ACTIVE FIRE PREVENTION USING OXYGEN REDUCTION PRINCIPLE

SUPDET Conference, Orlando, March 4 2014
Dipl.-Ing. Peter Clauss

- Company profile
WAGNER –
Dedicated to special solutions for fire prevention & protection

- WAGNER Group GmbH
  - Founded: 1976
  - by Werner Wagner
  - Family-owned & run
  - Sales: $100 million
  - Employees: 450
  - Headquarters: Langenhagen/ Hanover, Germany

Subsidiaries:
- Germany
- Austria
- Belgium
- China
- Dubai
- Holland
- India
- Poland
- Russia
- Singapore
- Switzerland
- United Kingdom

Our solutions | Product portfolio

WAGNER – MANUFACTURER & SYSTEM INTEGRATOR

- Fire prevention
  - With OxyReduct® fire prevention systems simply take the oxygen out of the fire.

- Fire detection
  - Earliest fire detection with TITANUS® ensures the maximum time advantage for countermeasures

- Fire fighting
  - FrExting® Effective extinguishing of a fire with natural inert gases, such as nitrogen, argon, carbon dioxide and IG541

- Risk management
  - Centrally control safety technology equipment with VisuLAN® for perfect overview and danger management organisation
QUALITY - PATENTS - APPROVALS

- More than 700 patents world-wide
- Certified solutions and systems in accordance with the respective local regulations
- Contribution to national and international guidelines
- VdS approval
- International approvals
- Receipt of various awards and honours

Content

AGENDA
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3. System build-up
4. Applications
5. System Design Criteria
6. Fire tests
7. Existing codes and standards in Europe
8. International approvals
9. Health and safety
10. References
11. Experience from 700 systems running systems
### Milestones in oxygen reduction systems development

- **1991**
  - Halon prohibition ordinance in Germany

- **1993 - 1997**
  - Approval of new extinguishing systems
    - Inergen
    - Nitrogen
    - Argon
    - Argonite
    - FM-200

- **1997**
  - WAGNER started fire tests to identify flammability limits under oxygen-reduced atmospheres

- **October 1998**
  - Presentation of OxyReduc® at the international trade show “Security” in Essen, Germany

- **September 1999**
  - First oxygen reduction system installed
  - Server room – Halle, Germany

**MILESTONES IN THE DEVELOPMENT OF OXYGEN REDUCTION SYSTEMS IN GERMANY & EUROPE**

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MILESTONES IN THE DEVELOPMENT OF OXYGEN REDUCTION SYSTEMS IN GERMANY & EUROPE

December 2004
First VdS system approval for oxygen reduction systems in Germany

June 2005
First VdTÜV installer approval for oxygen reduction systems in Germany

2005
Add-on OxyReduct® Fire Prevention Roll-out of Compact systems for projects with >50 m² - 1000m², e.g. server rooms.

January 2007
Publication of VdTÜV guideline (VdTÜV 3527) for inerting and oxygen reduction systems

June 2009
Publication of national standard ÖNORM F 3097, Austria

MILESTONES IN THE DEVELOPMENT OF OXYGEN REDUCTION SYSTEMS IN GERMANY & EUROPE

June 2009
Publication of national standard SN 123456, Switzerland

November 2011
Publication of technical specification PAS 95, United Kingdom

2011
WAGNER VPSA-Technology OxyReduct® VPSA can safe up to 80% of energy costs!

October 2013
Request by CEN/TC 191/WG6 to start for prEN enquiry WI 00191236 for oxygen reduction systems

March 2014
700³ system installed
• Basics - oxygen reduction principle

PREVENTION PRINCIPLE

The oxygen content in the atmosphere is reduced by adding nitrogen-enriched air (approx. 95 % nitrogen, 5 % oxygen) to the atmosphere.

Consequently, the mixing ratio of oxygen versus nitrogen is changed and a fire cannot start or will not continue to propagate!
DEFINITION

- Oxygen reduction systems
- Fire prevention systems

The purpose of oxygen reduction systems is to prevent the development or propagation of open fires by adding nitrogen to the atmosphere.

