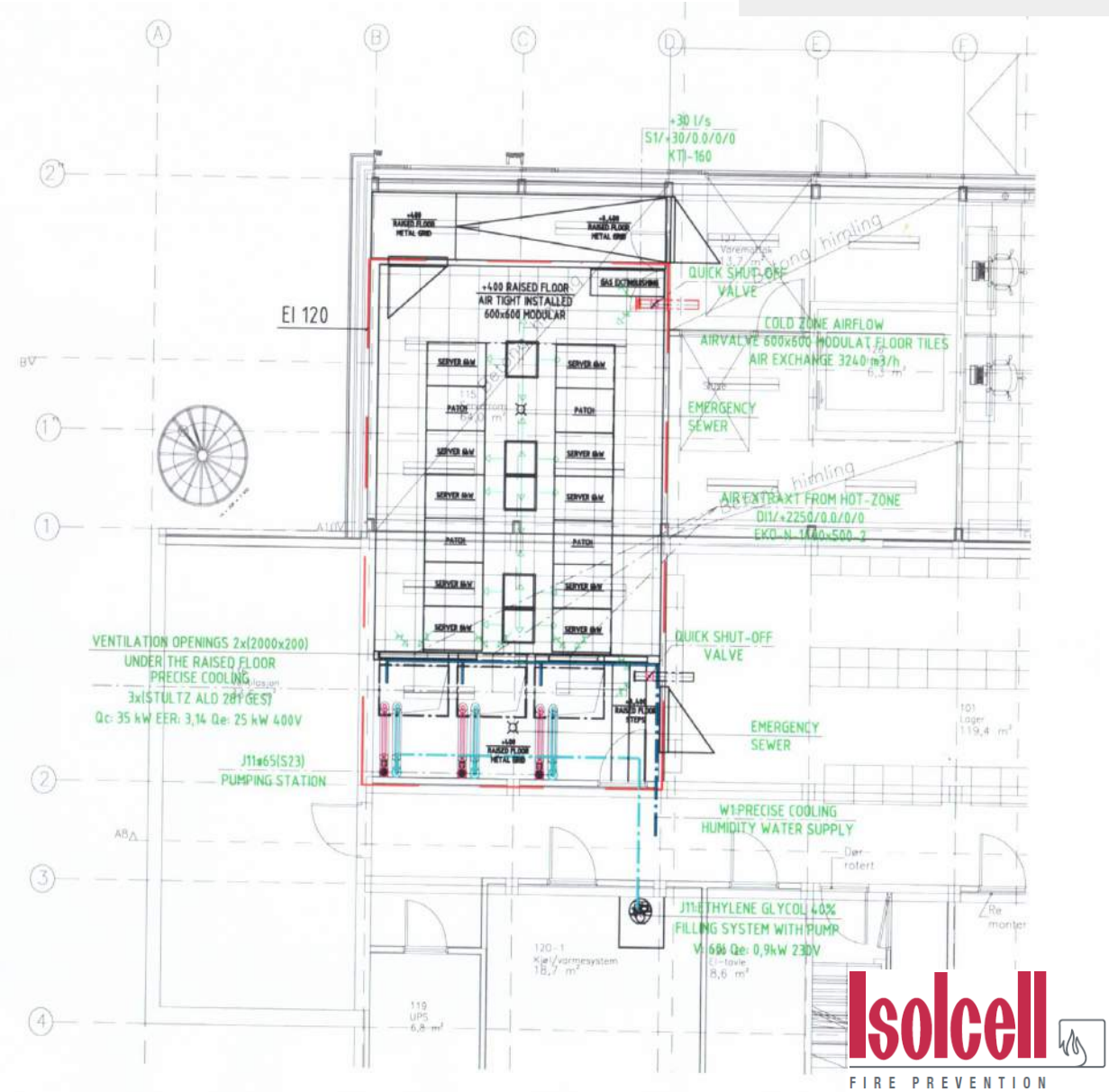
FLOOR PLAN

- Is required the floor plan with measures of the area to be protected



N2 Firefighter® ORS calculation program

- Use of the collected data and determination of the results

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Stickstoffbedarf:	[redacted]	[Nm³/h]
Stickstoff-Reserve		[Nm³/h]
Stickstoff-Reserve		[Nm³/h]
Stickstoff-Förderleistung		[Nm³/h]
Stickstoff-Förderleistung		[Nm³/h]
Stickstoff-Förderleistung		[Nm³/h]
Auswahlstickstoffbedarf:		[Nm³/h]

Haltezeit bei maximalem Flein [1	[redacted]	[h]
Betriebzeit bei maximalem Flein		[h]
Ausgleichszeit bei maximalem Flein [14		[h]
Erstabsenkungszeit bei maximalem Fle 14,7%]:		[h]
Stickstofferzeuger – Betriebszeit:		[%]
		[Std./Jahr]

Regelbereich für Sauerstoffniveau	
Oberer Schaltpunkt	[redacted]
Unterer Schaltpunkt	
Betriebskonzentration	
Maschinen VPSA	
Maschinen PSA	
Stickstoffbedarf/Machinen VPSA	
Stickstoffbedarf/Machinen PSA	

Maschinen			
Stickstofferzeugung	[Nm³/h]	[kW]	nr.
Nitrogen generator	[redacted]		
m³/h,			

Project name

General data
ISOLCELL Italia SpA reg. no.: **Project date**

Installation place
Height above sea level (m)
Average yearly wind speed (m/s)

Protected material
Fire class

Area		
Description:		
Structure type:		
Temperature:		
Humidity:		
Floor:		
Dimension		
Length (m)		
Width (m)		
Heights (m)		
Space (m²)		
Volume room (m³)		
Leakage estimation		
N50		
N20		
N__		
ACH		
Access to the area		
Type of opening:		
Quantity:		
Openings for h/max:		
Openings for h/average:		
Opening space (m²):		
Duration of opening (sec):		
Ignition level:		
Resulting Oxygen set point:		

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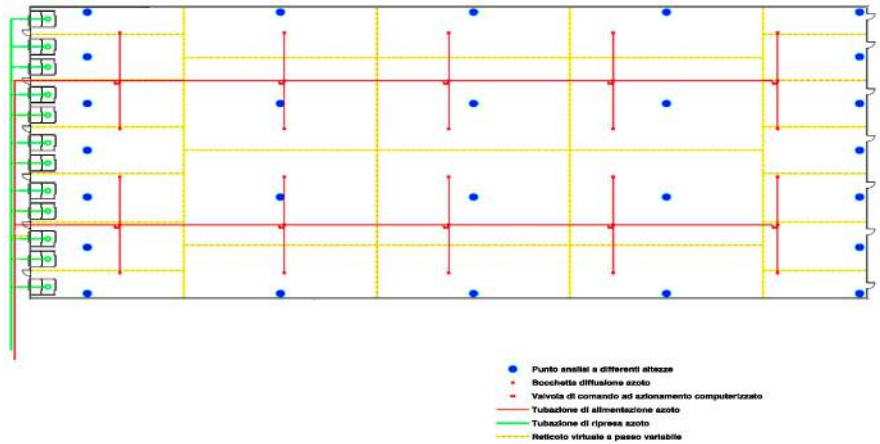
MONITORING OF OXYGEN CONCENTRATION

N2 Firefighter® VIRTUAL GRID methodology, distribution system

Patent 2522402-A1

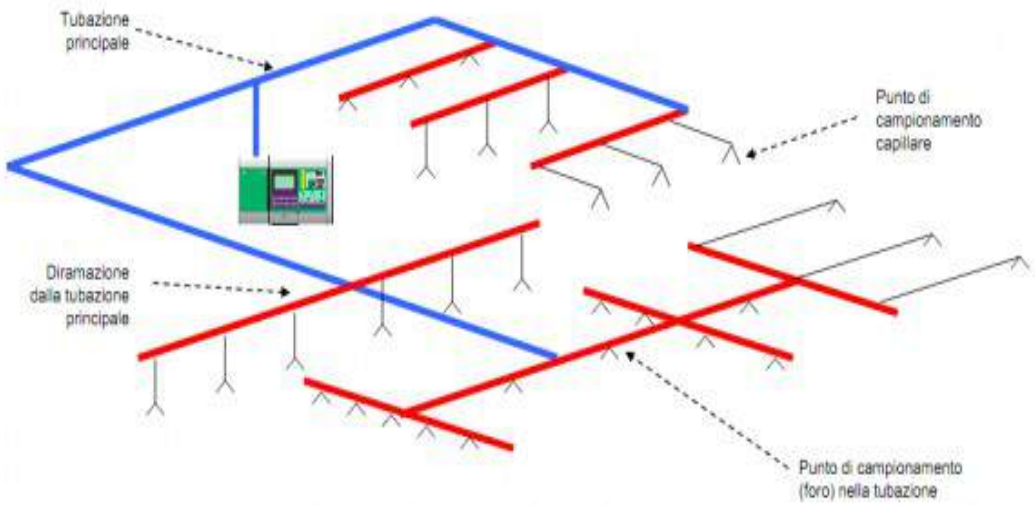
- Optimization/reduction of the amount of inert gas introduced in the environment
- Consequent reduction of energy consumption needed in order to maintain the self-extinguishing atmosphere
- Reduction of gradients originating from different residual oxygen values in the room
- Higher uniformity in residual oxygen levels to be maintained in the room, with higher certainty/guarantee that the environment will not include areas having oxygen values that are "out of control" and/or outside the safety zone
- Substantial improved in mixing between inert gas and oxygen, thus avoiding any stratification and further abating the likeliness of having areas with different oxygen values

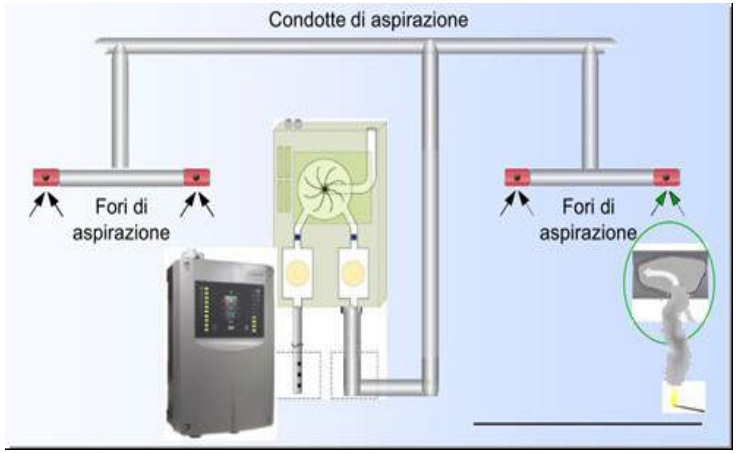


SMOKE DETECTION system with vacuum and smoke sensor; compliant with **EN 54-20, EN 50104, EN 61508**

N2 Firefighter® system is preset for the installation of a smoke detection system with vacuum.

