



- .2      Data to include schedules of tasks, frequency, tools required and task time.
- .5      Performance data to include:
  - .1      Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
  - .2      Equipment performance verification test results.
  - .3      Special performance data as specified.
  - .4      Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .6      Approvals:
  - .1      Submit two (2) copies of draft Operation and Maintenance Manual to Contract Administrator for approval. Submission of individual data will not be accepted unless directed by Contract Administrator.
  - .2      Make changes as required and re-submit as directed by Contract Administrator.
- .7      Additional data:
  - .1      Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .8      Site records:
  - .1      Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
  - .2      Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
  - .3      Use different colour waterproof ink for each service.
  - .4      Make available for reference purposes and inspection.
- .9      "As-Built" Drawings:
  - .1      Submit copies of "As-Built" drawings for inclusion in final TAB report.

### **1.3            QUALITY ASSURANCE**

- .1      Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

### **1.4            MAINTENANCE**

- .1      Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:
  - .1      One (1) set of packing for each pump.
  - .2      One (1) casing joint gasket for each size pump.
  - .3      One (1) glass for each gauge glass.
  - .4      One (1) filter cartridge or set of filter media for each filter bank in addition to final operating set.
- .2      Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals .

- .3      Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

**Part 2            Products**

**2.1            MATERIALS**

- .1      Materials and products in accordance to ASME, CSA, NFPA, FC-403 and ULC standards.

**Part 3            Execution**

**3.1            PAINTING REPAIRS AND RESTORATION**

- .1      Prime and touch up marred finished paintwork to match original.
- .2      Restore to new condition, finishes which have been damaged.

**3.2            CLEANING**

- .1      Clean interior and exterior of all systems including strainers.

**3.3            FIELD QUALITY CONTROL**

- .1      Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report.
- .2      Manufacturer's Field Services:
  - .1      Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Part 1 - Submittals.

**3.4            PROTECTION**

- .1      Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

**END OF SECTION**

**Part 1            General**

**1.1                SUMMARY**

- .1    Section Includes:
  - .1    Thermal insulation for piping and piping accessories in commercial type applications.

**1.2                REFERENCES**

- .1    American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - .1    ASHRAE Standard 90.1-01, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- .2    American Society for Testing and Materials International (ASTM)
  - .1    ASTM B209M-04, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
  - .2    ASTM C335-04, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .3    ASTM C411-04, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - .4    ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .5    ASTM C533-2004, Calcium Silicate Block and Pipe Thermal Insulation.
  - .6    ASTM C547-2003, Mineral Fiber Pipe Insulation.
  - .7    ASTM C795-03, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .8    ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3    Canadian General Standards Board (CGSB)
  - .1    CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
  - .2    CAN/CGSB-51.53-95, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts
- .4    Department of Justice Canada (Jus)
  - .1    Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
  - .2    Canadian Environmental Protection Act (CEPA), 1999, c. 33.
  - .3    Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .5    Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1    Material Safety Data Sheets (MSDS).

- .6 Manufacturer's Trade Associations
  - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).
- .7 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-03, Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .3 CAN/ULC-S702-1997, Thermal Insulation, Mineral Fibre, for Buildings
  - .4 CAN/ULC-S702.2-03, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

### 1.3 DEFINITIONS

- .1 For purposes of this section:
  - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
  - .2 "EXPOSED" - will mean "not concealed" as specified.
- .2 TIAC ss:
  - .1 CRF: Code Rectangular Finish.
  - .2 CPF: Code Piping Finish.

### 1.4 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures . Include product characteristics, performance criteria, and limitations.
    - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures .
- .3 Shop Drawings:
  - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
    - .1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba, Canada.
- .4 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures .
  - .2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix label beneath sample indicating service.

- .5 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.

## 1.5 QUALITY ASSURANCE

- .1 Qualifications:
- .2 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, qualified to standards member of TIAC.

