SPECIFICATION FOR A MICROMIST® WATER MIST FIRE SUPPRESSION SYSTEM FOR USE WITH THE CHEETAH® CONTROL PANEL SYSTEM

SECTION 1 - GENERAL CONDITIONS

I. SCOPE:

This specification outlines the requirements for a Fike Micromist® Water Mist Fire Suppression System with automatic detection and control. The work described in this specification includes all engineering, labor, materials, equipment and services necessary, and required, to complete and test the suppression system.

II. APPLICABLE STANDARDS AND PUBLICATIONS:

The design, equipment, installation, testing and maintenance of the Water Mist Suppression System shall be in accordance with the applicable requirements set forth in the latest edition of the following codes and standards:

1) NFPA No. 750 - Water Mist Fire Extinguishing Systems
2) NFPA No. 70 - National Electrical Code
3) NFPA No. 72 - National Fire Alarm Code
4) Factory Mutual Approval Guide
5) Fike Micromist Water Mist Design Manual, P/N 06-153.

The standards listed, as well as all other applicable codes and standards, shall be used as "minimum" design standards. Also to be considered are the requirements of the "Authority Having Jurisdiction" and good engineering practices.

III. REQUIREMENTS:

The Water Mist Suppression System installation shall be made in accordance with the drawings, specifications and applicable standards. Should a conflict occur between the drawings and the specification, the specification shall prevail.

IV. EXCLUSIONS:

The work listed below shall be provided by others, or under other sections of the specification:

1) 120 VAC or 208/220 VAC power supply to the control panel.
2) Interlock wiring and conduit for shutdown of HVAC, dampers and/or electric power supplies, relays or shunt trip breakers.
3) Connection to local/remote fire alarm systems, listed central alarm station(s) or building management system.

V. QUALITY ASSURANCE:

A) MANUFACTURER:

1) The manufacturer of the Micromist Suppression System hardware and detection components shall have a minimum of 10 years experience in the design and manufacture of similar types of suppression systems and can refer to similar installations providing satisfactory service.
2) The name of the manufacturer, part numbers and serial numbers shall appear on all major components.
3) All devices, components and equipment shall be the products of the same manufacturer.
4) All devices, components and equipment shall be new, standard products of the manufacturer's latest design and suitable to perform the functions intended.
5) All devices and equipment shall be FM approved. U.L. Listing of certain system components is optional.
6) Locks for all cabinets shall be keyed alike.

B. INSTALLER:

1) The installing contractor shall be trained by the supplier to design, install, test and maintain the Micromist Suppression System.
2) When possible, the installing contractor shall employ a NICET certified special hazard designer, level 2 or above, who will be responsible for this project.
3) The installing contractor shall be an experienced firm regularly engaged in the installation of automatic Water Mist, or similar, fire suppression systems in strict accordance with all applicable standards.

4) The installing contractor shall have a minimum of five (5) years experience in the design, installation and testing of Water Mist, or similar, fire suppression systems. A list of systems of a similar nature and scope shall be provided upon request.
5) The installing contractor shall show evidence that his company carries a minimum $2,000,000.00 liability and completed operations insurance policy.
These limits shall supersede limits required in the general conditions of the specification.
6) The installing contractor shall provide proof of his ability to recharge the compressed Nitrogen cylinder(s) within 24 hours after a Water Mist system discharge.
7) The installing contractor shall be an authorized stocking distributor of the Micromist system equipment so that immediate replacement parts are available from inventory.
8) The installing contractor shall show proof of emergency service available on a twenty-four hour, seven-day-a-week basis.

C. SUBMITTALS:

1) The installing contractor shall submit the following design information and drawings for approval prior to starting work on this project:
   a) Field installation layout drawings having a scale of not less than 1/8" = 1'-0" or 1:1000m detailing the location of all Micromist® storage tank(s), pipe runs (including pipe sizes and lengths), control panel(s), detectors, manual pull stations, audible and visual alarms, etc.
   b) Auxiliary details and information such as maintenance panels, door holders, special sealing requirements and equipment shutdowns.
   c) A separate layout or drawing shall show isometric details of Micromist® storage containers, mounting details, and proposed pipe runs and sizes.
   d) Electrical layout drawings shall show the location of all devices and include point-to-point conduit runs and a description of the method(s) used for detector mounting.
   e) Provide an internal control panel wiring diagram which shall include power supply requirements and field wiring termination points.
   f) Graphic Annunciator wiring schematics and dimensioned display panel illustration shall be provided. (Optional device)
   g) Complete pressure drop calculations, shall be provided for all Water Mist systems.
   h) Provide calculations for the battery stand-by power supply taking into consideration the power requirements of all alarms, initiating devices and auxiliary components under full load conditions.
   i) A complete sequence of operation shall be submitted detailing all alarm devices, shutdown functions, remote signaling, damper operation, time delay and Water Mist system operation sequence for each zone or system.
2) Submit drawings, calculations and system component data sheets for approval to the local Fire Prevention Agency, owners Insurance Underwriter and all other Authorities Having Jurisdiction before starting installation. Submit approved plans to the Architect/Engineer for record.

