



P/N: CR 99000-MFS

JULY 22, 2013

**PRE - ENGINEERED**

**Liquid Clean Agent Fire Protection System**

Installation, Maintenance, and Service Technical Manual



# Table of Contents

Notice.....	6
Preface .....	7
<b>1 Eco7 Fire Protection Fluid.....</b>	<b>8</b>
1.1 Introduction.....	8
1.2 Typical Applications.....	8
1.3 Materials Compatibility.....	8
1.4 Safety Considerations.....	8
1.5 Material Safety Data Sheet.....	9
<b>2 System Hardware.....</b>	<b>15</b>
2.1 Introduction.....	15
2.2 Cylinders.....	15
2.3 Cylinder Valves.....	17
2.4 Cylinder Brackets .....	19
2.5 Pressure Gauges.....	21
2.6 General System Assembly.....	21
2.7 Cylinder Valve Controls and Accessories .....	22
2.8 Agent Distribution Devices .....	27
<b>3 System Design for Class A, B &amp; K Fire using Eco7.....</b>	<b>28</b>
3.1 Introduction.....	28
3.2 Defining Scope of Protection .....	28
3.3 Amount of Agent Required.....	29
3.4 Cylinder(s) Configurations .....	29
3.5 Nozzles .....	29
3.6 Flow Limitations.....	30
<b>4 Maintenance.....</b>	<b>41</b>
4.1 Hardware Checkout after Installation .....	41
4.2 Regular Maintenance .....	41
4.3 System Checkout after Discharge.....	42
<b>Appendix A Chemori Part Numbers.....</b>	<b>44</b>

# List of Table

<b>Table 1: Fill Range of the Cylinders.....</b>	<b>15</b>
<b>Table 2: Cylinder Dimensions for 1 L to 6 L.....</b>	<b>15</b>
<b>Table 3: Cylinder Dimensions for 7 L to 80 L.....</b>	<b>16</b>
<b>Table 4: Valve Type and Cylinder Sizes.....</b>	<b>17</b>
<b>Table 5: The Dimensions (in Inches) of the Cylinder Brackets for 1 L to 6 L.....</b>	<b>19</b>
<b>Table 6: The Dimensions (in Inches) of the Cylinder Straps for 7 L to 80 L.....</b>	<b>20</b>
<b>Table 8: Nozzle Specifications.....</b>	<b>28</b>

# List of Figure

Figure 1: Cylinder (1 L to 6 L) and Valve Assembly .....	16
Figure 2: Cylinder (7 L to 80 L) and Valve Assembly .....	16
Figure 3: Schematic Diagram of DAR System and DAR Valve .....	17
Figure 4: Schematic Diagram of SAR System and SAR Valve .....	18
Figure 5: Brass Valve .....	18
Figure 6: Stainless Steel Valve .....	19
Figure 7: Schematic Drawings of Cylinder Bracket for 1 L to 6 L.....	20
Figure 8: Schematic Drawings of Cylinder Straps for 7 L to 80 L.....	20
Figure 9: 195 PSIG Pressure Gauges.....	21
Figure 10: General Valve Assembly.....	21
Figure 11: Detection Tubing Protection Guard.....	22
Figure 12: End-of-line Adapter.....	22
Figure 13: Direct Manual Assembly .....	23
Figure 14: Pneumatic Actuating Valve .....	24
Figure 15: Local Manual Control, Lever Type (upper) and Plunger Type (lower) .....	25
Figure 16: Pressure Supervisory Switch .....	26
Figure 17: Pressure Switch Box.....	26
Figure 18: Discharge Nozzle Types .....	28
Figure 19: Area Coverage per Nozzle for General System .....	29
Figure 20: Kitchen Hood Typical Layout .....	30

## Notice

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## **Preface**

The Pre-Engineered concept of automatic systems allows a degree of flexibility in design parameters. The information contained in this manual will allow a system designer to properly design the Chemori Pre-Engineered Eco7 System. It also permits an “authority having jurisdiction” to determine that all required design and engineering parameters have been satisfied.

# 1 Eco7® Fire Protection Fluid

## 1.1 Introduction

Eco7® is a revolutionary fire extinguishing liquid clean agent. It does not contain any harmful or toxic chemicals which make Eco7® safe for humans use and environment.

**Safe for people.** Eco7® is characterized by zero toxicity. This allows it to be used in occupied areas without affecting the end user in the event of a discharge.

**Safe for use in the Kitchen.** Eco7® does not contain any toxic elements; hence, there is no harmful contamination of food products or preparation equipment.

**Safer for the environment.** Eco7® consists of organic chemicals and contains no toxic elements allowing for easy clean up and does not cause any environmental damage or impact.

## 1.2 Typical Applications

Eco7® is used as a fire protection fluid in various applications mainly for those where there is the presence of liquid accelerants, oil, and cooking media. Eco7® is extremely effective in high temperature applications, such as, tyre fires.

## 1.3 Materials Compatibility

Eco7® systems shall not be used on fires involving the following materials.

- 1) Electrical,
- 2) Reactive metals, such as lithium, sodium, potassium, magnesium, titanium, zirconium, uranium, and plutonium;
- 3) Metal hydrides; and
- 4) Chemicals, that is capable of undergoing auto thermal decomposition, such as certain organic peroxides and hydrazine.

## 1.4 Safety Considerations



**WARNING:** Eco7® is discharged through the nozzle orifices. Direct eye or skin contact with the liquid or cold gas can cause discomfort. Do not stand directly in front of the discharge lines as the discharge pressure could cause injury. The nozzles are used to discharge the Eco7® in a vertical direction. The flow of Eco7® should not be blocked by any obstructions. Please read and follow the precautions and the safety related information in the Material Safety Data Sheet (MSDS).



## 1.5 Material Safety Data Sheet


### MATERIAL SAFETY DATA SHEET



MSDS NUMBER : CR-00701  
REVISION 1.0 - December 2013

MATERIAL SAFETY DATA SHEET  
CHEMORI ECO7®

#### SECTION 1 – PRODUCT AND COMPANY INFORMATION

TRADE NAME : 

PRODUCT NAME : ECO7® - "MULTI-PURPOSE" LIQUID CLEAN AGENT

CAS NUMBER : MIXTURE, NO SINGLE CAS NUMBER IS AVAILABLE

COMPANY : CHEMORI AMERICAS LLC  
16180 SW 72nd Avenue  
Portland, Oregon 97224, USA

PRODUCT USE : FIRE FIGHTING EXTINGUISHING AGENT

#### PHONE NUMBERS

PRODUCT INFORMATION : 1-503-747-7775

EMERGENCY CONTACT - CHEMTREC : 1-800-424-9300 (within USA and Canada)  
(FOR CHEMICAL EMERGENCY ONLY) +1-703-527-3887 (Outside USA and Canada)

EMAIL : [msds@chemori.com](mailto:msds@chemori.com)

#### SECTION 2 – COMPOSITION AND INGREDIENT INFORMATION

INGREDIENT NAME	CAS NUMBER	Weight Percent (%)
Water	7732-18-5	67.8 - 80
Proprietary mixture of synthetic detergents	No single CAS # applicable	20 - 30
Xanthan gum	11138-66-2	<2.0
Sodium benzoate	532-32-1	<0.2

### SECTION 3 – HAZARDS IDENTIFICATION

#### POTENTIAL HEALTH EFFECTS

Skin Contact	:	Contact with undiluted liquid may cause moderate irritation or dermatitis due to allergy.
Eye Contact	:	Product is an eye irritant when contact with undiluted liquid.
Inhalation	:	Vapors are minimal at an enclosed space temperature. If product is sprayed as an aerosol, airborne material may cause respiratory irritation.
Ingestion	:	Not a hazard in normal industrial use. Small amounts swallowed during normal handling operations are not likely to cause injury; swallowing large amounts may cause injury or irritation.

**ADDITIONAL HEALTH EFFECTS** : Existing eye or skin sensitivity may be aggravated by exposure.

**CARCINOGENIC STATUS** : Not available.

### SECTION 4 – FIRST AID MEASURES

EYE CONTACT	:	Flush the eyes with plenty of fresh water for 15 minutes while holding eyelids open. Get medical attention if irritation persists.
SKIN CONTACT	:	Wash off in flowing water or shower. Launder clothing before use.
INHALATION	:	No specific treatment is necessary since this material is not likely to be hazardous by inhalation. If exposed to excessive levels of airborne aerosol mists, get fresh air. Seek for medical attention if feeling unwell.
INGESTION	:	Swallowing less than an ounce is not expected to cause significant harm. For larger amounts, do not induce vomiting. Drink milk or water. Never administer anything by mouth to an unconscious person. Seek for medical attention if feeling unwell.

### SECTION 5 – FIRE FIGHTING MEASURES

FLASH POINT	:	>200°F (93°C)
FLAMMABLE LIMIT (in air, % by volume)	:	Not applicable
AUTO – IGNITION TEMPERATURE	:	Not applicable
FIRE AND EXPLOSION HAZARDS	:	Avoid contact with water reactive materials,

		burning metals and electrically energized equipment.
EXTINGUISHING MEDIA	:	Product is an extinguishing media. Use media appropriate for surrounding materials.
SPECIAL FIRE FIGHTING INSTRUCTION	:	This product will produce bubbles (foam) when mixed with water.

## SECTION 6 – ACCIDENTAL RELEASE MEASURES

### SAFEGUARDS (PERSONNEL)

NOTE: Review Sections 5 (Fire Fighting Measures) and 7 (Handling) before proceeding with the clean-up. Use appropriate Personal Protective Equipment during the clean-up.

### ACCIDENTAL RELEASE MEASURES

#### Concentrate

Stop flow if possible. Use appropriate protective equipment during the clean-up. For small volume releases, collect spilled concentrate with absorbent material; place in approved container. For large volume releases, contain and collect for use where possible. Prevent discharge of concentrate to waterways. Disposal should be made in accordance with federal, state and local regulations.

#### Solution

See concentration section above. Flush with water. Exercise caution, surfaces may be slippery. Do not discharge into biological sewer treatment systems without prior approval. Disposal should be made in accordance with federal, state and local regulations.

## SECTION 7 – PRECAUTION IN HANDLING AND STORAGE

HANDLING (PERSONNEL)	:	Avoid contact with eyes, skin or clothing. Avoid ingestion or inhalation. Rinse skin and eyes thoroughly in case of contact. Review Sections 3 (Hazard Identification) and 4 (First Aid Measures).
STORAGE	:	Recommended storage environment is between 28°F (-2°C) and 131°F (55°C). Store product in original shipping containers or tanks designed for product storage.

## SECTION 8 – EXPOSURE CONTROLS AND PERSONAL PROTECTION

ENGINEERING CONTROLS	:	Special ventilation is not required.
<b>PERSONAL PROTECTIVE EQUIPMENT</b>		
RESPIRATORY PROTECTION	:	Recommended exposure limits (OSHA-PEL and ACGIH-TLV) have not been determined for this material. The need for respiratory protection should be evaluated by a qualified health specialist.
PROTECTIVE CLOTHING	:	Rubber or PVC glove is recommended.
EYE PROTECTION	:	Safety glasses face shield or chemical splash goggles

OTHER HYGIENIC PRACTICES : must be worn when possibility exists for eye contact. Contact lenses should not be worn. Eye wash facilities are recommended.

Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing and wash thoroughly before re-use.

