SPRINKLER SYSTEM DESIGN CRITERIA - NFPA 13

OCCUPANCY CLASSIFICATION	AREA DESCRIPTION	DESIGN DENSITY (GPM/SQ FT)	CALCULATION AREA (SQ FT)	MAX AREA PER SPRINKLER (SQ FT)	HOSE ALLOWANCE (GPM)
LIGHT HAZARD	OFFICE SPACE, LOBBY, COMMON AREA, RESTROOMS	0.10	1500	225	100
LIGHT HAZARD	MEETING ROOM, CONFERENCE ROOM	0.10	1500	225	100
ORDINARY HAZARD I	MECHANICAL ROOM ELECTRICAL ROOM, TEL/DATA	0.15	1500	130	250
ORDINARY HAZARD I	RETAIL, STORAGE ROOMS UNDER 12-FEET	0.15	1500	130	250

MODIFICATIONS TO EXISTING SYSTEMS

1. PREPARE, IN NARRATIVE AND DRAWING FORMAT AS DIRECTED BY THE AUTHORITY OF HAVING JURISDICTION, A FORMAL IMPAIRMENT PLAN.
2. COORDINATE IMPAIRMENT PLAN WITH GENERAL CONTRACTOR FOR INCORPORATION INTO THE NFPA 241 FIRE SAFETY PROGRAM PREPARED BY THE GENERAL CONTRACTOR.
3. IMPAIRMENT PLAN SHALL IDENTIFY THE BUILDING OCCUPANCY (OR VACANCY) DURING CONSTRUCTION AND NATURE OF THE SYSTEM IMPAIRMENT.
4. IMPAIRMENT PLAN SHALL IDENTIFY MAXIMUM IMPAIRMENT DURATION PERMITTED BY THE AUTHORITY HAVING JURISDICTION BEFORE ALTERNATE PROTECTION OR FIRE WATCHES ARE NECESSARY.
5. IMPAIRMENT PLAN SHALL IDENTIFY THE DURATION AND TIMING OF FIRE SUPPRESSION SYSTEM SHUTDOWNS AND RESULTANT REQUIREMENT FOR TEMPORARY LINEAR HEAT DETECTION, IF ANY.
6. IMPAIRMENT PLAN SHALL IDENTIFY THE NEED FOR FIRE WATCHES, IF ANY.
7. IMPAIRMENT PLAN SHALL IDENTIFY THE NECESSARY PROVISIONS FOR TEMPORARY PIPING CONNECTIONS TO EXISTING FIRE SUPPRESSION SYSTEMS TO REMAIN IN SERVICE.
8. IMPAIRMENT PLAN SHALL IDENTIFY ADDITIONAL PROTECTION FEATURES AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION.
9. SPRINKLERS OUTSIDE OF RENOVATION WORK AREA. SPRINKLERS PROTECTING AREAS ADJACENT TO THE RENOVATION WORK AREA MUST REMAIN IN SERVICE THROUGHOUT THE DURATION OF CONSTRUCTION. PROVIDE TEMPORARY PIPING CONNECTIONS AS NECESSARY TO MAINTAIN SERVICE UNTIL NEW PIPING SYSTEMS ARE COMPLETED.
10. SPRINKLERS WITHIN RENOVATION WORK AREA. MAINTAIN SPRINKLER PROTECTION WITHIN THE RENOVATION WORK AREA TO THE GREATEST EXTENT PRACTICABLE. FOR SPRINKLERS SYSTEMS REQUIRING DRAIN-DOWN, REFILL SPRINKLER PIPING AT END OF EACH WORK SHIFT; OR WHERE REFILL IS NOT PRACTICABLE PROVIDE ALTERNATE PROTECTION OR FIRE WATCHES AS DIRECTED BY THE AUTHORITY HAVING JURISDICTION.
11. PROTECTION. PROTECT EXISTING FIRE SUPPRESSION EQUIPMENT FROM DUST, DEBRIS, PAINT, SPRAY-ON FIRE-PROOFING, AND SIMILAR THROUGHOUT THE DURATION OF CONSTRUCTION. REPLACE WITH NEW EXISTING SPRINKLERS THAT BECOME DAMAGED, PAINTED, SPRAYED OR SIMILAR.
12. RENOVATION WORK AREA ON MULTIPLE FLOORS. NO TWO ADJACENT FLOOR SPRINKLER SYSTEMS SHALL BE IMPAIRED SIMULTANEOUSLY.
13. FIRE DEPARTMENT CONNECTIONS. ALL BUILDING FIRE DEPARTMENT CONNECTIONS MUST REMAIN IN SERVICE THROUGHOUT THE DURATION OF CONSTRUCTION. PROVIDE TEMPORARY PIPING CONNECTIONS AS NECESSARY TO MAINTAIN SERVICE UNTIL NEW PIPING SYSTEMS ARE COMPLETED.
14. WET STANDPIPES. AT LEAST ONE BUILDING WET-PIPE STANDPIPE MUST REMAIN IN SERVICE THROUGHOUT THE DURATION OF CONSTRUCTION. ALL BUILDING WET-PIPE STANDPIPES MUST REMAIN IN SERVICE DURING NORMAL BUSINESS HOURS.
15. EXISTING IDENTIFICATION. REPLACE EXISTING FIRE SUPPRESSION SIGNAGE, GRAPHICS, FRAMED MAPS, AND SIMILAR WITH NEW AS REQUIRED TO REFLECT FIRE SUPPRESSION SYSTEM MODIFICATIONS.
16. EXISTING DOCUMENTATION. AMEND EXISTING PROPERTY RECORDS WITH SUPPLEMENTAL FIRE SUPPRESSION RECORD DOCUMENTATION INCLUDING DRAWINGS AND TEST REPORTS FOR THE ALTERATION WORK PERFORMED.

