



NYC Department of Buildings
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Report of Materials and Equipment Acceptance Division

Pursuant to Administrative Code Section 27-131, the following equipment or material has been found acceptable for use subject to the terms and conditions contained herein.

MEA 259-06-E

Manufacturer: Pem-All
39A Myrtle Street
Cranford New Jersey 07016

Trade Name(s): Pem-All Pre-Engineered CLEAN AGENT SYSTEMS
HFC-227ea
Pem-All Engineered CLEAN AGENT SYSTEMS
HFC-227ea
SIEMENS Engineered CLEAN AGENT SYSTEMS
(**SINORIX**[™])

Product: Clean agent fire-suppression systems

Pertinent Code Section(s): §27-133, Reference Standard RS 17-3

Prescribed Test(s): UL 2166 and UL 2001

Laboratory: Underwriters Laboratories, Inc.

Test Report(s): UL File Ex4668, Project 03NK25382, dated November 3, 2005
UL File Ex4724, Projects: 98NK6623/99BA523821, 99NK13228, 99NK30791, 99NK45755, 04NK14364, 03CA45381, issued October 4, 2001, revised February 6, 2006

Description – Pem-All Pre-Engineered HFC-227ea is a clean agent fire-suppression system utilizing HFC-227ea as the fire extinguishing agent. The HFC-227ea is an EPA SNAP-listed item and is listed in NFPA 2001 as an acceptance clean agent for use in occupied spaces. The HFC-227ea is manufactured by DuPont and is marketed under

their trade name of FE-227ea. The design concept is based on "Total Flood" hazards containing Class A, B, and C fires. The products together with NYMEA-approved Detection and Control equipment make up a complete system. The products completing the systems are identified in the UL-listed Design Manual Part Numbers:

Pem-All Pre-Engineered Clean Agent System HFC-227ea Manual PCA-LP-SYS1
Pem-All Engineered Clean Agent System HFC-227ea Manual PCA-90225-D
SIEMENS Building Technologies SINORIX Manual 500-597967

The Pre-Engineered concept of automatic systems allows a range of flexibility in design parameters. Installation Manual Part Number PCA-LP-SYS1 will allow a systems designer to properly design a Pem All Pre Engineered Clean Agent System. It will also permit an "authority having jurisdiction" to determine that all required design and Pre- Engineering parameters have been satisfied.

Pem-All Pre-Engineered Low pressure HFC-227ea Systems, are those that are intended to be designed and installed for single or multiple hazards within the limitations as outlined manual Part number PCA-LP-SYS1. AHJ should follow the Information specified by the Standard on Clean Agent Extinguishing Systems NFPA 2001; these design limits will be implemented.

Pem-All Pre-Engineered Clean Agent Systems

Model #s: PCA-3, PCA-6, PCA-12, PCA-18, PCA-35, PCA-70, PCA-140, PCA-240, PCA-60, PCA-520

Pem-All Engineered Clean Agent Systems

PCA90035-E - 35 lb
PCA90070-E - 70 lb
PCA90150-E - 150 lb
PCA90250-E - 250 lb
PCA90375-E - 375 lb
PCA90560-E - 560 lb
PCA91200-E - 1211 lb

Pem All Design Software Pem3.10

SIEMENS Engineered CLEAN AGENT SYSTEMS

CPY 35 - 35 lb
CPY 70 - 70 lb
CPY 150 - 150 lb
CPY 250 - 250 lb
CPY 375 - 375 lb
CPY 560 - 560 lb
CPY 1200 - 1211 lb

Siemens Design Software SINORIX3.10

HFC-227ea Pre-Engineered Cylinder & Valve Assemblies

Each basic size can be under filled in one pound increments to meet the exact amount of Clean Agent required, within their fill ranges. There are two types of cylinders that are

used in the Pre-Engineered clean agent system. The PCA-3* through the PCA-18* are all manufactured, tested and stamped in accordance to UL 299. The PCA-35 through the PCA-520 are manufactured, tested and stamped in accordance with DOT 4BW500 or DOT 4B500.

System Operating Pressure	System Operating Pressure	Temperature Limits
PCA-3* through the PCA-18* 240 PSI (16.9 kg/cm ² at 70°F (21.1° C)	PCA-35* through the PCA-520* 360 PSI (25.3 kg/cm ² at 70°F (21.1° C)	32° F (-17° C) to 130° F – (54.4° C)

Note:

The PCA-3* through the PCA-18* cylinders are equipped with a brass, high flow, pressure seated piston type valve. The 3 lb. through the 18 lb. cylinders have a 1/2” female N.P.T. outlet and the 35 lb. and 70 lb. have a 1” female N.P.T. outlet. The 140 lb and 240 lb have a 1-1/2” female N.P.T. outlet.

