

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK



# CITY OF PORTLAND BUILDING PERMIT

This is to certify that HILLER NE FIRE PROTECTION  
of 240 Ballardvale St, Willington, MA 01887

For installation at 70 BEDFORD ST  
USM Science Building

Job ID: 2011-07-1826-ALTCOMM

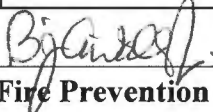
CBL: 114A- A-001-001

has permission to install NFPA 2001 Inergen system for Data Center

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statues of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of the buildings and structures, and of the application on file in the department.

Notification of inspection and written permission procured before this building or part thereof is lathed or otherwise closed-in. 48 HOUR NOTICE IS REQUIRED.

A final inspection must be completed by owner before this building or part thereof is occupied. If a certificate of occupancy is required, it must be

  
Fire Prevention Officer

(58)

Code Enforcement Officer / Plan Reviewer

THIS CARD MUST BE POSTED ON THE STREET SIDE OF THE PROPERTY  
PENALTY FOR REMOVING THIS CARD

closed

## BUILDING PERMIT INSPECTION PROCEDURES

Please call 874-8703 or 874-8693 (ONLY)

or email: [buildinginspections@portlandmaine.gov](mailto:buildinginspections@portlandmaine.gov)

With the issuance of this permit, the owner, builder or their designee is required to provide adequate notice to the city of Portland Inspections Services for the following inspections. Appointments must be requested 48 to 72 hours in advance of the required inspection. The inspection date will need to be confirmed by this office.

- **Please read the conditions of approval that is attached to this permit!! Contact this office if you have any questions.**
- **Permits expire in 6 months. If the project is not started or ceases for 6 months.**
- **If the inspection requirements are not followed as stated below additional fees may be incurred due to the issuance of a "Stop Work Order" and subsequent release to continue.**

### Final Fire

The project cannot move to the next phase prior to the required inspection and approval to continue, REGARDLESS OF THE NOTICE OF CIRCUMSTANCES.

IF THE PERMIT REQUIRES A CERTIFICATE OF OCCUPANCY, IT MUST BE PAID FOR AND ISSUED TO THE OWNER OR DESIGNEE BEFORE THE SPACE MAY BE OCCUPIED.



# PORTLAND MAINE

*Strengthening a Remarkable City, Building a Community for Life • [www.portlandmaine.gov](http://www.portlandmaine.gov)*

Director of Planning and Urban Development  
Penny St. Louis

**Job ID: 2011-07-1826-ALTCOMM**  
**Installation of NFPA 2001 Inergen**  
**System for the Data Center**

**For installation at:**  
**71 BEDFORD ST**  
**USM Science Building**

**CBL: 114A- A-001-001**

## **Conditions of Approval:**

### **Fire**

The suppression system shall be installed in accordance with NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*. A compliance letter is required.

Suppression system supervision shall be provided in accordance with NFPA 101, *Life Safety Code*, and NFPA 72, *National Fire Alarm and Signaling Code*.

Suppression system protection shall be maintained. Where the system is to be shut down for maintenance or repair, the system shall be checked at the end of each day to insure the system has been placed back in service.

**City of Portland, Maine - Building or Use Permit Application**

389 Congress Street, 04101 Tel: (207) 874-8703, FAX: (207) 8716

Job No: 2011-07-1826-ALTCOMM 2011-10799	Date Applied: 9/29/2011	CBL: 114A- A-001-001	
Location of Construction: 70 FALMOUTH ST	Owner Name: UNIVERSITY OF MAINE	Owner Address: 107 MAINE AVE BANGOR, ME 04401	Phone:
Business Name: USM Data Center	Contractor Name: Hiller NE Fire Protection - Jeffrey Kidd	Contractor Address: 240 Ballardvale Street, Willington, MA 01887	Phone: (207) 657-5646
Lessee/Buyer's Name:	Phone:	Permit Type: FAFS	Zone: USM Overlay
Past Use: University	Proposed Use: Same: University - to install fire suppression system in 2 <sup>nd</sup> floor computer room -#237	Cost of Work: <del>\$480,000.00</del> \$20,000.00	CEO District:
		Fire Dept: <input checked="" type="checkbox"/> Approved w/conditions <input type="checkbox"/> Denied <input type="checkbox"/> N/A	Inspection: Use Group: Type:
		Signature: <i>[Signature]</i> (58)	Signature:
Proposed Project Description: Data Ctr & Generator Upgrades Reno existing space		Pedestrian Activities District (P.A.D.)	

Permit Taken By: Planing	<b>Zoning Approval</b>		
<p>1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.</p> <p>2. Building Permits do not include plumbing, septic or electrical work.</p> <p>3. Building permits are void if work is not started within six (6) months of the date of issuance. False informatin may invalidate a building permit and stop all work.</p>	<b>Special Zone or Reviews</b> <input type="checkbox"/> Shoreland <input type="checkbox"/> Wetlands <input type="checkbox"/> Flood Zone <input type="checkbox"/> Subdivision <input type="checkbox"/> Site Plan  <input type="checkbox"/> Maj <input type="checkbox"/> Min <input type="checkbox"/> MMA Date: <i>ok me</i> <i>10/6/11</i>	<b>Zoning Appeal</b> <input type="checkbox"/> Variance <input type="checkbox"/> Miscellaneous <input type="checkbox"/> Conditional Use <input type="checkbox"/> Interpretation <input type="checkbox"/> Approved <input type="checkbox"/> Denied  Date:	<b>Historic Preservation</b> <input checked="" type="checkbox"/> Not in Dist or Landmark <input type="checkbox"/> Does not Require Review <input type="checkbox"/> Requires Review <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/Conditions <input type="checkbox"/> Denied  Date: <i>[Signature]</i>
	<b>CERTIFICATION</b>		

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT	ADDRESS	DATE	PHONE
RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE		DATE	PHONE



# Non-Water-Based Fire Suppression System Permit

If you or the property owner owes real estate or property taxes or user charges on any property within the city, payment arrangements must be made before permits of any kind are accepted.

Installation address: 70 Falmouth St. CBL: # 2011-10799 114A-A-1 *hsm over lty*

Exact location: (within structure) 2nd Floor Computer Room #237

Type of occupancy(s) (NFPA & ICC): Data Center, Normally Un-Occupied

Building owner: University of Southern Maine, Portland Campus

Managing Supervisor: Jeffrey Kidd of Hiller NE Fire Protection License No: \_\_\_\_\_

Supervisor phone: (978) 657-5550 E-mail: jeffkidd@hillerne.com

Installing contractor: Dean & Allyn, Inc. License No: \_\_\_\_\_

Contractor phone: (207) 657-5646 E-mail: dnarvaez@deanandallyn.com

The suppression work to be done will be: New:  Renovation:  Addition to existing system:

This is an amendment to an existing permit: Yes:  NO:  Permit no: \_\_\_\_\_

System Type: Inergen

NFPA Standard: 2001 Edition: Year 2008

\*Non-NFPA systems are not approved for use within the City of Portland.

Download a new copy of this document from [www.portlandmaine.gov/fire](http://www.portlandmaine.gov/fire) for every submittal. Attach all working documents as required on electronic PDF's in addition to full sized plans.

COST OF WORK: \$20,000.00  
PERMIT FEE: \$230.00  
(\$10 PER \$1,000 + \$30 FOR THE FIRST \$1,000)

*11-5-11*

Submit all information to the Building Inspections Department, 389 Congress Street, Room 315, Portland, Maine 04101.

Prior to acceptance of any fire protection system, a complete commissioning and acceptance test must be coordinated with all fire system contractors and the Fire Department, and proper documentation of such test(s) provided.

All installation(s) must comply with NFPA and the Fire Department Technical Standard(s).

Applicant signature: Jeffrey A. Kidd Date: 9/26/2011

**ANSUL**  
**INERGEN DESIGNER**  
Version 2.1.2

Data file name: \\Mac-server\engineering  
g\Job Folder\NE2471-University of Southern Maine (Langford & Low)\Calculations\A-2471-1r0.in  
Job: NE2471  
Customer: Langford & Low  
Address: 70 Falmouth St.  
Science Building  
Portland ME 04104  
REMARKS: University of Southern Maine

**Hazard Area Information**

Area: Data Center

Design concentration 34.2% at 65° Fahrenheit  
Estimated maximum concentration 50.2% at maximum hazard temperature 75° Fahrenheit  
Gross volume of enclosure 6088 cubic feet  
Structural volume reductions 429.9 cubic feet  
Net volume of enclosure 5658.3 cubic feet  
Minimum INERGEN required 2393.5 cubic feet  
Approximate INERGEN supplied 3912.9 cubic feet  
Flooding factor .423 cubic feet of INERGEN per cubic feet of enclosure volume  
Maximum allowable wall strength 5.0 lbs./sq.ft.  
Area consists of one volume  
Volume 1: Length 42.4 ft Width 17.3 ft Height 8.3 ft  
2 nozzles. Nozzle identifiers: 301, 302

Area: Data Center; Subfloor

Design concentration 34.2% at 65° Fahrenheit  
Estimated maximum concentration 50.2% at maximum hazard temperature 75° Fahrenheit  
Gross volume of enclosure 587 cubic feet  
Structural volume reductions 41.4 cubic feet  
Net volume of enclosure 545.4 cubic feet  
Minimum INERGEN required 230.7 cubic feet  
Approximate INERGEN supplied 377.1 cubic feet  
Flooding factor .423 cubic feet of INERGEN per cubic feet of enclosure volume  
Maximum allowable wall strength 5.0 lbs./sq.ft.  
Area consists of one volume  
Volume 1: Length 42.4 ft Width 17.3 ft Height 0.8 ft  
2 nozzles. Nozzle identifiers: 401, 402