- The layout consists of the use of the same piping line, either one or several separate lines, to suck out samples for analyzing the level of oxygen within the area to be protected; this plant can also be used, if necessary, for detecting smoke with suction system.





SENSOR DETECTION system with **OXYGUARD;** compliant with **EN 54-07, EN 50104, EN 61508**

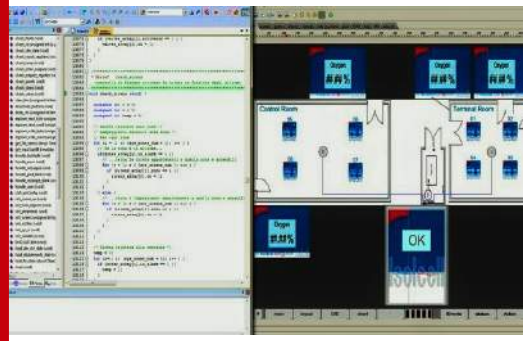
- is an oxygen detector and measure of the level of oxygen.
- measuring method applied is limiting current method using Zirconium Solid Electrolyte. An appropriate signal is to control unit with the value of oxygen level.
- Oxyguard is equipped with a short circuit isolator that is capable of isolating a short circuit in the installation.
- Oxyguard can generate the following messages:
  - oxygen level
  - fault messages
  - revision messages

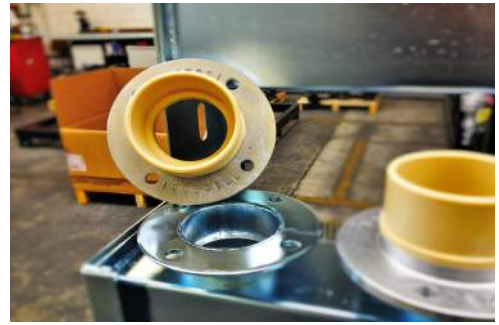
Summary

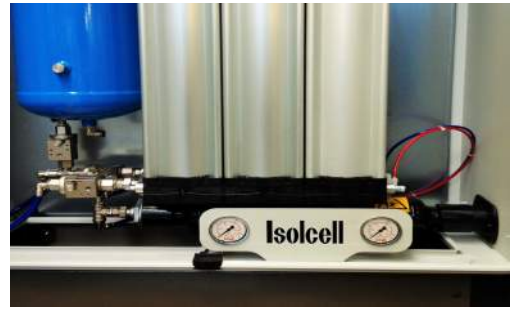
3. Typical system – rendering

TECHNOLOGY MADE IN ISOLCELL

- Currently the only manufacturing company that develops and builds the whole plant







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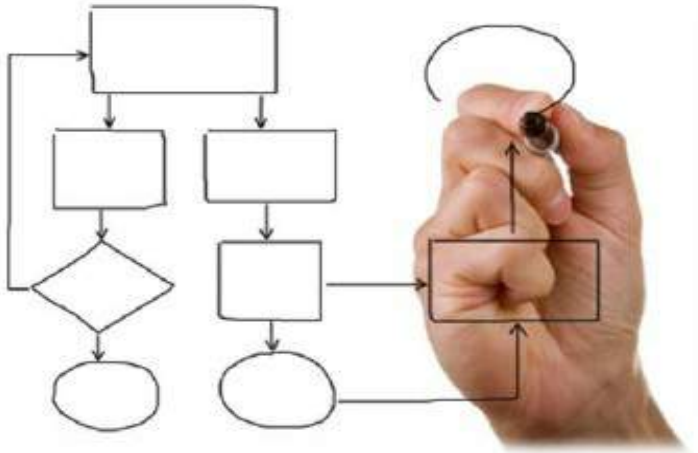
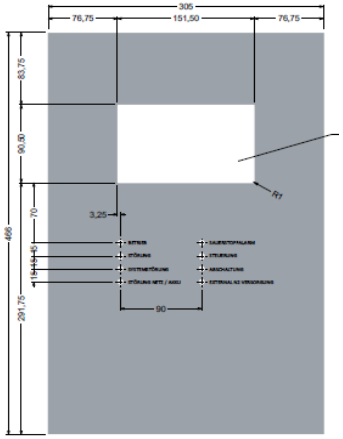
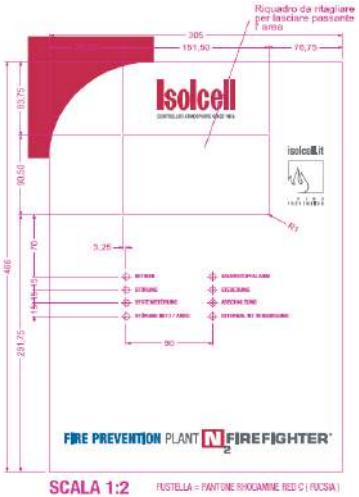
FIRE PREVENTION

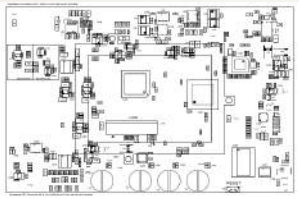
TECHNOLOGY MADE IN ISOLCELL

- From the project to the realization









Isolcell
FIRE PREVENTION

ELEMENT of a N2 Firefighter® system

- **Nitrogen generator:** PSA NIMOS, MEMBRANE, ADOX®
- **CIE unit:** N2 Firefighter® Multiplex compliant with:
  - EN 54-2, EN 54-4, EN 61508
- **Monitoring oxygen concentration:**
  - Option 1: sensor system compliant with
    - EN 54-07, EN 50104, EN 61508
  - Option 2: aspiration system compliant with
    - EN 54-20, EN 50104, EN 61508
- **Software:** Isocat
- **Security:** visual indicator of oxygen level, optical and acoustic alarm devices