The 360 lb and 520 lb have a 2 -1/2” male N.P.T. outlet. The valves are pressure operated and use the pressure from the cylinder to activate the valve and allow the clean agent to discharge. The cylinders have the following options available; 12 volt DC solenoid, 24 volt DC solenoid, 120 volt AC solenoid and local manual control. They are individually shown in the manual Part Number (PCA-LP-SYS1)

Pem-All Engineered HFC-227ea

I.GENERAL INTRODUCTION

The Engineered concept of automatic systems allows a range of flexibility in design parameters. Pem-All Engineered HFC-227ea Systems are those that are intended to be designed and installed to protect single or multiple hazards within the limitations tested by a recognized testing agency as stated Manual part number PCA-90225-D. The AHJ should follow the Information specified by the Standard on Clean Agent Extinguishing Systems NFPA 2001. The equipment is listed by Underwriters Laboratories, Inc., in accordance with the Standard for Halogenated Agent Extinguishing System Units, UL 2166, and approved by Factory Mutual.

CYLINDER AND VALVE ASSEMBLY

The Engineered Clean Agent System Cylinders are available in the following capacities: 35 lb., 70 lb., 150 lb., 250 lb., 375 lb, 560 lb, and 1200 lb. Each of the basic sizes can be under-filled in one pound increments to meet the exact amount of HFC-227ea required, within their fill ranges. The cylinders are manufactured, tested and stamped in accordance with DOT 4BW5000 or DOT 4BA500.

System Temperature Limits

32⁰ F (0⁰ C) to 130⁰ F (54.4⁰ C)

System Operating Pressure is:

360 PSI (25.3 Kg/CM²) at 70⁰ F (21.1⁰ C)

Pem-All CYLINDER FILL RANGE			
Base	Cyl.	Max. Fill at	Min. Fill at
Model	Size	70 lb/ft³	30 lb/ft³
PCA90035-E	35 lb	35 lb	16 lb
PCA90070-E	70 lb	71 lb	31 lb
PCA90150-E	150 lb	152 lb	66 lb
PCA90250-E	250 lb	253 lb	109 lb
PCA90375-E	375 lb	379 lb	163 lb
PCA90560-E	560 lb	561 lb	241 lb
PCA91200-E	1211 lb	1211 lb	519 lb

SIEMENS			
CYLINDER FILL RANGE			
Base	Cyl.	Max. Fill at	Min. Fill at
Model	Size	70 lb/ft³	30 lb/ft³
CPY 35	35 lb	35 lb	16 lb
CPY 70	70 lb	71 lb	31 lb
CPY 150	150 lb	152 lb	66 lb
CPY 250	250 lb	253 lb	109 lb
CPY 375	375 lb	379 lb	163 lb
CPY 560	560 lb	561 lb	241 lb
CPY 1200	1211 lb	1211 lb	519 lb

Local Mechanical

The Local Mechanical Manual Control Head features a local lever that depresses a Schraeder Check Valve thereby venting the pressure from the top of the piston in the cylinder valve. This allows the piston to slide upward and commence cylinder discharge. The Mechanical Manual Control mounts directly on top of an adapter that mounts directly on top of the cylinder valve.

PISTON ACTUATOR-SLAVE

The Piston Actuator-Slave Control Head features a pneumatically driven piston that depresses a Schraeder Check Valve thereby venting the pressure from the top of the piston in the cylinder valve, allowing the piston to slide upward and commence cylinder discharge. The pneumatic pressure required to operate the Piston Actuator-Slave Control Head is obtained from the "M" port of the master cylinder. Multiple cylinders equipped with Piston Actuator-Slave Control Heads can be activated from one master cylinder using 1/4" copper tubing (installer furnished) or 1/4" metal flex hose. The copper tubing will be 1/4 O.D. with "nominal 1/8" I.D. A.S.T.M.-280. Type K is acceptable.

Pem-All ELECTRIC DISCHAGE SOLENOID

35 lb, 70 lb, 150 lb, 250 lb, 375 lb, & 560 lb Cylinder

PAEH 50025-1 ELECTRIC SOLENOID 12 V.D.C.

PAEH 50025-1E ELECTRIC SOLENOID 12 V.D.C.
Hazardous Location Type

PAEH 50025-2 ELECTRIC SOLENOID 24 V.D.C.

PAEH 50025-2E ELECTRIC SOLENOID 24 V.D.C.
Hazardous Location Type

PAEH 50025-4 ELECTRIC SOLENOID 6 V.D.C.

PAEH 50025-4E ELECTRIC SOLENOID 6 V.D.C.
Hazardous Location Type

1200 lb Cylinder

PAEH 50025-5 ELECTRIC SOLENOID 12 V.D.C.