**EXPOSURE GUIDELINES**

EXPOSURE LIMITS : Not available

**SECTION 7 – PHYSICAL AND CHEMICAL CHARACTERISTICS**

GENERAL CHARACTERISTIC : Light yellow liquid, odorless

BOILING POINT : -

MELTING POINT : -

FREEZING POINT : <21°F(-6°C)

VAPOR PRESSURE @ 21°C/70°F : -

VAPOR DENSITY : -

SPECIFIC GRAVITY @ 25°C/77°F : 1.04

EVAPORATION RATE (Butyl acetate = 1) : <1

WATER SOLUBILITY : 100% Soluble

pH : approx. 6.9

VISCOSITY : 300 cP

**SECTION 8 – STABILITY AND REACTIVITY**

CHEMICAL STABILITY : Stable

MATERIAL INCOMPATIBILITY : Avoid use of product on burning metals, electrically-energized equipment and contact with water reactive materials

(Materials to Avoid)

HAZARDOUS POLYMERIZATION : Will not occur

**SECTION 9 – TOXICOLOGICAL INFORMATION**

**Mammalian Toxicity**

Acute Oral Toxicity (rat) : LD<sub>50</sub> > 10,000 mg/kg (OECD Test TG425)

**SECTION 10 – ECOLOGICAL INFORMATION**

**ECOTOXICITY**

Acute Oral Toxicity (fish) : LC<sub>50</sub> > 20,000 mg/kg (NIEA B904.12B)

**ENVIRONMENTAL IMPACT (of Anionic Surface Active Agent)**

Biochemical Oxygen Demand (BOD) : 1,910 mg/L NIEA W510.55B

Chemical Oxygen Demand (COD) : 5,640 mg/L NIEA W517.52B

## SECTION 11 – DISPOSAL CONSIDERATIONS

Eco7<sup>®</sup> is not a hazardous waste. However, state and local requirements for waste disposal may be restrictive or otherwise different from regulations. Therefore, applicable local and state regulatory agencies should be contacted regarding disposal of waste foam concentrate or foam solution.

### Concentrate

Do not discharge into biological sewer treatment systems without prior approval. Specific concerns may be high BOD load and foaming tendency. Dilution will reduce BOD and COD factors proportionately. Low dosage flow rate or antifoaming agents acceptable to the treatment plant may be helpful. Do not flush to waterways. Disposal should be made in accordance to the state and local regulations.

### Solution

Eco7<sup>®</sup> solution can be treated by wastewater treatment facilities. Discharge into biological sewer treatment facilities may be done with prior approval. Specific concerns are high BOD load. Dilution will reduce BOD and COD factors proportionately. Low dosage flow rate or antifoaming agents acceptable to the treatment plant may be helpful. Do not flush to waterways. Disposal should be made in accordance to the state and local regulations.

## SECTION 12 – TRANSPORT INFORMATION

### SHIPPING INFORMATION

Proper Shipping Name : Eco7<sup>®</sup> (Water-Based Fire Extinguishing Agent)  
Hazard Class : None  
UN Number : None

## SECTION 13 – REGULATORY INFORMATION

**138** Substances of Very High Concern (SVHC) screening - SVHC candidate list based on the publication by European Chemicals Agency (ECHA) on December 17, 2012 regarding regulation (EC) No. 1907/2006 concerning the REACH.

**Summary:** According to the interpretation of ECHA and the majority of EU member states on the definition of an article as well as the specified scope and analytical technique, concentrations of SVHC are <0.1 in the submitted Eco7<sup>®</sup> sample.

**Note:** Eco7<sup>®</sup> to meet market demand C6 session does not contain ingredients of PFOS.

## SECTION 14 – OTHER INFORMATION

	NFPA Rating	HMIS Rating
Health	1	1
Flammability	0	0
Reactivity	0	0

#### NOTICE TO READERS

Chemori urges each customer or recipient of this MSDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this MSDS and any hazards associated with the product. The above information is provided in good faith and believed to be accurate but does not claim to be all inclusive. Since conditions for use of the product are not under the control of the company, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Users should consider these data only as a guide to the appropriate precautionary and emergency handling of the product. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here is based on data available at the time of shipping, is subject to change without notice as new information is obtained, and may not be valid for such material used in combination with any other material or in any process. However, no warranty of any kind, express or implied, is given.

## 2 System Hardware

### 2.1 Introduction

The Chemori Pre-Engineered Eco7® Systems are designed and installed to protect single or multiple hazards within the limitations tested by a recognized testing agency as stated in this manual ONLY. Authorities Having Jurisdiction (AHJ) should follow the information specified by the Standard for Wet Chemical Extinguishing Systems NFPA 17A.

### 2.2 Cylinders

The Pre-Engineered Liquid Clean Agent System cylinders are available in the nominal capacities as indicated in Table 1. Each of the basic sizes can be filled with half litre increments to meet the exact amount of Eco7® required within their fill ranges.

Table 1: Fill Range of the Cylinders

Part Number	Cylinder Size (Nominal)	Max. Fill	Min. Fill	Operating Pressure
CR 999001	1 L	1 L	0.75 L	195psi
CR 999002	2 L	2 L	1.5 L	195psi
CR 999004	4 L	4 L	3 L	195psi
CR 999006	6 L	6 L	4.5 L	195psi
CR 999007	7 L	7 L	5 L	195psi
CR 999012	12 L	12 L	8 L	195psi
CR 999024	24 L	24 L	18 L	195psi
CR 999035	35 L	35 L	25 L	195psi
CR 999050	50 L	50 L	35 L	195psi
CR 999080	80 L	80 L	60 L	195psi

The cylinders are designed, manufactured, tested, and stamped in accordance to DOT-4B, DOT-4BA or DOT-4BW with the dimensions specified in Table 2 (with Figure 1) and Table 3 (with Figure 2) for 1 L to 6 L cylinders and 7 L to 80 L cylinders, respectively.

Table 2: Cylinder Dimensions for 1 L to 6 L

Part Number	Cylinder Size	ØD (inch)	DAR	SAR VALVE		½ SS VALVE	
			H (inch)	H1 (inch)	H2 (inch)	H1 (inch)	H2 (inch)
CR 999001	1 L	3.35	11.29	11.74	8.83	13.92	9.83
CR 999002	2 L	4.33	15.14	15.59	12.68	17.77	13.68
CR 999004	4 L	5.9	16.28	16.73	13.82	18.91	14.82
CR 999006	6 L	5.9	21.99	22.44	19.53	24.62	20.53

Figure 1: Cylinder (1 L to 6 L) and Valve Assembly

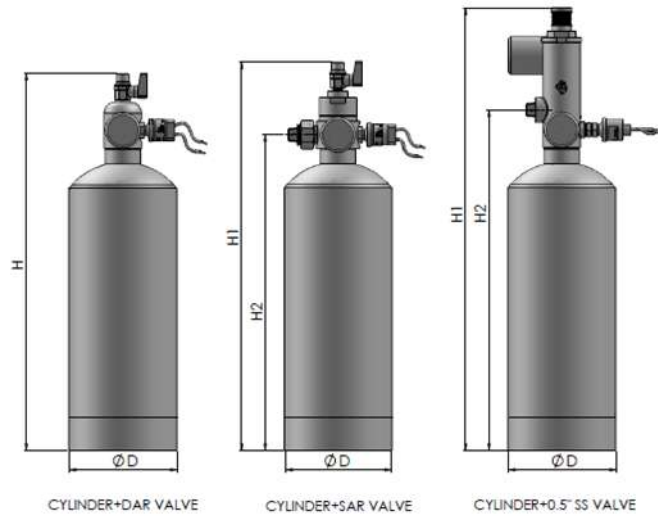
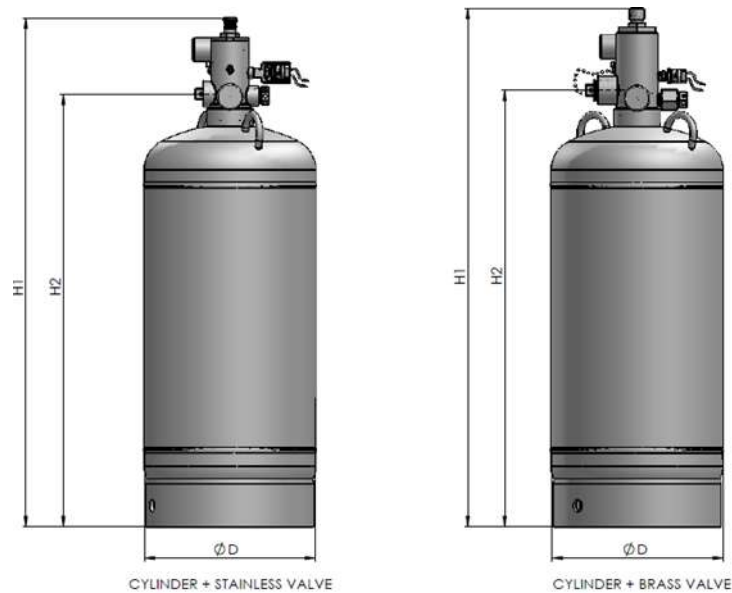


Table 3: Cylinder Dimensions for 7 L to 80 L

Part Number	Cylinder Size	ØD (inch)	BRASS VALVE		SS VALVE	
			H1 (inch)	H2 (inch)	H1 (inch)	H2 (inch)
CR 999007	7 L	10.75	18.91	13.76	18.29	13.51
CR 999012	12 L	10.75	23.01	17.86	22.39	17.61
CR 999024	24 L	10.75	33.44	28.29	38.82	28.04
CR 999035	35 L	12.8	33.57	27.56	32.77	27.13
CR 999050	50 L	12.8	43.57	37.56	42.77	37.13
CR 999080	80 L	16	46.33	40.31	45.52	39.88

Figure 2: Cylinder (7 L to 80 L) and Valve Assembly





## 2.3 Cylinder Valves

There are four types of cylinder valves that can be utilized in the Fire Suppress Pre-engineered Units. Each type of valve has a corresponding cylinder sizes to be used, as shown in Table 4.

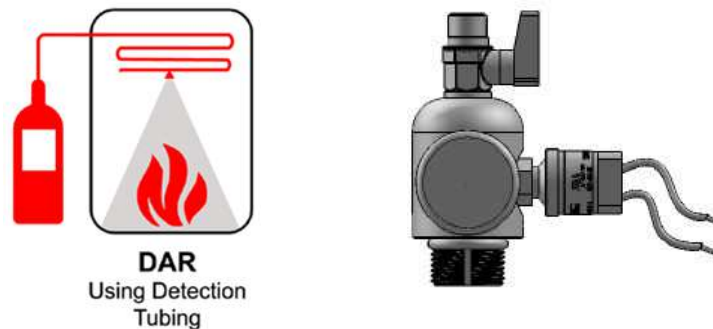
**Table 4: Valve Type and Cylinder Sizes**

Valve Type	Valve Size	Cylinder Size (Nominal)
Direct Action Release (DAR)	½"	1 L, 2 L, 4 L, 6 L
Secondary Action Release (SAR)	½"	1 L, 2 L, 3 L, 4 L, 6 L
Brass Valves	1"	7 L, 12 L, 24 L
	1 ½"	35 L, 50 L, 80 L
Stainless Steel Valves	½"	1 L, 2 L, 3 L, 4 L, 6 L
	1"	7 L, 12 L, 24 L
	1 ½"	35 L, 50 L, 80 L

a. Direct Action Release (DAR); Part Number: CR 99002

The DAR system uses Fire Detection Tubing (Part Number: CR 99011-A-1) as fire detection device and Fire Suppression delivery system. In the event of fires, the pressurized Fire Detection Tubing point that is located near the heat source will rupture, which results in a formation of discharge nozzle. The fire extinguishing agent shall be released and delivered to the detected source of fires (Figure 3). The DAR system is an automated system that has no option for manual operation.