DOCUMENT SUBMITTAL PROCESS

1. THE DESIGN CONTENT OF THESE DRAWINGS IS INTENDED TO SATISFY THE STATE BUILDING CODE REQUIREMENTS FOR CONSTRUCTION DOCUMENTS. WHEN STAMPED AND SEALED BY THE ENGINEER OF RECORD THEY ARE INTENDED TO BE USED AS PART OF THE BUILDING PERMIT APPLICATION ONLY.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING A COMPLETE SHOP DRAWING SUBMITTAL INCLUSIVE OF ALL INFORMATION REQUIRED BY THE STATE BUILDING CODE AND THE CONSTRUCTION DOCUMENTS. SHOP DRAWINGS REVIEWED BY THE ENGINEER OF RECORD SHALL BE USED FORSUPPLEMENTAL FIRE PROTECTION SYSTEM INSTALLATION PERMITS OR SUBMITTALS WHERE SUCH PERMITS OR SUBMITTALS ARE REQUIRED BY THE AUTHORITY HAVING JURISDICTION.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING A COMPLETE RECORD DRAWING SUBMITTAL INCLUSIVE OF ALL FIELD CHANGES AND ALL INFORMATION REQUIRED BY THE STATE BUILDING CODE AND THE CONSTRUCTION DOCUMENTS.
4. SHOP DRAWINGS AND RECORD DRAWING SUBMITTALS SHALL BE PREPARED BY THE CONTRACTOR'S QUALIFIED ENGINEERING TECHNICIAN AND SHALL INDICATE THE TECHNICIAN'S NICET CERTIFICATION NUMBER OR PROFESSIONAL ENGINEERING SEAL & SIGNATURE AS REQUIRED BY THE CONSTRUCTION DOCUMENTS.
5. THE ENGINEER OF RECORD SHALL NOT SIGN AND SEAL SHOP DRAWING OR RECORD DRAWING SUBMITTALS PREPARED BY THE CONTRACTOR. WHERE THE AUTHORITY HAVING JURISDICTION REQUIRES SHOP DRAWING OR RECORD DRAWING SUBMITTALS TO BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER, THE SUBMITTALS SHALL BE PREPARED BY A QUALIFIED PROFESSIONAL ENGINEER RETAINED BY THE CONTRACTOR.