Isolcell FIRE PREVENTION

3 Typical system - rendering

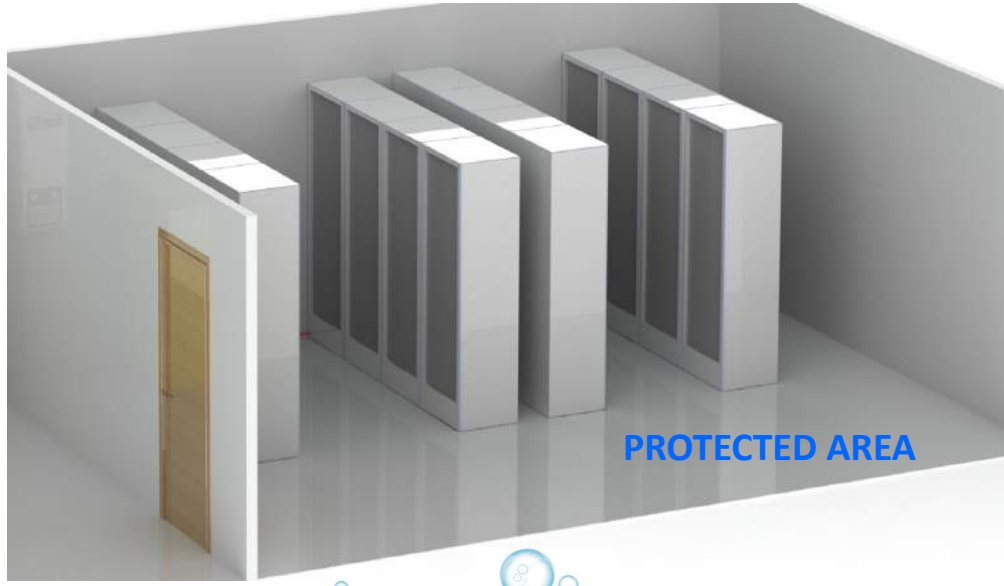
CONTROL UNIT

ALARM DEVICES

O2 SENSOR

COMMUNICATION

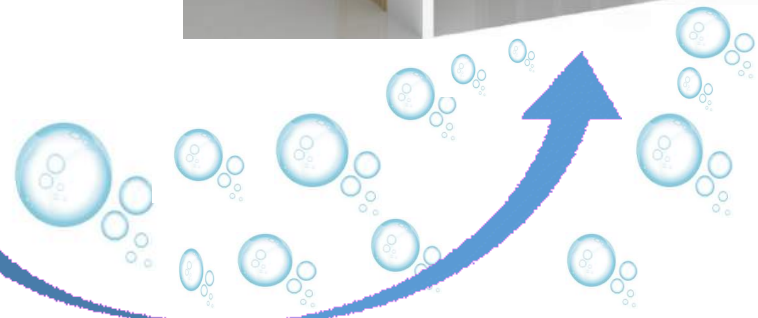
DISPLAY



PROTECTED AREA

ATMOSPHERE

ADOX®



Isolcell FIRE PREVENTION

N2 FIREFIGHTER | TYPICAL SYSTEM

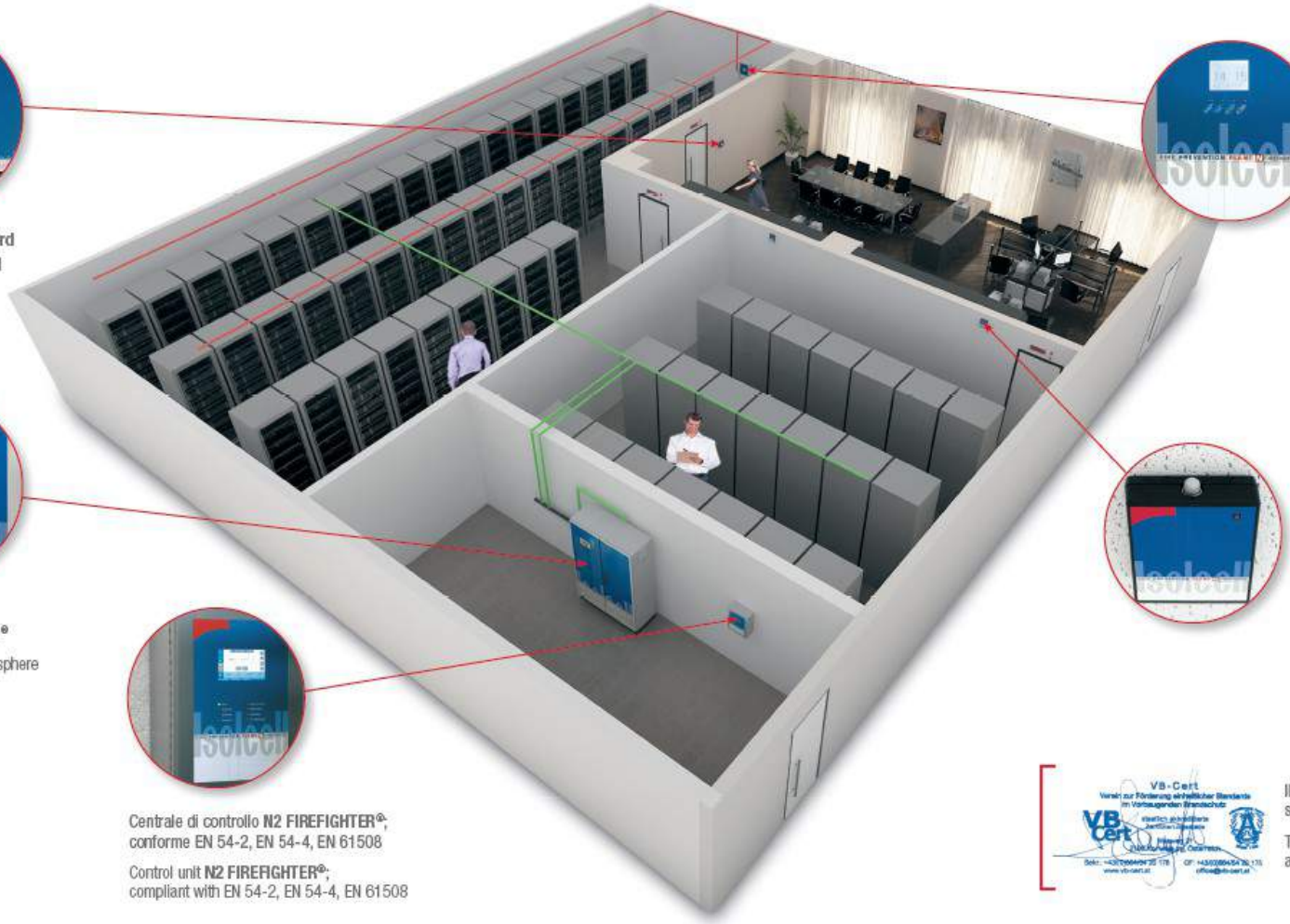
Display digitale **Oxyguard**
Digital display **Oxyguard**

Generatore atmosfera auto-estinguente **ADOX®**

Auto-extinguishing atmosphere generators **ADOX®**

Centrale di controllo **N2 FIREFIGHTER®**; conforme EN 54-2, EN 54-4, EN 61508

Control unit **N2 FIREFIGHTER®**; compliant with EN 54-2, EN 54-4, EN 61508



variante | option 1

Rilevatore e misuratore **N2 FIREFIGHTER®** ad aspirazione; conforme EN 54-20, EN 50104, EN 61508

Detector and measurement **N2 FIREFIGHTER®** aspiration system; compliant with EN 54-20, EN 50104, EN 61508

variante | option 2

Rilevatore e misuratore puntuale **N2 FIREFIGHTER®**; conforme EN 54-07, EN 50104, EN 61508

Detector and measurement **N2 FIREFIGHTER®** sensor system; compliant with EN 54-07, EN 50104, EN 61508

Il sistema N2 FIREFIGHTER® è anche certificato secondo le normative europee **ÖNORM**

The N2 FIREFIGHTER® system is also certified according to European standards **ÖNORM**

Isolcell
FIRE PREVENTION

Summary

4. Applications

APPLICATIONS for N2 Firefighter® ORS

- Large warehouse, store rooms
- Automated warehouses (Cold storage rooms: refrigerated and frozen, food warehouses, textile warehouses)
- Libraries and bookshops
- Museums and archives
- Finance institutions, banks, insurance companies
- Data center, CED, Server Farm
- Petrochemical and pharmaceutical industries
- Rooms containing high value equipment or instruments
- Ecc.

APPLICATIONS for N2 Firefighter® ORS

- Large warehouse, store rooms
- Automated warehouses (Cold storage rooms: refrigerated and frozen, food warehouses, textile warehouses)

APPLICATIONS for N2 Firefighter® ORS

- Libraries and bookshops
- Museums and archives
- Finance institutions, banks, insurance companies

APPLICATIONS for N2 Firefighter® ORS

- Data center, CED, Server Farm

THE ADVANTAGES of a fire prevention system

- It completely eliminates every fire risk in protected areas;
- The auto-extinguish atmosphere is non-toxic, non polluting and leaves no residues on protected objects;
- With N2 FireFighter there is little to no aesthetic impact on the space to be protected;
- Installation is easy, even in situations which are particularly complicated or are subject to tight regulations;
- The system can easily be fitted as part of main fire monitoring systems already available on the market;
- Lower maintenance costs than "traditional emergency" systems
- Delayed the decay and the wear of the objects;
- Great versatility: from small rooms up to large environments;
- The plant can be customised and easily expandible;

Summary

5. Fire test

FIRE TEST in laboratory

- Experiment were conducted in an enclosure:
  - Volume of 10,35 m³
  - Height 2,3 m
  - Room temperature 20 °C

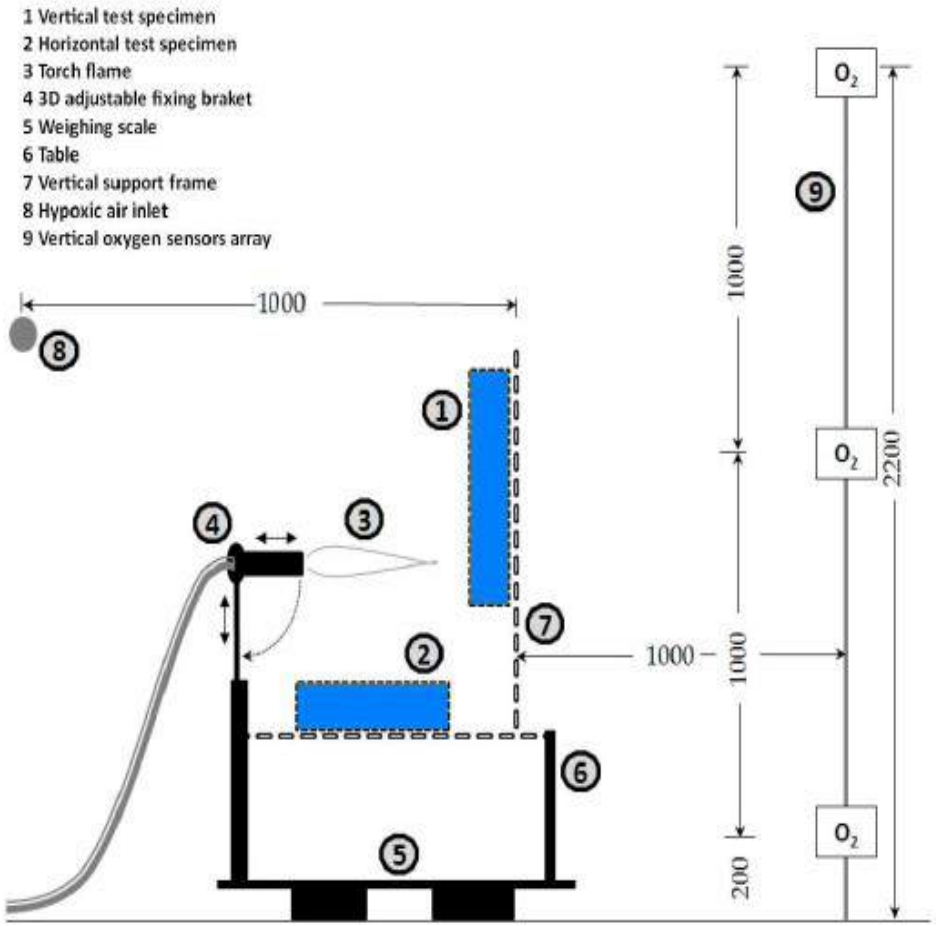
The enclosure was provided with an adjoining air lock vestibule in front of the entrance to limit air infiltration.

Door and windows were sealed with smoke sealant to limit air infiltrations

FIRE TEST in laboratory

INGNITION TEST according to PAS 95:2011 and VdS 3527:2007

- The Oxygen concentration inside the test enclosure was lowered and kept constant by means of three nitrogen generators providing hypoxic air with residual oxygen content varying from 5 % to 11 %
- Enclosure was equipped with three oxygen sensors located at three different height of the enclosure (0.2 m, 1.0 m, 2.2 m)
- Oxygen sensors had a sensitivity of 0.01 vol.%



RESULTS

Material	Ignition threshold, % vol. O_2
PE-HD (casing, building material)	16.0
PP (casing, building material)	16.0
PMMA	15.9
ABS	16.0
PVC (cable)	16.9
1 to 5, with EED risk	15.9
PE-LD (packaging foil)	15.9
Pinewood (wood for pallets, untreated)	17.0
Corrugated cardboard (packaging boxes, brown, untreated, non-pressed)	15.0
Palletised cardboard (packaging boxes, brown, untreated, non-pressed)	15.0
Paper (printing paper, 80 g/m^2, white, untreated)	14.1
Xylene	14.7
Methyl ethyl ketone	13.0
Isopropanol	14.0
Methoxypropanol	13.0
Isobutanol	14.8
Diacetone alcohol	15.9
Ethyl acetate	15.9
Butyl glycol	14.0
Ethanol	12.8
Acetone	13.0
Methanol	11.0
N-eptane	13.0
Toluene	14.0

Isolcell FIRE PREVENTION

CONCLUSIONS

- An oxygen concentration between 14.5 vol% and 15.0 vol% is able to limit ignition and prevent flame spread for most solid materials
- An oxygen concentration between 16.0 vol% and 17.0 vol%, although it is not able to prevent ignition, is however able to lessen fire damages
- An accurate assessment of materials, configurations and hazards is necessary to determine the correct oxygen concentration to keep in the protected rooms
- For materials investigated a sort of response threshold of fire spread is observed in the oxygen concentration range 17.0 – 18.0 vol%

Summary

6. Standards and regulations

STANDARD AND REGULATIONS

ISOLCELL SPA, a certified company, engineers, manufactures and installs oxygen reduction fire prevention equipment in compliance and pursuant with the standards specified by the following European regulations:

- **ÖNORM F 3007**: Oxygen reduction system (ORS)
- **ÖNORM F 3008**: oxygen reduction system – main control rooms
- **ÖNORM F 3073**: Planning, engineering, assembling, commissioning and servicing oxygen reduction system
- **TRVB S 155**: Engineering, installation and operation requirements for oxygen reduction systems through nitrogen within a building from a fire prevention technology standpoint
- Isolcell install also oxygen reduction system in according to **BSI PAS 95:2011**
- **Ministerial Circular** (Protocol n. 0007059 of 21.05.2012)

GEPRÜFT

bsi.