PAEH 50025-6 ELECTRIC SOLENOID 24 V.D.C.

SIEMENS ELECTRIC DISCHAGE SOLENOID

35 lb, 70 lb, 150 lb, 250 lb, 375 lb, & 560 lb Cylinder

CPYEC-12 ELECTRIC SOLENOID 12 V.D.C.

CPYEC-12EXP ELECTRIC SOLENOID 12 V.D.C.
Hazardous Location Type

CPYEC-24 ELECTRIC SOLENOID 24 V.D.C.

CPYEC-24EXP ELECTRIC SOLENOID 24 V.D.C.
Hazardous Location Type

CPYEC-6 ELECTRIC SOLENOID 6 V.D.C.

CPYEC-6EXP ELECTRIC SOLENOID 6 V.D.C.
Hazardous Location Type

1200 lb Cylinder

CPYEC-12-15W ELECTRIC SOLENOID 12 V.D.C.-15 watt

CPYEC-24-15W ELECTRIC SOLENOID 24 V.D.C.-15 watt

CYLINDER BRACKETS

The cylinder brackets are manufactured of stainless steel bands formed to the radii of the cylinders with flanges for bolting to continuous slot metal framing channel (12 gauge steel with corrosion-resistant paint or galvanized 1100 H Uni-strut). The channel is to be supplied by the installer. The cylinder bracket must be secured to a surface such that the bracket will withstand a load up to 5 times the cylinder weight. This precaution is to have the bracket safely support the weight of the cylinder and the reaction force of the HFC-227ea discharge.

One cylinder bracket is required for the 35 lb., 70 lb., 150 lb., and 250 lb. cylinders. For the 375 lb., 560 lb., and 1200 lb cylinders two bracket straps are to be used. All cylinders must be mounted vertically only, with valve up, resting firmly on the floor.

Liquid Level Indicator

The Liquid Level Indicator is a simple manually operated device which provides a means to determine the Clean Agent liquid level in vertically mounted agent storage containers. Once the liquid level is determined, it can then be converted into pounds (kilograms) of Clean Agent present in the agent storage container.

SHUTTLE VALVES

The Shuttle Valve is used to connect two cylinders to common discharge piping in a main-reserve configuration. The Shuttle Valve contains a Shuttle Check which closes off the pipe to the empty cylinder (main) to allow the charge from the reserve cylinder to flow out through the discharge piping.

The Shuttle Valve is available in 1" size for the 35 lb., and 70 lb. size cylinders and 1 1/2" size for the 150 lb. 250 lb.& 375 LB size cylinders.

CHECK VALVES

Check Valves are used when two or more agent storage cylinders are manifolded together with one common discharge piping configuration. Their purpose is to prevent loss of agent in the event that any of the agent storage cylinders are not connected to the manifold at time of system discharge.

The Check Valve must also be used in main-reserve systems on pipe sizes larger than 1 1/2".

All component parts of the 1" check valves are constructed of Brass and steel for durability and protection against corrosion. The metal to metal sealing area of the disc and seat is precision lapped, providing very tight shut-off of both gas and liquid. The check is spring assisted to ensure the valve closes before flow reversal. This feature helps prevent the phenomenon known as "hammer" and its associated damage to the piping system.

The 1 1/2" and 2 1/2" check valves are constructed with a brass body. The 1 1/2" has a brass check disk. The 2 1/2" has a low carbon steel check disc, bolt and nut. It has a wrench flat on the outer surface for tightening. The 1 1/2" & 2 1/2" check valves must be installed in the vertical position only with check disc on top.

Part Numbering and Nozzle Types

The PCA prefix is standard for all Engineered Clean Agent Nozzles.

The base five digit number denotes aluminum. The base five digit number denotes the N.P.T. pipe size of the nozzle. The next numerical figure denotes the N.T.P. pipe size of the nozzle. The next numerical figure denotes the type of nozzle (-2 is for the 180⁰ Side wall type and -3 denotes the 360⁰ Central type of nozzle). The final suffix of the nozzle part number denotes the decimal size drill diameter of each orifice.