INSPECTION AND TESTING

1. PREPARE A TYPEWRITTEN COMPUTER-OUTPUT TEST PLAN THAT CLEARLY ESTABLISHES THE SCOPE OF FIRE SUPPRESSION SYSTEM TESTING. INCLUDE AT A MINIMUM TESTING METHODS, PERSONNEL, DURATION, PLANNED IMPAIRMENTS, AND REQUIRED COORDINATION FOR INTEGRATED TESTING OF EMERGENCY CONTROL FUNCTION INTERFACES. COORDINATE NFPA 3 "RECOMMENDED PRACTICE FOR COMMISSIONING OF FIRE PROTECTION AND LIFE SAFETY SYSTEMS" AND NFPA 4 "STANDARD FOR INTEGRATED FIRE PROTECTION AND LIFE SAFETY SYSTEM TESTING" REQUIREMENTS WITH THE FIRE AND LIFE SAFETY COMMISSION AGENT (FCxA) WHERE AN FCxA IS CONTRACTED BY THE OWNER.
2. FUNCTIONAL FIELD TESTS SHALL BE WITNESSED BY THE CONSTRUCTION MANAGER (CM), THEIR DESIGNEES, AND WHEN CONTRACTED BY THE OWNER THE FIRE AND LIFE SAFETY COMMISSION AGENT (FCxA); PROVIDE NOTIFICATIONS A MINIMUM OF TWO (2) WEEKS IN ADVANCE.
3. ACCEPTANCE FIELD TESTING SHALL BE WITNESSED BY THE CM, THEIR DESIGNEES, AND AUTHORITIES HAVING JURISDICTION (AHJ); PROVIDE NOTIFICATIONS A MINIMUM OF TWO (2) WEEKS IN ADVANCE.
4. FLUSH, TEST, AND INSPECT SYSTEM PIPING IN ACCORDANCE WITH THE APPLICABLE NFPA WATER-BASED FIRE SUPPRESSION SYSTEM DESIGN AND INSTALLATION STANDARDS.
5. HYDROSTATICALLY TEST SYSTEM PIPING IN ACCORDANCE WITH THE APPLICABLE NFPA WATER-BASED FIRE SUPPRESSION SYSTEM DESIGN AND INSTALLATION STANDARDS. REPAIR LEAKS AND RETEST UNTIL NO LEAKS EXIST.
6. INSPECT AND ADJUST ALARM AND DELAY SETTINGS OF ALARM DEVICES.
7. INSPECT AND ADJUST ALARM VALVE TRIM SETTINGS.
8. INSPECT AND ADJUST AIR / NITROGEN SUPPLY AND DELIVERY SYSTEM SETTINGS.
9. INSPECT AND ADJUST PRESSURE RELIEF VALVES SUCH THAT NO WATER IS DISCHARGED UNDER NORMAL SYSTEM WORKING CONDITIONS.
10. INSPECT AND ADJUST PRESSURE REGULATING VALVES IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
11. VERIFY THAT EQUIPMENT HOSE THREADS ARE SAME AS LOCAL
12. PROVIDE WRITTEN NOTIFICATIONS FOR FUNCTIONAL FIELD TESTS; INCLUDE TEST PLAN.
13. FUNCTIONALLY TEST WATER-BASED FIRE SUPPRESSION SYSTEMS, INCLUDING REQUIRED FULL-FLOW TESTS, IN ACCORDANCE WITH THE APPLICABLE NFPA WATER-BASED FIRE SUPPRESSION SYSTEM DESIGN AND INSTALLATION STANDARDS. COMBINE TESTS TO CONSERVE WATER. CORRECT DEFICIENCIES AND RETEST SATISFACTORY RESULTS ARE ACHIEVED.
14. REPEAT FUNCTIONAL TESTING AS REQUIRED BY THE FIRE AND LIFE SAFETY COMMISSION AGENT (FCxA) WHERE AN FCxA IS CONTRACTED BY THE OWNER.
15. PREPARE TEST AND INSPECTION REPORTS. USE NFPA "CONTRACTOR'S MATERIAL AND TEST CERTIFICATE" FORMAT.
16. PLACE SYSTEM INTO NORMAL OPERATING SERVICE WITHOUT SYSTEM IMPAIRMENTS OR OUTSTANDING WORK.