REPVBBLICA ITALIANA

Isolcell FIRE PREVENTION

STANDARD AND REGULATIONS

21/05 2012 17:47 FAX 06716362307 AREA 3 PREV.INCENDI 001

Ministero dell'Interno

DIPARTIMENTO DEI VIGILI DEL FUOCO, DEL SOCCORSO PUBBLICO E DELLA DIFESA CIVILE
DIREZIONE CENTRALE PER LA PREVENZIONE E LA SICUREZZA TECNICA

032101 01 4189 000

Dipartimento dei Vigili del Fuoco del Soccorso Pubblico e della Difesa Civile
DCPREV
REGISTRO UFFICIALE - USCITA
Prot. n. 0007609 del 21/05/2012
032101.01.4189. Variazioni decreti C.C.T.S.

OGGETTO: Tecnologia antincendio con impianto a riduzione di ossigeno.

In riferimento alla richiesta presentata alla Direzione scrivente pervenuto con nota protocollata al n. 4568 del 15/05/2009, si rappresenta che il Comitato Centrale Tecnico Scientifico ha esaminato la tecnologia impiantistica in argomento sia in via generale che nell'ambito di specifici istanze di esame di progetti presentati in deroga.

Dall'esame è emerso che la tecnologia impiantistica a riduzione di ossigeno può essere proposta quale soluzione alternativa alle misure di prevenzione e protezione incendi usualmente adottate. Nei casi di applicazione in attività soggette al controllo dei Vigili del Fuoco, deve essere esaminata nel contesto dell'esame di deroga di cui all'art. 7 del D.P.R. 151 del 2011.

Allo stato attuale delle conoscenze si ritiene che per il succitato procedimento di deroga il Comitato Tecnico Regionale oltre alle prescrizioni dettate dal Comando VVF di competenza, possa utilmente considerare le ulteriori indicazioni di seguito elencate:

- per gli aspetti gestionali (tecnici, organizzativi, procedurali), si ritiene necessario fare riferimento, alle linee guida ed alle norme tecniche sull'argomento oggi disponibili nell'Unione Europea. Tra questi documenti si possono citare, in forma non esaustiva, i seguenti: UNI EN 15004, BSI PAS 95, Önorm F3007-F3008, TRVB 1555, VdS 3572, Allianz, SUVA. Nei singoli casi di applicazione, quindi, le varie misure di sicurezza vanno necessariamente combinate con le indicazioni progettuali nell'ottica di una gestione integrata ed efficace della sicurezza.
- devono essere opportunamente valutate e risolte alcune criticità della sicurezza del sistema a riduzione di ossigeno che riguardano, ad esempio:
  1. il sistema di riconoscimento delle condizioni critiche (sensori/prelievi di fumo, sensori/prelievi di monossido di carbonio, monitoraggio di combustioni covanti e procedure di sicurezza conseguenti ad evitare indesiderati ritorni d'aria) ed il sistema di ridondanza (sensori, analizzatori, alimentazioni);
  2. le procedure di arresto funzionamento/attivazione allarmi al raggiungimento di soglie di concentrazione ossigeno prestabilite (sotto e sopra il limite prestabilito);

VB-CERT
Association for the Promotion of Uniform Standards in Preventive Firefighting
State-accredited Certification Body
1050 Vienna, Siebenbrunnengasse 21/ Object A/4.OG
www.vb-cert.at
office@vb-cert.at

hereby certifies with this

Certificate
No. 039/SR—PSys/001

to the company

Isolcell Italia

Isolcell Italia S.p.A.
Via A Meucci 7
I-39005 Leifers / Laives (BZ)

the conformity of the product

Oxygen Reduction System
Type "N2 Firefighter"

with the standard stated below as shown in the test report no. **FT 14/540/11**

ÖNORM F 3007, Version 2009-06-15

and thus its conformity with all requirements set forth in the VB-Cert Guidelines for

Products and Systems
of Oxygen Reduction Technology

The aforementioned product is thus licensed for installation by a certified qualified company for gas extinguishing systems as per ÖNORM F 3073 and entitled to carry the VB-Cert-Logo in accordance with the regulations set forth in the annex.

Certified on: **May 10, 2012**

Certificate valid until: **October 14, 2013**

Vienna, May 10, 2012

Dipl.-Ing. Christian WAGNER
Director of the Certification Body
This certificate consists of one page and six annexes

VB-CERT
Association for the Promotion of Uniform Standards in Preventive Firefighting
State-accredited Certification Body
1050 Vienna, Siebenbrunnengasse 21/ Object A/4 OG
www.vb-cert.at
office@vb-cert.at

hereby certifies with this

Certificate
No. 039/SR—PSys/002

to the company

Isolcell Italia

Isolcell Italia S.p.A.
Via A Meucci 7
I-39005 Leifers / Laives (BZ)

the conformity of the product

Oxygen Reduction System
Type "N2 Firefighter Multiplex"

with the standard stated below as shown in the test report no. **FT 14/539/11**

ÖNORM F 3008, Version 2010-08-01

and thus its conformity with all requirements set forth in the VB-Cert Guidelines for

Products and Systems
of Oxygen Reduction Technology

The aforementioned product is thus licensed for installation by a certified qualified company for gas extinguishing systems as per ÖNORM F 3073 and entitled to carry the VB-Cert-Logo in accordance with the regulations set forth in the annex.

Certified on: **May 10, 2012**

Certificate valid until: **October 14, 2013**

Vienna, May 10, 2012

Dipl.-Ing. Christian WAGNER
Director of the Certification Body
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Isolcell
FIRE PREVENTION

CEN | European Committee for Standardization

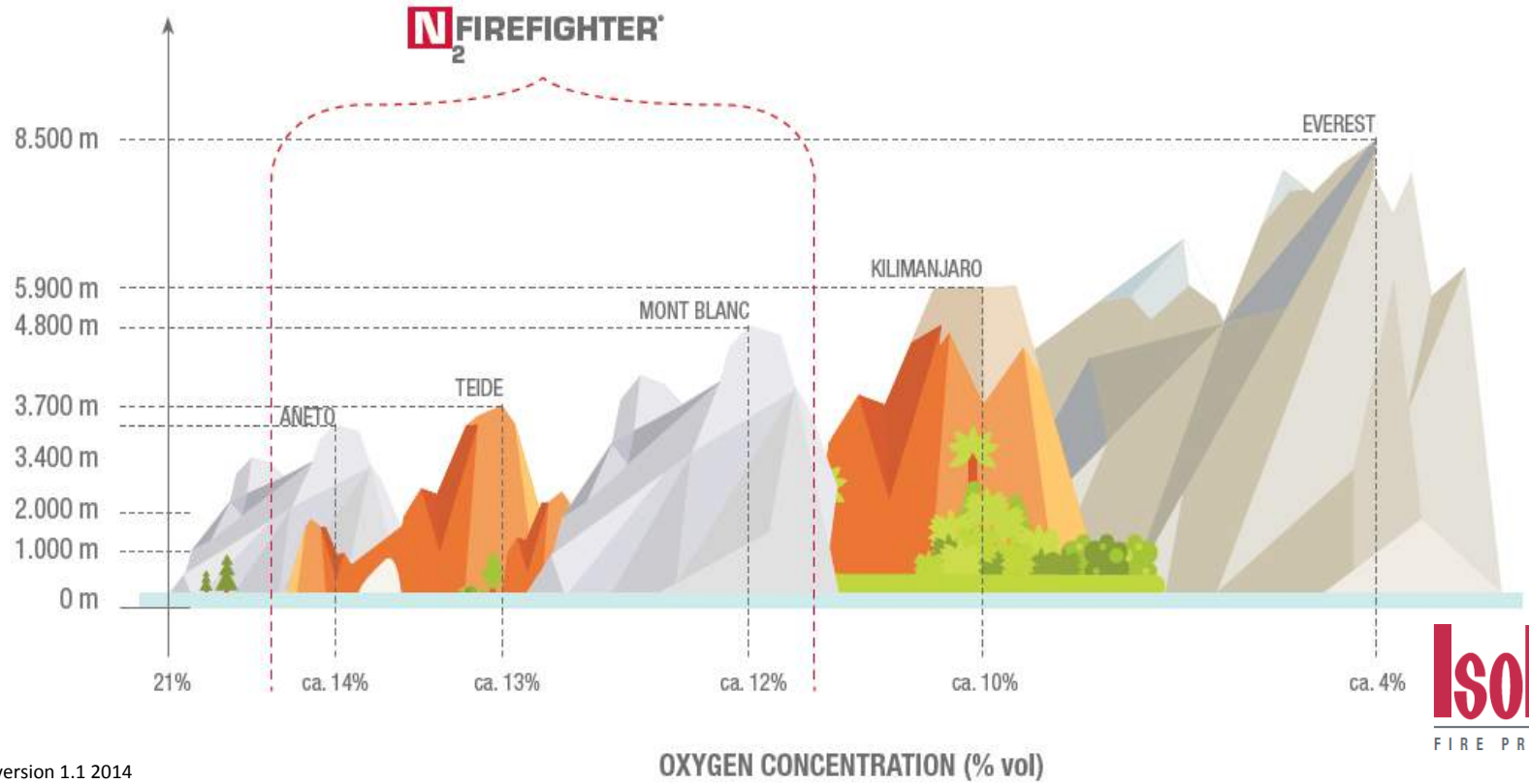
- ISOLCELL is member of the TASK GROUP in Europe, established for the study of Oxygen Reduction System
- Members of task group are:
  - Austria, Denmark, Finland, France, Germany, Holland, Italy, Norway, Spain, Sweden, Switzerland, United Kingdom

Summary

7. Health and Safety

OXYGEN-REDUCED ATMOSPHERES effects

- Exposure in an ORS atmospheres is comparable to high altitude exposure
- e.g. is the same air on the mountains at about 2.500 m above sea level



OXYGEN-REDUCED ATMOSPHERES effects

- Modern aircraft are pressurized to cabin altitudes up to 2.438 m (8.000 ft)
- The partial pressure of oxygen will have dropped to the equivalent of breathing **15.1% oxygen** at sea level*
- Each year in the world take off about 15 million aircraft carrying 1.2 milliard passengers**

*SOURCE: Thorax, BMJ Open Respiratory Research
**SOURCE: FOCUS (Italian magazine)

Oxygen concentration 15.1%

KILIMANGIARO
5.895 m
above sea level

MONTE BIANCO
4.810 m
above sea level

ETNA
3.340 m
above sea level

PASSENGER CABIN
2.438 m
above sea level

BURJ KHALIFA
829,8 m
above sea level

Isolcell FIRE PREVENTION

OXYGEN-REDUCED ATMOSPHERES: Hypoxic training

- High altitude training is often applied in sports and it is particularly popular with athletes due to increase the positive effects on performance
- Also people with health issues such as obesity, diabetes and asthma can achieve significant improvements in their health
- Training at altitude also decreases the recovery and rehabilitation period.