**Agent Storage Conditions**

Number of cylinders: 10 each containing 429 cubic feet of INERGEN.  
Total agent 4290 cubic feet  
Engineering units (ft, cu ft, psia) are specified  
Calculation based on 70 degree Fahrenheit pre-discharge Pipeline Temperature  
Calculation based on fixed nozzle and pipe sizes

**Pipe Data Input**

Sec Start	Sec End	Nominal Pipe Size	Length (ft)	Elev (ft)	90's	Side Tee	Thru Tee	Union/ Cplg	Noz Dia	EqI (ft)
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1	2	1/2 - 40 T	0.01	0.00	0	0	0	0		38.00
2	12	2 - 80 W	5.00	0.50	2	1	3	0	10 cyl	0.00
12	14	2 - 80 T	0.00	0.00	0	0	0	0		Orifice
14	22	2 - 40 T	40.30	4.30	6	0	0	0		0.00
22	24	2 - 40 T	7.80	0.00	0	0	1	0		0.00
22	28	3/4 - 40 T	17.50	-9.30	1	1	0	0		0.00
24	301	1 1/4 - 40 T	6.80	-1.00	1	1	0	0	0.594	0.00
24	302	1 1/4 - 40 T	13.30	-1.00	1	1	0	0	0.594	0.00
28	401	3/8 - 40 T	8.50	-0.50	1	1	0	0	0.188	0.00
28	402	3/8 - 40 T	8.50	-0.50	1	1	0	0	0.188	0.00

2 (End of Data Input File Printout)

**ANSUL**  
**INERGEN DESIGNER**

UL listed EX4510, FMRC Approved (J.I.) 2Y0A9.AF, ULC listed CEx1151  
Version 2.1.2

Data file name: \\Mac-server\engineering  
g\Job Folder\NE2471-University of Southern Maine (Langford & Low)\Calculations\A-2471-1r0.in  
Job Number NE2471 for Langford & Low  
Address: 70 Falmouth St.  
Science Building  
Portland ME 04104  
REMARKS: University of Southern Maine

**Agent Storage Conditions**

Storage pressure is 2175 psia at 70 degrees Fahrenheit.  
429 cubic feet of INERGEN stored in each of 10 cylinders.  
Total agent in storage is 4290 cubic feet.  
Time to discharge 3861 cubic feet (90% of INERGEN) is 69.7 seconds  
Maximum pressure downstream of manifold orifice is 1246 psia

**Concentrations**

Area	Volume	95% Time (sec)	Cu Ft INERGEN	Maximum Concentration at Max. Temp.	Minimum Concentration at Min. Temp.	Requested Concentration at Min Temp.
Data Center	5658.3	28	3919.4	50.3% at 75°F	49.6% at 65°F	34.2% at 65°F
Sea level equivalent oxygen: 10.4% at 75°F						
Data Center; Subfloor	545.4	29	370.6	49.6% at 75°F	49.0% at 65°F	34.2% at 65°F
Sea level equivalent oxygen: 10.6% at 75°F						

**Free Vent Calculation**

Area	Peak Rate	Maximum Wall Strength	Minimum Free Vent Area
Data Center	8275.7 cfm	5.0 lbs./sq.ft.	316 sq. in.
Data Center; Subfloor	787.1 cfm	5.0 lbs./sq.ft.	30 sq. in.

**Pressure Drop Results**

Sec Start	Sec End	Nominal Pipe Size	Length (ft)	Equiv Length(ft)	Elev (ft)	Tee/ Mfld	Start psia	Term psia	Flow (cfm)
1	2	1/2 40 T	0.0	38.0	0.0	MFLD	1033	1000	489.9
2	12	2 80 W	5.0	22.9	0.5	MFLD	1000	995	4898.9
12	14	ORIFICE .625 INCHES	DRILL NO.	5/8			995	452	4898.9



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 UL listed EX4510, FMRC Approved (J.I.) 2Y0A9.AF, ULC listed CEx1151  
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Data file name: \\Mac-server\engineering  
 g\Job Folder\NE2471-University of Southern Maine (Langford & Low)\Calculations\A-2471-1r0.in  
 Job Number: NE2471

**Pressure Drop Results (Continued)**

Sec Start	Sec End	Nominal Pipe Size	Length (ft)	Equiv Length(ft)	Elev (ft)	Tee/ Mfid	Start psia	Term psia	Flow (cfm)
14	22	2 40 T	40.3	71.3	4.3		452	576	4898.9
22	24	2 40 T	7.8	11.2	0.0	THRU	576	573	4474.
22	28	3/4 40 T	17.5	23.7	-9.3	SIDE	576	569	424.9
24	301	1 1/4 40 T	6.8	17.2	-1.0	BULL	573	564	2239.2
24	302	1 1/4 40 T	13.3	23.7	-1.0	BULL	573	561	2234.7
28	401	3/8 40 T	8.5	12.2	-0.5	BULL	569	558	212.4
28	402	3/8 40 T	8.5	12.2	-0.5	BULL	569	558	212.4

Calculation based on 70 degree Fahrenheit pre-discharge Pipeline Temperature

**Pipe and Fittings**

Sec Start	Sec End	Nominal Pipe Size	Length (ft)	90's	Side Tee	Thru Tee	Unions/ Cplgs	Eql (ft)
1	2	1/2 40 T	0.0	0	0	0	0	Cyl Valve 38 ft
2	12	2 80 W	5.0	2	1	3	0	
12	14	2 80 W		0	0	0	0	Man. Orifice
14	22	2 40 T	40.3	6	0	0	0	
22	24	2 40 T	7.8	0	0	1	0	
22	28	3/4 40 T	17.5	1	1	0	0	
24	301	1 1/4 40 T	6.8	1	1	0	0	
24	302	1 1/4 40 T	13.3	1	1	0	0	
28	401	3/8 40 T	8.5	1	1	0	0	
28	402	3/8 40 T	8.5	1	1	0	0	

**Nozzle Performance Summary**

Nozzle Number	Nominal Pipe Size	Drill Number	Drill Diameter	Quantity (cu ft) Discharged	Area Name
301	1 1/4 40 T	19/32	0.593	1962.5	Data Center

2 (Continued)

**ANSUL**  
**INERGEN DESIGNER**  
UL listed EX4510, FMRC Approved (J.I.) 2Y0A9.AF, ULC listed CEx1151  
Version 2.1.2

Data file name: \\Mac-server\engineering  
g\Job Folder\NE2471-University of Southern Maine (Langford & Low)\Calculations\A-2471-1r0.in  
Job Number: NE2471

**Nozzle Performance Summary (Continued)**

Nozzle Number	Nominal Pipe Size	Drill Number	Drill Diameter	Quantity (cu ft) Discharged	Area Name
302	1 1/4 40 T	19/32	0.593	1956.9	Data Center
401	3/8 40 T	3/16	0.187	185.3	Data Center; Subfloor
402	3/8 40 T	3/16	0.187	185.3	Data Center; Subfloor

**Messages/Errors**

ANSUL 150 bar INERGEN DESIGNER Version number 2.1.2  
Calculation based on fixed nozzle and pipe sizes.  
Calculation done on 8/10/2011 at 2:21:15 PM

Pipe schedule selected for pipe sizes downstream of the manifold orifice is based on the maximum pipe pressure for Grade A-53B, A-106B Seamless. To determine if other grades are acceptable, verify that the maximum pipe pressures for other grades are equal to or greater than the maximum anticipated downstream pressure.

**Calculation by** Hiller New England Fire Protection, Inc.  
Engineering Department  
240 Ballardvale St.  
Wilmington MA 1887 USA  
Telephone: 978-657-5550  
Fax: 978-657-0016



## Installation Data Pack for New Project

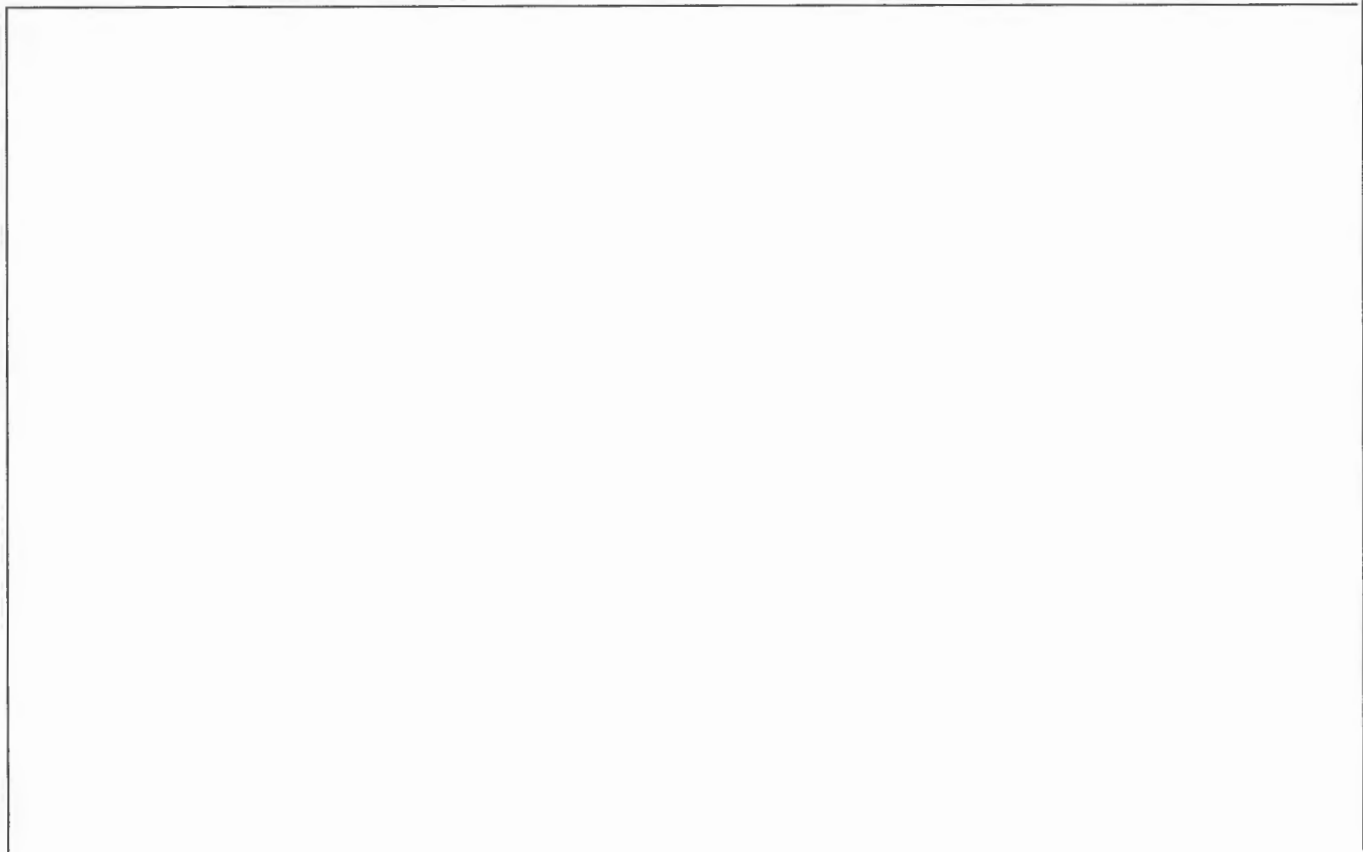
**Pipe Type** America  
**Contact** Hiller New England Fire Protection, Inc.  
**Date** 8/7/11  
**Units** US  
**Altitude** 0'  
**Designed with Hole Sizes** 0;5/64"

