Risk Consulting

COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

AXA XL RISK ENGINEERING PLAN REVIEW GUIDELINES

For Construction Projects

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Section 00 00 05
November 2022

Date Created: June 18, 2020
Date Updated: October 12th 2022
Last updated by: Jerry Hom/Deanna Glodoski

Introduction

AXA XL Risk Consulting (DBA - Global Asset Protection Services , LLC aka “GAPS”) provides property loss prevention and risk assessment reports and other property loss prevention services, as requested. AXA XL provides Columbia University with a plan review process as part of the insurance program managed by Columbia University Risk Management Department. The goal of this process is to help assure that appropriate design is being applied, reliable materials are being selected, and installation is according to universally accepted good installation practices and standards.

AXA XL Risk Consulting uses the most recent version of National Fire Protection Association (NFPA) Codes and Standards to review most projects. Where NFPA does not provide guidance, FM Data Sheets or AXA XL Risk Consulting Guidelines may be applied to a specific project or hazard. Please see the Best Practice section in this document for details.

AXA XL Risk Consulting recognizes that fire protection equipment should be listed and labeled for use. In the USA, this is generally by either Underwriter’s Laboratory (UL) or Factory Mutual (FM).

AXA XL Risk Consulting should be involved early in the initial stages of a project to provide input and develop any necessary property loss prevention specifications before a job is sent out for bid. Once a job is underway, AXA XL Risk Consulting will review relevant construction and fire protection system drawings and attend any necessary construction or planning meetings. A plan review number will be provided for each submission for tracking purposes.

Procedure

Working drawings, hydraulic calculations, product cut sheets and supporting literature may be received by regular mail or e-mail and be in either hardcopy or electronic format. Should electronic "DWG" files be received, these can be converted by the XLI Drawing Team. Smaller file attachments can be sent via email to rc_plan_review_americas@axaxl.com

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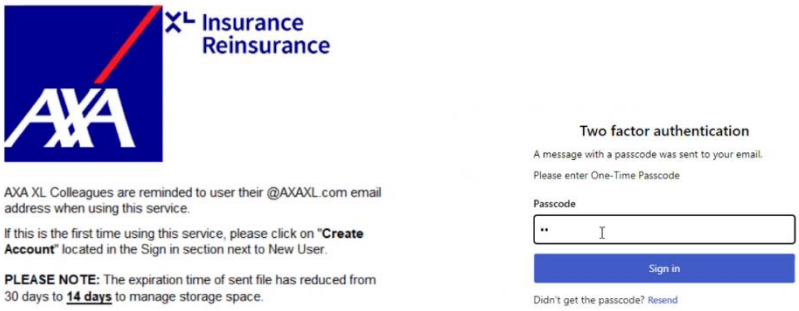
The submittal cover email should include:

Columbia University
Specific Project Name and/or Number
Contact name(s), email, phone number
Project Location Address
Scope of work, summary
Any special details and handling instructions

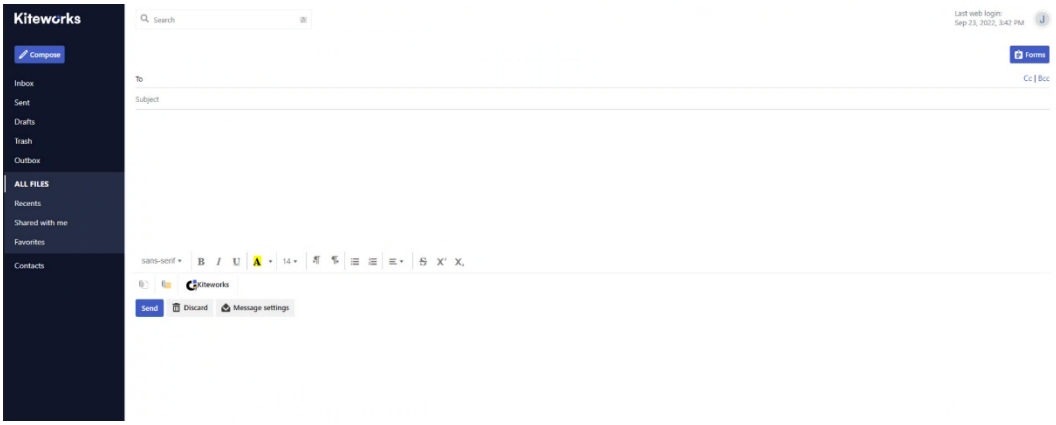
Electronic submissions that have attachments that are too large to fit in an email should be sent through Kiteworks at:

https://sfts.xlgroup.com/

You will recevie a two factor authentification via email:



Click the blue “Compose” button:



The Kiteworks Compose is similar to an email; large attachments should be sent to AXA XL’s Plan Review at rc_plan_review_americas@axaxl.com

The sender will also receive a confirmation email upon sending.