GENERAL REQUIREMENTS

1. PURPOSE OF ENGINEERING DRAWINGS. THE DRAWINGS ARE DIAGRAMMATIC. THEY ARE NOT INTENDED TO BE ABSOLUTELY PRECISE; THEY ARE NOT INTENDED TO SPECIFY OR TO SHOW EVERY REQUIRED COMPONENT OF THE SYSTEMS DESCRIBED. THE PURPOSE OF THE DRAWINGS IS TO INDICATE A SYSTEM CONCEPT, THE MAIN COMPONENTS OF THE SYSTEMS, AND THEIR APPROXIMATE GEOMETRIC RELATIONSHIPS. BASED UPON THE SYSTEMS CONCEPT, THE MAIN COMPONENTS, AND THEIR APPROXIMATE GEOMETRIC RELATIONSHIPS, PROVIDE ALL OTHER COMPONENTS AND MATERIALS NECESSARY TO MAKE THE SYSTEMS FULLY COMPLETE AND OPERATIONAL.
2. MINIMUM PERFORMANCE REQUIREMENTS. INTERPRET DRAWING AND SPECIFICATION REQUIREMENTS THAT ARE MORE STRINGENT THAN FEDERAL, STATE, & MUNICIPAL CODE-MINIMUM AS DELIBERATELY CONSIDERED PERFORMANCE CRITERIA THAT ARE A MANDATORY PART OF THE WORK. WHERE DRAWINGS AND SPECIFICATIONS ARE SILENT ON A CODE REGULATED CONDITION, COMPLY WITH FEDERAL, STATE, & MUNICIPAL CODE-MINIMUM. COMPLY WITH NFPA STANDARD EDITIONS REFERENCED BY APPLICABLE FEDERAL, STATE, & MUNICIPAL CODES.
3. DESIGN STANDARDS. COMPLY WITH NFPA **[13, 14, 16, 20, & 2001]**.
4. APPROVALS. PRODUCTS SHALL BE UL LISTED **[AND | OR]** FM APPROVED FOR FIRE PROTECTION DUTY AND THE INTENDED SERVICE APPLICATION.
5. ALL WORK IS NEW. UNLESS SPECIFICALLY NOTED AS EXISTING, ALL COMPONENTS INDICATED BY THE DRAWINGS ARE NEW.
6. RELATED DOCUMENTS. THE NECESSARY UNDERSTANDING OF THE PROJECT SCOPE AND FIRE SUPPRESSION WORK CANNOT BE OBTAINED WITHOUT REVIEW OF ALL PROJECT DOCUMENTS. REVIEW COMPLETE PACKAGE OF PROJECT DRAWINGS, SPECIFICATIONS, AND NARRATIVES TO FULLY UNDERSTAND THE PROJECT SCOPE AND TO COORDINATE THE FIRE SUPPRESSION WORK WITH OTHER DIVISIONS.
7. GENERAL INSTALLATION. INSTALL SYSTEM IN A WORKMANLIKE FASHION AND IN A RECTILINEAR ARRANGEMENT WITH PIPING AND SYSTEM COMPONENTS PERPENDICULAR AND PARALLEL WITH BUILDING ARCHITECTURAL AND STRUCTURAL ELEMENTS. PIPING SHALL BE CONCEALED ABOVE CEILING FINISHES. EXPOSED PIPING SHALL BE APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION AND SHALL MAINTAIN NECESSARY CLEARANCES.
8. FIRE DEPARTMENT OPERATIONS. INSTALL FIRE HOSE VALVES, INLET CONNECTIONS, OUTLET CONNECTIONS, ISOLATION VALVES, PUMP CONTROLLERS, SIGNAGE AND OTHER COMPONENTS REQUIRING FIRE FIGHTER PERSONNEL INTERFACE DURING EMERGENCY OPERATIONS IN READILY IDENTIFIABLE LOCATIONS, WITH ADEQUATE OPERATIONAL CLEARANCES, AND IN ACCORDANCE WITH RESPONDING FIRE DEPARTMENT STANDARD EMERGENCY OPERATIONAL PROCEDURES.
9. ALIGNMENT. SPRINKLERS INSTALLED IN FINISHED CEILINGS SHALL BE CENTER OF TILE OR ALIGNED WITH CEILING COMPONENTS WITH NO VISIBLE DEVIATION AND IN ACCORDANCE WITH ARCHITECTURAL REFLECTED CEILING PLANS.
10. RETURN BENDS. INSTALL PENDENT SPRINKLERS IN FINISHED CEILINGS WITH RETURN BENDS CONNECTED TO THE TOP OF THE SUPPLYING BRANCH PIPE OR FLEXIBLE SPRINKLER CONNECTION.
11. BUSHINGS. USE CONCENTRIC REDUCING FITTINGS FOR PIPE SIZE TRANSITIONS AND SPRINKLER NPT CONNECTIONS. BUSHINGS SHALL NOT BE USED.
11. TEMPERATURE RATING. PROVIDE ORDINARY TEMPERATURE RATED SPRINKLERS UNLESS OTHERWISE NOTED. PROVIDE INTERMEDIATE OR HIGH TEMPERATURE RATED SPRINKLERS WHERE REQUIRED BY NFPA 13 BASED UPON PROXIMITY TO HEAT SOURCES OR AMBIENT CEILING TEMPERATURE.