![Diagram showing natural atmosphere and reduced oxygen atmosphere](image-url)

Fire tests with different materials
NITROGEN GENERATION

Various air separation methods exist. Here the most widely used:

- MEMBRANE technology
- VPSA technology

MEMBRANE TECHNOLOGY

- Filtering the nitrogen using a hollow fiber membrane (polymer PPE)
- Operating pressure: approx. 8-13 bar (overpressure)
VPSA (VACUUM PRESSURE SWING ADSORPTION) TECHNOLOGY

- Adsorption process with carbon molecular sieve (CMS)
- Operating pressure: approx. 1-2 bar (overpressure)
Basics about oxygen reduction

VPSA (VACUUM PRESSURE SWING ADSORPTION) TECHNOLOGY

- Adsorption process with carbon molecular sieve (CMS)
- Operating pressure: approx. 1-2 bar (overpressure)

Compressed air

Vacuum pump

Compressed air

Air inlet

Exhaust air

CMS tank

O₂, Ar, CO₂

Nitrogen generator

Simplified CMS model:

Micro/Sub-micro-pores

VPSA (Operating pressure: approx. 1-2 bar (overpressure)

Simplified CMS model:

Particle of carbon

Air flow

Particle of carbon

CMS-Pellet

Air flow

Outer surface

Inner surface

Particle of carbon

Simplified CMS model:
• System Build up

**SYSTEM SKETCH FOR SINGLE-ZONE SYSTEM**

Basics about oxygen reduction

![Diagram of a single-zone system with labels for fire panel, control unit, surrounding air, compressor, nitrogen generator, nitrogen production, protected area, and early fire detection.](image-url)
Basics about oxygen reduction

SYSTEM SKETCH FOR MULTI-ZONE SYSTEM

SYSTEM BUILD UP

1. Area to be protected
2. Nitrogen distribution pipe
3. Equipment room OxyReduct®
4. Compressor
5. Nitrogen generator
6. OxyControl
7. Alarm device
8. TITANUS® ASD system
9. OXY·SENS® oxygen sensor
Applications

- Applications for fire prevention systems
  - archives
  - logistics / warehouses
  - server rooms / EDP rooms / Data Centers
  - cold stores
- Protected volumes up to 21 million ft³ / 600,000 m³
- More than 700 systems in operation worldwide

Application areas

- Archives
- Logistics / Storages
- Information technology
**Application areas**

**WAREHOUSES FOR FROZEN GOODS**
- Avoidance of damage to warehouse goods by smoke, the effects of fire and by extinguishing agents
- Easy adjustment of the system to accommodate changes in requirements

**WAREHOUSES FOR SMALL-LOAD CARRIER**
- Secure fire protection, despite flammable properties of plastic containers
- No loss of production or storage capacity

**LITHIUM BATTERY – PRODUCTION & STORAGE**
- Contain chain reactions that can rapidly lead to a major fire can be prevented
- Reduced-oxygen atmosphere prevents fire from spreading to neighboring cells
- Oxygen reduction concept is ideal for processes where water fire extinguishing using is not feasible, e.g. lithium battery aging process

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**Application areas**

**WAREHOUSES FOR CELLULOSE PRODUCTS**
- Introduction of nitrogen generated on site reduces the oxygen concentration in the warehouse in a controlled manner to a level where the paper rolls can no longer burn

**ARCHIVES**
- Protection of irreplaceable documents and works of art
- Avoidance of damage to archived documents from smoke and normal extinguishing agents

**DATA CENTER, SERVER- & EDP ROOMS**
- In contrast with conventional fire protection solutions, it is not necessary to shut off power to the IT infrastructure. This ensures continued operation of protection data while maintaining constant availability
- No damage from fire, smoke or extinguishing agents in normal system installations
The benefits of an active fire prevention system

- Avoids the initial outbreak or spread of fire
- Avoids electrical equipment fires
- No emergency power shut down in case of fire
- Significantly limits damage from smoke, fire size and fire spread
- Avoids potential damage from common extinguishing agents that might be released pursuant to an incident
- Reduces environmental risks from fire or its consequences
- Controls the risk of smoldering elements entering the risk area.
- Helps ensure business continuity
- Requires minimal re-adjustment when fire risks change
- System operates and monitors itself 24/7
- Helps ensure supply chain continuity

