APPLICATION
DESIGN DATA

AIRCRAFT HANGAR FIRE PROTECTION

Replaces pages 950a-h dated February 28, 1994 and 940i-k dated August 26, 1994. Revised page number.

DESIGN DATA

AIRCRAFT HANGAR FOAM/WATER SYSTEMS

GENERAL

A fixed foam/water fire protection system is essentially the most effective method of protecting aircraft hangars today. As the aircraft industry has expanded, aircraft values have increased tremendously, to better serve the industry. Consequently, properly designed and installed foam/water fire protection systems are very important when considering the overall aircraft hangar design. References are made to various protection standards in this Design section, and users are cautioned to become totally familiar with these standards, before attempting to develop a properly designed aircraft hangar foam/water fire protection system. At the very least, the user must be familiar with various National Fire Protection Association (NFPA) pamphlets such as NFPA 11, 13, 16, 16A, 22, 24, 30, 409, 419, insurance company standards,and/or other corresponding standards including LPC,VdS, or other applicable standards/codes required by the Authority Having Jurisdiction.

WARNING

The information contained in this section is intended to be used in conjunction with the above mentioned standards, as well as other required standards. It is not to be used as a "stand alone" design guide, under any circumstances. The technical information ,statements and recommendations contained in this manual are based on information and tests which, to the best of our knowledge, we believe to be dependable. It represents general guidelines only, and the accuracy or completeness thereof, are not guaranteed since conditions of handling and usage are outside our control. The purchaser should determine the suitability of the product and/or information for its intended use and assumes all risks and liability whatsoever in connection therewith.

DEFINING THE TYPE OR "GROUP" OF AIRCRAFT HANGAR

The classification or "grouping" of aircraft hangars in accordance with their design and construction as shown below, makes it possible to determine how the hangar is to be protected. Essentially, according to NFPA 409, there are three different classifications or "groups" of aircraft hangars, each with its own individual features or operating conditions which describe or differentiate one group from the other. The following definitions and/or tables describing the three different groups of aircraft hangers were taken from the 1990 edition of NFPA 409.

GROUP I AIRCRAFT HANGAR. A hangar having at least one of the following features and operating conditions:

(a) An aircraft access door height over 28 ft (8,5m)
(b) A single fire area in excess of 40,000 sq ft (3716m)
(c) Provision of housing for an aircraft with a tail height over 28 ft(8.5m)
(d) Provision of housing for strategically important military aircraft as determined by the Department of Defense.

GROUP II AIRCRAFT HANGAR. A hangar having both of the following features:

(a) An aircraft access door height of 28 ft(8.5m) or less;
and
(b) A single fire area for specific types of construction in accordance with Figure 1 for Group II Aircraft Hangars:

GROUP III AIRCRAFT HANGAR. A Group III hangar may be a freestanding unit for a single aircraft, a row hangar having a common structural wall and roof system and housing multiple aircraft as well as having door openings for each aircraft, and have both of the following features:

(a) An aircraft access door height of 28 ft (8.5M) or less ;
and
(b) A single fire area that measures up to the maximum square footage permitted for specific types of construction in accordance with Figure 2 for Group III Aircraft Hangars:

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Once the hangar group has been defined, design parameters may be established and preliminary system foam quantities can then be calculated, along with the method of foam delivery, backup systems, and other system components. Figure 3 can be used as a means of determining the overall fire protection design requirements for an aircraft hangar.

GROUP I AIRCRAFT HANGAR PROTECTION

The main objective of the fire protection system is to protect the hangar along with the aircraft, should there be a flammable liquid (fuel) spill. This is the main reason , therefore, why a deluge type of foam/water system is necessary. NFPA Pamphlet 409 “Aircraft Hangars”, states that “a Group I aircraft hangar storage and service area shall be equipped with an approved automatic foam/water deluge system - as the primary system.” Therefore, a Group I hangar will have overhead deluge foam/water systems with a maximum of 15,000 sq ft (1394 m^2) of floor area coverage per system, as the primary protection system. However, should the wing area of the aircraft exceed 3000 sq ft (279m^2), a secondary under-wing foam/water monitor system is also required. An under-wing foam/water system may also be required if there are multiple aircraft being stored in the hangar, even though the wing areas are less than 3000sq ft (279m^2) each, so consult with the Authority(s) Having Jurisdiction if there is any doubt regarding the supplemntary system. The supplementary under-wing system’s objective is to control the fire within 30 seconds, and to extinguish it within 60 seconds. NOTE: If the fuel tanks of the aircraft being housed in the hangar are purged and drained, then the above requirements for roof and under-wing protection “Do not apply to aircraft storage and servicing areas.” However, automatic closed-head sprinkler protection is still required “inside separate shop, office and storage areas located inside aircraft maintenance and service areas, unless they are otherwise provided with automatic fire protection systems”, per NFPA 409.