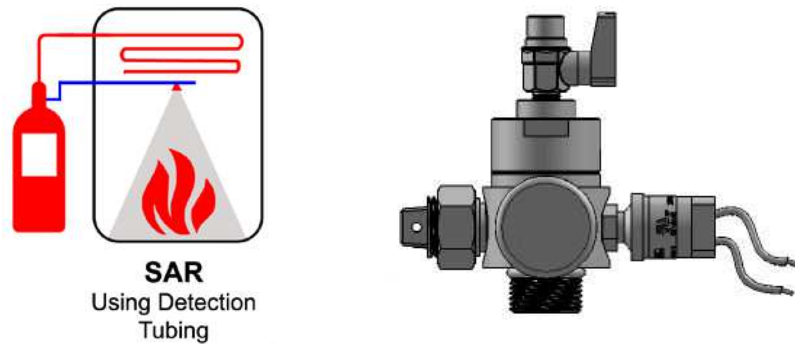
**Figure 3: Schematic Diagram of DAR System and DAR Valve**



b. Secondary Action Release (SAR) ); Part Number: CR 991050

Unlike DAR system, the SAR system utilizes Fire Detection Tubing (Part Number: CR 99011-A-1) as fire detection device only. A piping network (tubing) made of either copper, stainless steel or braided hose is installed to the cylinder for delivering the fire extinguishing agent. This piping tubing is equipped with nozzles that are strategically positioned at and/or around the areas to be protected. Hence, when the pressurized Fire Detection Tubing is ruptured, the SAR valve will operate and a Fire Suppressant agent immediately will be delivered through the piping from the cylinder to the protected areas (Figure 4). The SAR system has a manual release option that enables the operator to manually activate the system.

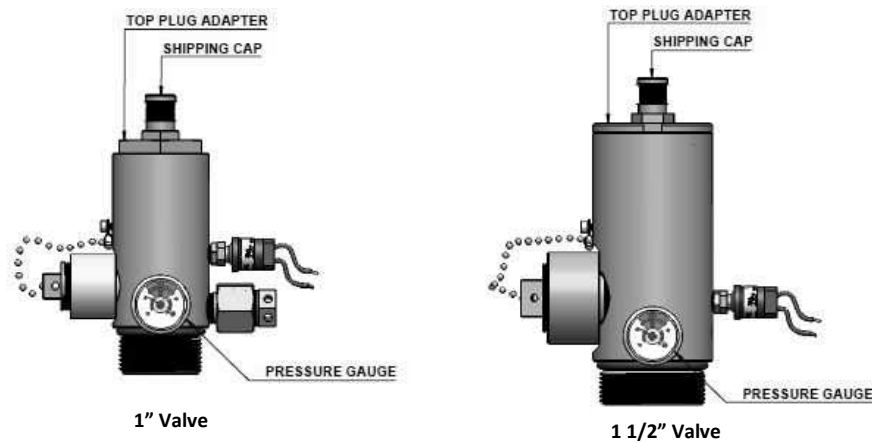
Figure 4: Schematic Diagram of SAR System and SAR Valve



c. Brass Valves

Brass valves are the back pressure type of valves. A piston in the valve is equipped with a rubber seal that keeps the fire extinguishing agent under pressure within the cylinder. A small hole in the piston allows cylinder pressure to be equalized on both sides of the piston. Since the area at the top of the piston is greater than the area at the bottom of the piston, the net force seals the piston against the valve discharge outlet. When the cylinder pressure on the top of the piston is relieved by means of Pneumatic Actuating Valve (PAV) (Part Number: CR 70264) or manual actuation (e.g. Local Manual Control with Part Number of CR 61033), there is only cylinder pressure acting against the piston seal, and the piston slides to its full open position allowing cylinder discharge through the distribution network. The PAV and manual actuation will be described in detail in Section 2.6.4 and 2.6.5, respectively.

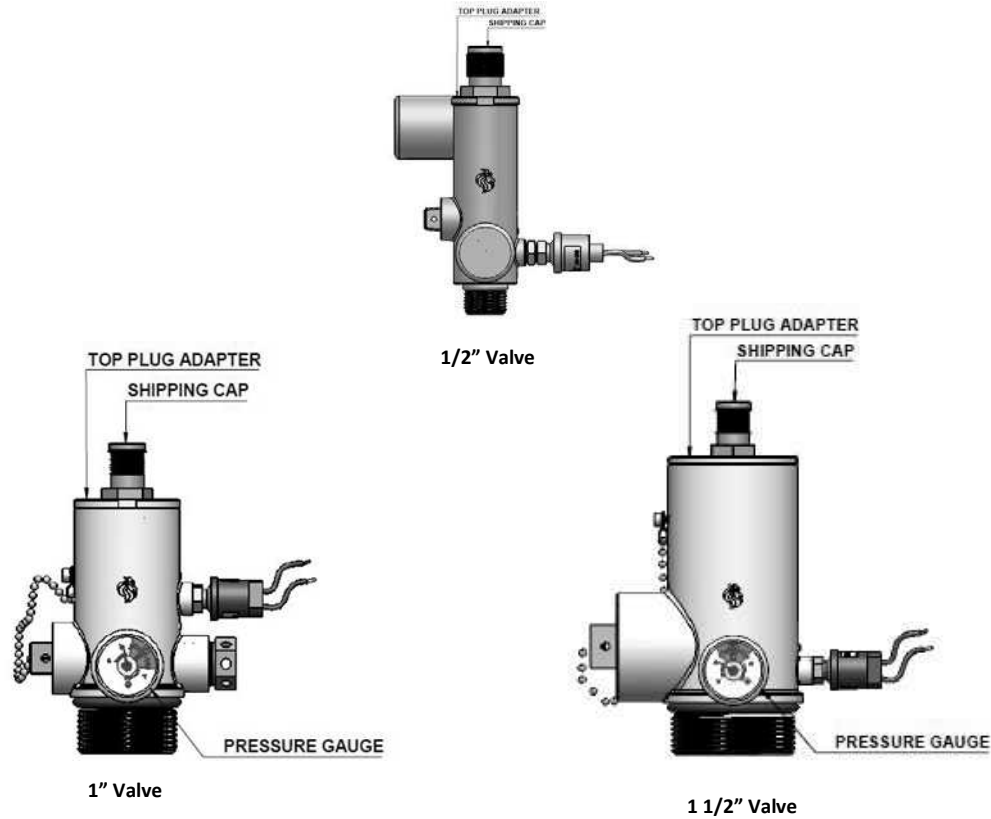
Figure 5: Brass Valve



d. Stainless Steel Valves

Similar to Brass Valves, Stainless Steel Valves are also utilized the back pressure type of valves. The main difference between Brass Valves and Stainless Steel Valve is the material, as indicated in the name. Stainless Steel Valves are the optimized designed of Brass Valves in addition to the increase strength and corrosion resistance material properties.

Figure 6: Stainless Steel Valve



## 2.4 Cylinder Brackets

The cylinder brackets are manufactured from steel, and they are used to hold the cylinder securely in place. The cylinder bracket must be secured to a surface such that the bracket will withstand a load up to 5 times of the cylinder weight. This precaution is to ensure that the bracket safely supports the weight of the cylinder and the reaction force of the agent during discharge.

All cylinders must be mounted vertically only with valve up as shown in Figures 7 and 8. The dimensions of the cylinder brackets are given in Tables 5 and 6.

Table 5: The Dimensions (in Inches) of the Cylinder Brackets for 1 L to 6 L

Cylinder Part No.	Cylinder O.D.	Bracket Part No.	L	W	H	Mounting
CR 999001	4.33"	CR 10120-A	5.3"	4.8"	6.15"	Wall
CR 999002	4.33"	CR 10120-B	5.3"	4.8"	10"	Wall
CR 999004	5.90"	CR 0050	7.0"	7.5"	10.5"	Wall
CR 999006	5.90"	CR 0051	7.0"	7.5"	15.25"	Wall

Figure 7: Schematic Drawings of Cylinder Bracket for 1 L to 6 L

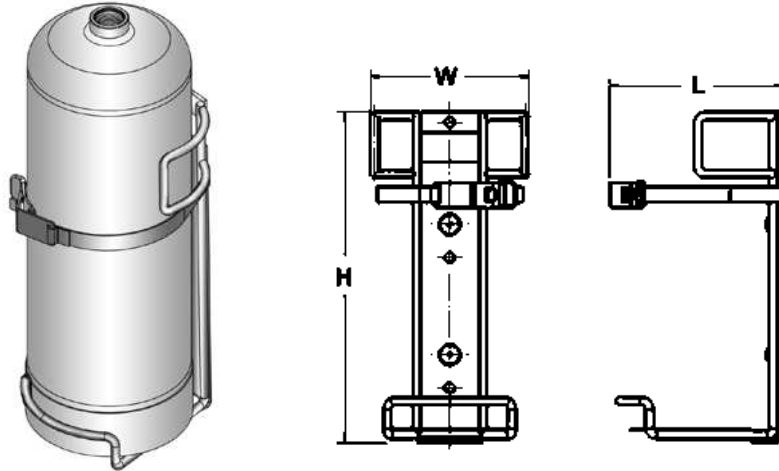
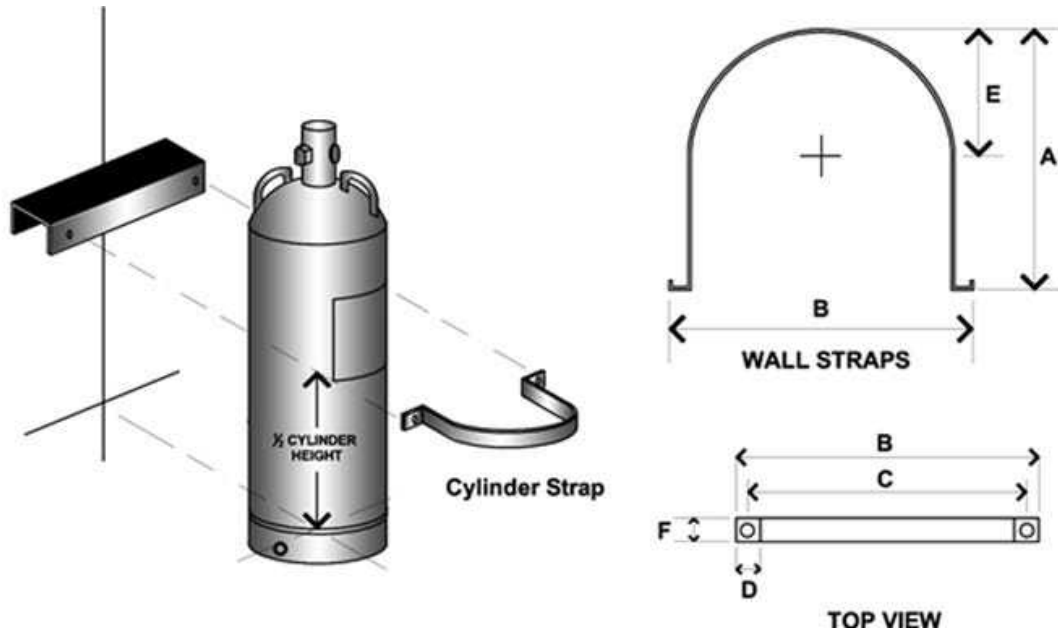


Table 6: The Dimensions (in Inches) of the Cylinder Straps for 7 L to 80 L

Cylinder Part No.	Cylinder O.D.	Bracket Part No.	A	B	C	D	E	F	Mounting
CR 999007	10.75"	CR 50139	9.875"	13.25"	11.75"	1.5"	4.75"	2"	Wall
CR 999012	10.75"	CR 50139	9.875"	13.25"	11.75"	1.5"	4.75"	2"	Wall
CR 999024	10.75"	CR 50139	9.875"	13.25"	11.75"	1.5"	4.75"	2"	Wall
CR 999035	12.80"	CR 60780	12.50"	16.00"	14.50"	1.5"	6.50"	2"	Wall
CR 999050	12.80"	CR 60780	12.50"	16.00"	14.50"	1.5"	6.50"	2"	Wall
CR 999080	16.00"	CR 60760	15.93"	19.25"	17.75"	1.5"	7.75"	2"	Wall

Figure 8: Schematic Drawings of Cylinder Straps for 7 L to 80 L



## 2.5 Pressure Gauges

The pressure gauges are available in both NPT and M10 threads with the pressure of 195 psig. While M10 thread pressure gauge (Part Number: CR 27-15-18-DC-3) is used for 1 L to 6 L systems, the NPT thread pressure gauge (Part Number: CR 27-15-18-DC-3-NPT) is utilized for 7 L to 80 L systems. The choice of the pressure gauge thread depends on the type of valves used for the system (Table 7).