## 1.6 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Storage and Protection:
  - .1 Protect from weather, construction traffic.
  - .2 Protect against damage.
  - .3 Store at temperatures and conditions required by manufacturer.
- .3 Waste Management and Disposal:
  - .1 Dispose of packaging and waste materials in appropriate on-site bins for recycling and disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .2 Indoor Environmental Quality Credit EQ - 4.4 Low - Emitting Materials. Co-ordinate with Section 01 35 21 - LEED Requirements.
  - .3 Adhesives, sealants and sealant primers: Low VOC to meet requirements of LEED Indoor Environmental Quality Credit EQ – 4.1 Low-Emitting Materials: Adhesives and Sealants.
    - .1 Low VOC complying with SCAQMD Rule #1168, October 2003,
  - .4 Paints and coatings: Low VOC to meet requirements of LEED Indoor Environmental Quality Credit EQ – 4.2: Low-Emitting Materials: Paints and Coatings.
    - .1 Conform with VOC and Chemical component limits of Green Seal's Standard GS-11 January 1993 requirements.
    - .2 VOC content of anti-corrosive coatings must be less than VOC content limits of Green Seal Standard GS-03 May 1997 requirements.

- .3 Paints and coatings not covered by GS-11 and GS-03 to meet requirements of SCAQMD Rule #1113, November 1996.

## Part 2 Products

### 2.1 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102.
  - .1 Maximum flame spread rating: 25.
  - .2 Maximum smoke developed rating: 50.

### 2.2 INSULATION

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/ULC-S702 and ASTM C547.
  - .2 Maximum "k" factor: to CAN/ULC-S702.
- .4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/ULC-S702 and ASTM C547.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to CAN/ULC-S702 ASTM C547.
- .5 TIAC Code C-2: mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
  - .1 Mineral fibre: to CAN/ULC-S702 and ASTM C547.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to CAN/ULC-S702 and ASTM C547.
- .6 TIAC Code A-6: flexible unicellular tubular elastomer.
  - .1 Insulation: with vapour retarder jacket.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: as indicated.
  - .4 Certified by manufacturer: free of potential stress corrosion cracking corrodants.
- .7 TIAC Code A-2: rigid moulded calcium silicate in sections and blocks, and with special shapes to suit project requirements.
  - .1 Insulation: to ASTM C533.
  - .2 Maximum "k" factor: as indicated.
  - .3 Design to permit periodic removal and re-installation.

### 2.3 INSULATION SECUREMENT

- .1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.
- .2 Contact adhesive: quick setting.
- .3 Canvas adhesive: washable.
- .4 Tie wire: 1.5 mm diameter stainless steel.
- .5 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

### 2.4 CEMENT

- .1 Thermal insulating and finishing cement:
  - .1 Hydraulic setting on mineral wool, to ASTM C449/C449M.

### 2.5 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

### 2.6 INDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.

### 2.7 OUTDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.
- .2 Reinforcing fabric: fibrous glass, untreated 305 g/m<sup>2</sup>.

### 2.8 JACKETS

- .1 Polyvinyl Chloride (PVC):
  - .1 One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.
  - .2 Colours: to match adjacent finish paint by Contract Administrator.
  - .3 Minimum service temperatures: -20 degrees C.
  - .4 Maximum service temperature: 65 degrees C.
  - .5 Moisture vapour transmission: 0.02 perm.
  - .6 Thickness: mm.
  - .7 Fastenings:
    - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
    - .2 Tacks.
    - .3 Pressure sensitive vinyl tape of matching colour.
  - .8 Special requirements:
    - .1 Outdoor: UV rated material at least 0.5 mm thick.

