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LDV-X

LARGE VOLUME DECONTAMINATION AND DETOXIFICATION SYSTEM FOR CHEMICAL AND BIOLOGICAL DECONTAMINATION

SECTORS OF ACTIVITY

Interiors: containers, critical or key internal infrastructure, aircrafts (military, passenger, cargo), military headquarters, citadels & control rooms, VIP suites, special events, sensitive surfaces, underground or indoor areas, tunnels, etc.

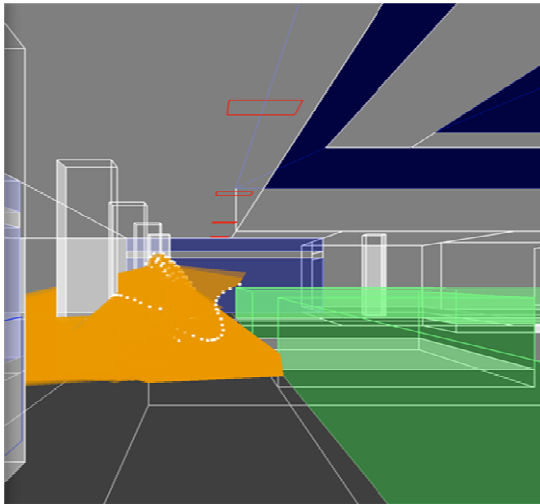


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Introduction

Cristanini's LVD-X offers a mobile solution for the ***chemical and biological decontamination and detoxification of interiors and confined spaces***. LVD-X acts by detoxifying the air and surfaces in several kinds of interiors in the civil and military domains, whether release is deliberate, accidental or due to neglect or natural causes, providing an effective response as well as ensuring the safety of confined contaminated areas.

In the past this has largely been used in the medical domain, and specifically biological sanitization of static infrastructure such as hospitals, medical and veterinary research centers using vaporized hydrogen peroxide.



A successful R&D program has been implemented over the years

Cristanini's R&D (Research & Development) programme has given birth to universal decontamination and detoxification solutions across the spectrum of CBRN and toxic industrial hazards and is a global leader in the decontamination and detoxification of mass personnel, vehicles, terrain and sensitive equipment.

In emergency situations, the deployment of LVD-X system becomes crucial as it addresses the interior detoxification of chemical and biological warfare agents, as well as the risks associated to endemic infectious diseases proliferation and spreading.

LVD-X R&D programme took into account the following requirements:

- **Effective** against chemical and biological contamination;
- **Adaptive** for different scenarios, environments and climatic conditions;
- **Speed** into **operating mode**, **simple** to operate;
- Use by **generalist** and specialist **personnel** in full Individual Protective Equipment;
- **Effective** on a **range of different materials**;
- **No requirement** for thermal **preparation** of the space to be decontaminated;
- **Negligible environmental impact**.

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LDV-X system is composed by 3 main elements:

- the system itself
- 2 products in 9-liter container for each:
 - A. **XP PRIMER** (liquid product) activating solution.
1 liter of XP PRIMER activating solution is made of:
 - a) 5-15% of non-toxic organic solvent
 - b) 1-5% of basic moisture
 - c) 0,5-3% of Benzalchonium Chloride
 - d) Distilled water up to 100%
 - B. **Hydrogen Peroxide (H₂O₂) at 30-35%**, commercial product for sanitation and disinfection, that can be found everywhere on the market.

Mode of operation

LDV-X system is electric (electricity can be provided by our Sanijet C.921 or other sources).

Decontamination procedure:

1. XP PREMIER (ACTIVATING MIXTURE) its vaporization allows the maximization of the activity between the contaminated warfare agent and the Hydrogen Peroxide that will be nebulized in the second phase;
2. The Hydrogen Peroxide (30% ÷ 35% concentration) is activated by a patented system included in the LDV-X system and is then transformed into free radicals OH-, activated by a heterogeneous catalyst and UV radiation. It is finally vaporized like a ultrafine aerosol (ACTIVATED SOLUTION).
This reaction generates hydroxyl radical (O H-) that has an oxidizing power equal to 2,80 V.¹ The only commonly used hydrogen peroxide has an oxidation power of 1,77 V.

The 2 products are vaporized by separated nozzles which can rotate on a 180° span.

The components accelerate the rapid diffusion saturating the air throughout the contaminated area. The aerosolized decontaminant homogenously detoxify both air and surfaces, in effect replicating the same course of dispersal as that of the warfare agent or hazard (most contaminants being heavier than air).

The system can efficiently work with an environment temperature in between + 49°C / - 5°C.

Standard timing of operations

The required detoxification time depends on the volume of the area to be treated.

In order to decontaminate an area of 200 m³, the following procedure should be implemented:

- Use the LDX-X system continuously for 30 minutes, vaporizing the XP PREMIER activating solution;
- Nebulize Hydrogen Peroxide for 20 minutes approximately;
- Wait for at least 30 minutes.

In order to decontaminate and detoxify large surfaces and volumes (more than 5000 m³), it is recommended to use more than 1 LDX-X system.

¹ Volt. measurement of power oxide reductant. 1 volt is the potential difference for which liberates 1 Joule energy when carrying 1 coulomb of electric charge.