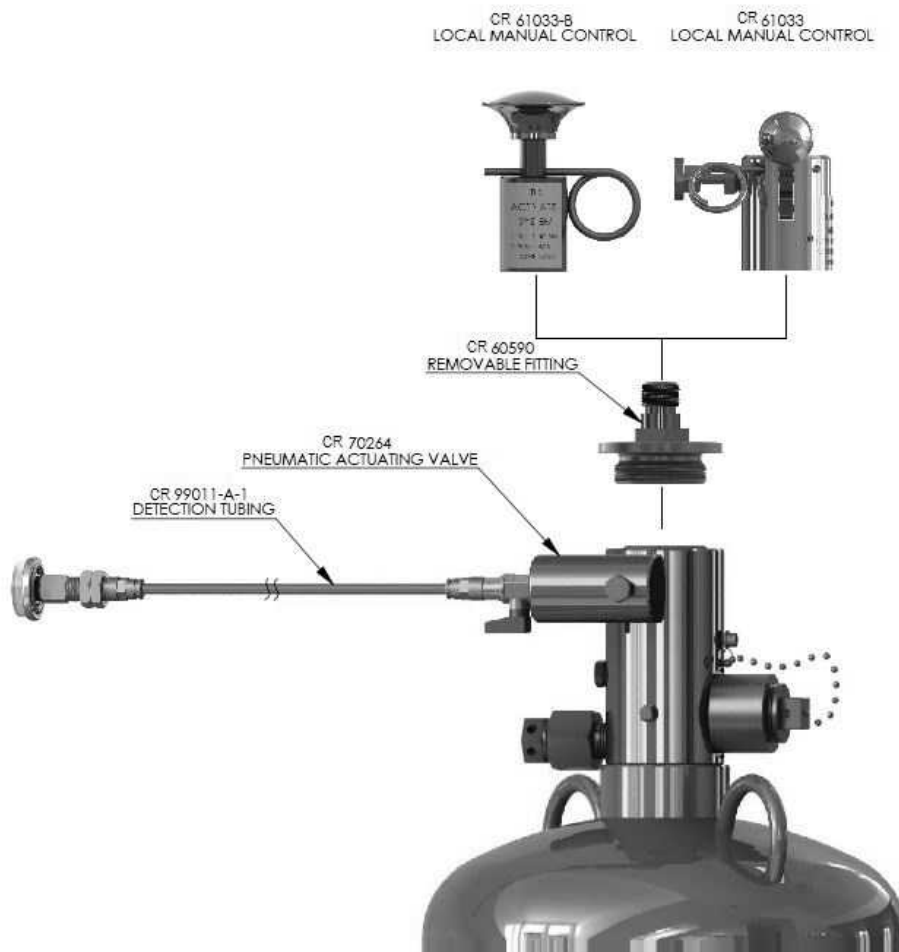
Figure 9: 195 PSIG Pressure Gauges



## 2.6 General System Assembly

Figure 10 shows the general system assembly of Eco7® which consists of multiple accessories and control valves that would be described in detail in Section 2.7.

Figure 10: General Valve Assembly



## 2.7 Cylinder Valve Controls and Accessories

### 2.7.1 Automatic Fire Detection Tubing

Chemori Pre-Engineered Systems utilises Chemori' Proprietary Fire Detection Tubing that are available in 6 mm outer diameter (inner diameter of 4 mm) and 8 mm outer diameter (inner diameter of 6 mm) with Part Numbers of CR 99011-A-1 and CR 99011-B-1, respectively. The detection tubing reacts to heat and does not require any power to work. This means that Eco7® systems are still fully operational in the event of a power failure.

The Fire Detection Tubing is also durable whilst being flexible. This means that it can be placed in virtually any environment and work around virtually any obstacles. The Fire Detection Tubing is impervious to contaminants they may settle on the surface during normal use. This is especially true in the kitchen exhaust environment where grease and oil films can settle on the surface. Moreover, the Fire Detection Tubing can be employed in vehicular protection where it can be exposed to engine oils, fuel, dirt and grime. Since the Fire Detection Tubing reacts to heat, there are no false discharges due to dust, dirt, insects and moisture that are typically associated with conventional detectors.

NOTE: In situations where the Fire Detection Tubing is exposed to possible pinch points or impacts, it should be fitted with Chemori Detection Tubing Protection Guard (Part Number: CR 99020-1), as shown in Figure 11.

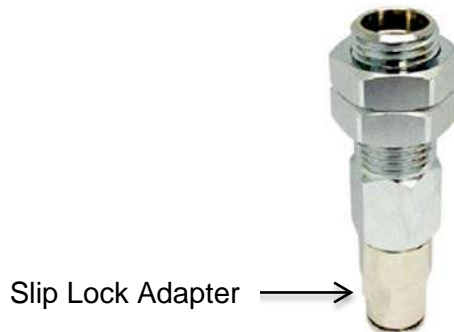
Figure 11: Detection Tubing Protection Guard



### 2.7.2 End-of-Line Adapter

The End of Line Adapter (CR 99025) is used for connecting devices, such as, Pressure Supervisory Switch and Pressure Gauge. This can be utilized in place of Direct Manual Release (Part Number: CR 99001) for monitoring the pressure of Fire Detection Tubing (Part Number: CR 99011-A-1 and CR 99011-B-1). A 1/8 BSPP Slip Lock Adapter (Part Number: CR 60032-A) is used as a connection between Fire Detection Tubing and Pressure Gauge or Pressure Supervisory Switch.

Figure 12: End-of-line Adapter



### 2.7.3 Direct Manual Release Assembly

At the end of Fire Detection Tubing (Part Number: CR 99011-A-1 and CR 99011-B-1), Direct Manual Assembly (Part Number: CR 99001) is installed through 1/8 BSPP Slip Lock Adapter (Part Number: CR 60032-A), as shown in Figure 13.

Direct Manual Release Assembly provides multiple functions as follows.

- 1) Provides a point for manual actuation of the Eco7 system
- 2) Allows for easy monitoring of the pressure within the detection tubing
- 3) No leak access point for servicing and detection tubing pressurization

Figure 13: Direct Manual Assembly



**CAUTION:**

1. Be sure the safety pull-pin is installed in body of the Direct Manual Assembly at all times. Ensure that the safety pull-pin is correctly installed until system is activated by use of the Direct Manual Release Assembly.
2. The pull-pin and plastic seal should be in place at all times when the control is not in use or during installation to avoid unwanted discharge of the system.

#### **2.7.4 Pneumatic Actuating Valve (PAV) Assembly**

A Pneumatic Actuating Valve (PAV) with the Part Number of CR 70264 (Figure 14) can be assembled to Brass or Stainless Steel Valves to activate the agent discharge. PAV does not need electricity to make it functional, and it works like a back pressure valve. Initially, the piston is in closed position. The burst of Fire Detection Tubing (Part Number: CR 99011-A-1) due to a localized heat point would release the inside pressure of Fire Detection Tubing. As a result, PAV piston would open and the pressure on top of the Valve Piston would release causing the discharge of Eco7® Fire Extinguishing Agent.

**Figure 14: Pneumatic Actuating Valve**





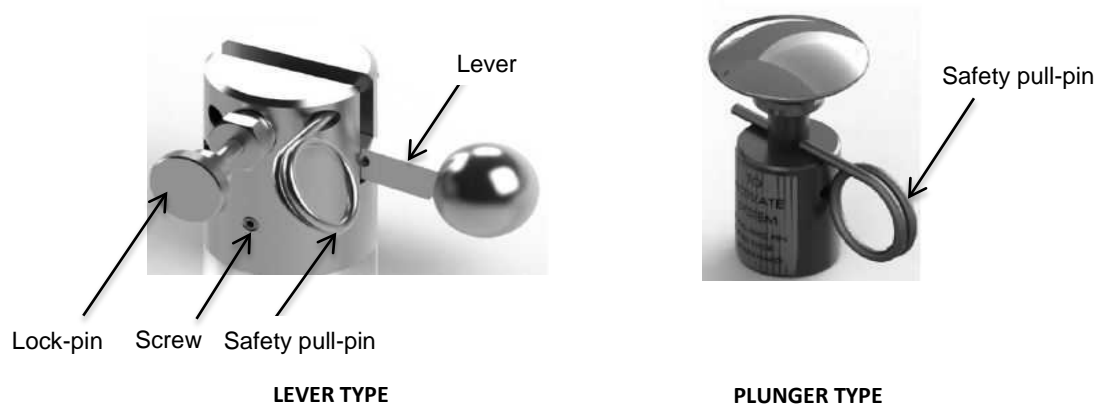
### 2.7.5 Local Manual Control

As shown in Figure 10, Local Manual Control (LMC) is assembled directly on the top of the cylinder valve. It is a manual control that requires pushing down the metal knob in order to depress a Schrader Valve that is located inside of the Removable Fitting. The act of depressing the Schrader Valve would result in venting the pressure from the top of the piston inside of the cylinder valve. This allows the piston to slide upward and commence the cylinder discharge.

There are two types of Local Manual Control available as follows.

- a. Lever Type (Part Number: CR 61033)  
Lever type LMC has a locking pin to ensure that the lever is in its original position. When knob is pushed to discharge the agent, the lever will not return to its original position due to the locking pin allowing a continuous discharge of the fire extinguishing agent.
- b. Plunger type (Part Number: CR 61033-B)  
Plunger type LMC works similarly to Lever type LMC. Instead of pushing the knob down to discharge the agent from the side, the knob is now located vertically on the top of the body. Plunger type LMC is designed with the purpose of cost optimization while ensuring that the functionality of the LMC remains the same as Lever type. For the easier assembly to the Removable Fitting (Figure 10), the body of Plunger type LMC is threaded.

Figure 15: Local Manual Control, Lever Type (upper) and Plunger Type (lower)



#### CAUTION:



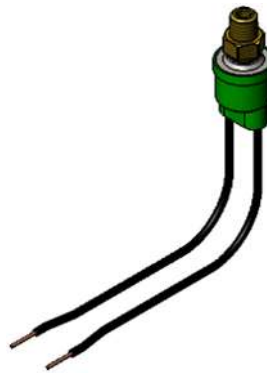
1. Be sure the safety pull-pin is installed in Local Manual Control of the cylinder at all times. Ensure that the safety pull-pin is correctly installed until system is activated by use of the local manual control.
2. When reinstalling the Local Manual Control Plunger Type back onto the Top Plug Adapter, you must ensure that the lock-pin is reset with the handle in the up position. Failure to reset the control head before installation will result in the unwanted discharge of the system during installation. Pulling out the lock-pin, and at the same time, lifting the handle to reset it. The pull-pin and plastic seal should be in place at all times when the Local Manual Control is not in use.