The submittal cover email should include:

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AXA XL Risk Consulting will review the documents and provide a written reply, typically within 15 calendar days of receipt of the submittal. Plans received after 5 pm EST Weekdays, Weekends, or Holidays will be marked as received on the next business day.

Plan review comments and recommendations will state one of three possibilities:

1. Meets the Intent of a Standard - Proposal acceptable for property insurance purposes. This acceptance is not intended to imply compliance nor be used as compliance for any legislative country, state or local requirements. This is usually accompanied by a list of items that should serve a final check list as the project is wrapping up.

2. Meets the Intent of a Standard upon completion of minor deficiencies - There will be occasions when the submitted material is found to have minor deficiencies that can be resolved through the submitter without holding up the project.

3. Does Not Meet the Intent of a Standard with comments or More information needed - Some submittals will either be lacking sufficient information to conduct a Plan Review and/or found to be deficient in major key areas. Many fire protection plans are rejected on first submission. Please allow time for resubmissions to be processed by submitting plans as soon as possible.

Items reviewed that deviate from recognized standards will be clearly explained. In the case where recommendations are generated due to the lack of information, comments will be made to resolve the issue.

Distribution

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Submission Requirements

1. Sprinkler Systems
    - 1.1. Scaled drawings with written dimensions and sprinkler head nodes clearly labeled
    - 1.2. Calculations
    - 1.3. Specification for sprinkler heads, piping, fittings, etc.
    - 1.4 Water supply test results supporting the calculation dated less than 1 year ago.
      Note: See NFPA 13, Standard for the Installation of Sprinkler Systems, 2019 Edition Chapter 27 for a complete submission list
2. Specialized fire suppression systems
    - 2.1. Scaled drawings with written dimensions
    - 2.2. Calculations for the agent
    - 2.3 Battery calculations for the system releasing/ monitoring panel
    - 2.4 Specification for activation panel, agent, piping, heads/nozzles
    - 2.5 How the system will be monitored (central station, local notification, supervision, etc)
    - 2.6 Sequence of events for the system releasing/ monitoring panel
3. Fire Pumps
    - 3.1. Scaled drawings with written dimensions
    - 3.2. Specification for the pump, jockey pump, piping, backflow preventor, and other trim
    - 3.3 Water supply tests
    - 3.4 How the water will be supplied to the pump
    - 3.5 Construction of the fire pump room/area (fire pumps are generally required to be in a room with fire rated walls)
4. Alarm systems
    - 4.1. Scaled drawings with written dimensions and nodes for line drop and battery calculations
    - 4.2 Battery calculations
    - 4.3 Line drop calculations
    - 4.4 Sequence of events
    - 4.5 Specification for the panel, devices, etc.
      Note: See also NFPA 72, National Fire Alarm and Signaling Code®, 2019 Edition: Chapter 7 for documentation requirements
5. Construction
    - 5.1 Drawings and specifications
6. Roofs
    - 6.1 Fill out attached roof form
    - 6.2 Drawing showing the area or areas of the roof being covered or recovered
    - 6.3 Height of the roof above grade eave and peak

6.4 Dimensions of the building
6.5 Height of parapet if applicable
6.6 FM Roof NAV number or UL Classification number
6.7 Wind calculations based on ASCE 7 or Factory Mutual confirmation of if the building is enclosed, partial enclosed, or open based on ASCE 7 or Factory Mutual definitions
6.8 Specifications
6.9 Description roof deck (gauge of metal or psi of concrete) and how the roof will be applied including any perimeter or corner enhancements

7. Laboratories
   7.1 Classification of Lab per NFPA 45: Standard on Fire Protection for Laboratories Using Chemicals, Current Edition
   7.2 Estimated amount of flammable and combustible liquids inside and outside flammable liquids cabinets
   7.3 Location and rating of fire barrier walls
   7.4 Specification for any flammable liquids cabinets or gas cylinder cabinets
8. Energy Related projects
   8.1 Emergency generators including fuel storage and fuel distribution
   8.2 Solar panels including associated convertors and electrical distribution
   8.3 Energy storage systems including battery banks, charging systems, electrical distribution.