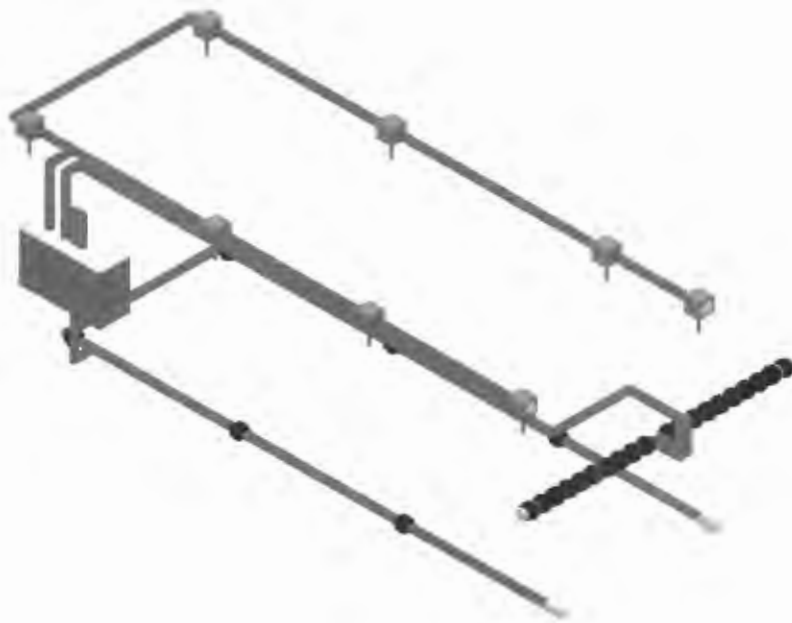
### Detector : VLP

**Type** VESDA VLP  
**Endcap Usage** Create a Balanced Design  
**Application** Default  
**Aspirator Speed** 3990rpm  
**Temperature** 68.0 °F  
**Absolute Pressure** 1013.5hPa  
**System Flowrate** 83.5l/min  
**Manifold Pressure** 211Pa  
**Total Pipe Length** 239' 3"  
**Number Of Sample Points** 36  
**Maximum Transport Time** 53  
**Minimum Hole Flow Rate** 1.0l/min  
**Inverted Detector** No  
**Fire Threshold** 0.062%/ft

### Balance Data

Group name	Aggregate Sensitivity	Balance	Suction pressure (least)	Endcap Sensitivity Factor
[Default Group]	0.062%/ft	76%	157Pa	0.0





Isometric View for VLP

## Pipe:Ceiling Sampling

Total Pipe Length 83' 10"  
 Ambient Pressure 0Pa  
 Sector Pressure 211Pa  
 Number Of Sample Points 8  
 Pipe Flowrate 22.1l/min

### To Tee

Pipe Diameter 0.874in

#	Distance ft	Relative ft	Direction	Hole Diameter in	Capillary Length ft	Transport Time sec	Pressure Pa	Flow l/min	Flow %	Hole Sensitivity %/ft	Diameter in	Capillary Diameter in	Intersection Pressure Pa
-	Elbow	3' 9"	3' 9"	F	-	-	-	-	-	-	-	-	-
-	Tee	5' 3"	1' 6"	R	-	-	-	-	-	-	-	-	-

### Lower Branch

Pipe Diameter 0.874in

#	Distance ft	Relative ft	Direction	Hole Diameter in	Capillary Length ft	Transport Time sec	Pressure Pa	Flow l/min	Flow %	Hole Sensitivity %/ft	Diameter in	Capillary Diameter in	Intersection Pressure Pa
1	Capillary	14' 6"	9' 3"	-	5/64"	10	194	2.8	3.3	1.862	0.874	0.375	202
2	Capillary	24' 6"	10'	-	5/64"	19	192	2.8	3.3	1.870	0.874	0.375	200
3	Capillary	34' 6"	10'	-	5/64"	36	191	2.8	3.3	1.875	0.874	0.375	199
4	Endcap	35'	6"	-	0	-	-	-	-	-	0.874	-	-

### Upper Branch

Pipe Diameter 0.874in

#	Distance ft	Relative ft	Direction	Hole Diameter in	Capillary Length ft	Transport Time sec	Pressure Pa	Flow l/min	Flow %	Hole Sensitivity %/ft	Diameter in	Capillary Diameter in	Intersection Pressure Pa
5	Capillary	8' 1"	2' 10"	-	5/64"	5	195	2.8	3.3	1.859	0.874	0.375	202
-	Elbow	9' 1"	1'	F	-	-	-	-	-	-	-	-	-
-	Elbow	20' 7"	11' 6"	R	-	-	-	-	-	-	-	-	-
6	Capillary	21' 7"	1'	-	5/64"	12	191	2.8	3.3	1.874	0.874	0.375	199
7	Capillary	33' 7"	12'	-	5/64"	19	189	2.7	3.3	1.885	0.874	0.375	197
8	Capillary	47' 7"	14'	-	5/64"	31	187	2.7	3.3	1.894	0.874	0.375	195
9	Capillary	53' 7"	6'	-	5/64"	42	186	2.7	3.3	1.899	0.874	0.375	194
10	Endcap	54' 1"	6"	-	0	-	-	-	-	-	0.874	-	-

21	Hole	55' 11"	10"	-	5/64"	-	17	157	2.1	2.5	2.444	0.874	-	-
22	Endcap	56' 5"	6"	-	0	-	-	-	-	-	-	0.874	-	-

## Pipe:Subfloor Sampling

Total Pipe Length 86' 6"  
 Ambient Pressure 0Pa  
 Sector Pressure 211Pa  
 Number Of Sample Points 8  
 Pipe Flowrate 18.9/min

### To Tee

Pipe Diameter 0.874in

#	Distance ft	Relative ft	Direction	Hole Diameter in	Capillary Length ft	Transport Time sec	Pressure Pa	Flow % l/min	Hole Sensitivity %/ft	Diameter in	Capillary Diameter in	Intersection Pressure Pa
-	Elbow	1' 9"	L	-	-	-	-	-	-	-	-	-
-	Elbow	2' 3"	D	-	-	-	-	-	-	-	-	-
-	Elbow	10' 9"	F	-	-	-	-	-	-	-	-	-
-	Tee	12'	L	-	-	-	-	-	-	-	-	-

### Upper Sampling

Pipe Diameter 0.874in

#	Distance ft	Relative ft	Direction	Hole Diameter in	Capillary Length ft	Transport Time sec	Pressure Pa	Flow % l/min	Hole Sensitivity %/ft	Diameter in	Capillary Diameter in	Intersection Pressure Pa
1	Hole	13' 3"	1' 3"	5/64"	-	6	201	2.4	2.9	0.874	-	-
-	Elbow	13' 9"	6"	F	-	-	-	-	-	-	-	-
-	Elbow	23' 9"	10'	R	-	-	-	-	-	-	-	-
2	Hole	24' 3"	6"	5/64"	-	12	199	2.4	2.9	0.874	-	-
3	Hole	35'	10' 9"	5/64"	-	19	197	2.4	2.8	0.874	-	-
4	Hole	45' 9"	10' 9"	5/64"	-	30	196	2.4	2.8	0.874	-	-
5	Endcap	56'	10' 3"	5/64"	-	53	195	2.3	2.7	0.874	-	-

### Lower Sampling

Pipe Diameter 0.874in

#	Distance ft	Relative ft	Direction	Hole Diameter in	Capillary Length ft	Transport Time sec	Pressure Pa	Flow % l/min	Hole Sensitivity %/ft	Diameter in	Capillary Diameter in	Intersection Pressure Pa
6	Hole	21' 6"	9' 6"	5/64"	-	12	200	2.4	2.9	0.874	-	-
7	Hole	32' 3"	10' 9"	5/64"	-	23	199	2.4	2.9	0.874	-	-
8	Endcap	42' 6"	10' 3"	5/64"	-	45	198	2.3	2.8	0.874	-	-



## Pipe:To CRAC Units

Total Pipe Length 68' 11"  
 Ambient Pressure 0Pa  
 Sector Pressure 211Pa  
 Number Of Sample Points 20  
 Pipe Flowrate 42.5l/min