- .2 ABS Plastic:
  - .1 One-piece moulded type and sheet with pre-formed shapes as required.
  - .2 Colours: to match adjacent finish paint by Contract Administrator.
  - .3 Minimum service temperatures: -40 degrees C.
  - .4 Maximum service temperature: 82 degrees C.
  - .5 Moisture vapour transmission: 0.012 perm.
  - .6 Thickness: 0.75 mm.
  - .7 Fastenings:
    - .1 Solvent weld adhesive compatible with insulation to seal laps and joints.
    - .2 Tacks.
    - .3 Pressure sensitive vinyl tape of matching colour.
  - .8 Locations:
    - .1 For outdoor use ONLY.
- .3 Canvas:
  - .1 220 and 120 gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
  - .2 Lagging adhesive: compatible with insulation.
- .4 Aluminum:
  - .1 To ASTM B209.
  - .2 Thickness: 0.50 mm sheet.
  - .3 Finish: smooth, stucco embossed, corrugated.
  - .4 Joining: longitudinal and circumferential slip joints with 50 mm laps.
  - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
  - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.
- .5 Stainless steel:
  - .1 Type: 316.
  - .2 Thickness: 0.25 mm.
  - .3 Finish: smooth, corrugated stucco embossed.
  - .4 Joining: longitudinal and circumferential slip joints with 50 mm laps.
  - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
  - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

## **2.9 WEATHERPROOF CAULKING FOR JACKETS INSTALLED OUTDOORS**

- .1 Caulking to: Section 07 92 10 - Joint Sealing.

---

**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**3.2 PRE-INSTALLATION REQUIREMENT**

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
- .2 Surfaces clean, dry, free from foreign material.

**3.3 INSTALLATION**

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers instructions and this specification.
- .3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  - .1 Install hangers, supports outside vapour retarder jacket.
- .5 Supports, Hangers:
  - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

**3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES**

- .1 Application: at expansion joints, valves, primary flow measuring elements flanges and unions at equipment.
- .2 Design: to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.
- .3 Insulation:
  - .1 Insulation, fastenings and finishes: same as system.
  - .2 Jacket: aluminum PVC or ABS fabric.

**3.5 INSTALLATION OF ELASTOMERIC INSULATION**

- .1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.
- .2 Provide vapour retarder as recommended by manufacturer.

**3.6 PIPING INSULATION SCHEDULES**

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

- .2 TIAC Code: A-1.
  - .1 Securements: SS bands at 300 mm on centre.
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code 1501-H.

- .3 TIAC Code: A-3.
  - .1 Securements: SS bands at 300 mm on centre.
  - .2 Seals: VR lap seal adhesive, VR lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C
- .4 TIAC Code: A-6.
  - .1 Insulation securements:
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code:
- .5 TIAC Code: C-2 with vapour retarder jacket.
  - .1 Insulation securements:
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.
- .6 TIAC Code: A-2.
  - .1 Insulation securements:
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code: 1501-H.
- .7 Thickness of insulation as listed in following table.
  - .1 Run-outs to individual units and equipment not exceeding 4000 mm long.
  - .2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Applica-tion	Temp degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
			Run out	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over
Steam	up to 175	A-1	38	50	65	75	90	90
Condensate Return	60 - 94	A-1	25	38	38	38	38	38
Pumped Condensate return	up to 94	A-1	25	38	38	38	38	38
Hot Water Heating	60 - 94	A-1	25	38	38	38	38	38
Hot Water Heating	up to 59	A-1	25	25	25	25	38	38
Glycol Heating	60 - 94	A-1	25	38	38	38	38	38
Glycol Heating	up to 59	A-1	25	25	25	25	38	38

Domestic HWS		A-1	25	25	25	38	38	38
Indoors Refrigerated Drinking Water		A-3	25	25	25	25	25	25
Domestic CWS		A-3	25	25	25	25	25	25
Refrigerant hot gas liquid suction	4 - 13	A-6	25	25	25	25	25	25
Refrigerant hot gas liquid suction	below 4	A-6	25	25	38	38	38	38
RWL and RWP		C-2	25	25	25	25	25	25
Cooling Coil cond. drain		C-2	25	25	25	25	25	25

.8 Finishes:

- .1 Exposed indoors: SS jacket.
- .2 Exposed in mechanical rooms: canvas.
- .3 Concealed, indoors: canvas on valves, fittings.
- .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
- .5 Outdoors: water-proof SS jacket.
- .6 Finish attachments: SS bands, at 150 mm on centre.
- .7 Installation: to appropriate TIAC code CRF/1 through CPF/5.