9. Miscellaneous

   8.1 Submit sufficient information to evaluate the hazard and the proposed protection

Best Practices

Common NFPA Codes and Standards
NFPA 10, Standard for Portable Fire Extinguishers
NFPA 13, Standard for the Installation of Sprinkler Systems
NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 22, Standard for Water Tanks for Private Fire Protection
NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances
NFPA 30, Flammable and Combustible Liquids Code
NFPA 45: Standard on Fire Protection for Laboratories Using Chemicals
NFPA 70, National Electrical Code®
NFPA 72, National Fire Alarm and Signaling Code®
NFPA 75, Standard for the Protection of Information Technology Equipment
NFPA 80, Standard for Fire Doors and Fire Windows
NFPA 400, Hazardous Materials Code
NFPA 750, Water Mist Fire Protection Systems
NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems

Note: Consultant shall notify CU Project Representative if any requirements herein is inconsistent with best practices.

Construction

XL Risk Engineering recommends the use of non-combustible building materials for all important buildings. If plastics are used in construction listed or approved assemblies are recommended. Please provide details about if and where the building construction may contain plastics. If metal sandwich type panels are used, they should be listed for FM4880, UL1040, or NFPA 285.

Walls and roof members should be designed to meet a minimum of ASCE 7 Risk Category III. The roof design should be Class I or non-combustible with a flame spread rating of Class A.
XL Risk Engineering recommends using a UL Classified or FM Approved system (FM Roof NAV number) with an internal non-combustible fire rating and Class A flame spread rating. Wind calculations should be provided with the roof submittal.

General design considerations should consider possible domestic water leaks over critical areas such as Operating Suites, MRIs, PET, Computer, and other high value equipment. Water shut-off valves should be easily accessible for maintenance to be able to address domestic water leaks promptly as these are known to cause major losses in hospital occupancies.

XL Risk Engineering recommends using providing secondary roof drains or scuppers in addition to the primary roof drains designed based on the 100 year rain fall over 1 hour.

If the installation will contain garden roof areas, please refer to FM Data Sheet 1-35, Green Roof Systems for advice on design of these areas.

Automatic Sprinkler Protection

Automatic building sprinklers should be provided throughout the building per NFPA 13, Standard for the Installation of Sprinklers, Current Edition based on occupancy. Hydraulic calculations should be submitted for review during construction when provided by the contractor.

Please consider that most storage areas now may contain a greater amount of plastic. Protection of plastic storage over 5 is highly dependent on ceiling height. Storage 5 ft and below may be protected with Ordinary Hazard Group 2 design according to NFPA 13.

Water Supply

Water supply including fire hydrants, fire water mains, and fire pumps should be designed per NFPA 20: Standard for the Installation of Stationary Pumps for Fire Protection, Current Edition and NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances, Current Edition. The water supply should meet 100% of the anticipated sprinkler and hose demands for the site per NFPA 13. See AXA XL Risk Consulting Guideline 17.6.1 for specific details on arrangement of water supplies in high rise buildings.

Note: The minimum cover depth for the fire water service is provided by NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 2016 Edition: Figure A10.4.2(a). Cover depths are higher for fire service mains as these are generally stagnant.

Alarm Systems

Fire alarm and security alarm systems should be provided and designed per NFPA 72, National Fire Alarm and Signaling Code, Current Edition. All sprinkler systems should be monitored for waterflow and tamper alarms. Low and high air alarms are needed if the systems are a dry or pre-action system.

Fire pump alarms should comply with NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, current edition.

HAZARD PROTECTION:

Diesel fuel supply for Generators or Boilers

Diesel Fuel Storage Tanks

-Locate fuel storage tanks inside minimum 2 h fire rated cut-off rooms or vaults; preferably on the first floor. Construct fuel tank supports from fire resistive materials. Protect plain steel supports with a fire resistive coating or automatic sprinklers beneath the tank.
-Provide secondary containment for fuel tank rooms, sized to handle at least 110% of the capacity of the largest single tank in the room.
-Use top-connections to fuel storage tanks for all fill, vent and discharge piping connections. When existing bottom-connections cannot practically be relocated, provide fusible link-actuated safety shutoff valves, located immediately between the tank connection and the piping. Provide a reliable means of preventing tank overfill.
-Protect tank rooms/vaults with automatic sprinklers designed to provide a minimum density of 0.30 gpm/ft^2 (12.2 mm/min) over the entire room/vault with preference given to a foam/water. It has been proven that automatic sprinkler protection alone cannot extinguish a fire with flash points under 200°F (93°C). Sprinklers may cool or contain, but not extinguish.