System design criteria
CALCULATION AND DOCUMENTATION

- Certified program must be used!
- Example: Wagner OxyCalc
- Data needed:
  - Volume of the protected area
  - Air exchange rate n50 (ISO 9972)
  - Oxygen target value
  - Entrance / exit type and frequency
  - Air conditioning concept

- Results:
  - Nitrogen demand
  - Operation hours
  - Decrease and increase times
  - Definition of hardware

MONITORING OXYGEN CONCENTRATION

- Measurement shall always be taken by at least two independent oxygen sensors per protected volume
- Oxygen sensors shall be evenly distributed through the protected volume (height and area)
- Only oxygen measuring systems with proven suitability, measurement range and display range for this application shall be used

<table>
<thead>
<tr>
<th>Volume in ft³ (m³)</th>
<th>No. of measuring sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>from</td>
<td>to</td>
</tr>
<tr>
<td>0</td>
<td>17,657.33 (500)</td>
</tr>
<tr>
<td>&gt; 17,657.33 (500)</td>
<td>141,258.67 (4,000)</td>
</tr>
<tr>
<td>&gt; 141,258.67 (4,000)</td>
<td>353,146.67 (10,000)</td>
</tr>
<tr>
<td>&gt; 353,146.67 (10,000)</td>
<td>882,866.67 (25,000)</td>
</tr>
<tr>
<td>&gt; 882,866.67 (25,000)</td>
<td>1,765,733.34 (50,000)</td>
</tr>
<tr>
<td>&gt; 1,765,733.34 (50,000)</td>
<td>3,531,466.67 (100,000)</td>
</tr>
<tr>
<td>&gt; 3,531,466.67 (100,000)</td>
<td>7,062,933.34 (200,000)</td>
</tr>
<tr>
<td>&gt; 7,062,933.34 (200,000)</td>
<td>10,594,400.02 (300,000)</td>
</tr>
<tr>
<td>&gt; 10,594,400.02 (300,000)</td>
<td>14,125,866.69 (400,000)</td>
</tr>
</tbody>
</table>

Table: Minimum Number of Measuring Sensors
EXAMPLE FOR AN OxyReduct® CALCULATION WITH OxyCalc®

- General project data
  - Site Data
    - Yearly average wind speed
    - Altitude of the protected area

- Number of protected areas

EXAMPLE FOR AN OxyReduct® CALCULATION WITH OxyCalc®

- Information regarding the protected area
  - Room data
    - Net volume
    - Air flow rate [n50]
  - Oxygen Levels
  - Fresh air supply by
    - Access
    - Charge
EXAMPLE FOR AN OxyReduct® CALCULATION WITH OxyCalc®

- Calculation
- Reduction and Increase time
- Maximum nitrogen requirement
- Nitrogen production
- Estimated operational costs

Fire tests to determine material target value
Fire tests with different materials

TEST LABORATORY

- 14,125 ft³ (400 m³)
- Height = 14.11 ft (4.3 m)
- n50 = 0.46
- Control of the nitrogen production unit
- Recording of the measured values
- 8 measuring points
  - VdS & ISO specification
  - 3 x temperature
  - 3 x oxygen concentration
  - air pressure
  - humidity

TEST LABORATORY

- Cold storage container
- Temperature down to -18.4 °F (-28 °C)
IGNITION TESTS ACCORDING TO VdS 3527 AND CEN

- Oxy-acetylene torch works independently of the surrounding atmosphere
- Flame shall be in a temperature range of 1652 °F to 1832 °F (900 °C to 1000 °C)
- Flames shall be applied to the test specimen for a minimum of 3 min. The flame is then removed.

Test criteria:
- If the sample does not keep burning independently after 1 min, it is considered to have passed the test.
  - The test shall then be repeated twice with the same oxygen concentration and with a new test specimen.
- If the test specimen
  - does not continue to burn independently
  - or ignite in three consecutive tests
  >> the series of tests is passed and the oxygen concentration is set as the ignition threshold for this material