### To Tee

Pipe Diameter 0.874in

#	Distance ft	Relative ft	Direction	Hole Diameter in	Capillary Length ft	Transport Time sec	Pressure Pa	Flow l/min	Flow %	Hole Sensitivity %/ft	Diameter in	Capillary Diameter in	Intersection Pressure Pa
-	Elbow	3' 9"	3' 9"	F	-	-	-	-	-	-	-	-	-
-	Elbow	4' 7"	10"	R	-	-	-	-	-	-	-	-	-
-	Elbow	35' 5"	30' 10"	F	-	-	-	-	-	-	-	-	-
-	Elbow	40' 5"	5'	R	-	-	-	-	-	-	-	-	-
-	Tee	43' 11"	3' 6"	F	-	-	-	-	-	-	-	-	-

### To CRAC Unit 2A

Pipe Diameter 0.874in

#	Distance ft	Relative ft	Direction	Hole Diameter in	Capillary Length ft	Transport Time sec	Pressure Pa	Flow l/min	Flow %	Hole Sensitivity %/ft	Diameter in	Capillary Diameter in	Intersection Pressure Pa
-	Elbow	44' 2"	3"	D	-	-	-	-	-	-	-	-	-
-	Elbow	46' 2"	2'	L	-	-	-	-	-	-	-	-	-
-	Elbow	47' 11"	1' 9"	F	-	-	-	-	-	-	-	-	-
1	Hole	48' 5"	6"	-	5/64"	9	160	2.1	2.6	2.419	0.874	-	-
2	Hole	49' 3"	10"	-	5/64"	10	160	2.1	2.6	2.423	0.874	-	-
3	Hole	50' 1"	10"	-	5/64"	10	159	2.1	2.6	2.426	0.874	-	-
4	Hole	50' 11"	10"	-	5/64"	10	159	2.1	2.6	2.429	0.874	-	-
5	Hole	51' 9"	10"	-	5/64"	11	158	2.1	2.5	2.432	0.874	-	-
6	Hole	52' 7"	10"	-	5/64"	11	158	2.1	2.5	2.435	0.874	-	-
7	Hole	53' 5"	10"	-	5/64"	12	158	2.1	2.5	2.438	0.874	-	-
8	Hole	54' 3"	10"	-	5/64"	13	157	2.1	2.5	2.440	0.874	-	-
9	Hole	55' 1"	10"	-	5/64"	14	157	2.1	2.5	2.442	0.874	-	-
10	Hole	55' 11"	10"	-	5/64"	17	157	2.1	2.5	2.444	0.874	-	-
11	Endcap	56' 5"	6"	-	0	-	-	-	-	-	0.874	-	-

### To CRAC Unit 1A

Pipe Diameter 0.874in

#	Distance ft	Relative ft	Direction	Hole Diameter in	Capillary Length ft	Transport Time sec	Pressure Pa	Flow l/min	Flow %	Hole Sensitivity %/ft	Diameter in	Capillary Diameter in	Intersection Pressure Pa
-	Elbow	44' 2"	3"	D	-	-	-	-	-	-	-	-	-
-	Elbow	46' 2"	2'	L	-	-	-	-	-	-	-	-	-
-	Elbow	47' 11"	1' 9"	B	-	-	-	-	-	-	-	-	-
12	Hole	48' 5"	6"	-	5/64"	9	160	2.1	2.6	2.419	0.874	-	-
13	Hole	49' 3"	10"	-	5/64"	10	160	2.1	2.6	2.423	0.874	-	-
14	Hole	50' 1"	10"	-	5/64"	10	159	2.1	2.6	2.426	0.874	-	-
15	Hole	50' 11"	10"	-	5/64"	10	159	2.1	2.6	2.429	0.874	-	-
16	Hole	51' 9"	10"	-	5/64"	11	158	2.1	2.5	2.432	0.874	-	-
17	Hole	52' 7"	10"	-	5/64"	11	158	2.1	2.5	2.435	0.874	-	-
18	Hole	53' 5"	10"	-	5/64"	12	158	2.1	2.5	2.438	0.874	-	-
19	Hole	54' 3"	10"	-	5/64"	13	157	2.1	2.5	2.440	0.874	-	-
20	Hole	55' 1"	10"	-	5/64"	14	157	2.1	2.5	2.442	0.874	-	-





**Inergen.**  
Clean Agent systems

# PRICELESS PROTECTION

INERGEN® Clean Agent Fire Suppression Systems

**ANSUL**  
Innovative Fire Solutions

## **INERGEN IS BETTER FOR YOUR PROPERTY**

Upon discharge, INERGEN instantly floods the room, remaining suspended to suppress fires quickly and effectively. An inert gas mixture, INERGEN is absolutely free of residues and corrosive by-products that may produce further property damage. In performance testing, INERGEN easily exceeded the NFPA Standard 2001 allowance of one-minute discharge, with documented extinguishments of 22 seconds for a Class A fire and 17 seconds for a Class B fire.

Reliable and field proven, INERGEN delivers the performance you would expect from the world leader in fire suppression.

## **BETTER FOR YOUR PEOPLE**

One of the most remarkable aspects of INERGEN is that it is safe for people. Unlike halocarbon (chemical) alternatives, which can create dangerous levels of hydrogen fluoride when in the presence of fire, INERGEN is entirely nontoxic, producing no corrosive decomposition products whatsoever. Plus, because INERGEN will not produce a fog when discharged, escape routes remain visible.

With INERGEN, the oxygen level is reduced enough to put out the flames, yet more than enough remains to breathe. In fact, those who breathe normally around INERGEN in extinguishing concentrations receive the same amount of oxygen to the brain as they would in an ordinary atmosphere, vital in cases where immediate evacuation may not be possible.

## **BETTER FOR THE ENVIRONMENT**

The production of Halon 1301 was banned in 1993, a direct result of its negative effects on the ozone layer. We engineered INERGEN to be environmentally kind from the very start. INERGEN is non-synthetic, made exclusively of gases we already breathe: nitrogen, argon, and carbon dioxide. Once discharged, it simply returns to the atmosphere in its natural state. And because it poses no ozone depletion or global warming potential, INERGEN will never be subject to future legislative bans.





# Hiller

## New England Fire Protection, Inc.

240 BALLARDVALE ST.  
WILMINGTON, MA 01887  
(978) 657-5550

mail

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TRANSMITTAL SHEET

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TO:	Building Inspections Department	FROM:	Eddie Cook
ADDRESS:	389 Congress St., Room 315 Portland, ME 04101	DATE:	9/26/2011
RE:	Modification to the 2 <sup>nd</sup> Floor Computer Room's Inergen Fire Suppression Detection/Control System at the University of Southern Maine 70 Falmouth St. Portland, ME 04104	JOB NUMBER:	NE2471

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ENCLOSED    DRAWINGS    EQUIPMENT CUTS    COMPACT DISC    FOR YOUR USE

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NOTES/COMMENTS:

Please find the following documents for the above mentioned project:

- 1 set of blue print drawings
- 1 set of Inergen calculations
- 1 set of Vesda calculations
- 1 set of Equipment Cut Sheets
- 1 compact disc containing pdf's of all of the above
- 1 application for permit of a Non-Water-based extinguishing agent
- Check for \$230 for permit

RECEIVED

SEP 29 2011

Dept. of Building Inspections  
City of Portland Maine

Please find the above mentioned documents pertaining to the 2<sup>nd</sup> floor Computer Room renovations at the Portland campus of the University of Southern Maine.

The Computer Room is currently being protected by an existing Inergen Fire Suppression system. The room is getting bigger. The far right wall is moving to the right approximately 4'-0". An additional Inergen cylinder will be added to the existing manifold to compensate for the added volume, helping the system maintain its compliance with NFPA 2001, year 2008. Nozzles will be relocated to help maintain an even distribution of agent. A door is being removed and the associated electric release and abort station will be removed. The A/V devices located at the removed door location will be relocated. A maintenance disconnect switch will be added and the existing obsolete smoke detection system will be replaced with a state of the art Vesda Smoke Detection System. Should you have any questions regarding this project, please don't hesitate in contacting me at the above phone number or email me at eddiecook@hillerne.com. Thank you,

Eddie Cook

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# EVEN AFTER THE FIRE, YOU'RE UP AND RUNNING

In minutes, fire and the attempts to put it out can destroy the equipment that keeps your operation in action. And yet, without the right defenses in place — those that protect people, property and the environment — many businesses are putting themselves at needless risk every day. Others, however, have an INERGEN® system at the ready.



Created as an ozone-safe replacement for Halon 1301, INERGEN is the nucleus of ANSUL's contemporary approach to fire protection: protect lives, protect property and protect the environment.

Clean, non-conductive INERGEN is a natural fire suppression agent particularly suited to areas where damage from conventional agents cannot be tolerated, such as sensitive data storage, information processing and systems operation electronics. In addition, many archival organizations use INERGEN to protect valuable, irreplaceable items such as artwork, historic documents and antiquities.

**NO OZONE DEPLETION, GLOBAL WARMING POTENTIAL OR ATMOSPHERIC LIFETIME  
ENTIRELY INERT ■ SAFE FOR SENSITIVE ELECTRONICS AND IRREPLACEABLE ITEMS  
ALL-NATURAL ■ UL/ULC, FM, USCG AND MANY INTERNATIONAL APPROVALS/LISTINGS  
EVERGREEN DISCHARGE WARRANTY ■ ENVIRONMENTAL WARRANTY**

---

## 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

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### 1.1. Identification of the preparation

Product Name: "INERGEN"  
Chemical Name: N/A – This is a mixture/preparation.  
CAS No.: N/A – This is a mixture/preparation.  
Chemical Formula: N/A – This is a mixture/preparation.  
EINECS Number: N/A – This is a mixture/preparation.

### 1.2. Use of the preparation

The intended or recommended use of this preparation is to discharge a FIRE EXTINGUISHING AGENT.