SECTION 2 - AGENT REQUIREMENTS

VI. SYSTEM DESCRIPTION AND OPERATION:

A) The system shall be a Micromist Water Mist Suppression System supplied by:

FIKE Protection Systems
704 South 10th Street
Blue Springs, MO. 64015 U.S.A.

B) The system shall be a pre-engineered, self-contained water mist system that is complete in all ways. It shall include all mechanical and electrical installation, all detection and control equipment, filled water storage container, discharge nozzles, pipe and fittings, manual release stations, audible and visual alarm devices, auxiliary devices and controls, shutdowns, alarm interface, caution/

advisory signs, functional checkout and testing, training and all other operations necessary for a functional, F.M. approved Water Mist Suppression System.

C) Provide two (2) inspections the first year of service. Inspections shall be made at 6 month intervals commencing when the system is placed into normal service.

D) The system(s) shall be actuated by fixed temperature heat detectors installed per NFPA 72.

E) Detectors shall be wired for single detector release, using either a Class “A” or Class “B” wiring arrangement. No other detection / wiring arrangements will be acceptable.

G) Automatic operation of each protected space, utilizing a “Single Detector Release” mode of operation, shall be as follows:
   1) Illuminate the “FIRE ALARM” lamp on the control panel.
   2) Indicate a “RELEASE” condition on the control panel display.
   3) Energize discharge horn(s) or horn/strobe(s).
   4) Transfer auxiliary contacts, which can perform auxiliary system functions such as:
      a) Open door holder/closure devices on access doors.
      b) Transmit a signal to a building fire alarm system.
      c) Shutdown HVAC or exhaust equipment.
      d) Shutdown power to equipment.
      e) Shut off fuel supplies
      f) Light an individual lamp on an optional graphic annunciator.
      g) Start the Water Mist system discharge sequence, which shall cause the following to occur:
         1) A system discharge in a **Machinery Space** must provide 10 minutes of protection cycling the water discharge in the following sequence:
            40 sec. On / 40 sec. Off
            40 sec. On / 40 sec. Off
            40 sec. On / 40 sec. Off
            40 sec. On / 60 sec. Off

      After the 60 sec. “Off” period the control panel will sample the detectors. If a detector is still in alarm the system will go through the above cycle again.

         2) A system discharge in a **Gas Turbine Generator** enclosure must provide 20 minutes of protection, cycling the water discharge in the following sequence:
            30 sec. On / 40 sec. Off
            30 sec. On / 40 sec. Off
            30 sec. On / 40 sec. Off
            30 sec. On / 40 sec. Off
            30 sec. On / 40 sec. Off
            30 sec. On / 40 sec. Off
            30 sec. On / 40 sec. Off
            30 sec. On / 160 sec. Off

      After the 160 sec. “Off” period the control panel will sample the detectors. If a detector is still in alarm the system will go through the above cycle again.

H) The system shall be capable of being actuated by manual discharge devices located at each hazard exit. Operation of a manual device shall duplicate the sequence descriptions above. The manual discharge station shall be of the electrical actuation type and shall be supervised at the main control panel.

VII) MATERIALS AND EQUIPMENT:

A) GENERAL REQUIREMENTS:

The Micromist System materials and equipment shall be standard products of the supplier's latest design and suitable to perform the functions intended. When one or more pieces of equipment must perform the same function(s), they shall be duplicates produced by one manufacturer.

1) All devices and equipment shall be U.L Listed and/or FM approved.

B) WATER MIST STORAGE AND DISTRIBUTION:

Each system shall have its own supply of water and nitrogen gas.