**3.7 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

---

**Part 1            General**

**1.1                REFERENCES**

- .1     Underwriters Laboratories, Inc. (UL)
  - .1        1. UL Standard 1254
  - .2        2. UL Standard 300
- .2     B. Underwriters Laboratories of Canada (ULC)
  - .1        1. ULC/ORD-C 1254.6
- .3     C. National Fire Protection Association (NFPA)
  - .1        1. NFPA 96
  - .2        2. NFPA 17A

**1.2                SUBMITTALS**

- .1     Submit two sets of manufacturer's data sheets
- .2     Submit two sets of piping design drawings

**1.3                SYSTEM DESCRIPTION**

- .1     The system shall be an automatic fire suppression system using a wet chemical agent for grease related fires.
- .2     The system shall be capable of suppressing fires in the following areas associated with cooking equipment: ventilating equipment including hoods, ducts, plenums, and filters; fryers; griddles and range tops; upright, natural charcoal, or chain-type broilers; electric, lava rock, mesquite or gas-radiant char-broilers.
- .3     The system shall be the pre-engineered type having minimum and maximum guidelines established by the manufacturer and listed by Underwriters Laboratories of Canada (ULC).
- .4     The system shall be installed and serviced by personnel trained by the manufacturer.
- .5     The system shall be capable of protecting cooking appliances by utilizing either dedicated appliance protection and/or overlapping appliance protection.

**1.4                QUALITY CONTROL**

- .1     A. Manufacturer: The R-102™ Restaurant Fire Suppression System shall be manufactured by a company with good experience in the design and manufacture of preengineered fire suppression systems. The manufacturer shall be ISO 9001 registered.

- .2 Certificates: The wet agent shall be a specially formulated, aqueous solution of organic salts with a pH range between 7.7 – 8.7, designed for flame knockdown and foam securement of grease-related fires.

## 1.5 WARRANTY, DISCLAIMER, AND LIMITATIONS

- .1 The pre-engineered restaurant fire suppression system components shall be warranted for five years from date of delivery against defects in workmanship and material.

## 1.6 DELIVERY

- .1 A. Packaging: All system components shall be securely packaged to provide protection during shipment.

## 1.7 ENVIRONMENTAL CONDITIONS

- .1 The R-102 system shall be capable of operating in a temperature range of 32 °F to 130 °F (0 °C to 54 °C).

## Part 2 Product

### 2.2 COMPONENTS

- .1 The basic system shall consist of an ANSUL® AUTOMAN® regulated release assembly which includes a regulated release mechanism and a wet chemical storage tank housed within a single enclosure. Nozzles, blow-off caps, detectors, cartridges, agent, fusible links, and pulley elbows shall be supplied in separate packages in the quantities needed for fire suppression system arrangements. Additional equipment shall include remote manual pull station, mechanical and electrical gas valves, pressure switches, and electrical switches for automatic equipment and gas line shut-off.
- .2 Wet Chemical Agent: The extinguishing agent shall be a specially formulated, aqueous solution of organic salts with a pH range between 7.8 – 8.2, designed for flame knockdown and foam securement of grease related fires.
- .3 Agent Tank: The agent tank shall be installed in a stainless steel enclosure or wall bracket. The tank shall be constructed of stainless steel. Tanks shall be available in two sizes; 1.5 gallon (5.7 L) and 3.0 gallon (11.4 L). The tanks shall have a working pressure of 110 psi (7.6 bar), a test pressure of 330 psi (22.8 bar), and a minimum burst pressure of 600 psi (41.4 bar). The tank shall include an adaptor/tube assembly containing a burst disc union.