OXYGEN-REDUCED ATMOSPHERES: Hypoxic training, SCIENCE meets SPORTS

- Some references
  - The Altitude Centre has been incredibly supportive in my preparation for both the European Cup Marathon in Barcelona and the Commonwealth Games in Delhi. The ability to simulate altitude has enabled me to maximise my preparations in a home environment. The benefits are being shown with a Team Bronze at the European Cup and hopefully a good placing at the Commonwealths in October 2010.
    HOLLY RUSH | Marathon Commonwealth athlete (UK)

  - Rodney Glunder (born as Rodney Faverus) started training when he was 18. He started kickboxing and continued to develop in multiple martial arts, making him the all-round fighter he is today. He won many prices and participated in many fights all around the world. He is Dutch champion Rodney Free-fight and European and World Champion in Mix-Fight. In 2007, he became World Champion in karate IBK Pro divison. He included high altitude trianing into his daily training schedule to get the most out of his body.

    RODNEY GLUNDER | MMA and Kickboxing (NL)

  - In Febuary 2011 he made a come-back after being out of the running for 9 months due to an injury. He participated in the Clasica de Almeria. In preparation to his games, he sleeps at altitude in one of b-Cat's high altitude tents.
    STEF CLEMENT | Cyclist (NL)

OXYGEN-REDUCED ATMOSPHERES:

- Study for working in oxygen-reduced atmosphere

Altitude	$\%O_2$, isobaric conditions	Atmospheric pressure		pO_2		Time of useful consciousness
[m]		[mmHg]	[hPa]	[mmHg]	[hPa]	
0	20.9	760.0	1013.2	158.8	211.7	
500	19.7	716.0	954.6	149.6	199.5	
1000	18.5	673.8	898.3	140.8	187.7	
1500	17.4	634.0	845.3	132.5	176.7	
2000	16.4	596.0	794.6	124.6	166.1	
2500	15.4	560.0	746.6	117.0	156.0	No limitation
3000	14.5	525.8	701.0	109.9	146.5	
3500	13.6	493.0	657.3	103.0	137.3	
4000	12.7	462.0	616.0	96.6	128.8	
4500	11.9	432.6	576.8	90.4	120.5	
5000	11.1	404.8	539.7	84.6	112.8	
5500	10.4	378.6	504.8	79.1	105.5	>30 min.
6000	9.7	353.6	471.4	73.9	98.5	
6500	9.1	330.0	440.0	69.0	92.0	
7000	8.5	307.8	410.4	64.3	87.7	3-5 min.
10500	5.0	183.0	244.0	38.2	50.9	ca. 1 min.
12900	3.4	123.5	164.7	25.8	34.4	15-30 sec.

THE INTERNATIONAL MOUNTAINEERING AND CLIMBING FEDERATION
UNION INTERNATIONALE DES ASSOCIATIONS D'ALPINISME

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CH-3000 Berne 23 • SWITZERLAND
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e-mail: office@uiaa.ch

UIAA MEDICAL

DOCUMENTO di CONSENSO

della

COMMISSIONE MEDICA UIAA

VOL: 15

Il lavoro in condizioni ipossiche

Destinato a Medici, Persone che si occupano di Medicina del lavoro, Persone non-medico interessate

Th. Küpper, J.S. Milledge, D. Hillebrandt, J. Kubalova, U. Hefti, B. Basnayt, U. Gieseler, R. Pullan, V. Schöffl

2009
aggiornamento V2.13/ 7/2010

Traduzione di
Enrico Donegani e Chiara Gallione
2010

V 2.13

Isolcell FIRE PREVENTION

OXYGEN-REDUCED ATMOSPHERES:

- Regluations for **working in oxygen-reduced atmosphere** | Guidelines
  - Risk class and safety measures

RISK CLASS	OXYGEN CONCENTRATION c in vol. % O_2	SAFETY MEASURES
A	18,0 > C ≥ 15,0	- After 4 hours must be observed a break of at least 30 minutes outside the oxygenreduced atmospheres - Employee should be instructed
B	15,0 > C ≥ 13,0	- After 4 hours must be observed a break of at least 30 minutes outside the oxygenreduced atmospheres - Must be guaranteed a continuos surveillance of workers - Employee should be instructed
C	13,0 > C ≥ 0	- Must be guaranteed a continuos surveillance of workers - Do not enter without additional measures - Must be equipped with a breathing apparatus that operates independently from the surrounding atmosphere

Isolcell FIRE PREVENTION

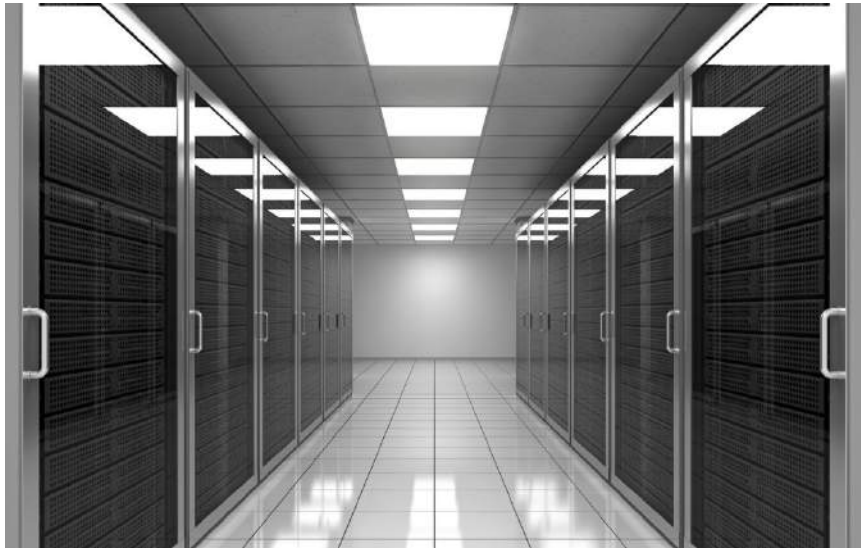
Summary

8. References

COMPANIES OR INSTITUTIONS that have already chosen the **ORS technology**

IT:

- Data center
- Server Farm
- CED



inasset. business datacenter

TasNetworks

Green Mountain DATA CENTRE

BERGEN REGIONAL MEDICAL CENTER

DigiPlex Independent data centres

SYKEHUSET ØSTFOLD

ST. OLAVS HOSPITAL UNIVERSITETSSYKEHUSET I TRONDHEIM

SIEMENS

Allianz

EAB Nybygg Kallerud

NORDLANDSSYKEHUSET NORDLÁNDA SKIPPIJVIESSO

TÜVRheinland

welcome italia i migliori servizi di telecomunicazione per la vostra impresa

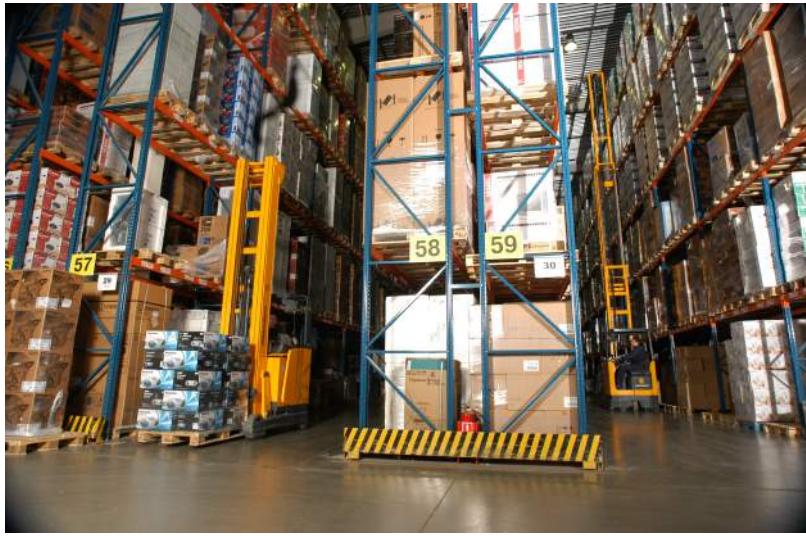
HELSE SØR-ØST

Isolcell FIRE PREVENTION

COMPANIES OR INSTITUTIONS that have already chosen the **ORS technology**

Automated warehouses:

- Cold storage rooms
- Food warehouses
- Textile warehouses
- Other warehouses



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pistor

Wohlwend AG
Tiefkühlspezialitäten

McCain

Original Wagner

Berglandmilch
reg. Gen.m.b.H

Isolcell
FIRE PREVENTION

COMPANIES OR INSTITUTIONS that have already chosen the **ORS technology**

Archives & Museums

Summary

9. Case Histories

WAREHOUSE

FLO Spa, ITALY

Fire prevention system N2 Firefighter® installed compliant with **ÖNORM F 3007, ÖNORM F 3008, ÖNORM F 3073, TRVB 155, Ministerial Circular** (Protocol n. 0007059 of 21.05.2012)

GEPRÜFT

General information

- Automated warehouses for plastic material (PE-HD)
- Total volume: 161.866m³ (108,7 x 43,1 x 34,55)
- Altitude 45 m above sea level