IGNITION THRESHOLDS ACCORDING TO VdS 3527

<table>
<thead>
<tr>
<th>No.</th>
<th>Material</th>
<th>Ignition threshold % by volume O₂ (Reference temperature + 68 °F + 20 °C, unless specified)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PE-HD (Casing, building material)</td>
<td>16.0</td>
</tr>
<tr>
<td>2</td>
<td>PP (Casing, building material)</td>
<td>16.0</td>
</tr>
<tr>
<td>3</td>
<td>PMMA</td>
<td>15.9</td>
</tr>
<tr>
<td>4</td>
<td>ABS</td>
<td>16.0</td>
</tr>
<tr>
<td>5</td>
<td>PVC (Cable)</td>
<td>16.9</td>
</tr>
<tr>
<td>6</td>
<td>1-5 lead to EDP risks</td>
<td>15.9</td>
</tr>
<tr>
<td>7</td>
<td>PE-LO (Packaging foil)</td>
<td>15.9</td>
</tr>
<tr>
<td>8</td>
<td>Pine (pallet wood, untreated)</td>
<td>17.0</td>
</tr>
<tr>
<td>9</td>
<td>Corrugated cardboard (packaging paperboard, brown, untreated, unprinted)</td>
<td>15.0</td>
</tr>
<tr>
<td>10</td>
<td>Palletized cardboard (Packaging paperboard, brown, untreated, unprinted)</td>
<td>15.0</td>
</tr>
<tr>
<td>11</td>
<td>Paper (writing paper, 80 g/m², white, untreated)</td>
<td>14.1</td>
</tr>
</tbody>
</table>
IGNITION THRESHOLD FOR FROZEN GOODS TESTS
ACCORDING TO VdS 3527

- Temperature has an impact on the ignition concentration!
- Low temperature stops fire at higher oxygen levels!
- VdS fire tests - a must for getting approval!
- Example:
  - Material tested: frozen food, wood, plastics, cardboard
  - No fire at -16.6 °F (-27 °C) and 18.5 vol.-% oxygen!

Existing standards in Europe

- ISO
- DIN
- CEN
- BSI
- VdS

Fire tests for cold storages

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**ACTUAL SITUATION IN GERMANY**

- OxyReduct® was the first active fire prevention system to be approved by the VdS in Germany.
- VdS confirms high quality and reliability, and this is of central importance for both providers and users.
- Businesses equipped with VdS-approved and monitored fire protection systems benefit from lower insurance premiums.
- In Germany and Austria, fire prevention systems are
  - on the same safety level as gaseous extinguishing systems
  - accepted by VdS and by insurance companies as well as by local building authorities

**Existing standards in Europe**

- Germany
  - VdS Guidelines for Inerting and Oxygen Reduction Systems
  - VdS 3527en, Planning and Installation
  - New VdS Guideline is in progress

- Switzerland
  - SN 123456 (Planning and Installation of Oxygen Reduction Systems)

- Austria
  - ÖNORM, F 3007, Oxygen Reductions Systems (SRS - Sauerstoff-Reduziersysteme)

- UK
  - PAS 95:2011 (Hypoxic air fire prevention systems – Specification)
CEN

- Resolution agreed at the CEN/TC 191 meeting on October 13, 2010 in Berlin to create new work item for "Design of Oxygen Reduction Systems"
- Task group starts working process in 2011
  - Members of task group: Germany, Netherlands, UK, France, Finland, Denmark, Sweden, Norway, Spain, Italy, Switzerland, Austria
- Approval for activation as a working item in October 2013
  - WI 00191236 for oxygen reduction systems
  - Requested by CEN/TC 191/WG6
  - Start for prEN enquiry
- CEN/TC 191 will invite ISO/TC 21/SC 8 to participate (CEN lead)

International approvals
System approvals:
- VdS-certified systems
- VdS-certified installer
- POJTES, Russia
- CNBOP, Poland
- VB-Cert, Austria
- TSU, Slovakia,
- MSZT Cert, Hungary
- PAVUS, Czech Republic
- .......