### 1.3. Company identification

Manufacturer/Supplier: ANSUL INCORPORATED  
Address: One Stanton Street, Marinette, WI 54143-2542  
Prepared by: Safety and Health Department  
Phone: 715-735-7411  
Internet/Home Page: <http://www.ansul.com>  
Date of Issue: September, 2004

### 1.4. Emergency telephone

CHEMTREC 800-424-9300 or 703-527-3887

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## 2. COMPOSITION/INFORMATION ON INGREDIENTS

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2.1. Ingredient Name: Nitrogen.  
Chemical Formula: N<sub>2</sub>.  
CAS No.: 7727-37-9.  
EINECS Number: 231-783-9.  
Concentration, Wt %: 42.5 %  
Hazard Identification: See Heading 3.

Ingredient Name: Argon.  
Chemical Formula: Ar.  
CAS No.: 7440-37-1.  
EINECS Number: 231-147-0.  
Concentration, Wt %: 47 %.  
Hazard Identification: See Heading 3.

Ingredient Name: Carbon Dioxide.  
Chemical Formula: CO<sub>2</sub>.  
CAS No.: 124-38-9.  
EINECS Number: 204-696-9.  
Concentration, Wt %: 10.5 %.  
Hazard Identification: See Heading 3.

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## 3. HAZARDS IDENTIFICATION

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### FOR HUMANS:

Product:  
EU Classification: Nonflammable Gas.  
R Phrases: None.  
S Phrases 9 Keep container in a well ventilated place.

### Limit Values for Exposure:

Nitrogen: None established.  
Argon: None established.  
Carbon Dioxide: OSHA PEL: 5,000 ppm.  
ACGIH TLV-TWA: 5,000 ppm.  
ACGIH TLV-STEL: 30,000 ppm.  
IDLH (Immediately Dangerous for Life and Health): 50,000 ppm.

Neither this preparation nor the substances contained in it have been listed as carcinogenic by National Toxicology

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. Exposure limit values

Limit Values for Exposure:

Nitrogen:	None established.
Argon:	None established.
Carbon dioxide:	OSHA PEL: 5,000 ppm, (9,000 mg/m <sup>3</sup> ).
	ACGIH TLV-TWA: 5,000 ppm, (9,000 mg/m <sup>3</sup> ).
	ACGIH TLV-STEL: 30,000 ppm, (54,000 mg/m <sup>3</sup> ).
	IDLH (Immediately Dangerous for Life and Health): 50,000 ppm.

### 8.2. Exposure controls

#### 8.2.1. Occupational exposure controls

##### 8.2.1.1. Respiratory protection

Exposure to high concentrations requires the use of self-contained breathing apparatus. Other respirators will not protect in an oxygen deficient atmosphere.

##### 8.2.1.2. Hand protection

Use leather gloves when handling cylinders.

##### 8.2.1.3. Eye protection

Use safety glasses with side shields or safety goggles.

##### 8.2.1.4. Skin protection

No special equipment is needed.

#### 8.2.2. Environmental exposure controls

None needed. The components of this product are normal atmospheric gases.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1. General information

Appearance:	Colorless gas.
Odor:	None.

### 9.2. Important health, safety, and environmental information

pH:	7 (at 25 °C).
Boiling point/boiling range:	-320 °C.
Flash point:	None to boiling.
Flammability (solid/gas):	Not flammable.
Explosive properties:	Not explosive.
Oxidizing properties:	Not an oxidizer.
Vapor Pressure:	2205 psi @ 70 °F. (21.1 °C)
Relative Density (Water = 1):	0.084 lbs/ft <sup>3</sup> .
Solubility:	
- Water solubility:	Carbon dioxide: 88 ml per 100 ml @ 20 °C. Nitrogen: Insoluble. Argon: Insoluble.
- Fat solubility:	Not soluble.
Partition coefficient, n-octanol/water:	Not determined.
Viscosity:	Not determined.
Vapor density (Air = 1):	1.0.
Evaporation rate (Butyl acetate = 1):	< 1, water only evaporates.

### 9.3. Other information

Auto-ignition temperature:	Does not ignite.
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**15. REGULATORY INFORMATION**

EU Classification: Nonflammable gas.  
 R Phrases: None.  
 S Phrases: 9 Keep container in a well ventilated place.  
 Exposure Limit Values:  
 Nitrogen: None established.  
 Argon: None established.  
 Carbon dioxide: OSHA PEL: 5,000 ppm, (9,000 mg/m<sup>3</sup>).  
 ACGIH TLV-TWA: 5,000 ppm, (9,000 mg/m<sup>3</sup>).  
 ACGIH TLV-STEL: 30,000 ppm, (54,000 mg/m<sup>3</sup>).  
 IDLH (Immediately Dangerous for Life and Health): 50,000 ppm.  
 EINECS Status: All components are included in EINECS inventories or are exempt from listing.  
 EPA TSCA Status: All components are included in TSCA inventories or are exempt from listing.  
 Canadian DSL (Domestic Substances List): All components are included in the DSL or are exempt from listing.  
 Environmental restrictions: None are known.  
 Restrictions on Marketing and Use: None are known.  
 Refer to any other national measures that may be relevant.

**16. OTHER INFORMATION**

<b>(HMIS) HAZARDOUS MATERIAL IDENTIFICATION SYSTEM RATINGS:</b>		
HEALTH:	<u>1</u>	4. Severe Hazard
FLAMMABILITY:	<u>0</u>	3. Serious Hazard
REACTIVITY:	<u>0</u>	2. Moderate Hazard
		1. Slight Hazard
		0. Minimal Hazard

**(WHMIS) CANADIAN WORKPLACE HAZARDOUS MATERIAL IDENTIFICATION SYSTEM RATINGS:**  
 This product is rated: **A Compressed Gas.**

Format is from directive 2001/58/EC.  
 EINECS data is from <http://ecb.jrc.it/existing-chemicals/>  
 Data used to compile the data sheet is from Ansul Material Safety Data Sheet, February, 2002.  
 Toxicological information added from the EINECS ESIS (Existing Substances Information System).  
 A rating under WHMIS has been added, following the Canadian guidelines.

**17. DISCLAIMER**

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT, BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ANSUL SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT.

MSDS available at <http://www.ansul.com>

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## INERGEN® FIRE SUPPRESSION SYSTEMS DATA SHEET

## 150 BAR SYSTEM SPECIFICATIONS

### PRODUCT NAME

INERGEN® Fire Suppression System

### ENVIRONMENTAL IMPACT

INERGEN agent is a mixture of three naturally occurring gases: nitrogen, argon, and carbon dioxide. As INERGEN agent is derived from gases present in the earth's atmosphere, it exhibits no ozone depleting potential, does not contribute to global warming, nor does it contribute unique chemical species with extended atmospheric lifetimes. Because INERGEN agent is composed of atmospheric gases, it does not pose the problems of toxicity associated with the chemically derived Halon alternative agents.

### PRODUCT DESCRIPTION

The INERGEN Fire Suppression System, manufactured by Ansul, is an engineered system utilizing a fixed nozzle agent distribution network. The system is designed and installed in accordance with the National Fire Protection Association (NFPA) Standard 2001, "Clean Agent Fire Extinguishing Systems." When properly designed, the INERGEN system will extinguish surface burning fire in Class A, B, and C hazards by lowering the oxygen content below the level that supports combustion.

INERGEN agent has also been tested by FMRC for inerting capabilities. Those tests have shown that INERGEN agent, at design concentrations between 40% and 50%, has successfully inerted mixtures of propane/air, and methane/air.

The system can be actuated by detection and control equipment for automatic system operation along with providing local and remote manual operation as needed. Accessories are used to provide alarms, ventilation control, door closures, or other auxiliary shutdown or functions.

When INERGEN agent is discharged into a room, it introduces the proper mixture of gases that will allow a person to breathe in a reduced oxygen atmosphere.

A system installation and maintenance manual is available containing information on system components and procedures concerning design, operation, inspection, maintenance, and recharge.

The system is installed and serviced by authorized distributors that are trained by the manufacturer.

**Basic Use** – The INERGEN system is particularly useful for suppressing fires in hazards where an electrically non-conductive medium is essential or desirable; where clean-up of other agents present a problem; or where the

hazard is normally occupied and requires a non-toxic agent.

The following are typical hazards protected by INERGEN systems:

- Computer rooms
- Subfloors
- Tape storage
- Telecommunication/Switchgear
- Vaults
- Process equipment
- All normally occupied or unoccupied electronic areas where equipment is either very sensitive or irreplaceable

**Composition and Materials** – The basic system consists of extinguishing agent stored in high strength alloy steel cylinders. Various types of actuators, either manual or automatic, are available for release of the agent into the hazard area. The agent is distributed and discharged into the hazard area through a network of piping and nozzles. Each nozzle is drilled with a fixed orifice designed to deliver a uniform discharge to the protected area. On large hazards, where three or more cylinders are required, a screwed or welded pipe manifold assembly is employed. The cylinder(s) is connected to the distribution piping or the manifold by means of a flexible discharge bend and check valve assembly.

**Additional equipment includes** – Control panels, releasing devices, remote manual pull stations, corner pulleys, door closures, pressure trips, bells and alarms, and pneumatic switches. All or some are required when designing a total system.

**INERGEN Agent** – INERGEN agent is a mixture of three inerting (oxygen diluting) gases: 52% nitrogen, 40% argon, and 8% carbon dioxide. INERGEN gas extinguishes fire by lowering the oxygen content below the level that supports combustion. When INERGEN agent is discharged into a room, it introduces the proper mixture of gases that still allow a person to breathe in a reduced oxygen atmosphere. It actually enhances the body's ability to assimilate oxygen. The normal atmosphere in a room contains 21% oxygen and less than 1% carbon dioxide. If the oxygen content is reduced below 15%, most ordinary combustibles will cease to burn. INERGEN agent will reduce the oxygen content to approximately 12.5% while increasing the carbon dioxide content to about 3%. The increase in the carbon dioxide content increases a person's respiration rate and the body's ability to absorb oxygen. Simply stated, the human body is stimulated by the carbon dioxide to breathe more deeply and rapidly to compensate for the lower oxygen content of the atmosphere.

