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.
6) Fike SHP-Pro™ Product Manual, P/N 6-297.

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 240 VAC, 50/60 Hz 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 water mist 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 provided by 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.

F) Automatic operation of each protected space, utilizing a “Single Detector Release” mode of operation, shall be as follows:

1) Illuminate the “ALARM” lamp on the control panel.
2) Illuminate the “PREDISCHARGE” lamp on the control panel.
3) After Predischarge delay, illuminate the “RELEASE” lamp on the control panel.
4) Energize discharge horn(s) or horn/strobe(s).
5) 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, causing either of 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.

G) 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) The Micromist® system shall be actuated by solenoids connected to the SHP-Pro™ solenoid releasing circuit.
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 "Supervisory" 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

A) CONTROL PANEL:

1) The control panel shall be a SHP-Pro™ Conventional Control Panel, P/N 10-063 series manufactured by Fike Corporation, Blue Springs, MO.
2) The SHP-Pro™ Control System, and its components, shall be UL listed and FM approved for releasing service and FM approved for water mist operation.
3) The SHP-Pro™ Control System shall perform all functions necessary to operate the system detection, actuation and auxiliary functions, as outlined.
4) The SHP-Pro™ Control System is capable of charging 7 AH up to 40 AH batteries. Batteries shall be sized to provide 24 hours of standby panel operation and 10 minutes of Alarm operation.
5) The SHP-Pro™ Control System shall be microprocessor based with hardware and software integration designed to guarantee reliability.
6) The SHP-Pro™ Control System shall support Cross Zoned, Sequential, Single Detector Release and Manual Release detection/actuation methods.
7) The SHP-Pro™ Control System shall provide the following capabilities and functions:
    a) Ten (10) System Status LEDs to provide positive indication of system status: AC normal; alarm; pre-discharge; release; supervisory; trouble; panel silenced; abort; release disabled; and ground fault.
    b) Seven (7) segment diagnostic Led for trouble and event occurrences.
    c) System configuration via dip switches.
    d) Disable switch for audible circuits, release circuits and relays.
    e) Integral power supply rated for 1A standby, 4A Alarm at 24 VDC nominal.
    f) Selection of 120 or 240 VAC power input at 50/60 Hz.
    g) One (1) resettable and one (1) non-resettable auxiliary power output circuits rated for 2.0 amps @ 24 VDC.
    h) Integral battery charging circuit cable of charging 7 AH to 40 AH sealed lead-acid batteries.
    i) 18 gauge steel enclosure available in Red or Gray finish.
    j) Two (2) Style B initiating device circuits capable of sequential alarm, cross-zone, or single detector release operation. Each circuit is capable of supporting 25 detectors per circuit maximum for an overall system capacity of 50 detectors.
    k) Three (3) Style B initiating device circuits capable of monitoring closed contact devices.
    l) Optional Class A module converts all five initiating device circuits to Style D wiring and operation.
    m) Three (3) Class B (Style Y) notification appliance circuits rated for 2.0 amps @ 24 VDC.
    n) Two (2) Class B (Style Y) releasing circuits rated for 2.0 amps @ 24 VDC. One circuit is dedicated for “Agent Release” and the other is dedicated to “Solenoid” operation.
    o) Optional Class A module that converts all five output circuits to Style Z (3 NAC, 2 Releasing).
    p) Three (3) Form “C” relays, rated at 2 amps, are provided on the SHP-Pro™ panel board. These relays are dedicated to Alarm, Supervisory and Trouble operation.
    q) Installation of up to two (2) optional CRM4 Relay Modules (P/N 10-2204) will provide up to eight (8) additional 2 amp relays. Relay operation will vary (i.e., alarm, trouble, pre-discharge, discharge, abort, supervisory or water flow functions) depending on panel configuration.
    r) Programmable pre-discharge and discharge timers
    s) Five (5) optional Abort types

B) DETECTORS:

Due to the extreme conditions encountered in most Micromist® applications (i.e., extended temperatures, presence of fumes, dust, dirt, etc.), only the following "stick type" thermal detectors shall be used:

a) Fike P/N 60-021, 190°F (87.8°C) set point
b) Fike P/N 60-018, 225°F (107.1°C) set point
c) Fike P/N 60-038, 275°F (134.8°C) set point
d) Fike P/N 60-022, 325°F (162.6°C) set point
e) Fike P/N C60-007, 450°F (231.9°C) set point

Detectors shall be spaced and installed in accordance with the manufacturer's specifications and the guidelines of NFPA 72 – current edition.

C) MANUAL RELEASE (Electric):

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

1) The Manual Release switch shall be a Fike P/N 10-1638 or a Manual Pull station, P/N 02-3710.
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 or Manual Pull switch 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 the SHP-Pro™, input circuit 3.

D) ABORT STATION (Optional):

The optional Abort Station shall be the "Dead Man" type and shall be located next to each manual switch.

1) "Locking" or "Keyed" abort stations shall not be permitted.
2) The Abort Station shall be a Fike P/N 10-1639.
3) The Abort Station shall be supervised and shall indicate a trouble condition at the SHP-Pro™ Control Panel, if depressed, and no alarm condition exists.
4) The (optional) Abort Station shall be located adjacent to each manual station and can be furnished in combination with a Manual Release Switch or in combination with a Manual Release Switch and (optional) Digital Countdown Timer (Fike P/N 20-046).
5) The Abort Station shall be connected to the SHP-Pro™, input circuit 4.

E) LIQUID LEVEL DEVICE:

The water cylinder shall be equipped with a liquid level device which shall be wired to the SHP-Pro™, input circuit 5 and shall indicate a trouble/supervisiory condition if the cylinder water level drops and the contacts on the level switch close.

F) AUDIBLE and VISUAL ALARMS:

Alarm audible and visual signal devices shall operate from the SHP-Pro™ 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 "WATER MIST DISCHARGE ALARM – DO NOT ENTER" sign, Fike P/N 02-10262, shall be provided at each strobe location.
4) A "WATER MIST ALARM – EXIT AREA IMMEDIATELY" sign, Fike P/N 02-10263, shall be provided at each horn and/or strobe location inside the protected area.

G) CAUTION SIGNS:

A "AREA PROTECTED BY WATER MIST – DO NOT ENTER DURING DISCHARGE" sign, Fike P/N 02-10264, shall be installed on the doors that enter the protected area to alert personnel that all doors should remain closed in the event of a fire.

H) 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 SHP-Pro™ 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.

I) 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 SHP-Pro™ control panel circuit shall be tested for trouble by inducing a trouble condition into the system.

J) 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 SHP-Pro™ Control Panel operation, manual functions, trouble procedures, supervisory procedures, auxiliary functions and emergency procedures.

K) 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.

L) 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.

M) 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.

N) 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.

O) 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.