There are several methods of providing foam to the roof and monitor systems using Viking equipment, and most of them have already been previously indicated in the Design section of this Data book. They include Viking deluge systems, as well as Viking pressure regulating systems. The Viking pressure regulating systems are unique, in that they utilize bladder tank systems and In Line Balanced Proportioners (ILBP’s), which eliminate the installation of foam concentrate pumps. For more detailed information on the pressure regulating system, you should refer to the proper section of this Data Book,as well as the Viking Engineering And Design Data Book. NFPA 409 states that the “control valves, foam liquid concentrate storage, injection system, and foam concentrate pump shall be located outside aircraft storage and servicing areas. The envi-

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ronmental conditions shall be suitable for the particular agent involved."

Therefore, careful consideration must be given to the location of the foam tanks, system risers, and associated equipment, in relation to the aircraft hangar storage and service areas.

The following chart is a general review of Type I aircraft hangar fire protection design, based on using criteria from the 1990 edition of NFPA 409. It is intended to be used only as a guide, and in conjunction with the aircraft hangar design pamphlets, insurance company rules, governmental regulations and requirements, and other standards required by the authorities having jurisdiction, when developing the hangar's fire protection system.

The following example is intended to familiarize the user with how to determine the fire protection design for a Group I hangar. It is to be used only as a guide to help develop the overall fire protection system requirements for a Group I aircraft hangar. It is not intended to be used as a stand alone design guide, since the actual project specifications, building codes, and other project requirements, must be used to determine the actual aircraft hangar design.

STEP 1- CLASSIFY HANGAR

The hangar classification for this particular example has already been pre-determined to be a Class I hangar. If the hangar classification was not known, the previously illustrated tables would be used as a reference, in order to determine the aircraft hangar classification, along with the project documents and requirements of the authorities having jurisdiction.

STEP 2- REVIEW PROJECT REQUIREMENTS AND PROTECTION OPTIONS

This example of a Group I hangar is 240 ft (73.15m) long, and 275 ft (83.8m) wide, and it houses a 747 type aircraft. It also has a 60 ft (18.3m) x 50 ft (15.2m), 3000 sq. ft. (278.7m) addition at the front end of the building, in order to enclose the aircraft's nose section. (See Figure 5)

STEP 3- SELECT TYPE OF FOAM, DETERMINE PRIMARY (ROOF) SYSTEM DISCHARGE DENSITY AND DURATION

In order to determine the proper roof system density, the exact type of foam concentrate must be known (I.E. AFFF, fluoroprotein, protein), since it directly affects the roof density. For this particular example, AFFF foam will be used, along with standard sprinklers. Therefore, a roof density of .16 gpm (6,5 l/m/m), for a minimum duration of ten minutes is required by NFPA 409.

NOTE: If an aspirated AFFF, fluoroprotein or protein type of foam concentrate was to be used in lieu of the AFFF concentrate as demonstrated above, then the roof system density would have been .2 gpm/ sq ft (8.1 l/m/m). This would then affect the capacity of the foam concentrate storage tanks, the on site water storage tank capacity, fire pump sizing, and other related system components such as system pipe sizing. So, selecting the proper foam concentrate may save some unnecessary project costs. However, the selected foam concentrate must still meet the project requirements, codes, and other AHJ requirements.For example, a foam concentrate such as milspec AFFF, (military specification AFFF), could be specified for a non-military project, but it might not actually be required to properly protect the hazard. Use extreme caution when designing or bidding on projects such as this, by always stating exactly what is or is not included.