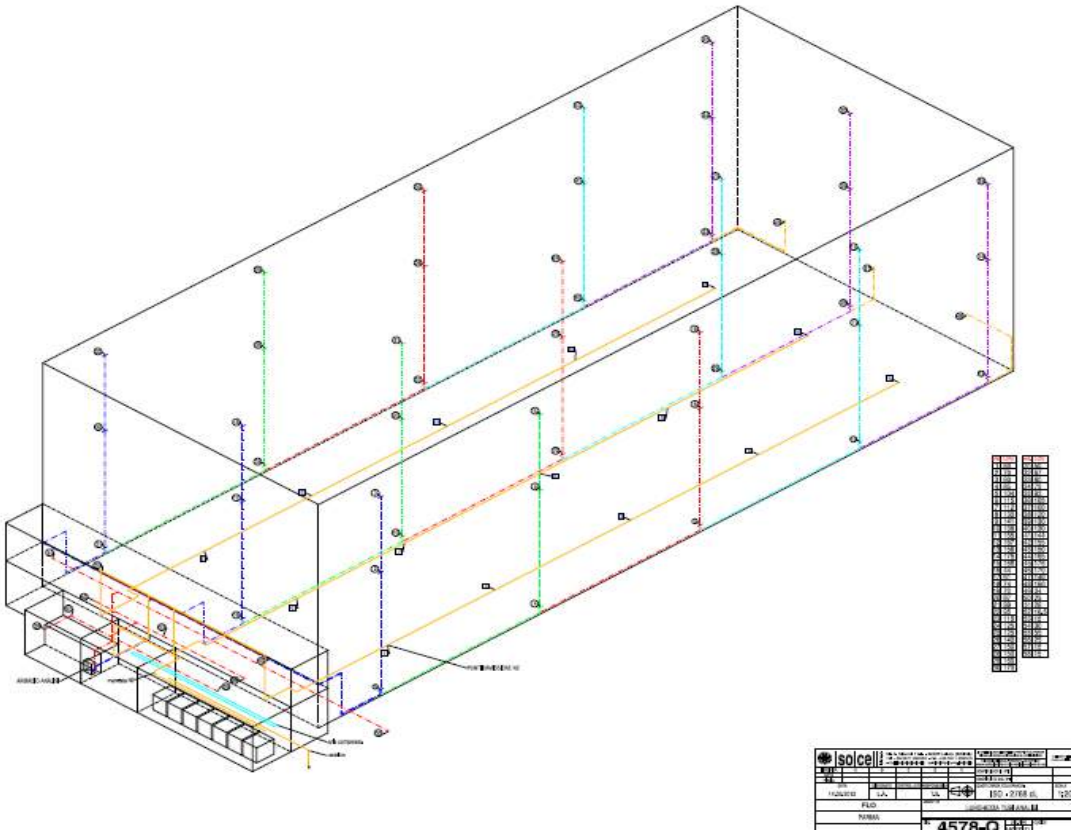
- Material to be protected (PE-HD) ignition threshold Vol. O_2% = 16.0
- Safety margin 1,0
- O_2 monitoring system tolerance 0,1
- Maximum design concentration 15,1
- Minimum design concentration 14,9

Isolcell FIRE PREVENTION

WAREHOUSE

FLO Spa, ITALY

- Floor plan

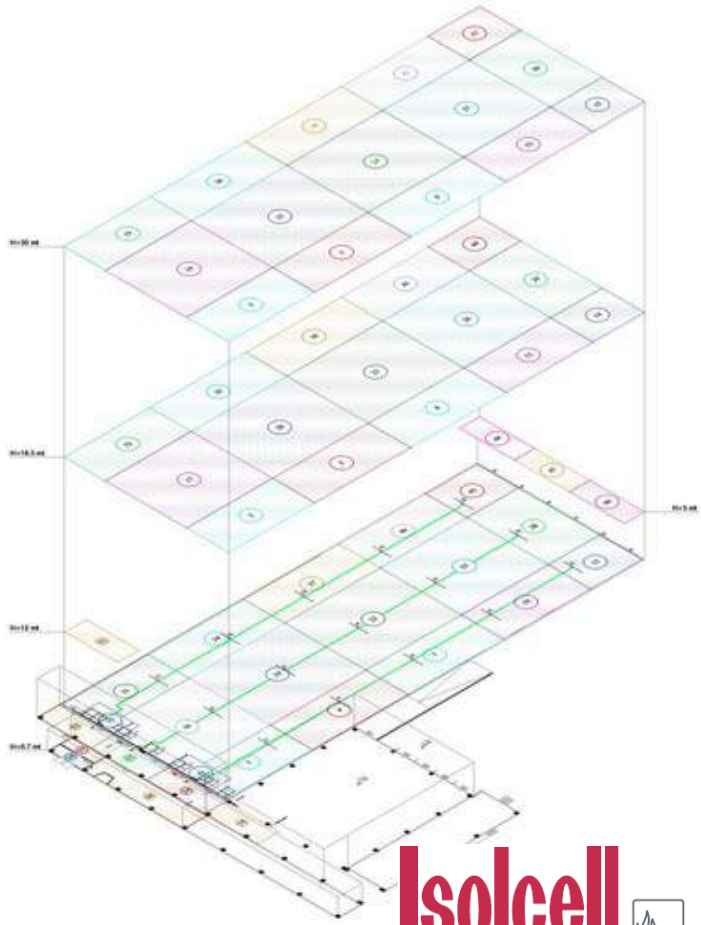


WAREHOUSE

FLO Spa, ITALY

OXYGEN MONITORING SYSTEM: Isolcell N2 FireFighter® variable-pitch virtual grid plant;

- 64 hidden measurement points (58 internal 6 external)
- Oxygen measurement point connected to the CIE which is capable of generating all systems alarms, faults and events



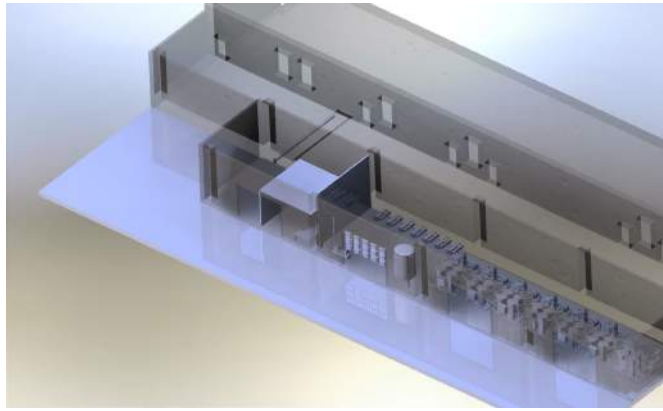
WAREHOUSE

FLO Spa, ITALY

PIPE AND FITTINGS:

- Pipe nominated for use in the hypoxic air distribution networks is 2” schedule 40 galvanized steel with a pressure rating of 154 bar
- Fittings are 1/2” galvanized steel with a pressure rating of 50 bar
- The system working pressure is less than 1 bar

WAREHOUSE



FLO Spa, ITALY

NITROGEN GENERATORS:

- ADOX® technology, working pressure max. 1,5 bar
- Total nitrogen flow 1400 m³/h
- Total power required 238 kW
- Average daily energy costs on design usage 89,00 kW/day

- Duty cycle of system:
  - Total nitrogen generator running period is 37,5%

Isolcell FIRE PREVENTION

WAREHOUSE

FLO Spa, ITALY

N2 FIREFIGHTER® SYSTEM at FLO in operation since 2009

il magazzino del mese

Flo ■ di Chiara Sassi, *Politecnico di Milano*

Più automazione migliore efficienza

Flo, azienda operativa nella produzione di contenitori monouso in plastica, ha scelto di riorganizzare la propria logistica puntando sull'automazione di magazzino. Tale scelta ha permesso di migliorare la qualità del processo logistico

Flo S.p.A. nasce a Fontanellato (PR) nel 1973, dal volere del fondatore ed attuale presidente Antonio Simonazzi, come azienda produttrice di bicchieri in plastica per distributori automatici. Tale realtà, fortemente integrata sul territorio parmense, ha investito molto non solo a livello nazionale, ma anche oltralpe: negli anni '90, infatti, sono stati aperti uffici commerciali in Germania, Inghilterra e Francia – dove è stato anche attivato un centro produttivo –.
Nel contempo, la crescita aziendale è stata perseguita attraverso diverse acquisizioni che hanno permesso a Flo di diversificare sia il portafoglio prodotti, aggiungendo per esempio gli articoli in carta, sia i settori serviti, entrando con successo nel mondo della grande distribuzione.
Ad oggi, l'ampiezza della gamma dei prodotti offerti da Flo copre tutto il mondo delle stoviglie monouso e prevede piatti, bicchieri, posate, contenitori, vaschette e tovaglioli per un totale di circa 3.000 codici. I prodotti per il mercato del vending sono dei veri e propri articoli tecnici e devono possedere requisiti specifici in [illegible] dimensioni, pesi e t[illegible] superficiali e unifor[illegible] materiale, con perce[illegible] errore bassissime. La stessa attenzione sui particolari usata nella produzione dei bicchieri per i distributori automatici viene usata per la produzione di tutti gli articoli destinati al retail, mondo nel quale Flo si è distinta proprio per la qualità del prodotto fornito. A quasi quarant'anni dalla sua nascita, [illegible]

DATA CENTER

GREEN MOUNTAIN, NORWAY

Fire prevention system N2 Firefighter® installed compliant with **BSI PAS 95:2011**