**Cylinders** – The cylinders are constructed, tested, and marked in accordance with applicable Dept. of Transportation (DOT) and the U.S. Bureau of Explosives specifications. As a minimum, the cylinders must meet the requirements of DOT 3AA2300 or 3AA2015+.

**Cylinder Assembly** – The cylinder assembly is of steel construction with a red standard finish. Four sizes are available to meet specific needs. Each is equipped with a pressure seat-type valve equipped with gauge. The valve is constructed of forged brass and is attached to the cylinder providing a leak tight seal. The valve also includes a safety pressure relief device which provides relief at 2900-3300 psi (20685-23167 kPa) per CGA test method. Cylinder charging pressure is 2175 psi at 70 °F (14997 kPa at 21 °C). The cylinders are shipped with a maintenance record card and shipping cap attached. The cap is attached to the threaded collar on the neck of each cylinder to protect the valve while in transit. The cylinder serial number and date of manufacture are stamped near the neck of each cylinder.

**Electric Actuator** – Electric actuation of an agent cylinder is accomplished by an electric actuator interfaced through an AUTOPULSE® Control System. This actuator can be used in hazardous environments where the ambient temperature range is between 32 °F and 130 °F (0 °C and 54 °C). In auxiliary or override applications, a manual lever actuator can be installed on top of the actuator.

**Manual or Pneumatic Actuators** – Manual/pneumatic actuators are available for lever actuation on the cylinder valve. Manual actuation is accomplished by pulling the hand lever on the actuator.

**Detection System** – The AUTOPULSE Control System is used where an automatic electronic control system is required to actuate the INERGEN system. This control system is used to control a single fixed fire suppression or alarm system based on inputs received from fire detection devices. The detection circuits can be configured using cross, counting, independent or priority-zone (counting) concepts. The control system has been tested to the applicable FCC Rules and Regulations for Class A Computing devices.



## INERGEN® FIRE SUPPRESSION SYSTEMS DATA SHEET

## EXTINGUISHING AGENT

### APPLICATION

INERGEN® extinguishing agent used in Ansul engineered systems is particularly useful for hazards where an electrical, non-conductive medium is essential or desirable; where clean-up of other agents presents a problem; where hazard obstructions require the use of a gaseous agent; or where the hazard is normally occupied and requires a non-toxic agent.

The following are typical hazards protected by INERGEN systems:

- Computer rooms
- Subfloors
- Tape storage
- Telecommunications/Switchgear
- Vaults
- Process equipment
- All normally occupied or unoccupied areas where electronic equipment is either very sensitive or irreplaceable

### ENVIRONMENTAL IMPACT

INERGEN agent is a mixture of three naturally occurring gases: nitrogen, argon and carbon dioxide. As INERGEN agent is derived from gases present in the earth's atmosphere, it exhibits no ozone depleting potential, does not contribute to global warming, nor does it contribute unique chemical species with extended atmospheric lifetimes. Because INERGEN agent is composed of atmospheric gases, it does not pose the problems of toxicity associated with the chemically derived Halon alternative agents.

### DESCRIPTION

INERGEN agent is a plentiful, non-corrosive gas that does not support combustion nor react with most substances. INERGEN agent contains only naturally-occurring gases which have no impact on the ozone or the environment in general. INERGEN agent is a mixture of three inerting (oxygen diluting) gases: 52% nitrogen, 40% argon, and 8% carbon dioxide. INERGEN agent extinguishes fire by lowering the oxygen content below the level that supports combustion. When INERGEN agent is discharged into a room, it introduces the proper mixture of gases that still allow a

person to breathe in a reduced oxygen atmosphere. It actually enhances the body's ability to assimilate oxygen. The normal atmosphere in a room contains approximately 21% oxygen and less than 1% carbon dioxide. If the oxygen content is reduced below 15%, most ordinary combustibles will not burn. INERGEN agent will reduce the oxygen content to approximately 12.5% while increasing the carbon dioxide content to about 3%. The increase in the carbon dioxide content increases a person's respiration rate and the body's ability to absorb oxygen. Simply stated, the human body is stimulated by the carbon dioxide to breathe more deeply and rapidly to compensate for the lower oxygen content of the atmosphere.

### PERFORMANCE

INERGEN is an effective fire extinguishing agent that can be used on many types of fires. INERGEN extinguishing system units are designed for total flooding protection against Class A surface burning, Class B flammable liquid, and Class C fires occurring within an enclosure by lowering the oxygen content below the level that supports combustion.

INERGEN agent has been tested by FMRC for inerting capabilities. Those tests have shown that INERGEN agent, at design concentrations between 40% and 50%, has successfully inerted mixtures of propane/air, and methane/air.

### PHYSICAL PROPERTIES OF INERGEN

Specific gravity:  
0.085 lbs./cu. ft. (1.36 kg/m<sup>3</sup>)

Vapor density:  
1.1 (Air = 1)

Approximate molecular weight:  
34

### APPROVAL

INERGEN agent complies with the NFPA Standard 2001, Standard for Clean Agent Fire Extinguishing Systems and EPA Program SNAP, Significant New Alternate Policy.

Agent is listed and approved by Underwriters Laboratories, Inc. (UL) and Factory Mutual Research Corporation (FMRC).

Containers meet the applicable Department of Transportation (DOT) specifications.

ANSUL and INERGEN are trademarks of Ansul Incorporated or its affiliates.



## CV-98 Valve / Cylinder Shipping Assembly

### Description

The cylinder is factory filled with INERGEN® agent. A single cylinder may be used or multiple cylinders can be manifolded together to obtain the required quantity of agent for total flooding. The cylinder valve can be actuated electrically, pneumatically, and/or manually with approved valve actuation components. All valves are equipped with an anti-recoil feature.

The cylinders are shipped with a maintenance record card and protective shipping cap attached to the threaded neck of each cylinder. This cap entirely encloses and protects the valve while in shipment.

The equivalent length of the valve is equal to 20 ft. (6.1 m) of 1/2 in. Sch. 40 pipe.

Component	Material	Approvals
Cylinder	Steel	Meets DOT 3AA2300
Valve	Brass	
Safety Relief Valve	Brass	
Valve/Cylinder Assembly		FMRC Approved UL Listed (EX-4510)
Shipping Cap	Steel	

Shipping Assembly Part No.	Nominal Cylinder Size		Actual INERGEN Agent Quantity		Approximate Weight		Dimension A		Dimension B	
	ft.3	(m3)	ft.3	m3	lb.	(kg)	in.	(cm)	in.	(cm)
<b>Shipping Assemblies – Red Standard Paint</b>										
426147	200	(5.7)	205	(5.8)	128	(58)	52.7	(129)	8.5	(21.6)
426148	250	(7.1)	266	(7.5)	169	(77)	57.7	(147)	9.3	(23.5)
426149	350	(9.9)	355	(10.1)	217	(98)	59.7	(152)	10.7	(27.3)
426620	LC-350	(9.9)	355	(10.1)	217	(98)	60.2	(152.9)	10.5	(26.7)
426594	LC-425	(12.0)	429	(12.1)	246	(111.6)	70.5	(179.1)	10.5	(26.7)
426150	435*	(12.3)	439	(12.4)	260	(117.9)	66.9	(170.0)	11.0	(27.9)
<b>Shipping Assemblies – Red Corrosion Resistant Paint</b>										
426256	200	(5.7)	205	(5.8)	128	(58)	52.7	(129)	8.5	(21.6)
426257	250	(7.1)	266	(7.5)	169	(77)	57.7	(147)	9.3	(23.5)
426258	350	(9.9)	355	(10.1)	217	(98)	59.7	(152)	10.7	(27.3)
426621	LC-350	(9.9)	355	(10.1)	217	(98)	60.2	(152.9)	10.5	(26.7)
426595	LC-425	(12.0)	429	(12.1)	246	(111.6)	70.5	(179.1)	10.5	(26.7)
426259	435	(12.3)	439	(12.4)	260	(117.9)	66.9	(170.0)	11.0	(27.9)

\* NOTE: For Shanghai version, order Part No. 430935.

### Canadian TC Approved

Shipping Assembly Part No.	Nominal Cylinder Size		Actual INERGEN Agent Quantity		Approximate Weight		Dimension A		Dimension B	
	ft.3	(m3)	ft.3	m3	lb.	(kg)	in.	(cm)	in.	(cm)
<b>Shipping Assemblies – Red Enamel Paint</b>										
426712	200	(5.7)	205	(5.8)	128	(58)	52.7	(129)	8.5	(21.6)
426713	250	(7.1)	266	(7.5)	169	(77)	57.7	(147)	9.3	(23.5)
426714	350	(9.9)	355	(10.1)	217	(98)	59.7	(152)	10.7	(27.3)
427551	LC-425	(12.0)	429	(12.1)	246	(111.6)	70.5	(179.1)	10.5	(26.7)
426715	435	(12.3)	439	(12.4)	260	(117.9)	66.9	(170.0)	11.0	(27.9)
<b>Shipping Assemblies – Red Epoxy CR Paint</b>										
426716	200	(5.7)	205	(5.8)	128	(58)	52.7	(129)	8.5	(21.6)
426717	250	(7.1)	266	(7.5)	169	(77)	57.7	(147)	9.3	(23.5)
426718	350	(9.9)	355	(10.1)	217	(98)	59.7	(152)	10.7	(27.3)
427552	LC-425	(12.0)	429	(12.1)	246	(111.6)	70.5	(179.1)	10.5	(26.7)
426719	435	(12.3)	439	(12.4)	260	(117.9)	66.9	(170.0)	11.0	(27.9)