STEP 4- CALCULATE THE PRIMARY (ROOF SYSTEM) FOAM QUANTITY

The primary foam quantity is determined by the following formula:

Q = D x A x 1.15 x T x P

where:

Q=Quantity of foam in gallons or liters D=Density in gpm/sq ft or l/m/m^2

A=Area of application in sq ft or m^2

1.15=15% overage factor(this is the maximum system overage allowed by NFPA 409)

T=Time of discharge (normally 10 minutes, but check actual job requirements. Don't forget about connected reserve supply which may also be required.

P=Percentage of foam concentrate. (Usually 3%, but is subject to actual project requirements.)

Q = .16gpm x 69,000 sq ft x 1.15 x 10 minutes x 3%

Q = .16 x 69,000 x 1.15 x 10 x .03

Q = 3808.8 gallons (14417,9 liters) of AFFF foam concentrate for the roof system.

NOTE: This example only covers the initial 10 minute duration. Should a reserve be required, then it must be added to the original "Q" above. This will also affect the capacity of the foam conentrate bladder tank(s) or storage tank(s).

NOTE: STEPS 5, 6, & 7, ARE ONLY REQUIRED FOR HANGARS HOUSING AIRCRAFT WITH WING AREAS LARGER THAN 3000 SQ FT (279M), OR IF REQUIRED BY THE AHJ OR PROJECT DOCUMENTS.

STEP 5- DETERMINE MONITOR LOCATION AND COVERAGE, IF WING AREA EXCEEDS 3000 SQ FT (279M)

Determine supplementary monitor locations and coverages for aircraft with wing areas in excess of 3000 sq ft (279m). Again, some projects may require supplementary monitor systems even if the aircraft wing areas are less than 3000 sq ft, refer to the project documents for specific requirements.

NOTE: The arc of coverage under the wings of the aircraft and beyond, as well as the monitor nozzle "throw" and coverage under the fuselage, are usually described in the bid documents and also indicated on the contract drawings. Otherwise, you must consult with the specified monitor nozzle manufacturers for specific monitor nozzle station information, or any other questions related to monitor system design, in order to properly design the supplementary underwing fire protection system. The design objective of the supplementary underwing system, according to NFPA 409, is to achieve control of the fire within 30 seconds, and to extinguish the fire within 60 seconds. It is important to note at this point, that the placement of monitor nozzles, along with the areas of coverage, flows, nozzle settings and related information, may vary on each aircraft hangar project due to owner/architect preference.

Because of all the variables involved with the selection of monitor nozzle stations, it is not possible to provide the contractor, engineer or designer

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with a detailed step by step set of instructions on how to design the monitor nozzle stations. Usually, as stated earlier, the documents and or plans will indicate the approximate placement of the monitor nozzle stations, along with the areas of coverage for each station. If this information is not available, it is imperative that it be requested, in writing, before proceeding with bidding the project. Contacting the monitor designing nozzle manufacturer(s) for additional information is also suggested.

Viking has attempted to be as specific as is possible with aircraft hangar design, however, monitor nozzle station placement is something that the owner or engineer has a great deal of input on, and it is best to consult with them, should any questions arise. Should there be a question on the monitor nozzle selection, or if any doubt exists as to whether the equipment specified is correct for the particular application, it is imperative that a letter be written to the authority(s) having jurisdiction, asking for clarification, or requesting instructions as to how to proceed in ordering the monitor nozzle station equipment. This will avoid the possibility of ordering equipment which is not compatible or is not desired for use on the project.

Should questions arise which are not covered by NFPA 409, and/or other similar pertinent design standards, Viking will assist the contractor with resolving the questions by attempting to obtain official interpretations of the standards. All of the official interpretations which we receive, will be documented for future reference.

For this particular example, a total of four monitors were required, two at the ends of the wings, and one at each side of the fuselage, just behind the nose of the aircraft. This placement, selected by the owner along with the project engineer, allowed for the desired underwing and fuselage coverages, with minimal floor space requirements. The monitor nozzle chosen, was selected for proper "throw", in order to force a possible fuel spill out from under the body and wing area of the aircraft.