Health and safety
WORK-PHYSIOLOGICAL MECHANISMS OF HYPOXIA

- Exposure to oxygen-reduced atmospheres is comparable to high altitude exposure

- In terms of occupational health
  - actual altitude (hypobaric hypoxia)
  - oxygen reduction (isobaric hypoxia)

  can be regarded as identical

EFFECTS ON HUMANS

<table>
<thead>
<tr>
<th>ft above sea level</th>
<th>vol.-% O₂ at sea level</th>
</tr>
</thead>
<tbody>
<tr>
<td>14,763</td>
<td>12 vol.-% O₂</td>
</tr>
<tr>
<td>13,125</td>
<td>13 vol.-% O₂</td>
</tr>
<tr>
<td>11,482</td>
<td>14 vol.-% O₂</td>
</tr>
<tr>
<td>9,842</td>
<td>15 vol.-% O₂</td>
</tr>
<tr>
<td>8,202</td>
<td>16 vol.-% O₂</td>
</tr>
<tr>
<td>6,561</td>
<td>17 vol.-% O₂</td>
</tr>
<tr>
<td>4,921</td>
<td>17 vol.-% O₂</td>
</tr>
<tr>
<td>3,280</td>
<td>18 vol.-% O₂</td>
</tr>
<tr>
<td>1,040</td>
<td>18 vol.-% O₂</td>
</tr>
</tbody>
</table>

Mount Elbert, Rocky Mountains
14,442 ft / 4,402 m above sea level

Zugspitze, mountain station
9,711 ft / 2,960 m above sea level

Aircraft cabin

St. Leonhard, Austria
5,708 ft / 1,740 m above sea level
PUBLISHED STUDY

“IMPACT ON HEALTH OF WORKING IN OXYGEN-REDUCED ATMOSPHERES (HYPOXIA)”

Supported by the German Federation of Institutions for Statutory Accident Insurance and Prevention (now DGUV – German Social Accident Insurance)

Conclusions, recommendations

The cohort study, supported by the two pilot studies (“test exposure” and “individual organisation of breaks”), shows that under the current working conditions in Germany no risk of suffering from an acute health hazard is posed by working in oxygen-reduced atmospheres, nor are those complaints encountered more often in comparison with the corresponding non-exposed control subjects that might be expected as a typical consequence of intensive exposure to hypoxia. This applies as low as 1.5 Vol% oxygen, with additional medium to heavy physical strain and periods, and of up to 8 hours, whereby the majority of the test subjects worked in atmospheres ≥ 15 Vol% oxygen, with little physical strain and for periods of less than 30 min. Thus the conclusion is best supported for this kind of exposure. More intensive exposure (in particular less oxygen, more physical strain) is associated with an increase in the risk of complaints. Nevertheless, the absolute risk including of complaints was not higher than in the group of comparable, non-exposed employees.
NEW HEALTH AND SAFETY GUIDANCE
GERMAN LIABILITY INSURANCE ORGANIZATION

Regulations for personal protection in Germany
Working in oxygen-reduced atmospheres
- BGI/GUV-I 5162
- Information of the DGUV (German Social Accident Insurance)

Risk categories and safety measures
The following measures must be carried out when working in rooms with reduced oxygen content.

<table>
<thead>
<tr>
<th>Risk class</th>
<th>Oxygen concentration ( c ) in vol.-% ( O_2 )</th>
<th>Safety measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 0</td>
<td>( 20.9 &gt; c \geq 17.0 )</td>
<td>Employee training</td>
</tr>
<tr>
<td>Class 1</td>
<td>( 17.0 &gt; c \geq 15.0 )</td>
<td>Occupational health examination pursuant to “Working in oxygen-reduced atmospheres”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Employee instructions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After 4 hours, a break of at least 30 minutes outside the oxygen-reduced area is required</td>
</tr>
<tr>
<td>Class 2</td>
<td>( 15.0 &gt; c \geq 13.0 )</td>
<td>Occupational health examination “Working in oxygen-reduced atmospheres”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Employee instructions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After 2 hours, a break of at least 30 minutes outside the oxygen-reduced area is required</td>
</tr>
<tr>
<td>Class 3</td>
<td>( c &lt; 13.0 )</td>
<td>Not within the scope of this information sheet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do not enter without specific additional measures</td>
</tr>
</tbody>
</table>

Risk classification of hypoxia exposure and safety measures
References

Installation example I

PROJECT HAYAT, TURKEY
HAYAT PROJECT, TURKEY

General information

- High storage for paper and hygienic articles
- Total volume = 21 million ft³ (592,200 m³)
- Approx. 80,000 pallets
- Storage temperature: approx. 68-86 °F (20-30 °C)
- O₂ design concentration: 14.6 vol.-%