## Flexible Discharge Bend

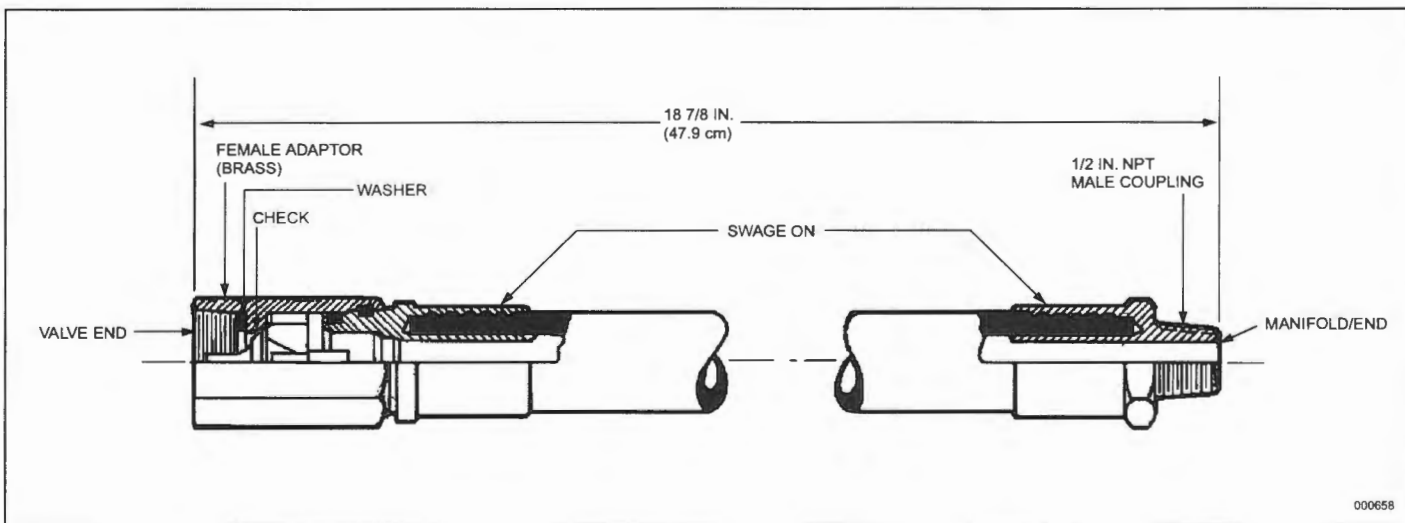
### Description

- ▶ The valve Flexible Discharge Bend (Part No. 427082) is a 5/8 in. (1.59 cm) I.D. extra-heavy flexible hose which connects the valve discharge outlet to the fixed piping or header manifold. The discharge bend has a special female thread for connecting to the valve outlet and a male 1/2 in. NPT thread for connecting to the fixed piping or manifold.
- ▶ The discharge bend will withstand a pressure of 9000 psi (621 bar). Its flexible connection allows for easy alignment of multiple cylinder banks to fixed piping. Each bend has a built-in check valve that prevents loss of agent should the system discharge while any cylinder is removed.

The equivalent length of this hose is equal to 18 ft. (5.5 m) of 1/2 in. Sch. 40 pipe.

Shipping Assembly Part No.	Description
▶ 427082	Flexible discharge bend
842430	Washer

Component	Material	Thread Size/Type		Approvals
		Valve End	Manifold End	
▶ 5/8 in. Flexible Discharge Bend	SAE 100 R2 Type AT	Special to mate with CV90 and CV-98 Valve	1/2 in. NPT Male	FMRC Approved UL Listed (EX-4510)



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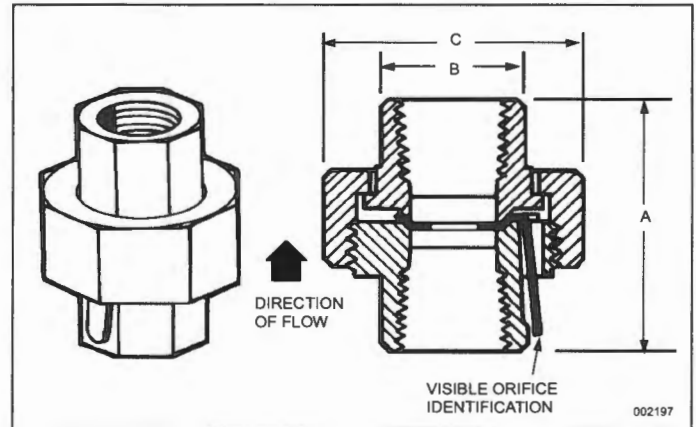


**Pressure Reducer/Union**

**Description**

The pressure reducer/union is required to restrict the flow of INERGEN® agent thus reducing the agent pressure down stream of the union. The 3000 psi (206.9 bar) NSCWP union contains a stainless steel orifice plate which is drilled to the specific size hole required based on the flow calculation.\* The orifice plate provides readily visible orifice identification. The orifice union is available in six sizes: 1/2 in., 3/4 in., 1 in., 1 1/4 in., 1 1/2 in., and 2 in. NPT.

All pressure reducer/unions must be installed in the piping with the orifice identification tab on the pressure inlet side of the system. The 1 1/4 in., 1 1/2 in. and 2 in. orifice unions must be installed per the direction of the flow arrow stamped on the body.



Shipping Assembly Part No.	Description	A	B	C
416677	1/2 in. NPT pressure reducer/union	2.06 in. (5.2 cm)	1.18 in. (2.9 cm)	1.95 in. (4.9 cm)
416678	3/4 in. NPT pressure reducer/union	2.38 in. (6.1 cm)	1.50 in. (3.8 cm)	2.38 in. (6.1 cm)
416679	1 in. NPT pressure reducer/union	2.63 in. (6.7 cm)	1.78 in. (4.5 cm)	2.77 in. (7.0 cm)
416680	1 1/4 in. NPT pressure reducer/union	2.94 in. (7.5 cm)	2.04 in. (5.2 cm)	3.31 in. (8.4 cm)
416681	1 1/2 in. NPT pressure reducer/union	3.31 in. (8.4 cm)	2.31 in. (5.9 cm)	3.70 in. (9.4 cm)
416682	2 in. NPT pressure reducer/union	3.56 in. (9.0 cm)	2.85 in. (7.2 cm)	4.39 in. (11.2 cm)

Component	Material	Thread Size	Approvals
Pressure Reducer/ Union	Body: Forged Steel  Orifice Plate: Stainless Steel	1/2, 3/4, 1, 1 1/4, 1 1/2, 2 in. NPT	FMRC Approved UL Listed (EX-4510)

- ▶ NOTE: Refer to "Nozzle/Pressure Reducer Range Chart" in
- ▶ Design Section for detailed orifice range information.

\* Orifice diameter must be specified when placing order.

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## 360° Discharge Nozzle

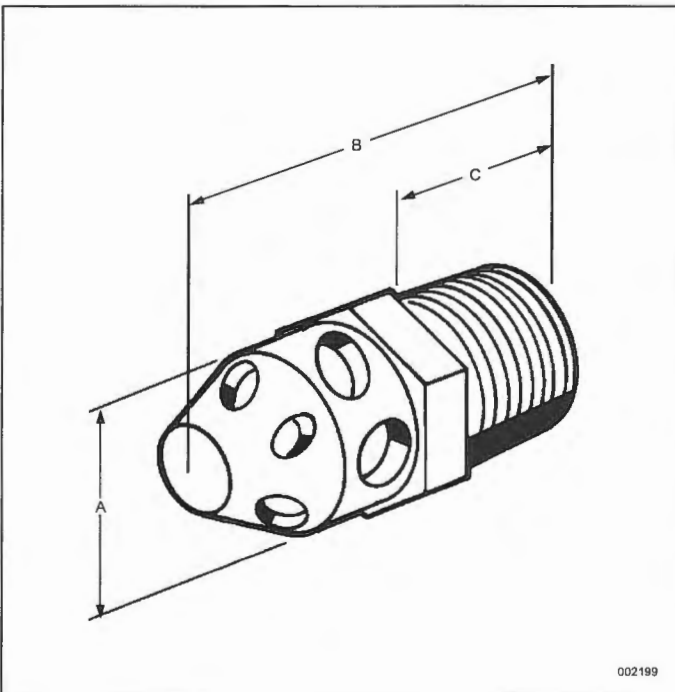
### Description

Discharge nozzles are designed to direct the discharge of INERGEN® agent using the stored pressure from the cylinders. Ten sizes of nozzles are available. The system design specifies the orifice size to be used for proper flow rate and distribution pattern\*. The nozzle selection depends on the hazard and location to be protected. Standard nozzles are constructed of brass.

**NOTE:** 2, 2 1/2, and 3 in. nozzles are not recommended in areas that are subject to damage by high velocity discharges, such as suspended ceiling tiles.

Shipping Assembly Part No.	Description
417908	1/4 in. NPT nozzle**
417723	3/8 in. NPT nozzle**
417362	1/2 in. NPT nozzle
417363	3/4 in. NPT nozzle
417364	1 in. NPT nozzle
417365	1 1/4 in. NPT nozzle
417366	1 1/2 in. NPT nozzle
426155	2 in. NPT nozzle
426156	2 1/2 in. NPT nozzle
426137	3 in. NPT nozzle

Component	Material	Thread Size	Approvals
Nozzle	Body-Brass	1/4**, 3/8**, 1/2, 3/4, 1, 1 1/4, 1 1/2, 2, 2 1/2, 3 NPT	FMRC Approved UL Listed (EX-4510)



Size	A-In.	B-In.	C-In.	Hex
1/4 in.	5/8	1 9/16	21/32	5/8
3/8 in.	3/4	1 5/8	23/32	3/4
1/2 in.	15/16	1 31/32	27/32	15/16
3/4 in.	1 1/8	2 5/32	7/8	1 1/8
1 in.	1 13/32	2 9/16	1	1 7/16
1 1/4 in.	1 3/4	2 3/4	1 1/16	1 3/4
1 1/2 in.	2	2 31/32	1 1/16	2
2 in.	2 3/8	3	1	2 3/8
2 1/2 in.	3	3 1/2	1	3
3 in.	3 1/2	4 1/8	1 1/4	3 1/2

- ▶ NOTE: Refer to "Nozzle/Pressure Reducer Range Chart" in
- ▶ Design Section for detailed orifice range information.