### 2.7.6 Pressure Supervisory Switch

The Pressure Supervisory Switch (Figure 16) is to monitor the pressure within the cylinder. It can be used to trip the power, heat and gas supply to the protected hazard. It also will act as a low pressure leak warning device. If the cylinder to which it is attached leaks (e.g. the pressure drops to  $120\pm 10$  psig (Release Pressure) or below), the switch contact will operate giving an indication to the Control Panel that the cylinder has lost pressure.

One version of the switch is normally closed (N.C.) with Part Number of CR 50138-6, and the second version is normally open (N.O.) with Part Number of CR 50138-3. The switch is referenced to the normally open pressure condition. When the cylinder is pressurized until the actuation pressure (e.g.  $195\pm 10$  psig) is reached, the contact for the normally closed (N.C.) switch will shift from normally closed to normally open status and vice versa for the normally open (N.O.) switch. However, when the cylinder is de-pressurized until the release pressure is reached, the contact will shift back to its original status. When the switch is used on a standard supervisory input circuit, there will be no distinction between a wiring fault and a device actuation.

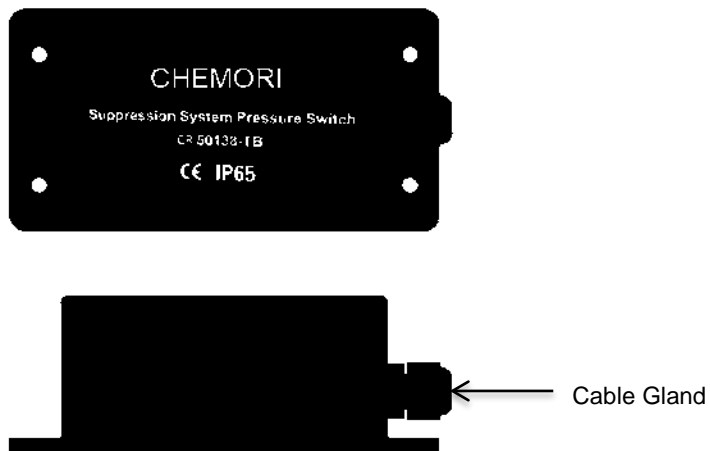
Figure 16: Pressure Supervisory Switch



### 2.7.7 Pressure Switch Box

Pressure Switch Box (CR 50138-TB) is mounted to the wall horizontally and is designed to protect the Pressure Supervisory Switch from outside forces. Cable gland is incorporated in the assembly to protect the wire from pulling.

Figure 17: Pressure Switch Box



## 2.8 Agent Distribution Devices

### 2.8.1 Pipe, Pipe Fittings, and Pipe Supports

Pipe, pipe fittings, and pipe supports shall be in accordance to the latest edition of NFPA 17A available from the National Fire Protection Association, Batterymarch Park, Quincy, MA-02269.

#### 2.8.1.1 Pipe Requirements

Pipe shall be a minimum Seamless Stainless Steel Tube ASTM A269/A213 TP316/316L or Copper tube ASTM B88.



#### NOTE:

1. **Cast-iron pipe and steel pipe conforming to the ASTM A-120, or non-metallic pipe shall NOT be used.**
2. **All piping must be thoroughly reamed to remove burrs and swabbed with a degreasing solvent to remove all traces of cutting oils and chips.**

#### 2.8.1.2 Pipe Fittings

Pipe joints shall be DIN type fitting and have a minimum working pressure of 620 psi (43 bars). The temperature ratings of the fittings must not be exceeded. PTFE tape must be applied on male threads only for screwed fittings (excluding the first two threads closest to the end of the pipe); compression fittings do NOT require PTFE tape. The method of joining all pipes must be in accordance to the latest requirements listed in the NFPA 17A.

All reductions in pipe size must be made by using concentric reducer fittings after the tee. Reducing bushings are not acceptable. All tees shall exit in the horizontal plane. See Tee Orientation in Figure 21 for details.

#### 2.8.1.3 Pipe Supports

Pipe supports must be installed with allowance for expansion and contraction. They must be rated to support the dead weight of the pipes and the thrust forces of the Eco7® discharge. The piping for fire-extinguishing system shall be installed in accordance to proper commercial practices and securely supported by hangers. Refer to the ANSI B-31.1 Codes for bracing requirements.

### 2.8.2 Nozzles

Discharge nozzles are made of stainless steel with male pipe threads. Two types of nozzles are available. One is Wide Mist Nozzle with 1/8" NPT, and another one is Directional Mist Nozzle with 1/4" NPT (Figure 18). Both nozzles produce a cone shaped mist in a 360° central discharge pattern. Each nozzle has a single discharge outlet which should be aimed to the centre of the protected hazard. Both nozzles are to be positioned no less than 50 cm from the hazard and not greater than 90 cm from hazard. Each nozzle can cover a 70 cm by 70 cm area.

Any combination of types of nozzles could be used in a single area. When multiple nozzles are employed, the coverage for each nozzle must not exceed its maximum length and area of coverage.

Table 7: Nozzle Specifications

Nozzle Part No.	Thread Size	Flow rate	Orifice Diameter	Discharge Angle
CR 990001-XV	1/8" NPT	1.75 LPM	1.0 mm	110° ± 10°
CR 990002-IP	1/4" NPT	2.75 LPM	1.0 mm	80° ± 10°

Figure 18: Discharge Nozzle Types

**DIRECTIONAL MIST NOZZLE**



**WIDE MIST NOZZLE**



### 3 System Design for Class A, B & K Fire using Eco7®

#### 3.1 Introduction

The design section provides an understanding of the characteristics of Eco7® in relation to its flow from its storage container, through the piping network, and discharging from the distribution nozzles. Information is also given for the “Authorities Having Jurisdiction” for approving the system installation. Systems shall be installed and maintained in accordance to the NFPA 17A and this manual. The calculation method has been investigated for the specific types of pipe, fittings and pipe I.D. If the application does violate the limitations mentioned in this chapter, there is a risk that the system will not supply the designated quantity of agent.

NFPA 17A Standards shall be followed by the system designer. The latest edition of NFPA 17A is available from National Fire Protection Association, Batterymarch Park, Quincy, MA-02269.

The Chemori Eco7® system is designed for targeted applications to extinguish Class A, B and K fires. It is important that every system is designed to provide the maximum extinguishing characteristics and that the limitations for total flooding are strictly followed.

#### 3.2 Defining Scope of Protection

System protection can be separated into full area coverage or targeted protection; both systems are to be used for the local protection of equipment.

- a) Full area coverage protection will protect a defined area using a nozzle overlapping design. This will allow equipment to be moved and changed as required whilst still being protected.
- b) Target protection will have nozzles aimed directly where they are required. This will allow for a more efficient agent usage but does not allow for flexibility within the protected zone.

### 3.3 Amount of Agent Required

The amount of agent required depends on three keys criteria as follows.

1. Area to be protected and number of nozzles required
2. Type of nozzle
3. Required discharge time

The agent should be enough to deliver a minimum of 1.25 litres per cubic metre or to provide a minimum discharge time of 25 seconds including the cooling to the fire affected regions. The minimum discharge time is set at 25 seconds. The fire will be extinguished within the first 10 seconds, and the remaining 15 seconds is to provide high levels of cooling to the fire affected regions. When multiple types of nozzle are used in a single system, the higher discharge rate must be used for all nozzles.

Table 19 shows the Protection coverage for both nozzles. For Class K fires (Kitchen Systems), the maximum area coverage is strictly limited to 0.70 m x 0.70 m and must have a minimum discharge time of no less than 45 seconds. The nozzles must be positioned so that there is no gap within the protection zone.



**Note: The agent required is rounded up to nearest half litre increment when determining the fill for the cylinder.**

### 3.4 Cylinder(s) Configurations

Following are configurations for cylinder use in the engineered design method.

- a) Single hazard with one cylinder and its piping and nozzle system.
- b) Single hazard with multiple cylinders, each with their own piping and nozzle system.
- c) Multiple hazards with one cylinder discharging through its piping and nozzle system.

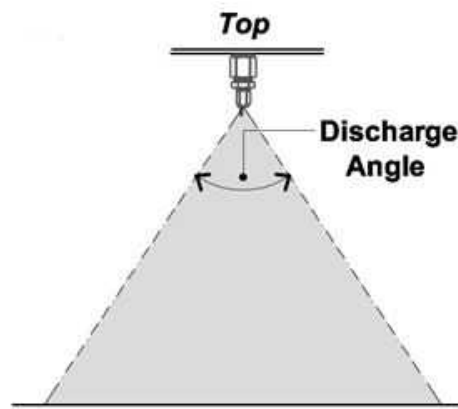
### 3.5 Nozzles

#### 3.5.1 Area Coverage

The maximum height at which a nozzle can be placed from the hazard in an enclosed area is 2 m. The nozzles may not be placed higher than 3.5 m from the cylinder outlet.

For Kitchen Systems the maximum area coverage is limited to 0.70 m x 0.70 m.

Figure 19: Area Coverage per Nozzle for General System



### 3.6 Flow Limitations

1. Duration of discharge: Eco7® discharge from a nozzle shall not be less than 25 seconds. A design discharge time can be increased to no more than 3 minutes
2. Maximum coverage area: The maximum coverage area per nozzle is 0.80 m x 0.80 m for normal applications. For Kitchen systems, the maximum coverage area per nozzle is 0.70 m x 0.70 m
3. Minimum nozzle pressure: 100 psig
4. Maximum flow rates: The maximum flow rates must not be exceeded

### 3.7 Application

Following is the schematic diagram of the typical application of Eco7®.

**Figure 20: Kitchen Hood Typical Layout**

# SAMPLE COMPUTATION DESIGN FOR KITCHEN HOOD

**CHEMORI**  
 Website : [www.chemori.com](http://www.chemori.com)  
 Email : [sales@chemori.com](mailto:sales@chemori.com)

Hazard to be Protected

**Area 1 - Cook Top (1.2 meters x 2.8 meters)**

**Area 2 - Range Hood/Intake (0.7 meter x 1.8 meters)**

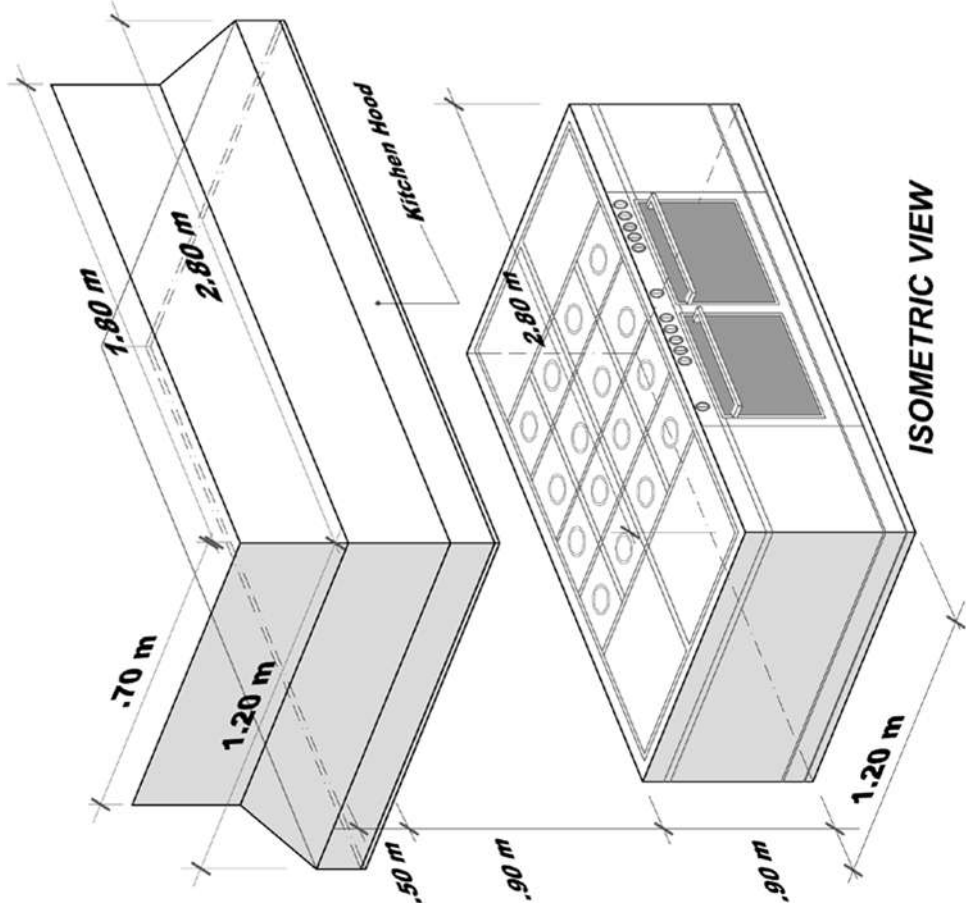
Number of Nozzles Required


**Area 1 - WIDTH** ----->  $1.2 \div 0.7 = 1.71$  -----> 2

**- LENGTH** ----->  $2.8 \div 0.7 = 4$

**2 rows of 4 nozzles,**

Distance to hazard  $\geq 0.90$  } Select directional nozzle  
 Hazard type- kitchen } for higher flow and further reach.