STEP 6- DETERMINE MONITOR SYSTEM APPLICATION RATE AND DURATION

The minimum supplementary monitor system application rate required by NFPA 409 for an AFFF system, is 0.10 gpm of foam solution per sq ft (4,1 l/m/m) of floor area beneath the wing and wing-center section of the aircraft. For protein or fluoroprotein based concentrates, the minimum application rate required is 0.16 gpm of foam solution per sq ft (6,5 l/m/m) of floor area beneath the wing and wing-center section of the aircraft. Since this particular example is based on using AFFF foam, the minimum density for the supplementary system is 0.10 gpm/sq ft (4,1 l/m/m). The minimum duration required by NFPA 409 is 10 minutes.

STEP 7- CALCULATE FOAM QUANTITY FOR MONITOR SYSTEM

This is accomplished in essentially the same manner as described in Step 4, or (Q = D x A x T x P). However, the monitor nozzle pressure, and the minimum monitor nozzle flow required to achieve the desired nozzle coverage, must be factored into the above formula, or the "Q" may be severely underestimated, resulting in extra project costs. The area of under-wing coverage in this example, for each of the four monitor nozzles, calculates out to approximately 1375 sq ft (127,75 m), (5500 sq ft 4 monitor nozzle locations = 1375 sq ft per location). (Estimated monitor nozzle flow = 0.1 gpm x 1375 sq ft, or 137.5 gpm per station). However, each monitor nozzle oscillates over a prescribed area of coverage, and may include overlapping spray patterns, so the actual nozzle flow must be determined from the actual arc of oscillation. The actual area (A) for the arc of oscillation (AO) may be determined by using the following formula: (Our example has a 35°AO, and a "throw" (r) of 125' (38,1m)

A = (πr)(AO ÷ 360°) where r = radius of monitor nozzle "throw"

A = (3.14 x 125) x (35° ÷ 360)

A = (49062.5) X 0.097

A = 4770 sq ft (443,1 m) x .1 gpm underwing density

This results in a minimum monitor nozzle flow of 477 gpm (1805,6 l/m). For practical purposes, the monitor nozzles should be considered as flowing 500 gpm (1892.7 lpm) each, as 500 gpm is a tested monitor nozzle rating. Now that the total flow per monitor station has been determined (4 stations total), the amount of foam concentrate (Q) can be calculated.

NOTE: There may be some instances when it is permissable to eliminate the area included in the arc of oscillation (AO) from the monitor nozzle to a point where the foam solution first begins to strike the floor, from the above calculation. The area will vary depending upon the angle of elevation of the monitor nozzle, along with other factors such as the manufacturer, adjustability of the nozzle, and system pressure. Therefore, it is imperative that the authority having jurisdiction be consulted for a final determination.

To find the amount of foam concentrate (Q) required to provide the desired percentage of foam concentrate in the foam/water solution, for the monitor stations, use the following formula:

Q = (F) x (N) x (T) x (P), where F is the individual monitor nozzle flow, N is the number of monitor stations required, T is the time of discharge, and P is the percentage of foam concentrate required in the foam/water solution. Therefore:

Q = F x N x T x P

Q = 500 gpm x 4 stations x 10 minutes x 3% solution

Q = 500 x 4 x 10 x .03

Q = 600 gallons (2271,3 liters) of foam concentrate

STEP 8- CALCULATE THE HAND HOSE LINE REQUIREMENTS

The project documents must be referred to, in order to determine the number of hand hose lines which will be required to operate, and the amount of flow each station is required to provide. For this example, the requirements of NFPA 409 must be met, so this means that 2 hand hose lines will be in operation, and each will flow 60 gpm (227 l/m) for a period of 20 minutes.

STEP 9- CALCULATE FOAM QUANTITY FOR HAND HOSE LINES

Use a modified version of the original formula to calculate the amount of foam concentrate (Q) required to operate the hand hose stations for the required amount of time. The modified formula will be: Q = F x N x T x P, where (F) represents the hose station flow, (N) stands for the number of hand hose stations required to operate, (T) represents time of operation (20 minutes per NFPA 409), and (P) is the percentage of foam concentrate required in the foam/water solution. Therefore:

Q = F x N x T x P

Q = 60 gpm x 2 stations x 20 minutes x 3% concentrate

Q = 60 x 2 x 20 x .03

Q = 72 gallons (272,6 liters) of foam concentrate

STEP 10- CALCULATE TOTAL QUANTITY OF FOAM

The total quantity of foam can now be determined by simply adding the sub-totals from Steps 4, 7 and 9 together.