- .4 Regulated Release Mechanism: The regulated release mechanism shall be a spring-loaded, mechanical/pneumatic type capable of providing the expellant gas supply to one or two agent tanks depending on the capacity of the gas cartridge used. It shall contain a factory installed regulator deadset at 110 psi (7.6 bar) with an external relief of approximately 180 psi (12.4 bar). It shall have the following actuation capabilities: automatic actuation by a fusible link detection system and remote manual actuation by a mechanical pull station. The regulated release mechanism shall contain a release assembly, regulator, expellant gas hose, and agent storage tank housed in a stainless steel enclosure with cover. The enclosure shall contain knock-outs for 1/2 in. conduit. The cover shall contain an opening for a visual status indicator. It shall be compatible with mechanical gas shut-off devices; or, when equipped with a field or factory-installed switch, it shall be compatible with electric gas line or appliance shutoff devices.
- .5 Regulated Actuator Assembly: When more than two agent tanks are required, the regulated actuator shall be available to provide expellant gas for additional tanks. It shall be connected to the cartridge receiver outlet of the regulated release mechanism providing simultaneous agent discharge. The regulator shall be deadset at 110 psi (7.6 bar) with an external relief of approximately 180 psi (12.4 bar). The regulated actuator assembly shall contain a regulated actuator, regulator, expellant gas hose, and agent tank housed in a stainless steel enclosure with cover. The enclosure shall contain knockouts to permit installation of the expellant gas line.
- .6 Discharge Nozzles: Each discharge nozzle shall be tested and listed with the R-102 system for a specific application. Nozzles tips shall be stamped with the flow number designation (1/2, 1, 2, and 3). Each nozzle shall have a metal or rubber blow-off cap to keep the nozzle tip orifice free of cooking grease build-up.
- .7 Distribution Piping: Distribution piping shall be Schedule 40 black iron, chrome-plated, or stainless steel pipe conforming to ASTM A120, A53, or A106.
- .8 Detectors: The detectors shall be the fusible link style designed to separate at a specific temperature.
- .9 Cartridges: The cartridge shall be a sealed steel pressure vessel containing either carbon dioxide or nitrogen gas. The cartridge seal shall be designed to be punctured by the releasing device supplying the required pressure to expel wet chemical agent from the storage tank.
- .10 Agent Distribution Hose: Kitchen appliances manufactured with or resting on casters (wheels/rollers), which have the Fire Suppression System hard piped, shall include a UL Listed agent distribution hose as a component of the suppression system. This shall allow the appliance to be moved for cleaning purposes without disconnecting the appliance fire suppression protection. Hose assembly shall include a restraining cable kit to limit the appliance movement within the range (length) of the flexible hose.
- .11 Flexible Conduit: The manufacturer supplying the Restaurant Fire Suppression System shall offer flexible conduit as an option to rigid EMT conduit for the installation of pull stations and/or mechanical gas valves. The flexible conduit shall be UL Listed and include all approved components for proper installation.

- .12 Pull Station Assembly: The Fire Suppression System shall include a remote pull station for manual system actuation. The pull station shall be designed to include a built-in guard to protect the pull handle. The pull station shall also be designed with a pull handle to allow for three finger operation and shall be red in color for quick visibility.

### **Part 3 Implementation**

#### **3.1 INSTALLATION**

- .1 The R-102 fire suppression system shall be designed, installed, inspected, maintained, and recharged in accordance with the manufacturer's listed instruction manual.

#### **3.2 TRAINING**

- .1 Training shall be conducted by representatives of the manufacturer.

**END OF SECTION**

**Part 1            General**

**1.1            SECTION INCLUDES**

- .1            Materials and installation for pre-engineered dry chemical fire protection systems.

**1.2            REFERENCES**

- .1            American National Standards Institute/National Fire Prevention Association (ANSI/NFPA)
  - .1            ANSI/NFPA 17-[02], Standard for Dry Chemical Extinguishing Systems.
  - .2            Department of National Defence Canada (DND)/Infrastructure and Environment/Construction and Property Services
    - .1            Canadian Forces Fire Marshal (CFFM).
  - .3            Fire Commissioner of Canada (FC)
  - .4            Underwriters' Laboratories Inc. (UL)
    - .1            UL 21-[June 1995], Standard for LP-Gas Hose.
    - .2            UL 252-[April 1996], Standard for Compressed Gas Regulators.
    - .3            UL 569-[April 1995], Standard for Pigtails and Flexible Hose Connectors for LP-Gas.
    - .4            UL 1254-[June 1996], Standard for Pre-Engineered Dry Chemical Extinguishing System Units.
- .5            Underwriters' Laboratories of Canada (ULC)
  - .1            Various listings.