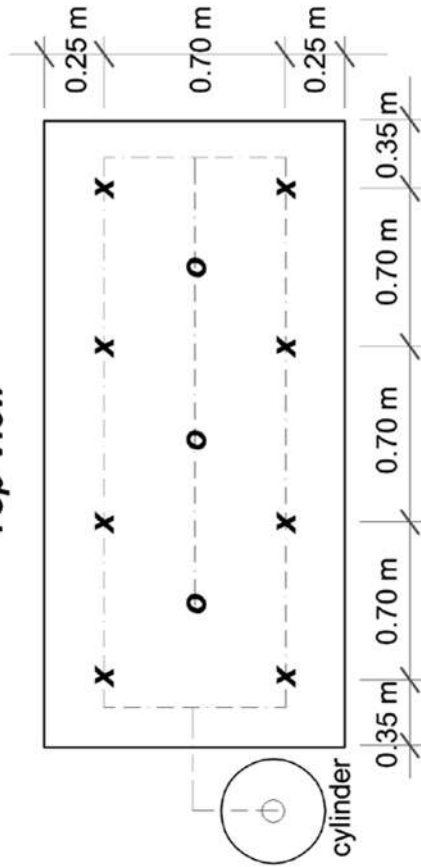


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DRAWN CHK'D APP'VD MFG Q.A.	RAJ JRC WMC MJ	SIGNATURE: DATE	PART NO PART NAME PRODUCT GP UNIT MATERIAL:	TITLE: KITCHEN HOOD EXAMPLE	
MANUFACTURED BY:		FOR ALL VALVE INCH		FINISH:	DRAWING NO:
SCALE:		N.T.S.	SHEET 1 OF 3:		

**SAMPLE COMPUTATION DESIGN FOR KITCHEN HOOD**

**Pipe and Nozzle Layout.**

**Top View**



**x = downward facing nozzle**

**o = upward facing nozzle**

Area 2 - WIDTH ----->  $0.7 \div 0.7 = 1$

- LENGHT----->  $1.8 \div 0.7 = 2.57$ -----> 3


**1 row of 3 nozzles,**

Distance to hazard  $\geq 0.0$  } can use either type  
 Hazard type- kitchen. } nozzle,  
 select directional for  
 balance system.

**Agent Required**

Total number of nozzles = 11

$A_{reg} = 11 @ 2.75 \text{ lpm} \times 45/60$   
 $= 22.69 \text{ Litres}$   
 $= 23 \text{ Litres}$  -----> Require 24 L Cylinder

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS		DO NOT SCALE DRAWING	REVISION 3
		SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		TITLE: KITCHEN HOOD EXAMPLE	
DRAWN	ANGULAR:	SIGNATURE:	DATE	FINISH:	
CHK'D	RAF		PART NO		
APP'VD	JRC		PART NAME		
MFG	WMC		PRODUCT GP		
Q.A	MJ		UNIT		
MANUFACTURED BY:			MATERIAL:		
			FOR ALL VALVE		
			INCH		
			WEIGHT:		
			SCALE:	N.T.S.	SHEET 2 OF 3:



**SAMPLE COMPUTATION DESIGN FOR KITCHEN HOOD**

Pipe Limitations

Max. Flow rate =  $11 \times 2.75$   
 = 30.25 lpm

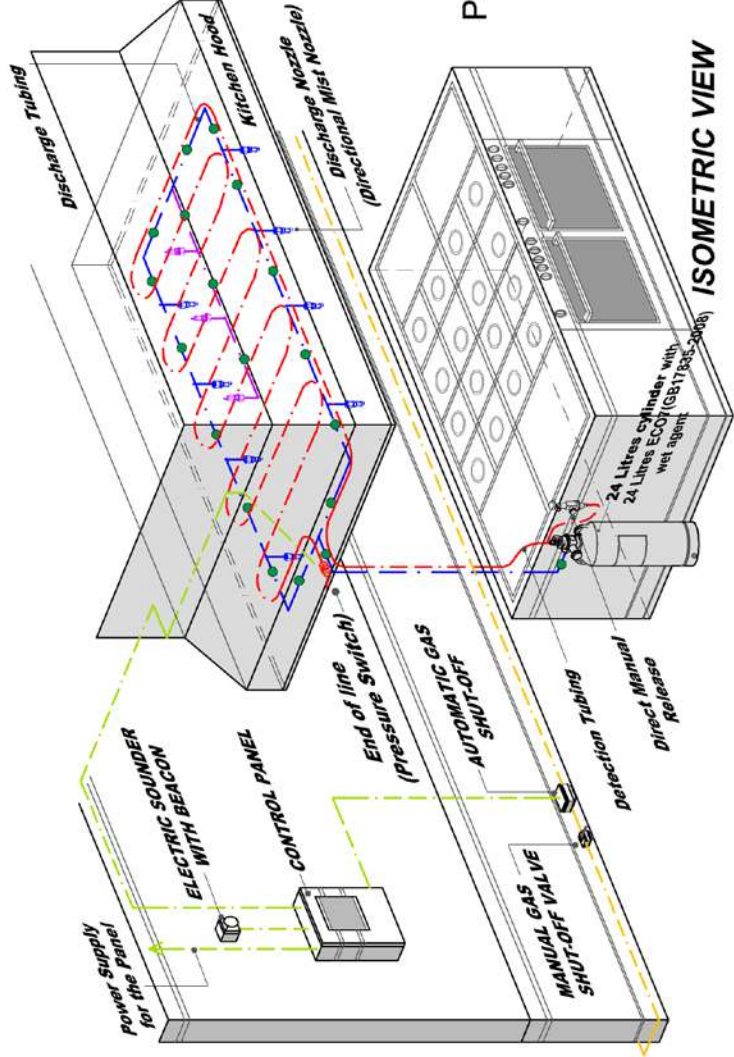
Max Length of 1/2" pipe allowable.

Must use 1/2" pipe or greater from cylinders.

Convert Litres to Cubic inches.  
 $(24 \times 61.0237) = 1465$  cu. in.

Pipe L<sub>max</sub> =  $1465 / 10 \div (\pi(0.5/2)^2) = 747$  inches.  
 = 18.98 metres

Actual = 10 metres  
 Number of joints = 8 (<30)



**SYSTEM IS ACCEPTABLE**

**ISOMETRIC VIEW**

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: ANGULAR:		DO NOT SCALE DRAWING	REVISION 3
DRAWN: RAF CHK'D: JRC APP'VD: WMC MFG: O.A. MANUFACTURED BY:		DATE: _____ PART NO: _____ PART NAME: _____ PRODUCT GP: _____ UNIT: _____ MATERIAL: _____ WEIGHT: _____		TITLE: KITCHEN HOOD EXAMPLE	
ANGLAR: _____ SIGNATURE: _____		FOR ALL VALVE INCH		FINISH: _____ DRAWING NO: _____ SCALE: N.T.S. SHEET 3 OF 3	

**FINAL DESIGN FOR KITCHEN HOOD**

**CHEMORI**  
 Website : [www.chemori.com](http://www.chemori.com)  
 Email : [sales@chemori.com](mailto:sales@chemori.com)