General information

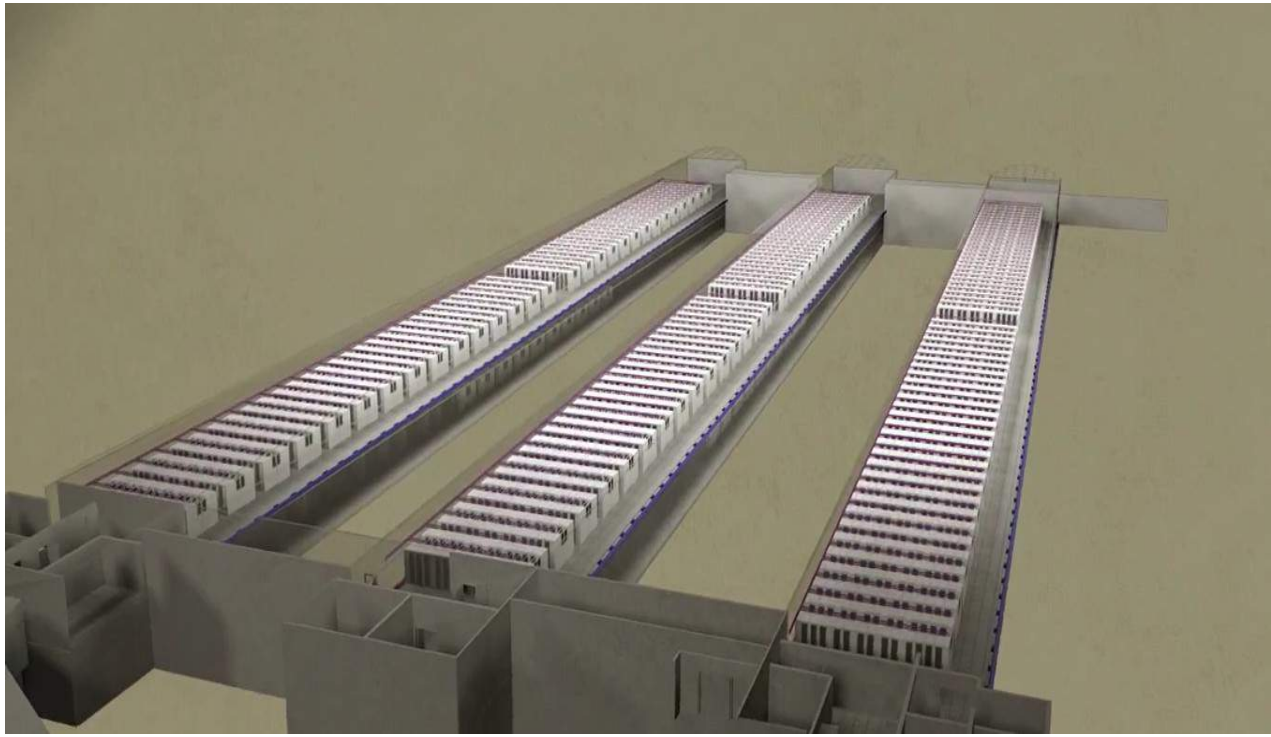
- Data center
- No. rooms 50
- 33.000 m³

- Material to be protected: server
- Oxygen design concentration 15.9 %

DATA CENTER

GREEN MOUNTAIN, NORWAY

- Floor plan



DATA CENTER

GREEN MOUNTAING, NORWAY

OXYGEN MONITORING SYSTEM: sensors system compliant with **EN 54-07, EN 50104, EN 61508**

- Oxygen sensor

DATA CENTER

GREEN MOUNTAIN, NORWAY

- Nitrogen generator installed
  - ADOX® technologies

DATA CENTER

GREEN MOUNTAIN, NORWAY

- **N2 FIREFIGHTER® SYSTEM** at GREEN MOUNTAIN in operation since 2012

ARCHIVE

ESTAV, ITALY

Fire prevention system N2 Firefighter® installed compliant with **ÖNORM F 3007, ÖNORM F 3008, ÖNORM F 3073 , TRVB 155, Ministerial Circular** (Protocol n. 0007059 of 21.05.2012)

GEPRÜFT

General information

- Archive of medical records
- 7000 m³

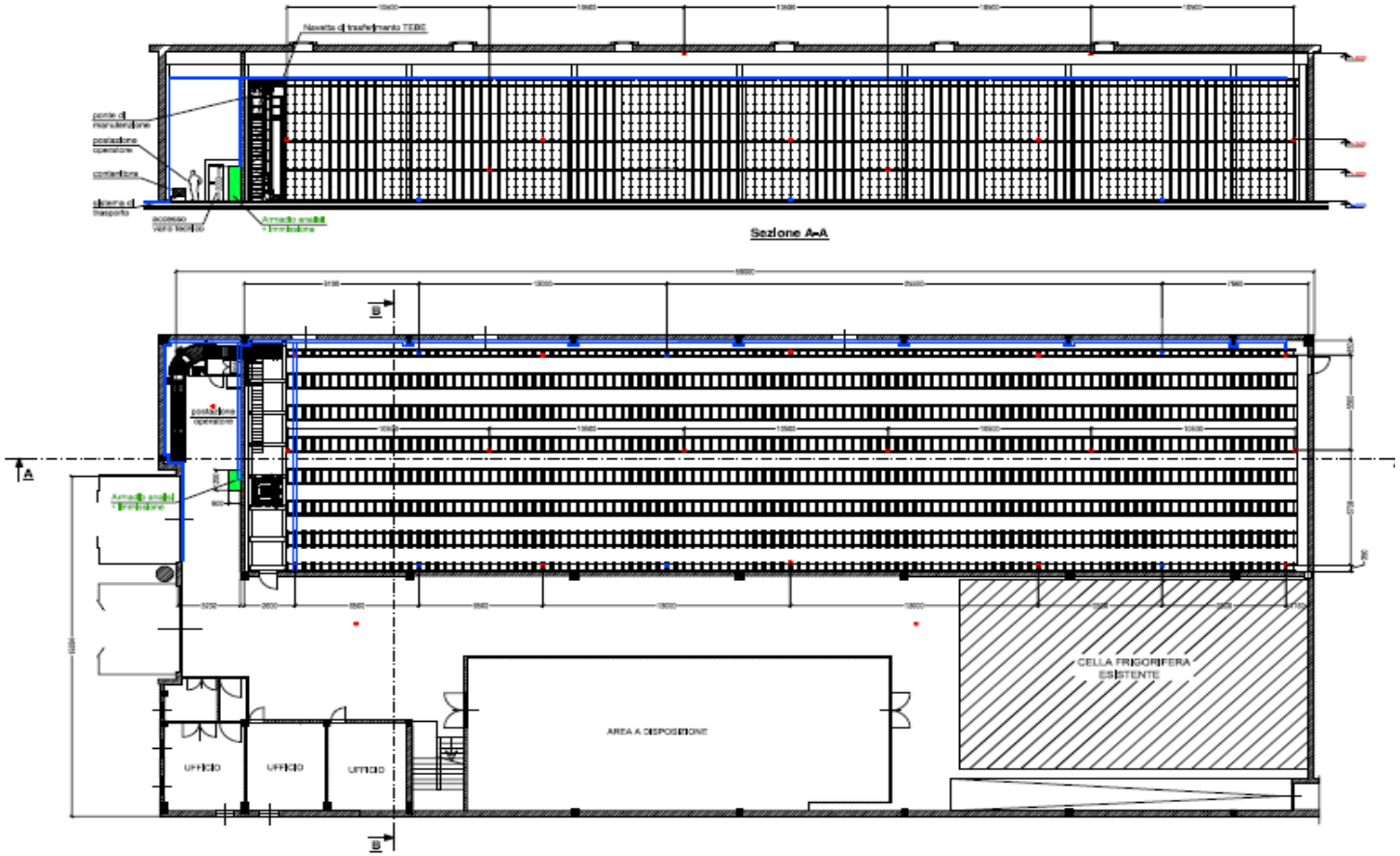
- Material to be protected Paper, medical records
- Oxygen design concentration 14.0 %

Isolcell FIRE PREVENTION

ARCHIVE

ESTAV, ITALY

- Archive



ARCHIVE

ESTAV, ITALY

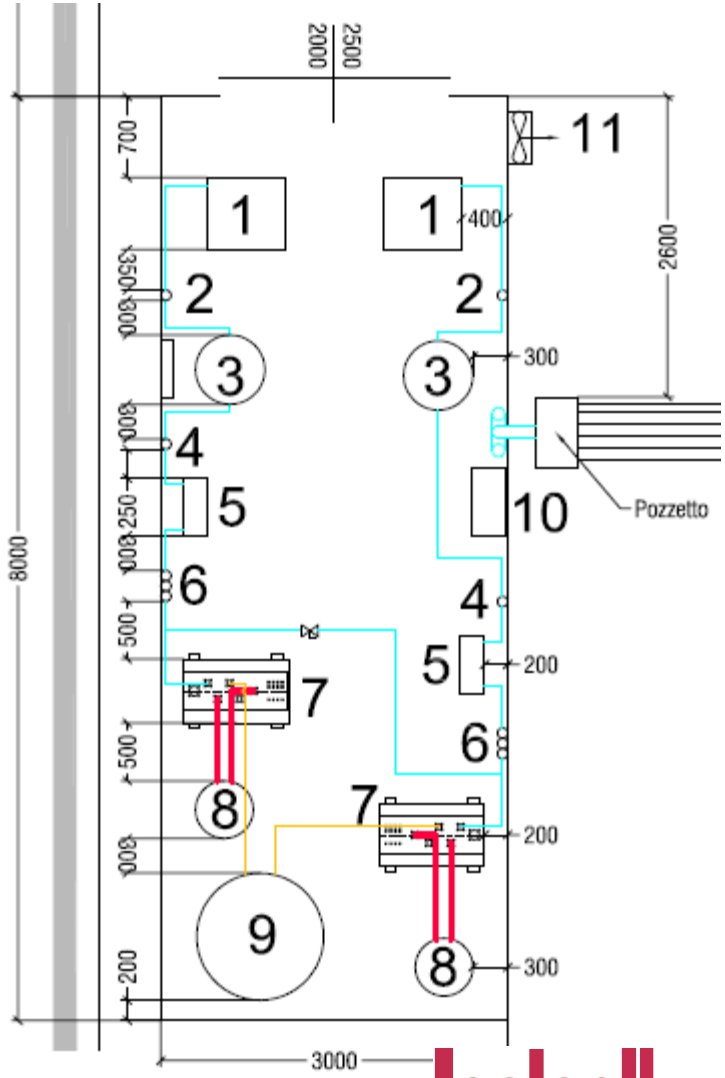
OXYGEN MONITORING SYSTEM: Isolcell N2 FireFighter® variable-pitch

- Critical points in the premises to be protected can be very accurately identified

ARCHIVE

ESTAV, ITALY

- Dislocation of the machines
- Nitrogen generators
  - PSA NIMOS technologies



ARCHIVE

ESTAV, ITALY

- **N2 FIREFIGHTER® SYSTEM** at INASSET in operation since 2011

SHOW ROOM | meeting room

Fire prevention system N2 Firefighter® installed compliant with **ÖNORM F 3007, ÖNORM F 3008 ÖNORM F 3073 , TRVB 155, Ministerial Circular** (Protocol n. 0007059 of 21.05.2012)

GEPRÜFT

General information

- Meeting room
- 90 m³

- Oxygen design concentration 14.8 %

Isolcell FIRE PREVENTION

SHOW ROOM | meeting room

OXYGEN MONITORING SYSTEM: sensors system compliant with **EN 54-07, EN 50104, EN 61508**