12. GUARDS. INSTALL GUARDS ON SPRINKLERS SUSCEPTIBLE TO MECHANICAL DAMAGE INCLUDING, BUT NOT LIMITED TO SPRINKLERS IN MECHANICAL ROOMS AND SPRINKLERS INSTALLED LESS THEN 7 FT AFF.
13. DRAINAGE. PRE-PLAN SYSTEM INSTALLATION WITH OTHER DIVISIONS OF WORK TO MINIMIZE THE NEED FOR AUXILIARY DRAIN VALVES. ARRANGE SYSTEM PIPING TO DRAIN BACK TO MAIN RISER DRAIN VALVE OR ZONE CONTROL ASSEMBLY DRAIN VALVE.
14. COORDINATION. MAKE REASONABLE AND NECESSARY MODIFICATIONS IN LAYOUTS AND COMPONENT ARRANGEMENT NEEDED TO PREVENT CONFLICT WITH AND TO ACCOMMODATE OTHER DIVISIONS OF THE WORK.
15. CLEARANCES. INSTALL PIPING, VALVES, AND SYSTEM COMPONENTS TO MAINTAIN MINIMUM CLEARANCES REQUIRED TO OPERATE AND MAINTAIN FIRE SUPPRESSION VALVES AND EQUIPMENT; TO INSTALL, OPERATE AND MAINTAIN EQUIPMENT AND FEATURES OF OTHER DIVISIONS; TO ACCOMMODATE FINISHED CEILING HEIGHTS; AND TO MAINTAIN MAXIMUM HEADROOM IN AREAS OPEN TO STRUCTURE ABOVE.
16. PENETRATIONS. USE SPECIFIED SLEEVES, SLEEVE SEALS, AND ESCUTCHEONS AT PIPE PENETRATIONS. AT FIRE RESISTANCE RATED PENETRATIONS, THE PENETRATED FLOOR OR WALL, PENETRATING PIPE, SLEEVE OR SLEEVE SEAL, AND FIRESTOP MATERIAL AS AN ASSEMBLY SHALL COMPLY WITH A DESIGNATED UL THROUGH-PENETRATION FIRESTOP SYSTEM.
17. ACCESS TO VALVES. INSTALL VALVES SUCH THAT THEY ARE READILY ACCESSIBLE AND VISIBLE. LOCATE OVERHEAD VALVES SUCH THAT THEY ARE ACCESSIBLE VIA 8-FT (MAX) LADDER AND WITH POSITION INDICATOR CLEARLY VISIBLE FROM THE FLOOR BELOW.
18. SUPPORT. ATTACH HANGERS AND SUPPORTS DIRECTLY TO STRUCTURAL BEAMS, COLUMNS AND FLOOR SLABS. DO NOT ATTACH TO METAL-DECK ROOF / CEILING PANS. DO NOT ATTACH OR SUPPORT ANY DIVISION 21 WORK FROM NON-STRUCTURAL ELEMENTS OF ANY KIND. THREADED ROD SHALL NOT BE FORMED OR BENT. ALL BOWED, BENT OR OTHERWISE DEFORMED THREADED ROD SHALL BE REPLACED WITH NEW.
19. RESTRAINT AGAINST MOVEMENT. INDEPENDENT OF CONSIDERATION OF SEISMIC PROTECTION, FIRE SUPPRESSION FEED-MAIN, STANDPIPE, AND SYSTEM RISER PIPING SUPPLIED BY FIRE PUMPS SHALL BE RIGIDLY RESTRAINED AGAINST MOVEMENT RESULTING FROM PUMP-INDUCED WATER PRESSURE AND VELOCITY FORCES.
20. IDENTIFICATION. INSTALL VALVE SIGNAGE AND TAGS AT EACH CONTROL VALVE, INSTALL PIPE IDENTIFICATION LABELS; INSTALL HYDRAULIC DATA SIGNS AT EACH SYSTEM RISER; INSTALL SIGNAGE AT FIRE DEPARTMENT CONNECTIONS INDICATING SYSTEMS SERVED AND REQUIRED PRESSURE; INSTALL SUPPLEMENTAL SIGNAGE AS DIRECTED BY THE AUTHORITY HAVING JURISDICTION.
21. FIRE PROTECTION DURING CONSTRUCTION. PROVIDE FIRE PROTECTION DURING CONSTRUCTION INCLUDING BUT NOT LIMITED TO MANUAL AND AUTOMATIC DRY-PIPE STANDPIPES AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION.
22. ON-SITE AS-BUILT DOCUMENTATION. MAINTAIN COMPLETE AND SEPARATE SET OF INSTALLATION DRAWINGS ON SITE AT ALL TIMES. RECORD WORK COMPLETED AND ALL MODIFICATIONS CLEARLY AND ACCURATELY.

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BIDDING & CONSTRUCTION
07/06/2022

ISSUE 07/06/2022
JOB 30860.00
DRAWN Author
SCALE 12" = 1'-0"

REVISIONS

FIRE PROTECTION - NOTES AND DESIGN CRITERIA

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