**SAMPLE COMPUTATION DESIGN FOR BUS SYSTEM**  
**AREA TO BE PROTECTED**

**LENGTH → 8.15 m**

**WIDTH → 2.2 m**

**Number of Nozzles Required**

**L  $8.15 \div 0.75 = 10.86 \rightarrow 11$  Nozzles per Row**

**W  $2.2 \div 0.75 = 2.93 \rightarrow 3$  Rows Required**

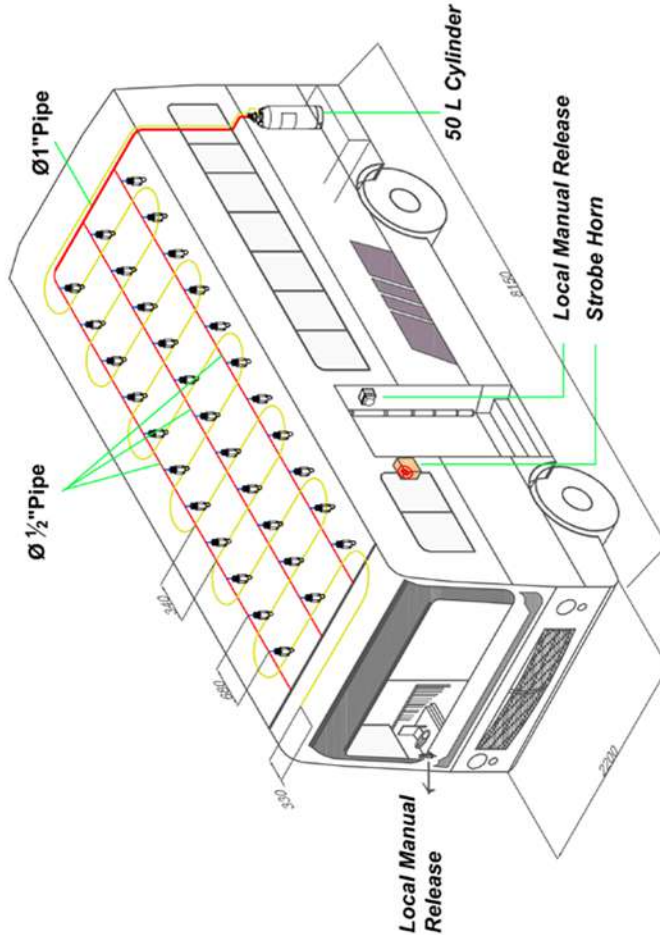
**Total Number of Nozzles = 33**

**Distance to Hazard  $\geq 1.5$  m → Recommend Directional Nozzle**

**33 @  $2.75 \cdot \frac{25}{60} = 37.8125$  L**

**Recommend 50 L ▼**

**Fill to increase discharge time to over 33 seconds.**



**ISOMETRIC VIEW**

**LEGEND:**

	STAINLESS STEEL PIPE 1/2" Ø
	FIRE DETECTION TUBING

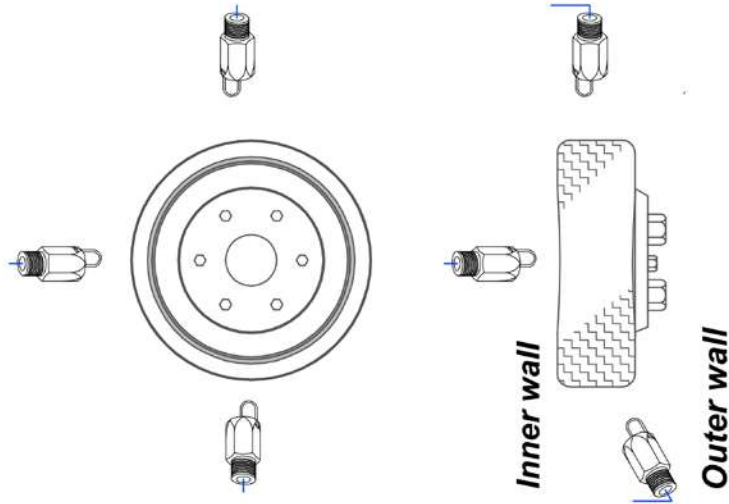
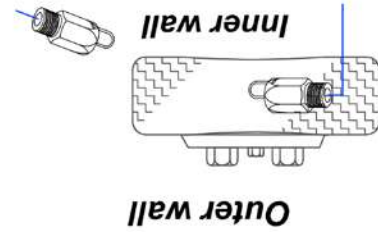
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	DATE: 15-12-2013 PART NO: PART NAME: PRODUCT GP: UNIT: MATERIAL: WEIGHT:	TITLE: TYPICAL BUS SYSTEM EXAMPLE
DRAWN: CHECKED: APPROVED: MFG: Q.A.	SIGNATURE: P/CL: JRC: WMC: MJ:	FINISH: FOR ALL VALVE INCH DRAWING NO: SCALE: N.T.S. SHEET 1 OF 5
MANUFACTURED BY:	(REV. 0)	



## SAMPLE COMPUTATION DESIGN FOR VEHICLE WHEEL / TYRE PROTECTION ( SINGLE WHEEL)

### Number of Nozzles Required

- **3 Nozzles: Wide or Directional**
- **Min agent 2 L**
- **Recommend agent 4 L**
- **System can be combined with other areas with synchronized discharge.**
- **This design is sufficient for vehicle tyres up to 0.75 m in diameter. Tyre with a diameter larger than 0.75m may require more nozzles.**
- **Flow coverage test must be conducted while at stationary to see if the coverage is sufficient.**



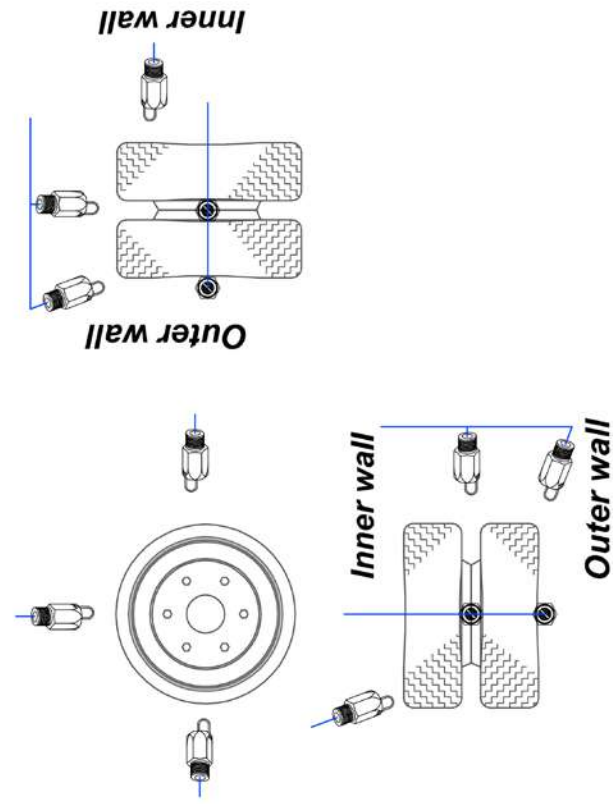
### ORTHOGRAPHIC VIEW

<b>CHEMORI</b>		UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS		DO NOT SCALE DRAWING	REVISION 00
DRAWN: _____ CHK'D: _____ APP'VD: _____ MFG: _____ Q.A: _____ MANUFACTURED BY: _____		SIGNATURE: _____ DATE: 5-12-2013		TITLE: TYPICAL BUS SYSTEM EXAMPLE	
PKL: _____ JRC: _____ WMC: _____ MJ: _____		PART NO: _____ PRODUCT GP: _____ UNIT: _____ MATERIAL: _____ WEIGHT: _____		FINISH: _____	
FOR ALL VALVE INCH		TOLERANCES: LINEAR: _____ ANGULAR: _____		DRAWING NO: _____ (REV. 0)	
SCALE: N.T.S.		SHEET 3 OF 5			


**SAMPLE COMPUTATION DESIGN FOR VEHICLE WHEEL / TYRE PROTECTION ( DOUBLE WHEEL SYSTEM )**

Number of Nozzles Required

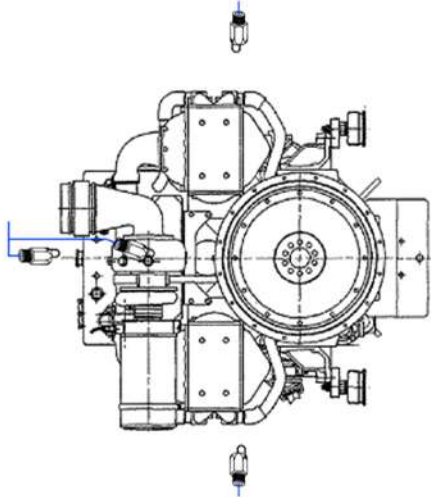
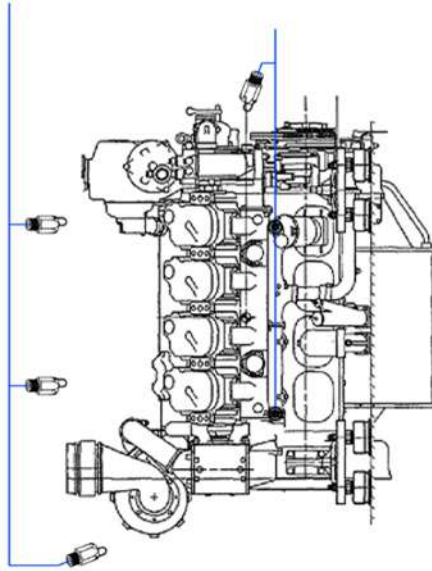
- **5 Nozzles: Wide or Directional**
- **Min agent 4 L**
- **Recommend agent 6 L**
- **System can be combined with other areas with synchronized discharge.**
- **This design is sufficient for vehicle tyres up to 0.75 m in diameter. Tyre with a diameter larger than 0.75m may require more nozzles.**
- **Flow coverage test must be conducted while at stationary to see if the coverage is sufficient.**



**ORTHOGRAPHIC VIEW**

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		DO NOT SCALE DRAWING	REVISION 00
DATE: 5-12-2013		TITLE: TYPICAL BUS SYSTEM EXAMPLE		FINISH:	
DRAWN: PKL	CHKD: JRC	PART NO:	FOR ALL VALVE		
APPVD: W/MC	MFG:	PRODUCT GP:	UNIT:	INCH	
Q.A: /M/	MANUFACTURED BY:	MATERIAL:	DRAWING NO:	(REV. 0)	
WEIGHT:		SCALE:		N.T.S.	SHEET 4 OF 5

**SAMPLE COMPUTATION DESIGN FOR BUS SYSTEM  
 VEHICLE ENGINE PROTECTION**



**NOZZLES**


**FOR BUS SYSTEMS 9 NOZZLES**  
**FOR MINI BUS / VAN SYSTEMS 5 - 7 NOZZLES**  
**AND LARGE CAR SYSTEMS.**  
**FOR SMALL / MEDIUM CAR SYSTEMS 4 - 6 NOZZLES**

**MIN AGENT**

**6 L**  
**4 L -6 L**  
**4 L**

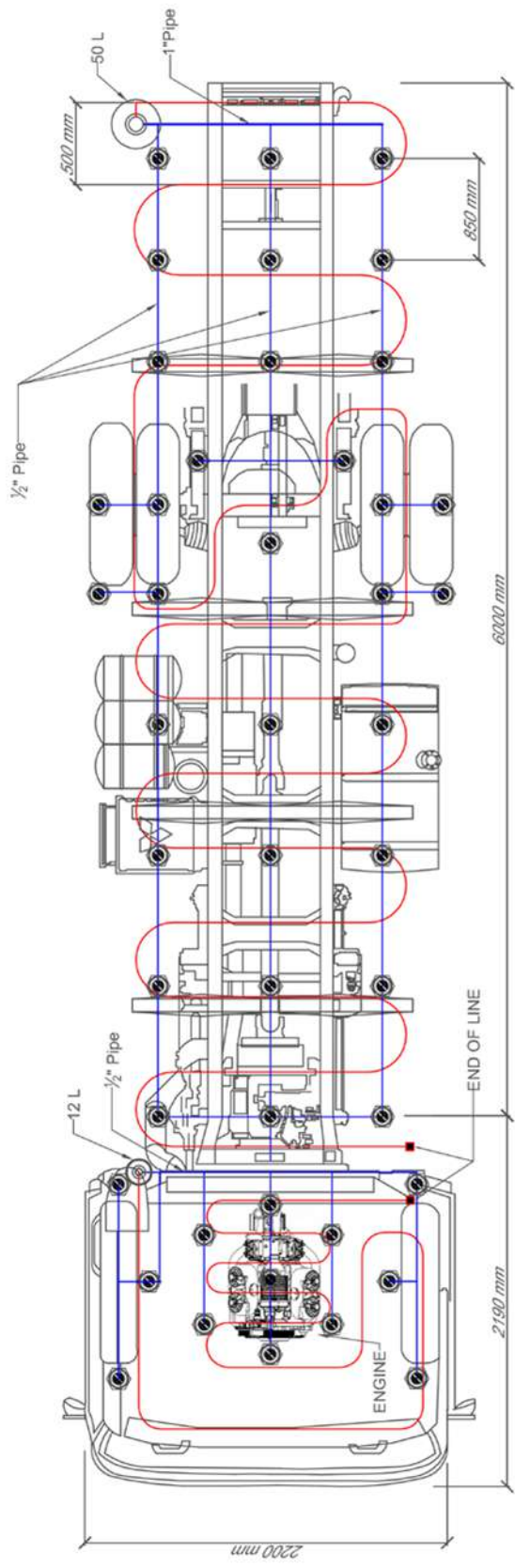
**RECOMMEND**

**1 L per NOZZLE**

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS UNLESS INDICATED OTHERWISE TOLERANCES: LINEAR: _____ ANGULAR: _____		DO NOT SCALE DRAWING	REVISION 00
		DATE: 5-12-2013 PART NO: _____ PART NAME: _____ PRODUCT GP: _____ UNIT: _____ MATERIAL: _____ WEIGHT: _____		TITLE: TYPICAL BUS SYSTEM EXAMPLE	
DRAWN: _____ CHKD: _____ APP'D: _____ MFG: _____ Q.A: _____	SIGNATURE: _____ PKL: _____ JRC: _____ WMC: _____ MJ: _____	FOR ALL VALVE INCH: _____		DRAWING NO: _____ SCALE: _____ M.T.S. SHEET 5 OF 5	

# SAMPLE COMPUTATION DESIGN FOR BUS CHASSIS SYSTEM

**CHEMORI**  
 Website : [www.chemori.com](http://www.chemori.com)  
 Email : [sales@chemori.com](mailto:sales@chemori.com)



## TOP VIEW

	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: ANGULAR: ANGULAR:	DO NOT SCALE DRAWING REVISION 00	
DRAWN: PKL CHK'D: JRC APP'VD: WMC MFG: MJ Q.A.	SIGNATURE: DATE: 13-12-2013 PART NO: PART NAME: PRODUCT GP: UNIT: MATERIAL: WEIGHT:	TITLE: TYPICAL BUS CHASSIS SYSTEM EXAMPLE	FINISH: DRAWING NO.: SCALE: M.T.S. SHEET 6 OF 7
MANUFACTURED BY:		(REV. 0)	

**LEGEND:**

	STAINLESS STEEL PIPE 1/2" Ø
	FIRE DETECTION TUBING

# SAMPLE COMPUTATION DESIGN FOR BUS CHASSIS SYSTEM

## CHEMORI

Website : [www.chemori.com](http://www.chemori.com)  
Email : [sales@chemori.com](mailto:sales@chemori.com)



- Front Engine and Tyre protection
- 13 Nozzles (using small Bus Engine and Front tyre protection design)
- Use wide nozzle for close proximity
- Rear Under Carriage and Tyre protection
- 32 Nozzles ( using standard design criteria and rear tyre protection design)
- Depending on distance from nozzle to the floor of the under carriage use Directional or Wide nozzles, Tyre use Wide nozzle

### Note:

- No Nozzle is to protrude past the external dimensions of the vehicle
- Water discharge test must be carried out to check agent discharge coverage
- Functional test of Bus must be carried out to check for nozzle clearance from heat source and moving parts.