Total "Q" from Step 4 = 3808.8 gallons of foam concentrate

Total "Q" from Step 7 = 600.0 gallons of foam concentrate

Total "Q" from Step 9 = 72.0 gallons of foam concentrate

Total "Q" of 4480.8 gallons (16961,7 liters) of foam concentrate will be required for this project

The total quantity of foam may be stored in a single or multiple reser-voiirs or tanks such as Viking bladder tanks, depending on the type of foam discharge devices selected. The Authority Having Jurisdiction should also be consulted as to how and where the bladder tanks, monitor nozzle foam reservoirs, and related foam storage may be located.

NOTE: The above quantity of 4480.8 gallons (16961,7 liters) of foam concentrate is the minimum requirement by NFPA 409. It does not include any reserve amount of concentrate which may be required by the project documents or additional demands which may be required by the insuring body, LPC, Vds or any other Authority Having Jurisdiction.

STEP 11- REVIEW STEPS 1 THROUGH 10 FOR COMPLIANCE

The reason that this step was included, was simply to alert the designer(s), engineer(s), or other parties involved in the design of the aircraft hangar fire protection system, that a review of the project should be performed at this time. This would include reviewing the project drawings, documents and other related material, checking the information contained in this data book, such as the review of the type I hangar fire protection table, and any other related documents, such as NFPA 409. This step should also be used to double-check for any items which may have been previously overlooked, or didn't seem very important at the beginning of the project. It is a discretionary step, and is totally up to the person(s) involved with the project to decide how detailed the review is to be.

STEP 12- COMPLETE A PRELIMINARY LIST OF MATERIAL

Each project will have its own specific requirements, so there will be variations which differentiate one project from another. The easiest method to follow in order to complete a preliminary list of materials for the Viking foam/water fire protection system installation, is to utilize the Checklist found in the "Miscellaneous" section, at the end of the Viking Foam Technical Data Book. It is a step by step checklist of Viking's foam/water equipment including discharge devices, concentrate controllers, concentrate control valves, types of systems, and other related devices.

The example included for this exercise, utilizes a Viking deluge valve with a hydraulically actuated concentrate control valve (a Viking Halar coated deluge valve with proper trim), installed as indicated on Figure 201, found on page 201b, in the Viking Foam Systems Engineering and Design Data Book.

DETECTION SYSTEMS

There are many types of detection systems used to activate either the roof system or the supplementary under-wing system, such as a combination of Ultra-Violet and Infra-Red (UVIR) detectors, heat detectors, smoke detectors (very seldom used), pilot sprinklers, rate of rise detectors,or beam detectors. On most aircraft hangar projects, the type of detection system will be indicated on the construction plans, and in the project documents. Electric detection system layouts, including specific detector locations, are usually indicated on the construction plans, especially when some of the more sophisticated types of detectors, such as UVIR, or beam detectors are specified.

For most aircraft hangar projects, the pneumatic or hydraulic detection system for the roof and supplementary underwing monitor nozzle system will be included as part of the fire protection specification. This is because most fire protection contractors who are experienced in special hazard type projects, such as aircraft hangar installations, are familiar with both types of detection systems, along with their components. For specific information on Viking's Microfast Model M fixed temperature releases, Model C-1 thermostatic releases, and other pneumatic or hydraulic detection equipment, please refer to the Viking Engineering and Design Data Book.

Normally, an electric detection system would be included as part of the electrical specifications, but there have been occasions where even the electrical detection has been included as part of the fire protection section. Should the project documents require that the fire protection contractor provide an electric detection system, it is suggested that the fire protection contractor subcontract the entire detection system to a well established electrical contractor who is familiar with similar detection system installations. The fire protection contractor may wish to exclude the electrical detection portion of the project from his/her bid. Whatever the exception(s) or inclusion(s) to the project may be, it is simply good practice to indicate them in writing, in order to eliminate possible confusion or conflict.