Diesel Fuel Distribution Pumps

-Locate fuel distribution pumps inside a minimum 2-hour fire rated cut-off room.
-Provide automatic sprinkler protection in the fuel pump room. For pumps that are located in other areas, provide automatic sprinklers directly over the pumps and extending 15 ft (4.6 m) in

each direction beyond the footprint of the pumps. Provide secondary containment for fuel pumps using minimum 3 in. (75 mm) high curbing or metal containment pans.
-Provide leak detection within the secondary containment of the pumps that will shut down the pumps.
-Interlock pumps to shutoff upon leak detection. Other means, such as heat detection, waterflow, etc. may be used as an interlock other than leak detection. The main goal is to shut down and isolate the fuel supply in the event of a major fire or other unforeseen event.
Provide fusible-link actuated safety shutoff valves on the suction side of fuel pumps. Provide an anti-siphon valve between the tank discharge and the pumping system.

Diesel Fuel Distribution Piping

-Use seamless steel piping with welded fittings for distribution of diesel fuel. Flanged or threaded fittings are acceptable inside generator or fuel pump rooms having secondary containment and interlocked leak detection. Flanged or threaded fittings are also acceptable if the piping itself is equipped with secondary containment and interlocked leak detection.
-Use concentric (secondary containment) piping for pipe runs outside of cut-off fuel pump or generator rooms. Provide a built-in well at the low-point of concentric piping with interlocked detection within the well. Single-wall, seamless steel piping with welded fittings may be used within fire-rated pipe chases.
-Provide fusible-link actuated safety shutoff valves on the fuel piping where it enters generator rooms.

Diesel Fuel Day Tanks for Generators

-Locate day tanks within dedicated tank rooms, generator rooms or mechanical equipment rooms that are cut-off from adjoining occupancies by minimum 2 h fire rated construction.
-Provide secondary containment for day tanks, sized for 110% capacity of the largest day tank within the containment area. When large diameter pipes are used to create a fuel header that serves as the day tank for one or more generators, provide secondary containment for the generator room, sized to handle 110% capacity of the header.
-Install fusible-link actuated safety shutoff valves on bottom-connections to day tanks.
-Provide an anti-siphon valve between the tank discharge and the pumping system. Provide automatic sprinklers directly over the day tanks and extending 15 ft (4.6 m) in each direction beyond the footprint of the tanks. Provide a reliable means of preventing tank overfill.

Emergency Generators

The installation should be designed in consideration of NFPA 110: Standard for Emergency and Standby Power Systems, Current Edition and NFPA 37: Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, Current Edition. Protection features to consider:
- Alarms back to a constant location showing generator running, engine trouble, and other alarms to the room/unit
- Generator rooms should be protected by automatic sprinklers designed for extra hazard sprinkler protection if fuel is stored in the room. Protection may be reduced to ordinary hazard

group 2 if the day tank is less than 100 gallons of diesel fuel and safety shut-off valves are provided to limit the flow of fuel into the room if there is a fire or fuel break in the room.

Transformers 1000 kVA or larger

Provide protection per GAP Guideline 5.9.2. Are the transformers oil filled or dry type? Oil filled transformers should ideally be located in separate rooms with dikes. If there is more than one oil filled transformer in the same room, automatic sprinkler protection is recommended for the room. With dry type transformers and switchgear, automatic sprinkler protection is not required. The minimum protection required is smoke or heat detection in the room.

Oxygen and other gas storage and distribution

Protection should be provided based on NFPA 55: Compressed Gases and Cryogenic Fluids Code, Current Edition.

Computer, Data, and Battery Rooms

These rooms should be designed per NFPA 75: Standard for the Fire Protection of Information Technology Equipment, Current Edition; NFPA 76: Standard for the Fire Protection of Telecommunications Facilities, Current Edition; and NFPA 111: Standard on Stored Electrical Energy Emergency and Standby Power Systems, Current Edition. Other resources include GAP Guideline 7.10, Electronic Data Processing Facilities; and GAP Guideline 5.7.4, Stationary Batteries.

Solar Panel Roof Installations

Details of roof construction including insulation, membrane, etc – with the method of attachment of each layer.
-Additional weight calculations conducted by a structural engineer
-Plans for clearing snow that accumulates. What is the trigger point (measured inch accumulation, predicted amounts, etc.?)
-Calculations should include snow loading. Often panels change the snow loading on a roof, especially in highly affected regions.
-Details should be provided on if panels are owned or a leasing to own or a supplier owned arrangement. (Supplier owned – paid for the power generated at a reduced rate compared to the local utility)
-Details of the panels – listings, method of attachment, wiring arrangement/type, etc. should be provided
-Method of the wiring on the roof – cables should be in cable trays or similar and any entry point to the building should be sleeved with noncombustible materials.
-Location of inverters – include details (dedicated room, Fire rating, available Sprinkler protected)
-An infrared thermographic survey should be completed after installation. The results should be available.

-The responding fire department should tour the installation and discuss the location of access, disconnect points, preplan?
-Provide a disconnect that is located in a way that the fire department can easily get to during an emergency