1) The system design shall be modular, with a single Micromist system supplying up to nine nozzles.
2) All systems shall be designed in accordance with the manufacturer's recommendations and guidelines.
3) Each system shall be located outside the hazard area, but as near as possible, to reduce the amount of pipe and fittings required to install the system.
4) The water and nitrogen shall be stored in FIKE P/N 73-XXX Series Micromist Suppression Package Cylinders. Nitrogen cylinders shall be pressurized to 1850 psi (12,755 kPa). The water cylinder shall have an epoxy coated finish inside the water cylinder to protect against corrosion. Container construction shall conform to NFPA 750.
5) Containers shall be actuated by solenoids through a FIKE P/N 55-022 Solenoid Release Module (SRM), located in the control panel of each Micromist package.
6) Each air cylinder shall have a pressure gauge and/or low pressure switch to provide visual and electrical supervision of the container pressure. The low pressure switch shall be wired to the control panel to provide an audible and visual "Trouble" alarm in the event the container pressure drops below 1580 psi (10,894 kPa).
7) The air cylinder shall have a pressure relief provision that automatically operates when the internal pressure exceeds 3000 psi (20,684 kPa). The water cylinder shall have a pressure relief provision that automatically operates when the internal pressure exceeds 500 psi (3447 kPa).
8) Discharge nozzles shall be provided, and installed within the manufacturers guidelines, to distribute the Water Mist throughout the protected space. The nozzles shall be FIKE P/N 73-XXXX designed to provide proper agent quantity and distribution. The nozzles shall have a ½" (15 mm) NPT female pipe thread for connection to the pipe network.
9) Distribution piping, and fittings, shall be installed in accordance with the manufacturer's requirements, NFPA 750 and approved piping standards and guidelines. All distribution piping shall be installed by qualified individuals using good, accepted practices and quality procedures. All piping shall be adequately supported and anchored at all directional changes and nozzle locations.
    a) All piping shall be reamed, blown clear and swabbed with suitable non-flammable solvents to remove burrs, mill varnish and cutting oils before assembly.
    b) All pipe threads shall be sealed with Teflon tape pipe sealant applied to the male thread ONLY.

SECTION 3 - ELECTRICAL REQUIREMENTS

C) CONTROL PANEL

1) The control panel shall be a CHEETAH Control System, P/N 10-052-X-X, manufactured by Fike Protection Systems, Blue Springs, MO.
2) The CHEETAH Control System, and its components, shall be UL listed and FM approved for releasing service and be suitable for Deluge and Pre-action sprinkler service.
3) The CHEETAH Control System shall perform all functions necessary to operate the system detection, actuation and auxiliary functions, as outlined.
4) The CHEETAH Control System shall be capable of providing 65 Ah of battery standby power.
5) The CHEETAH Control System shall be microprocessor based with hardware and software integration designed to guarantee reliability.
6) The CHEETAH Control System shall support Counting Zone, Single Detector Release and Manual Release detection/actuation methods.
7) The CHEETAH Control System shall provide the following capabilities and functions:
    a) Two (2) Class B (Style Y) indicating appliance circuits rated for 2.0 amps @ 24 VDC.

b) Two (2) Signal Line Circuits, Style 4/6 (Class A/B). Communicates to up to 127 addressable devices per circuit. Addressable devices described below.
c) Two auxiliary supply circuits rated 2A @ 24Vdc, each
d) One re-settable auxiliary supply circuit rated 2A @ 24 Vdc.
e) Three (3) Form "C" relays, rated 2 amps @30 Vdc. These relays provide alarm, trouble, and supervisory annunciation.
f) Optional CRM4, Relay module (P/N 10-2204) provides 4 programmable contacts rated 2A @ 30 Vdc. Cheetah can support two (2) CRM4 modules.
g) Optional SLM, Supplemental Loop Module (P/N 10-2203) provides two additional Signal Line Circuits, Style 4/6 (Class A/B). Communicates to up to 127 addressable devices per circuit. Addressable devices described below.
h) Optional SPS, Supplemental Power Supply (P/N 10-2201-p). Operates from 120Vac, 50/60 Hz (p=1) or 208/240 Vac, 50/60 Hz (p=2). Increases Cheetah's external normal standby current from 1.0A to 2.0A and Cheetah's external alarm current from 5.0A to 10.0A. Provides two (2) auxiliary supply circuits rated 2A @ 24 Vdc, each. Supports up to 65 Ah of standby battery capacity.
i) Eight (8) Status LEDs plus alpha-numeric display for troubleshooting: AC power; fire alarm; pre-alarm warning; supervisory; trouble; alarm silenced; supervisory silence and trouble silence.
j) Programmable pre-discharge and discharge timers
k) Intelligent Transistor protection to prevent noise spikes and microprocessor failure from inadvertently activating release outputs
l) Disarm function to disable release outputs
m) Multiple input power source - 120 VAC or 208/220 VAC @ 50/60 Hz
n) 5.0 amps @ 24 VDC power supply to operate high current draw horns and strobes. Capable of allowing expansion to 10 amps by use of optional module Supplemental Power Supply (SPS) which also is capable of supporting 65 Ah of standby batteries.
o) Enclosure shall be available in either Red or Gray finish