APPROVALS

Only listed and/or approved valves and devices should be used on aircraft hanger installations. This is simply good practice as it indicates that the valves and devices have been tested and/or approved for their intended use. The proper sprinkler head(s) must be selected based upon the type and brand of foam being used.

Viking has the most comprehensive listing and approval of sprinkler heads for use with various types of 3M foam in the industry.

Viking sprinkler heads are also listed and approved with other brands and types of foam. Please refer to the tables found in the "Discharge Devices" sub-section of this data book for a complete listing of the Viking sprin-

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klers for use with various brands and types of foams.

This section of the Aircraft Hangar Protection Application information, will cover Group II aircraft hangers, or those aircraft hangers which have both of the following features:

(a) An aircraft access door height of 28ft (8.5m) or less;
and
(b) A single fire area for specific types of construction in accordance with Figure 1, as indicated on page Foam 430b.

Note: This section does not pertain to Group II hangers housing aircraft with drained and purged fuel tanks. (See NFPA Pamphlet 409, 1990 Edition, Section 4-1.1 for reference.)

Group II aircraft hangers must be protected in accordance with any of the following methods:

(a) The same requirements as those described for Group I aircraft hangers, except that the discharge rate for foam/water deluge systems using air aspirating discharge devices, may be reduced to a minimum of 0.16 gpm/sq. ft. of foam solution (6.5l/min/m), for Group II aircraft hangers.
(b) A combination of automatic sprinkler protection as described in the "Sprinkler System" section of Group II Aircraft Hangar Protection in NFPA 409, and an automatic, low level, low expansion foam system, as described in the "Low Expansion Foam System" portion of Group II Aircraft Hangar Protection.
(c) A combination of automatic sprinkler protection, again as described in the Sprinkler System section of Group II Aircraft Hangar Protection, and an automatic high expansion foam system, as described in the High Expansion portion of the Group II Aircraft Hangar Protection.

Along with the above requirements, automatic closed-head sprinkler protection must be provided inside separate shop, office, and storage areas located inside aircraft maintenance and servicing areas. The design must be in accordance with hazard classifications specified in NFPA 13, or other applicable standard. In addition to the requirements as described above, the hand hose, foam-water hand hose systems, and wheeled and portable extinguisher requirements for Group I aircraft hangers, also apply, as well as "Protection System Alarms" described in NFPA 409, or other applicable standards.

As with Group 1 Aircraft Hangars, the control valves, foam-liquid concentrate storage, injection system and concentrate pump (if required), must be located outside the aircraft storage and servicing areas, and the environmental conditions must be suitable for the concentrate being used. Therefore, it is imperative that careful consideration be given to the location of the foam tanks, system risers, and associated equipment, in relation to the aircraft hangar storage and service areas. The following chart contains a general review of Group II hangar fire protection design, and it is to be used as a guide only, and in conjunction with recognized aircraft hangar protection standards, insurance company rules, governmental regulations and requirements, and other standards required by the authorities having jurisdiction.

ACCEPTANCE TESTS

The system(s) may be required to be tested with the foam system in operation, to insure that the system performs as required. This may mean a test of the foam/water solution to check for proper percentage, such as 3% or 6%, etc. Proper disposal of the foam solution is essential to the acceptance test, and all local, state and other applicable standards for proper disposal of the foam/water solution, must be followed. The required standards will also state how many systems must operate simultaneously, so as to determine if the water supply is adequate,flow pressures, agent discharge capacity, foam coverage, percentage of concentration, and other operating characteristics are satisfactory.

Once the acceptance tests have been completed, the installing company (contractor), may be required to furnish a written statement that the work has been completed in accordance with the approved plans and specifications, and properly tested.