Discharge Nozzle Types

Part Number	Description
PCA60704-2-.XXXX 1/2"	(180 ⁰) SIDEWALL
PCA60704-3-.XXXX 1/2"	(360 ⁰) CENTRAL
PCA60705-2-.XXXX 3/4"	(180 ⁰) SIDEWALL
PCA60705-3-.XXXX 3/4"	(360 ⁰) CENTRAL
PCA60706-2-.XXXX 1"	(180 ⁰) SIDEWALL
PCA60706-3-.XXXX 1"	(360 ⁰) CENTRAL
PCA60707-2-.XXXX 1 1/4"	(180 ⁰) SIDEWALL
PCA60707-3-.XXXX 1 1/4"	(360 ⁰) CENTRAL
PCA60708-2-.XXXX 1 1/2"	(180 ⁰) SIDEWALL
PCA60708-3-.XXXX 1 1/2"	(360 ⁰) CENTRAL
PCA60709-2-.XXXX 2"	(180 ⁰) SIDEWALL
PCA60709-3-.XXXX 2"	(360 ⁰) CENTRAL

SIEMENS Part numbers

Part Number		Description
CPYEN-1-.XXXX	1/2"	(180 ⁰) SIDEWALL
CPYEN-2-.XXXX	1/2"	(360 ⁰) CENTRAL
CPYEN-1-.XXXX	3/4"	(180 ⁰) SIDEWALL
CPYEN-2-.XXXX	3/4"	(360 ⁰) CENTRAL
CPYEN-1-.XXXX	1"	(180 ⁰) SIDEWALL
CPYEN-2-.XXXX	1"	(360 ⁰) CENTRAL
CPYEN-1-.XXXX	1 1/4"	(180 ⁰) SIDEWALL
CPYEN-2-.XXXX	1 1/4"	(360 ⁰) CENTRAL
CPYRN-1-.XXXX	1 1/2"	(180 ⁰) SIDEWALL
CPYEN-2-.XXXX	1 1/2"	(360 ⁰) CENTRAL
CPYEN-1-.XXXX	2"	(180 ⁰) SIDEWALL
CPYEN-2-.XXXX	2"	(360 ⁰) CENTRAL

ACCESSORY EQUIPMENT

Main Reserve Selector Switch

The main reserve selector switch is a means of transferring of the electrical supply from the main cylinder to the reserve cylinder.

LOW PRESSURE INDICATING SWITCH

The switch is be used as a cylinder pressure supervisory switch. It is attached to the port marked "P". If the cylinder to which it is attached leaks, reducing its pressure below 291 + - 10 PSIG, the switch contacts will operate giving an indication on the control panel that the cylinder has lost pressure. See Figure 18.

One version of the switch is available, the Normally Close. The switch is referenced in the no pressure condition. When the cylinder is pressurized the contacts swing over. N/C transfers to N/O when pressurized.

See Control panel for correct wire of the Low pressure indicating switch. When the switch is used on a standard supervisory input circuit there will be no distinction between a wiring fault and device actuation. This device is only to be utilized when accepted by the authority having jurisdiction.

System Discharge - MANUAL RE-SETTING TYPE

The switch is provided to furnish additional electrical contacts for control purposes at time of discharge. The switch may be installed into the same pneumatic tubing for the Piston Actuators.

The Pem-All Flow Program pem 3.03 The SIEMENS Flow Program 3.03

The design Flow program provides model of the flow of the HFC-227ea from storage container, through the piping network and discharging from the distribution nozzles. Information is also given for the "authority having jurisdiction" for approving installation. Systems shall be installed and maintained in accordance with NFPA 2001.

The calculation method has been investigated for specific types of pipe, types of fitting and pipe inside diameters.

The flow of HFC-227ea through the discharge piping is a complex two phase flow. The Pem-All HFC-227ea engineered systems have been investigated and comply with UL 2166 test standards for clean agents.

The Pem-All HFC-227ea system is designed for total flooding applications to extinguish Class A, B and C type fires. It is important that every system be designed to provide maximum extinguishing characteristics and that the limitations for total flooding are followed.

Pursuant to "Promulgation of the Rules relating to Material and Equipment Application Procedures" dated November 5, 1992, the Bureau of Fire Prevention has no objections Letter dated February 12, 2007, F.P. Index #0610010B.

Terms and Conditions: The above-described clean agent systems are accepted on condition that:

1. Installation and use comply with the applicable New York City Building Codes, rules, regulations, etc. and in particular with 3RCNY 15-08 of 1996 "Clean Agent Extinguishing Systems" except as modified by conditions of this letter and RS 17-3 requirements.
2. Systems may be used for **Class A and C fire applications with a minimum FM-200 design concentration of 6.25%.**
3. Systems may be used for **Class B fire applications with a minimum design concentration based upon NFPA 2001 of 2004 determination.**
4. Underwriters Laboratories, Inc.'s requirements and limitations shall be complied with.

5. Manufacturer's installation, maintenance procedures and limitations shall be complied with.
6. All shipments and deliveries of such equipment shall be provided with a metal tag, suitably placed, certifying that the equipment shipped or delivered is equivalent to that tested and acceptable for use, as provided in Section 27-131 of the New York City Building Code.

Final Acceptance March 8, 2007
Examined By Donald [Signature]