D) DEVICES:

The Cheetah control panel shall be capable of communicating to up to 127 devices per SLC circuit.

1) Thermal Detectors
   a) The detectors shall be spaced and installed in accordance with the manufacturer's specifications and the guidelines of NFPA No. 72 - 1996 edition.
   b) The Thermal detector shall be a Fike P/N 60-018, 60-021, 60-022, 60-038, or C60-007.
2) Solenoid Release Module (SRM)
   a) The SRM, Fike P/N 55-022, shall be capable of supporting up to 2.0A @ 24 Vdc of releasing current.
   b) The SRM shall be capable of operating two 12vdc solenoids wired in series.
3) Supervise Output Module (SOM)
   a) The SOM, Fike P/N 55-021, shall be capable of supplying up to 2.0A @ 24 Vdc of supervised output current for connection to compatible bells, horns, strobes, etc.
4) Dual Relay Module (R2M)
   a) The R2M, Fike P/N 55-023, shall be capable function programmable by the Cheetah control panel. Each contact shall be capable of switching up to 2A @ 30 Vdc.

5) Fast Response Contact Module (FRCM)
   a) The FRCM, Fike P/N's 55-018, -019 and –020 shall be functionally identical, the only difference between the three models being the mounting/packaging.
   b) The FRCM shall monitor normally open or normally closed contacts and shall be programmed for a variety of input types as defined in the Cheetah programming.

E) MANUAL RELEASE (Electric):

The electric manual release switch shall be a dual action device which provides a means of manually discharging the Suppression System when used in conjunction with the Fike CHEETAH Control System.

1) The Manual Release switch shall be a Fike P/N 10-1638 or a Manual Pull station, P/N 20-128
2) The Manual Release switch or Manual Pull station shall be a dual action device requiring two distinct operations to initiate a system actuation.
3) Manual actuation shall cause the system to discharge and shall cause all release and shutdown devices to operate in the same manner as if the system had operated automatically.
4) A Manual Release shall be located at each exit from the protected hazard and shall have an advisory sign, Fike P/N 02-10265, provided at each location.
5) The Manual Release or Manual Pull station shall be connected to a FRCM that is programmed for the intended function.

F) LIQUID LEVEL DEVICE:

The water cylinder shall be equipped with a liquid level device which shall be wired to a FRCM which shall indicate a trouble/supervisiory condition if the cylinder water level drops and the contacts on the level switch close.

G) AUDIBLE and VISUAL ALARMS:

Alarm audible and visual signal devices shall operate from the CHEETAH Control Panel.

1) The Alarm Bell, Alarm Horn and Horn/Strobe devices shall be Fike P/N's 20-XXX, or equal in quality, performance and features.
2) The visual alarm unit shall be a Fike P/N 20-XXX Vertical Strobe device, or equal in quality, performance and features.
3) A Strobe device shall be placed outside and above each exit door from the protected space, and a "UPON DEVICE ACTIVATION – DO NOT ENTER" sign, Fike P/N 02-10262, shall be provided at each strobe location.

H**) AUXILIARY PANELS: (Optional)**

1) A Graphic Annunciator panel shall be mounted near the CHEETAH control panel. The graphic annunciator shall show a scale layout of the protected area(s) and have indicator lamps to locate each system detector and/or other system components. The panel shall have a lamp test switch located on the panel face. Other panel options shall be available. Scale shall not be less than 1/8" = 1'-0" or 1:100 m.

I) SYSTEM and CONTROL WIRING:

All system wiring shall be furnished and installed by the contractor.