DETECTION AND ACTUATION

Several types of detection may be used to actuate the high or low expansion foam systems along with the pre-action sprinkler system, and the most common ones are fixed temperature, rate compensated or rate-of-rise types. Please refer to the manufacturer's technical data for proper installation information for the detection system. Viking has several types of detection systems available such as fixed temperature releases, pilot sprinklers, and rate of rise detection (C-1 Thermostatic Releases). Please refer to the Viking Engineering and Design Data Book for detection devices, spacing requirements, and other related information. The use of rate of rise detection in aircraft hangars must be very carefully considered, or false operation of the system could occur. The designer must be familiar with how a rate of rise detection system operates, since operation of the detection system can be affected by varying annual weather conditions or conditions which could create a sudden rise in temperature. Detection systems may also be required to be provided with complete supervision, as NFPA 409 requires. Manual actuation stations are required by NFPA 409, and they must be located so that each system can be individually operated from both inside or outside the aircraft storage and servicing area. The manual stations must be located so as to be unobstructed, readily accessible, and located in normal paths of exit from the area. Again, it is imperative that the applicable requirements be adhered to for the proper design of the aircraft hangar's fire protection system.

WATER SUPPLY

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The water supply must be sufficient to supply the combination of systems and hose stations as required by the applicable standard(s), for both quantity and duration. Group II aircraft hangars require a minimum of 30 minutes of water at the required rates called for in NFPA 409. The water supply for low expansion foam systems in Group II aircraft hangars must be capable of a 10 minute duration suitable for the production of foam. For high expansion foam systems, the water supply duration must be capable of producing foam for 12 minutes. The water supply must also be capable of providing the hose stations as required by the standards being used, and if the system also serves as a supply for exterior hose streams, a minimum 500 gpm (1893 l/m) must be included in the calculations. If fire pumps and suction reservoirs are provided, then they must be designed and installed in accordance with the design standards which apply to the specific project.

For most Group III aircraft hangars, no fixed system fire protection is necessary. However, where hazardous operations including fuel transfer, welding, torch cutting, torch soldering, doping, and spray painting are performed, the hangar must be protected in the same manner as a Group II facility, per NFPA 409 requirements. Please check the applicable standards for your specific project to find out what they may require for fire protection systems.

Portable fire extinguishers are also required for Group III hangars, per NFPA 10. When portable extinguishers are locked up to prevent the possibility of theft, each tenant and aircraft owner must have a key for the locks. The distribution of fire extinguishers in the aircraft storage and servicing areas, must be in accordance with extra hazard classification as outlined in NFPA 10. In other areas of the aircraft hangars, the distribution of the extinguishers shall be in accordance with light, ordinary or extra hazard occupancy, based upon an analysis of each room or area following the requirements of NFPA 10, or other applicable standard(s).

PERIODIC INSPECTION AND TESTING OF GROUP I, II & III AIRCRAFT HANGARS

All Group I, II, & III aircraft hangar fire protection systems, will require inspection and testing at certain intervals. The inspection and testing is to be performed according to the prevailing standard(s) for aircraft hangar sprinkler system inspection and testing. For example, NFPA 409 contains a table for periodic inspection and testing (refer to Table 6-1.1), which contains specific inspection and test information along with the timetables within which the inspections and tests must be completed. It is very important to maintain all records of inspections, tests, and test results, as proof that the system(s) have been inspected and tested on a properly scheduled basis.

Please note that this application information is essentially based on NFPA fire protection system requirements. However, there may be other overriding fire protection system standards which apply to specific projects, and these standards may be much different than what NFPA requires. This is the main reason why this application information is not intended to be used as a “stand alone” design guide, but rather in conjunction with all other applicable standards. This application information is intended to assist in the fire protection design of the aircraft hangar only, and it does not apply to other areas of aircraft hangar design, such as construction, internal separations, clear space distances around hangars, floors, roofs, drainage, heating and ventilating, lightning and electrical, lighting, grounding, exit and access, draft curtains, etc.

(Note: For Group I, II, and III aircraft hangars, please refer to NFPA 409, or the specific project’s applicable standard(s), for specific requirements pertaining to Acceptance Tests, Wheeled and Portable Extinguishers, and Protection System Alarms, since these items are not covered in detail in this application manual.)

The information included in the Aircraft Hangar Foam/Water Systems section of the Viking Foam Systems Engineering and Design Data Book, is based on the 1990 edition of NFPA 409. While Viking will make every effort to update this section in accordance with the latest NFPA information, etc., it is the responsibility of the user/purchaser to determine the suitability of the product and/or information for its intended use, and the user/purchaser assumes all risks and liabilities whatsoever in connection therewith.

OBSOLETE

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