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Products consumption

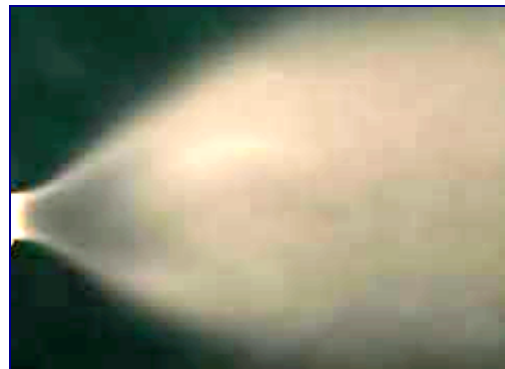
- a) 0,15 l/min. ~ XP PRIMER activating solution;
- b) 0,15 l/min. ~ Hydrogen peroxide.

The above mentioned consumption figures refer to a working pressure of 2.5-3 bar (procedure validated by the NATO WU Military Research Institute Laboratory in Brno (Czech Republic), at the temperature of 20°C (+1°C), 50% humidity (+5%), with a contamination of 80 µl, and samples put at 1.5 meter from the floor).

The activating solution XP PRIMER is not toxic, not corrosive and can be transported by air without following special precautions and strict safety regulations (CAS 109-87-5 / 109-87-5 / 68308-64-5). For hydrogen peroxide, however, limitations in terms of transportation and safety are higher; this explains why we suggest to buy this product in your country (it can be found easily on the market).



Semirrotating nozzles



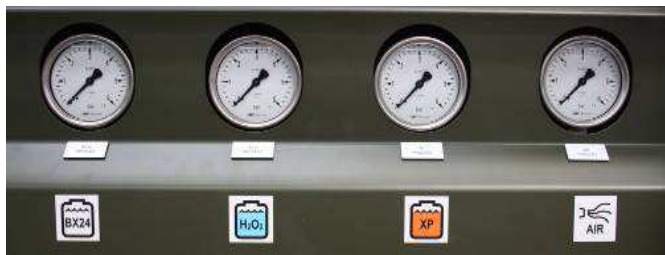
Aerosolized decontaminant microparticles

LDV-X system is equipped also with a lance with which it is possible to carry out decontamination and detoxification operations with our universal product BX24 (NSN: 6810-15-149-4789). This product has been tested on chemical warfare agents, TICs (Toxic Industrial Chemicals), aggressive biological agents including anthrax spores and several viruses among which Ebola. BX24 has been homologated by the Italian Ministry of Defense.

Products used

The LVD-X system pressurizes with fresh air (clean air with low humidity and free of dust and impurities) the containers of the three following substances:

- A. **XP PREMIER** → Cristanini patented mixture that optimizes the reaction with the decontaminant;
- B. **H₂O₂** → Liquid decontaminant, Hydrogen Peroxide 30÷35% volume;
- C. **BX24** → Universal chemical and biological detoxificant and radiological decontaminant.



Control panel for operator monitoring



Pressurized containers for XP PREMIER and hydrogen peroxide

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Transportability

The system can be integrated into critical infrastructures, citadels or permanent infrastructures or it can be used as a movable system for punctual utilizations in case of need. The system is easily transportable because it is equipped with:

- four wheels;
- four integrated handles;
- It is suitable for maritime, road, overland or underground rail transportation;
- It can be quickly and easily deployable because it is an avio-transportable system.

Storage

The system can be stored in an environment temperature between + 49°C / - 32°C (STANAG 4370).

There are several options for the storage of the system:

- The system can be stored independently or in a small palletized 'LD3' (UP 1329²) container (optional);
- The system can be pre-positioned and stored in critical areas in order to allow the operator the deploy the system during emergencies;

Standard conformity and certifications

LDV-X system complies with:

- 2006/42/CE, 2006/95/CE, 2004/108/CE, 97/23/CE
- EN ISO 12100
- EN ISO 13857:2008
- EN 60204-1:2006/a1:2009
- EN 60439-1:1999/A1:2004
- NATO – CWA AEP 58
- ISPESL (UP 1260 – BX24)



Test performances have been conducted in accordance with AEP58-NATO. The system was tested with chemical warfare agents (VX, GB and HD vapors).

The tests that have been carried out on LDV-X system are available upon request (UP 920/4 "*Index of presentations, certifications, tests and references of LDV-X large volume decontamination system*").

Dimensions and weight	Length : 1110 mm Width: 746 mm Height: 890 mm Weight: 200 kg
Technical data	Voltage: 220 CA / 50 ÷ 60 Hz monophas Maximum power: 3 kW Maximum Air Pressure: 3.5 bar Air Supply: 60 NI/min³ Protection against ingress of dust and water: IP65 Hose length: 20 m Acoustic pressure: < 74 dB(A)

Operator Control Panel

² UP identify our documents with technical information.

³ NI: Normal liter. Units for measuring flow used in pneumatic.

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The LVD-X control panel allows the operator to operate the system at distance from the machine that is relative to the specific circumstances. All control options on the panel are identified complying with ISO 7000. The panel allows selection of the various decontamination/detoxification options and their relative working cycles.

LDV-X system can be used in 2 modes:

- a) **Manual mode**, with the utilization of:
 - o Semi-rotating robotic cylinder ('on' 'off' sequence; variable functioning times)
 - o Lance for decontamination with BX24 (also in this case with variable functioning times)
- b) **Automatic mode**. Set to complete a non-stop 30+20 minutes cycle.

The control panel also has a clear '**Emergency Stop**' button for immediate shut down.

**IN THE CONTINUAL PURSUIT OF IMPROVING ITS PRODUCTS,
CRISTANINI RESERVES THE RIGHT TO CHANGE TECHNICAL INFORMATION
AND IMAGES WITHOUT PRIOR NOTICE.**



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