1) All wiring shall be installed in electrical metallic tubing (EMT), or conduit, and must be installed and kept separate from all other building wiring.
2) All system components shall be securely supported independent of the wiring. Runs of conduit and wiring shall be straight, neatly arranged, properly supported, installed parallel and perpendicular to walls and partitions.
3) The sizes of the conductors shall be those specified by the manufacturer. Color coded wire shall be used. All wires shall be tagged at all junction points and shall be free from shorts, earth connections (unless so noted on the system drawings), and crosses between conductors. Final terminations between the CHEETAH control panel and the system field wiring shall be made under the direct supervision of a factory trained representative.
4) All wiring shall be installed by qualified individuals, in a neat and workmanlike manner, to conform to the National Electrical Code, Article 725, and Article 760, except as otherwise permitted for limited energy circuits, as described in NFPA 72 -1993 edition. Wiring installation shall meet all local, state, province and/or country codes.
5) The complete system electrical installation, and all auxiliary components, shall be connected to earth ground in accordance with the National Electrical Code.

J**) SYSTEM INSPECTION and CHECKOUT:**

After the system installation has been completed, the entire system shall be checked out, inspected and functionally tested by qualified, trained personnel, in accordance with the manufacturer's recommended procedures and NFPA standards.

1) Containers and distribution piping shall be checked for proper mounting and installation.
2) Electrical wiring shall be tested for proper connection, continuity and resistance to earth.
3) The complete system shall be functionally tested, in the presence of the owner or his representative, and all functions, including system and equipment interlocks, must be operational at least five (5) days prior to the final acceptance tests.
   a) Each detector shall be tested in accordance with the manufacturer's recommended procedures.
   b) All system and equipment interlocks, such as door release devices, audible and visual devices, equipment shutdowns, local and remote alarms, etc. shall function as required and designed.
   c) Each CHEETAH control panel circuit shall be tested for trouble by inducing a trouble condition into the system.

K) TRAINING REQUIREMENTS:

Prior to final acceptance, the installing contractor shall provide operational training to each shift of the owners personnel. Each training session shall include system CHEETAH Control Panel operation, manual functions, trouble procedures, supervisory procedures, auxiliary functions and emergency procedures.

L) OPERATION and MAINTENANCE:

Prior to final acceptance, the installing contractor shall provide complete operation and maintenance instruction manuals, four (4) copies for each system, to the owner. All aspects of system operation and maintenance shall be detailed, including piping isometrics, wiring diagrams of all circuits, a written description of the system design, sequence of operation and drawing(s) illustrating control logic and equipment used in the system. Checklists and procedures for emergency situations, troubleshooting techniques, maintenance operations and procedures shall be included in the manual.

M) AS-BUILT DRAWINGS:

Upon completion of each system, the installing contractor shall provide four (4) copies of system “As-Built” drawings to the owner. The drawings shall show actual installation details including all equipment locations (i.e.: control panel(s), agent container(s), detectors, alarms, manuals and aborts, etc.) as well as piping and conduit routing details. Show all room or facilities modifications, including door and/or damper installations completed. One (1) copy of reproducible engineering drawings shall be provided reflecting all actual installation details.

N) ACCEPTANCE TESTS:

1) At the time "As-Built" drawings and maintenance/operations manuals are submitted, the installing contractor shall submit a "Test Plan" describing procedures to be used to test the control system(s). The Test Plan shall include a step-by-step description of all tests to be performed and shall indicate the type and location of test apparatus to be employed. The tests shall demonstrate that the operational and installation requirements of this specification have been met. All tests shall be conducted in the presence of the owner and shall not be conducted until the Test Plan has been approved.
2) The tests shall demonstrate that the entire control system functions as designed and intended. All circuits shall be tested: automatic actuation, solenoid and manual actuation, HVAC and power shutdowns, audible and visual alarm devices and manual operation. Supervision of all panel circuits, including AC power and battery power supplies, shall be tested and qualified.
3) Upon acceptance by the owner, the completed system(s) shall be placed into service.

O) SYSTEM INSPECTIONS:

1) The installing contractor shall provide two (2) inspections of each system, installed under this contract, during the one-year warranty period. The first inspection shall be at the six month interval, and the second inspection at the 12 month interval, after system acceptance. Inspections shall be conducted in accordance with the manufacturer's guidelines and the recommendations of NFPA 750.
2) Documents certifying satisfactory system(s) operation shall be submitted to the owner upon completion of each inspection.

P) WARRANTY:

1) All FIKE system components furnished, and installed under this contract, shall be guaranteed against defects in design, materials and workmanship for the full warranty period which is standard with the manufacturer, but in no case less than one (1) year from the date of system acceptance.