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\* Orifice diameter must be specified when ordering nozzle.  
Refer to Orifice Size Chart in Manual Appendix Section.

\*\*UL/ULC listed only.

**VESDA<sup>®</sup>**  
by  **xtralis.**

**The World's No. 1 Brand  
of Air-sampling Smoke Detector**



4

## When unobtrusive detection is required

*Is it important to preserve the internal design/decoration of the building? Is vandalism a problem with the current smoke detection system?*

A VESDA system can be installed with tiny capillary sampling tubes, which are barely discernible to the human eye. The detectors can be placed in a cupboard or utility area. Great for:

- Modern offices
- Cathedrals
- Art galleries and museums
- Heritage buildings
- Prisons and detention centers
- Prestigious residences

5

## When evacuation is a challenge

*Will the building be open to the general public? Will it house people who need extra help during an evacuation? Is evacuation difficult due to crowds or limited exits? What is the business impact of an evacuation?*

The very early warning that a VESDA system provides allows the maximum time for evacuation. This is critical for:

- Shopping centers
- Stadiums
- Heritage buildings
- Hospitals
- Underground tunnels
- Facilities for children and the elderly

6

## When environmental conditions are difficult

*Is poor air quality or are extreme temperatures present in the area to be protected?*

VESDA detectors feature dual-stage filtration to ensure they continue to function reliably in dirty environments. The detectors can be installed elsewhere, with only the sampling pipes in the extreme environment. The sampled air can be filtered, warmed or cooled before reaching the detector. Ideal for:

- Power stations
- Public transport
- Paper and saw mills
- Cold stores
- Mines
- Automotive operations
- Manufacturing facilities
- Hazardous areas (Factory Mutual Class 1 Div 2)

7

## When suppression systems are present

*Is suppression release costly and disruptive?*

The very early warning provided by a VESDA system allows early intervention to prevent suppression releases. The multiple warning levels of a VESDA system can be used to trigger different responses at different stages of a fire — from controlling air conditioning to initiating a suppression release. Applicable for:

- Communications hubs
- Command stations
- Server rooms
- Switch rooms





# VESDA by Xtralis Product Range

## VESDA VFT

The VESDA VFT is a unique and versatile high-sensitivity ASD that is able to pinpoint the source of incipient smoke to speed response, enhance investigation, and minimize business disruption and downtime. This advanced detector provides intelligent addressability to identify up to 15 protected areas via microbore air-sampling tubes.

## VESDA VLP (LaserPLUS™)

The VESDA VLP is the most popular detector in the VESDA by Xtralis product range. Like all VESDA ASDs, it detects fire at the earliest possible stage and reliably measures very low to extremely high concentrations of smoke. It has the world's widest sensitivity range of 0.005 to 20% obs/m (0.0015 to 6% obs/ft). VESDA VLP supports four configurable alarms (Alert, Action, Fire 1 and Fire 2) and protects areas up to 2,000 square meters (20,000 square feet).

## VESDA VLS (LaserSCANNER™)

The VESDA VLS locates the origin of smoke by identifying the first sector (pipe) with the highest level of smoke and then continues to sample air from all sectors to monitor fire growth. The VESDA VLS also provides four alarm levels for each individual pipe (Alert, Action, Fire 1 and Fire 2) and provides individual pipe addressability and settings. It protects areas up to 2,000 square meters (20,000 square feet).

## VESDA VLC (LaserCOMPACT™)

The VESDA VLC offers cost-effective protection of single environments and small areas. It offers the same wide sensitivity range as the VESDA VLP and VESDA VLS — 0.005 to 20% obs/m (0.0015 to 6% obs/ft). The VESDA VLC supports three configurable alarm levels (Alert, Pre-Alarm and Fire) and comes in two versions. One version interfaces via relays only (RO) and the other across either relays or VESDAnet (VN). In addition, an explosion-proof version of the VN VLC is available for the protection of hazardous areas.

## VESDA VLF (LaserFOCUS™)

The VESDA VLF delivers the most advanced and cost-effective air-sampling smoke detection technology for small environments. The VESDA VLF-250 model protects areas up to 250 square meters (2,500 square feet), and the VESDA VLF-500 model covers up to 500 square meters (5,000 square feet). In addition to the features found in all Xtralis Laser products, VESDA VLF provides a new range of features and built-in intelligence for quick installation, commissioning and servicing.

## VESDA VLT (LaserTEKNIC™)

The VESDA VLT enables Original Equipment Manufacturers to offer the benefits of VESDA by Xtralis very early warning smoke detection in their products with little development investment.

## Remote Displays and Programmers

The VESDA display module monitors and reports the status of a detector, providing visual representation of smoke levels along with all alarm and fault conditions. For monitoring convenience, multiple displays can be associated with a single detector.

The menu-driven VESDA Programmer allows the user to conveniently configure, commission and maintain the VESDA system, as well as program each individual detector. Only one programmer is needed to support the entire network.

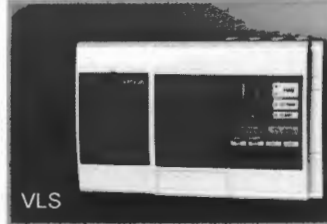
Display and programmer modules can be mounted in a detector unit separately (connected via VESDAnet), in a single remote mounting box, or in a 19-inch sub rack.



VFT



VLP



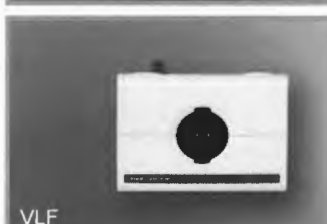
VLS



VLC



Ex d



VLF



VLT





# Detector Configurations

Features						
	VFT-15	VLS	VLP	VLC VESDAnet (VN)	VLC Relays Only(RO)	VLF 250/500
Worldwide Approvals	Vds, UL, FM, CSFM	LPC, VdS, AFNOR, UL, ULC, UL268A (in-duct application), FM, NY-MEA, CSFM, ActivFire, CFE.				
Hazardous Area Approval (FM Class 1, Div 2, Groups A, B, C, D)	No	No	Yes	Yes	Yes	Yes
Sensitivity Range	0.001 to 20% obs/m (0.0003 to 6.0% obs/ft)	0.005 to 20% obs/m (0.0015 to 6% obs/ft)			0.025 to 20% obs/m (0.008 to 6.4% obs/ft)	
Two-stage Filter	Yes	Yes	Yes	Yes	Yes	Yes
Area Coverage (Maximum)	1,500 m <sup>2</sup> (15,000 ft <sup>2</sup> ) (across 15 sectors)	2,000 m <sup>2</sup> (20,000 ft <sup>2</sup> ) (across 4 sectors)	2,000 m <sup>2</sup> (20,000 ft <sup>2</sup> )	800 m <sup>2</sup> (8,000 ft <sup>2</sup> )	800 m <sup>2</sup> (8,000 ft <sup>2</sup> )	250/500 m <sup>2</sup> (2,500/5,000 ft <sup>2</sup> )
Multiple Pipe Addressability	Up to 15	Up to 4	No	No	No	No
Total Number of Alarm Thresholds	120 (Day/Night)	32 (Day/Night)	8 (Day/Night)	3	3	8 (Day/Night)
Relay Outputs	5 (Expands to 21)	7 or 12 relays	7	3	3	3 (Expands to 6)
On-board Memory (Max. Events)	Up to 20,000	18,000	18,000	12,000	12,000	18,000
Flow Sensor Circuit (one per pipe inlet)	1 + 1 in chamber	4	4	1	1	1
AutoLearn™ (automatically adjusts system to environment)	No	Yes	Yes	Yes	Yes	AutoLearn Smoke™ AutoLearn Flow™
Supported by ASPIRE2™ Pipe Network Design Software	Yes (transport times only) Predefined networks	Yes	Yes	Yes	Yes	Yes
Maximum No. of Holes	15	60	100	40	40	12/24
Bar Graph/Indicator LED	Yes	Local or Remote (20-segment bargraph display)	Local or Remote (20-segment bargraph display)	Local (5 on-board LEDs, remote 20-segment bargraph display)	Local (5 on-board LEDs)	Local (7 on-board LEDs, 10-segment circular display)
Programming Tools - On-board Programming Module - Portable Programmer - PC Software (VSC, VSM) via VESDAnet (when the detectors are connected on the VESDA network)	On-board programmer and PC software (VSC/VSM4)	Yes	Yes	Yes	Programmed via RS232 direct connection to PC using VSC	Programmed via RS232 direct connection to PC using VSC
<b>VESDAnet</b>						
Max. No. of Devices/Detectors per Loop	N/A	200/100	200/100	200/100	N/A	200/100 (with VN Card)
Max. Distance between Devices	N/A	1,300 m (4,000 ft)	1,300 m (4,000 ft)	1,300 m (4,000 ft)	N/A	1,300 m (4,000 ft) (with VN Card)
Computer-based Management via VSM	Yes	Yes	Yes	Yes	No	Yes (with VN Card)
Remote Relay Modules - 7-relay version - 12-relay version	N/A	(Part No.) VRT-501 VRT-900	VRT-500 N/A	VRT-500 N/A	N/A	VRT-500 N/A
Compatible Remote Bar-graph Displays - Display, 7-relays - Display, 12-relays - Display, no relays	N/A	(Part No.) VRT-400 VRT-800 VRT-700	VRT-200 N/A VRT-600	VRT-J00 N/A VRT-K00	N/A N/A N/A	VRT-V00 N/A VRT-W00

The full range of VESDA by Xtralis ASDs are EN 54-20 tested and approved.