- Oxygen sensor: Oxyguard

SHOW ROOM | meeting room

NITROGEN GENERATORS

- ADOX® technology

SHOW ROOM | meeting room

- **N2 FIREFIGHTER® SYSTEM** in operation since 2009

HOSPITAL | archive and server rooms

SARPSBORG, NORWAY

Fire prevention system N2 Firefighter® installed according to **BSI PAS 95:2011**

General information

- Archive
- Server rooms
- No. rooms 19
- Total volume 3421 m³
- Leakage rate of 3% of volume per hour

- Oxygen design concentration 15.0 %

HOSPITAL| archive and server rooms

HOSPITAL SARPSBORG, NORWAY

OXYGEN MONITORING SYSTEM: sensors system compliant with **EN 54-07, EN 50104, EN 61508**

- Oxygen sensor: Oxyguard

HOSPITAL| archive and server rooms

HOSPITAL SARPSBORG, NORWAY

- Nitrogen generators installed, PSA NIMOS technology

HOSPITAL| archive and server rooms

HOSPITAL SARPSBORG, NORWAY

- **N2 FIREFIGHTER® SYSTEM** at HOSPITAL SARPSBORG in operation since 2013

ELECTRICAL SUBSTATIONS

TRANSEND NETWORKS PTY LTD, AUSTRALIA

Fire prevention system N2 Firefighter® installed according to own tender

General information

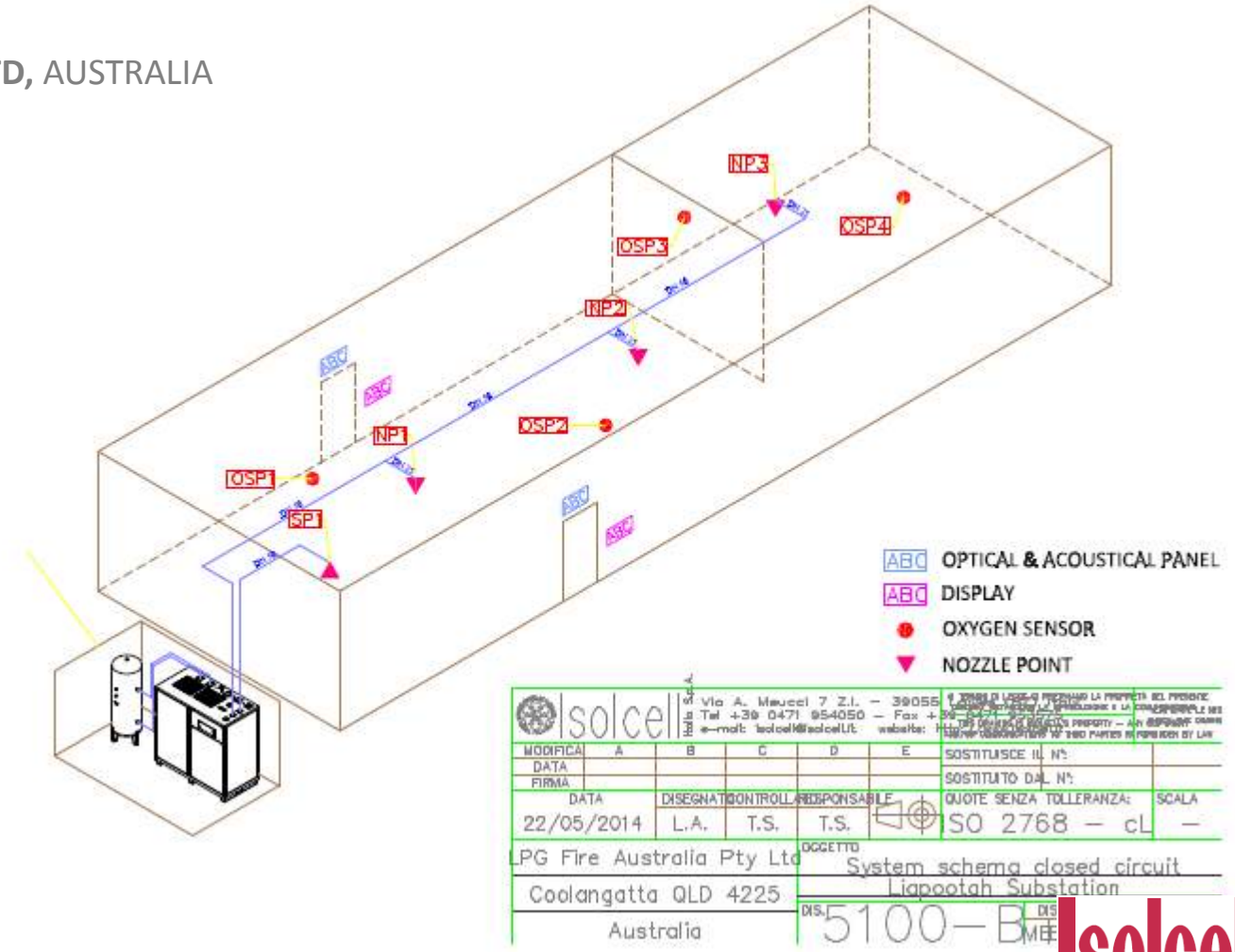
- Electrical substations
- Total volume 560 m³
- Leakage rate less than 3%

- Oxygen design concentration 14.7 %

ELECTRICAL SUBSTATIONS

TRANSEND NETWORKS PTY LTD, AUSTRALIA

- Floor plan

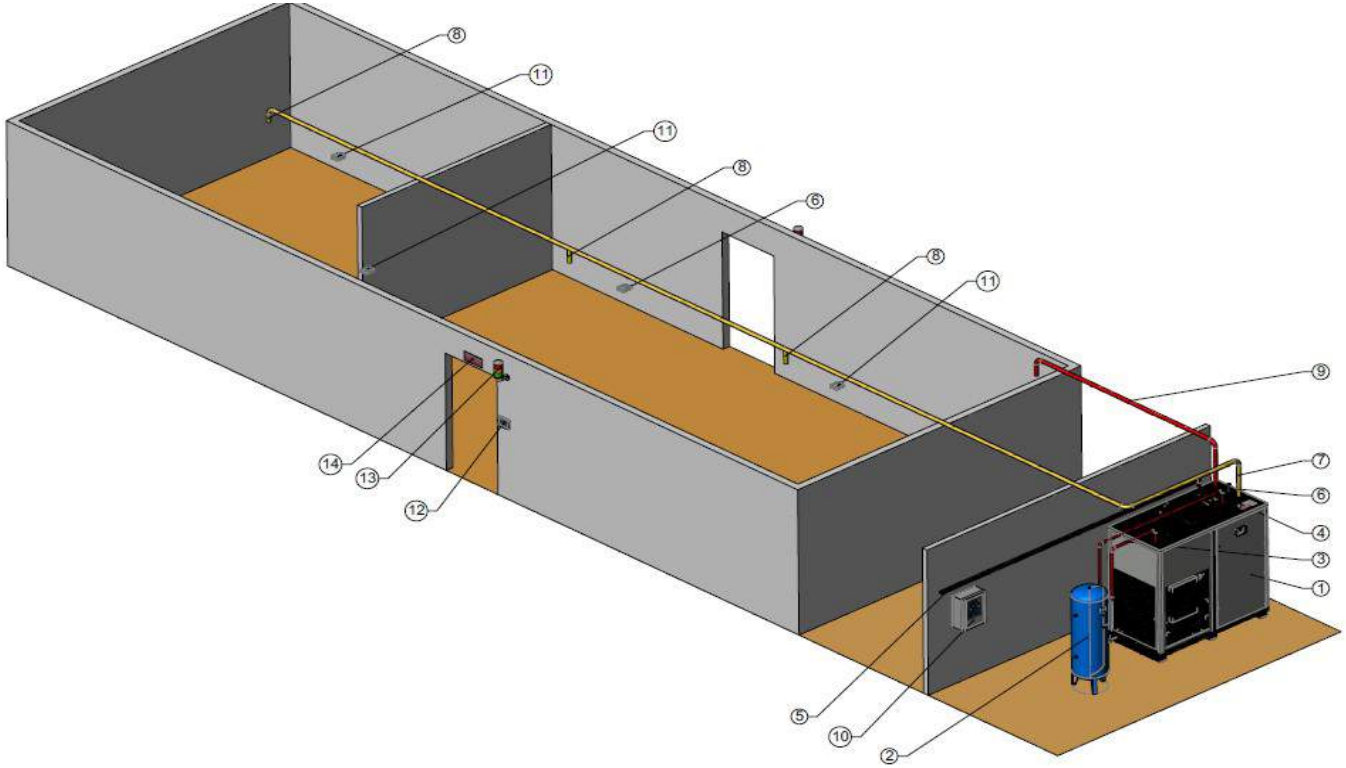


ELECTRICAL SUBSTATIONS

TRANSEND NETWORKS PTY LTD, AUSTRALIA

OXYGEN MONITORING SYSTEM: sensors system compliant with **EN 54-07, EN 50104, EN 61508**

Oxygen sensor: Oxyguard



ELECTRICAL SUBSTATIONS

TRANSEND NETWORKS PTY LTD, AUSTRALIA

- Nitrogen generators installed, ADOX® technology

ELECTRICAL SUBSTATIONS

TRANSEND NETWORKS PTY LTD, AUSTRALIA

- **N2 FIREFIGHTER® SYSTEM** at TRANSEND NETWORKS PTY LTD in operation since 2013

Summary

10. FAQ

FAQ | N2 Firefighter®

- **Can prevent all risk of fire?**
  - The system is based on the principle of the fire triangle (oxygen, heat, fuel). It removes a condition that, if present, would originate a combustion
- **The modified atmosphere is harmful?**
  - No, the modified atmosphere is natural and is obtained through a process of filtration of the atmosphere that we breathe
- **The temperature is lower in the protected room?**
  - No, the auto-extinguishing atmosphere does not affect temperature
- **The technology N2 Firefighter® must be ensured by a second system of fire protection, for example fire extinguishers, sprinklers?**
  - No, the system is regulated and certified, therefore it's already redundant itself. It does not require additional fire protection systems.
- **The auto-extinguishing atmosphere can degrade the objects in the room?**
  - No on the contrary it slows down the oxidation and thus the degradation and the deterioration of the objects.
- **How to select the most suitable fire protection system?**
  - Simply considering that N2 Firefighter® is a prevention system and not a suppression fire system

Summary

11. Contact

CONTACT

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Thank you for your attention!

Isolcell
CONTROLLED ATMOSPHERE SINCE 1988

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