Dimensions of high storage warehouse

- (L*W*H): 393 ft. * 344 ft. * 154 ft. (120 m * 105 m * 47 m)
- Area of 135,192 ft² (12,600 m²)
- Height of 154 ft. (47 m)
- Corresponds to 21 million ft³ (592,200 m³) storage volume
Installation example

HAYAT PROJECT, TURKEY

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COLD STORAGE

References

COLD STORAGE FIRE PREVENTION: NEWCOLD, RHEINE, GERMANY

- KLM – consumer market supplier of frozen foods and ice cream
- KLM decided to increase its storage capacities in order to expand its range of services for its customers.
- Area of 92,000 ft² (8,535 m²)
- Height of 125 ft. (38 m)
- The new high-bay cold storage warehouse offers a volume of around 13.5 million ft³ (380,000 m³).
- 68,000 pallets.
- Largest fully automated high-bay cold storage warehouse in Germany at present
COLD STORAGE FIRE PREVENTION: NEWCOLD, RHEINE, GERMANY

- US$ 56 million (€ 40 million) new construction
- Automatic loading and unloading system that allows a truck to be fully loaded with 32 pallets in only two minutes
- Temperature-controlled and partly automated packing plant quickly configures mixed boxes
- 5,000 pallets/day capacity

- WAGNER’s OxyReduct® active fire prevention system reduces the oxygen content in the high-bay cold storage warehouse to 16.2 vol.-%

References

COLD STORAGE FIRE PREVENTION: NEWCOLD, RHEINE, GERMANY

Installation example III

SERVER ROOM
Experience from 700 systems in operation
EXPERIENCE GAINED – 700 RUNNING SYSTEMS

- Oxygen reduction is now a proven niche solution in the European fire security market.
- Technology has developed and achieved a high level of acceptance for special and critical applications.
- It has become the chosen technology for safeguarding high valuable assets, goods and processes.
- Chosen solution for protecting the irreplaceable where conventional systems are at the limits.
- Excellent addition to classical fire protection concepts.

THANK YOU FOR YOUR ATTENTION
Legal Notices, Disclaimers and Warranties

GENERAL DISCLAIMERS
- The information contained in this document is for informational purposes only. Prior to the installation of any system, an evaluation of a prospective buyer’s requirements must be performed in order to make an assessment of the compatibility of any specific products for the buyer’s intended use. Performance of a product at a customer’s site does not constitute a guaranty or warranty for a particular purpose. The performance of such products will vary depending on site conditions. Where the customer or end-user is responsible for any guarantees, guarantees cannot be transferred to another party.

- The Crystallit® system described in this document has not been approved for use in the United States. Use of such products is subject to legal and regulatory approval and/or permits from federal, state and local authorities, for which the seller and/or buyer may need to be responsible. No representation is made herein concerning the compatibility of such products with federal, state and local laws and regulations.

LIMITED WARRANTY
- Wagner Group, Division (“Wagner”) warrants the Crystallit® system components to be free from defects in material and workmanship for a period of twelve (12) months from date of installation.

- This warranty does not apply when the system is not installed in accordance with the manufacturer’s instructions, the system is not properly installed by a Wagner authorized representative, the warranty is not transferred to the end-user of the system, the warranty is void if the system is not used for the intended purpose, the warranty is void if the system is not used in accordance with the manufacturer’s instructions, or the warranty is void if the system is not used for any purpose.

- Wagner will replace any defective or non-operating component for which defective or non-operating component is purchased.

DISCLAIMER OF IMPLIED WARRANTIES
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- There are no further warranties, express or implied.

LIMITATION OF LIABILITY
- No Liability for Consequential or Indirect Damages. Neither Wagner nor its representatives shall be liable for any incidental or consequential damages that may result from the use of Crystallit® products. In no event shall Wagner’s liability exceed the purchase price of the product(s) that were the subject of the claim.

- Maximum Liability. Wagner’s liability under any warranty is limited to the repair or replacement of the defective product.

The issue assumes no responsibility for the results obtained by the use of any product. No warranty is made regarding the general effectiveness, accuracy or functioning of the use of any product, regardless of any error or written statements made, by way of technical advice or otherwise, related to the use of such products.