**1.3            SUBMITTALS**

- .1            Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2            Provide ULC listed maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**1.4            WASTE MANAGEMENT AND DISPOSAL**

- .1            Dispose of packaging and waste materials in appropriate on-site bins for recycling and disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2            Indoor Environmental Quality Credit EQ - 4.4 Low - Emitting Materials. Co-ordinate with Section 01 35 21 - LEED Requirements.
- .3            Adhesives, sealants and sealant primers: Low VOC to meet requirements of LEED Indoor Environmental Quality Credit EQ - 4.1 Low-Emitting Materials: Adhesives and Sealants.

- .1 Low VOC complying with SCAQMD Rule #1168, October 2003,
- .4 Paints and coatings: Low VOC to meet requirements of LEED Indoor Environmental Quality Credit EQ – 4.2: Low-Emitting Materials: Paints and Coatings.
  - .1 Conform with VOC and Chemical component limits of Green Seal's Standard GS-11 January 1993 requirements.
  - .2 VOC content of anti-corrosive coatings must be less than VOC content limits of Green Seal Standard GS-03 May 1997 requirements.
  - .3 Paints and coatings not covered by GS-11 and GS-03 to meet requirements of SCAQMD Rule #1113, November 1996.

## **Part 2 Products**

### **2.1 COMPONENTS**

- .1 ULC listed pre-engineered system.
- .2 Design to ANSI/NFPA 17, to protect as indicated.
- .3 Design systems to meet requirements in UL 1254 and include in operating manual following:
  - .1 Description of system operating details.
  - .2 Description of fire risks to be protected.
  - .3 Pipe and fitting limitations.
  - .4 Nozzle limitations, including maximum dimensional and area coverage, and installation location.
  - .5 Requirements for equipment maintenance.

### **2.2 STORAGE CONTAINERS**

- .1 Main and connected reserve bank of extinguishing agent and expellant gas.
- .2 Pressure gauge on each container.
- .3 Approved container mounting and retaining system.
- .4 Main or reserve supply selector switch.
- .5 Directional flow valves.
- .6 Capacity: as indicated.
- .7 Caps, plugs or valves connected to pressurized cylinder must have at least four full threads of engagement.
- .8 Provide means of relieving pressure when minimum of two full threads are engaged between device and cylinder, to prevent potential injury when cylinder valve assembly is pressurized while being serviced.

---

**2.3 PIPING AND FITTINGS**

- .1 To ANSI/NFPA 17.
- .2 Stainless steel in exposed areas.
- .3 Scarf or notch bottom of siphon tubes used to transport extinguishing agent through pressure vessel and valve to distribution piping to provide for uninterrupted flow of extinguishing agent.
- .4 Pressure regulators to comply with applicable requirements of UL 252.
- .5 Hose assemblies used for distributing extinguishing agent to comply with applicable requirements in UL 21 and UL 569.

**2.4 NOZZLES**

- .1 Chrome plated brass or stainless steel in accordance with ANSI/NFPA 17 and ULC listed.

**2.5 FIRE DETECTION SYSTEM**

- .1 ULC listed, automatic, to ANSI/NFPA 17.

**2.6 OPERATING DEVICES**

- .1 ULC listed operating system to ANSI/NFPA 17.
- .2 Provide one (1) manual control ULC listed operating station to ANSI/NFPA 17, located as indicated.
- .3 Shut down devices in accordance with instructions of manufacturer's listed system.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install in accordance with ULC listing.

**3.2 SITE TESTS**

- .1 Do site tests in accordance with Section 01 45 00 - Quality Control.
- .2 Test to acceptance in accordance with ANSI/NFPA 17.
- .3 Testing to be witnessed by Fire Commissioner of Canada, Canadian Forces Fire Marshal or authority having jurisdiction.

**3.3 RECHARGING**

- .1 After completion of tests, ensure each cylinder in both initial and reserve banks contains correct dry chemical and weight of extinguishing agent and expellant gas. Restore systems to normal condition.

**END OF SECTION**