### Fire Detection Tubing:

- Shall be installed with spring protector
- Shall not be installed at potential "pinch points"
- Shall not be installed immediately next to or on any heat source

		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE: TOLERANCES: LINEAR: _____ ANGULAR: _____		DO NOT SCALE DRAWING	REVISION 00
DRAWN: _____ CHKD: _____ APP'D: _____ MFG: _____ C.A. _____		DATE: 13-12-2013		TITLE: TYPICAL BUS SYSTEM EXAMPLE	
ANGULAR: _____ PKL _____ /PC _____ /M/C _____ M/J _____		PART NO: _____ PART NAME: _____ PRODUCT GP: _____ UNIT: _____ MATERIAL: _____		FINISH: _____	
SIGNATURE: _____ MANUFACTURED BY: _____		FOR ALL VALVE INCH _____		DRAWING NO: _____ (REV. 0)	
WEIGHT: _____		SCALE: _____		N.T.S. SHEET 7 OF 7	



## 4 Maintenance

### 4.1 Hardware Checkout after Installation

The following checkout procedure applies to the Chemori furnished Eco7® hardware only. Automatic detection, control panel, the associated devices (alarms, pull stations, etc.) along with their associated control functions are required to be checked in accordance to this manual and the NFPA 17A.



**NOTE: All detection devices, auxiliary alarms, and control devices must be electrically compatible with each other.**

The detection tubing must be pressurised and maintained for 24 hours to determine if there is any leakage throughout the system.

The cylinder brackets and pipe fixtures must be checked that they are secured and are sufficiently tightened.

All nozzles must be checked that they are positioned correctly and centre to their individual coverage zone.

The detection tubing must have no leaks and must be pressurised to 195 psi before opening the ball valve to the cylinder, which results in an activation of the system.

The audible alarm should be tested to ensure that alarm can be heard and seen.

### 4.2 Regular Maintenance

Chemori systems shall be maintained in accordance to the NFPA 17A and this manual.

#### 4.2.1 Weekly

The owner or designated personnel are suggested to perform the following checks:

1. Check pressure gauge(s) on cylinder valve(s) and detection tubing. If the pressure is 10% below the pressure required of the cylinder at time of inspection, the cylinder must be serviced by an authorized Chemori distributor.
2. Check for physical damage or missing parts from the Eco7® system hardware.
3. Check the orientation and tightness of the discharge nozzles.
4. Check for obstructions that would interfere with nozzle discharge pattern or mechanical operation of the system.
5. Check that all tamper seals are still intact and secure.

#### 4.2.2 Semi-Annual

The semi-annual maintenance must be performed by an authorized Chemori distributor.



**NOTE:**

1. Repeat weekly inspection
2. At least semi-annually, the quality of the agent and the pressure of refillable containers shall be checked. If a container shows a loss in net weight of more than 5% or a loss in pressure (adjusted for temperature) of more than 10%, it shall be refilled or replaced. Inspection of the 7 L to 80 L cylinders has to be weighed.
3. Perform functional test to all components of the entire system (see “Hardware Checkout after Installation”).
4. Detection should be check for cracks or extreme brittleness. Replace affected regions.

#### 4.3 System Checkout after Discharge

When entering the enclosure after Eco7® discharge, ensure that caution is taken as the floor might be wet and slippery. The Eco7® does not contain any corrosive or hazardous agents, thus, clean-up operations are simply rinsing of the equipment. Eco7® should not stain any equipment during discharge. An authorized installer or system designer must be consulted after the system has discharged. The cylinder must be removed from the bracket to be recharged with the Eco7® and re-pressurized with nitrogen. Following is the general procedure after the system is discharge.

1. Disconnect wiring from control panel, or 110 volts circuit when no panel is used.
2. Remove all detection tubing from cylinder adapters.
3. Fire Detection Tubing should be check for the point of disruption. The detection tubing should also be check for cracks or extreme brittleness. If it is observed that the detection tubing has cracks and/or any other damages that may affect the function of the detection tubing, replacement of the detection tubing may be required.



**CAUTION: Failure re-pressurise the detection tubing before reinstallation will result in a false discharge.**

4. Remove cylinder piping from cylinder valves.
5. Attach anti-recoil plugs on all cylinders.
6. Loosen cylinder brackets and remove the cylinders.
7. Have all cylinders recharged only by a qualified Chemori Eco7® recharge facility.



**NOTE: Only Chemori qualified Eco7® recharge personnel shall inspect cylinder, valve, and controls for nicks, corrosion, and impairment of parts.**

8. Replace all parts as necessary. Check nozzles for any damages, misalignment and/or foreign matters. After system discharges through a shuttle valve, functional test of the shuttle valve may need to be conducted again for free movement. Follow all instructions on the cylinder nameplate. If the valve is to be disassembled to lubricate the “o” ring, make sure the pressure within the cylinder is at ZERO psig. To make sure there is no residual pressure

within the cylinder, install the anti-recoil fittings on the discharge outlet and actuate the cylinder valve.



**CAUTION: DO NOT BREATHE THE GAS VENTING FROM THE ANTI-RECOIL.**

Only the bore of the valve and the piston “o” ring shall be greased with the Chemori CR 50172 grease. The seating surface in the valve and the rubber piston seat shall NOT be greased. Only the Chemori CR 50172 grease shall be used.

9. After the recharging has been completed, replace cylinders in brackets and re-fasten the brackets.
10. Remove anti-recoil plugs.
11. Re-connect discharge piping.
12. Reset control panel.
13. Re-install the detection tubing to the cylinder valve and pressurise the detection tubing.
14. Reconnect all pressure actuators and pressure actuation tubing.
15. Follow instructions given in “Hardware Checkout after Installation”.



**NOTE: This system consists of components tested within limitations contained in this manual. The designer of this system must be consulted prior to any planned changes to either the system or the area being protected. An authorized Chemori distributor must be consulted after the system has discharged.**

## Appendix A Chemori Part Numbers

Chemori Part Number	Description
<b>Wet Agent</b>	
ECO7®	ECO7® Fire Protection Fluid
<b>Cylinders and Valves</b>	
CR 999001	1 L cylinder with valve
CR 999002	2 L cylinder with valve
CR 999004	4 L cylinder with valve
CR 999006	6 L cylinder with valve
CR 999007	7 L cylinder with valve
CR 999012	12 L cylinder with valve
CR 999024	24 L cylinder with valve
CR 999035	35 L cylinder with valve
CR 999050	50 L cylinder with valve
CR 999080	80 L cylinder with valve
CR 99002	DAR valve assy.
CR 991050	SAR valve assy.
CR 06000-AX	1/2" valve assy.
CR 90001	1" valve assy.
CR 90001-SS	1" valve assy.
CR 90002	1-1/2" valve assy.
CR 90002-SS	1-1/2" valve assy.
CR 50021	Anti-recoil for 1" valve
CR 60611	Anti-recoil for 1-1/2" valve
CR 60055	Burst disc assy. for 7 L to 80 L cylinder
CR 60590	Removable Fitting
<b>Cylinder Brackets</b>	
CR 10120-A	Bracket for 1 L cylinder
CR 10120-B	Bracket for 2 L cylinder
CR 0050	Bracket for 4 L cylinder
CR 0051	Bracket for 6 L cylinder
CR 50139	Wall strap for 7 L, 12 L and 24 L cylinders
CR 60780	Wall strap for 35 L and 50 L cylinders
CR 60760	Wall strap for 80 L cylinders
<b>Pressure Gauges</b>	
CR 27-15-18-DC-3	195 psig pressure gauge (M10x1)
CR 27-15-18-DC-3-NPT	195 psig pressure gauge (1/8 NPT)
<b>Cylinder Valve Controls</b>	
CR 70264	Pneumatic Actuating Valve
CR 61033	Local manual control head (Lever Type)
CR 61033-B	Local manual control head (Plunger Type)
CR 61056	Top plug adapter assembly for 1/2" valve
CR 61053	Top plug adapter assembly for 1" valve

<b>Chemori Part Number</b>	<b>Description</b>
CR 61053-SS	Top plug adapter assembly for 1" valve (SS)
CR 61054	Top plug adapter assembly for 1-1/2" valve
CR 61054-SS	Top plug adapter assembly for 1-1/2" valve (SS)
<b>Agent Distribution Devices</b>	
CR 990001-XV	1/8" NPT X-Vane Mist Nozzle
CR 990002-IP	1/4" NPT Impact Pin Mist Nozzle
CR 99011-A-1	Fire Detection Tubing (diameter: 6 mm)
CR 99011-B-1	Fire Detection Tubing (diameter: 8 mm)
CR 99025	End-of-Line Adapter
CR 99001	Direct Manual Release Assembly
CR 99020-1	Detection Tubing Protection Guard
CR 60032-A	1/8 BSPP Slip Lock Adapter
<b>Accessories</b>	
CR 55200	Weather proof manual control – electrical pull station (model # RMS-1T-WP)
CR 55201	Dual action manual control – electrical pull station "ECO7® AGENT RELEASE" (model # RMS-1T-LP-KL)
CR 55201-1	Dual action manual control – electrical pull station (model # RMS-1T-LP)
CR 55201-2	Single action manual control – electrical pull station (model # RMS-1T)
CR 50195-1	Main-Reserve selector switch
CR 88105	Abort switch
CR 50138-6	Pressure Supervisory Switch (Normally Closed)
CR 50138-3	Pressure Supervisory Switch (Normally Open)
CR 50138-TB	Pressure Switch Box
CR 50339	Pressure Operated Switch (N.C./N.O.) SPDT (manual reset) Model Number: CR 27
<b>Maintenance</b>	
CR 50310	Test dowel for solenoid
CR 5000-3	1" valve service kit
CR 5000	1-1/2" valve service kit
CR 50172	Piston grease fortified
CR 50146	Recharge adapter for 1" valve
CR 60850	Recharge adapter for 1-1/2" valve
CRHTA1	Hydrostatic test adapter for 1" valve
CRHTA2	Hydrostatic test adapter for 1-1/2" valve
CR 99000-MFS	Installation, Maintenance, and Service Technical Manual

NOTES



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