CONSTRUCTION SAFETY DESIGN SOLUTION #5
DESIGN CATEGORY: ROOF
HAZARD: FALL FROM ROOF
DESIGN SOLUTION: ROOF ANCHORS

This design solution reduces the risk of serious falls from roofs during the construction and maintenance activities over the life of a building. Falls from roofs result in about – about 71 fatalities per year [BLS, 2008] Permanent anchors provide a convenient, safe place to tie off when personal fall arrest systems are needed. They also reduce the chance a worker will not use a personal fall arrest system because there is no place to tie off, or the worker connects to something that may not be structurally sound or certified by a registered Professional Engineer (PE).

SOLUTION

Planning the construction and future maintenance of a building can identify areas where permanent anchors should be installed. There are many vendors that design and install roof anchors. Anchors should be capable of sustaining a load of at least 5000 pounds without fracture or failure in the most adverse loading direction. The potential for material degradation due to environmental factors such as temperature, salt, and humidity should be considered.

There are many different methods of securing an anchor to a structure in order to meet the load requirements. Through bolting with a backup plate is the preferred installation method. An H-frame can be designed and installed between bar joints when installing roof anchors to bar joists. Once installed it is generally the responsibility of the building owner to inspect and maintain roof anchors to ensure their continued and reliable performance.

Figure 1 Planning the construction and future maintenance of a building can identify areas where permanent anchors should be installed.

Figure 2 Residential roofing has a high incidence of falls. Installing residential roof anchors provides a place for workers to tie off.

BACKGROUND INFORMATION

Applicable US Safety Regulations

OSHA Construction standards

1926.502(d)(15)Anchorages used for the attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed, and used as follows:

(i) as part of a complete personal fall arrest system which maintains a safety factor of at least two; and

(ii) under the supervision of a qualified person

Other applicable standards and guidelines

Guidelines: Roof Anchorages for Fall Arrest Systems. Ontario Ministry of Labor

ANSI/IWCA 1-14.1 Window Cleaning Safety Standard

http://www.canaminternational.ws/www/v4/newslet.nsf/va_redir/joistv5n2?open (H-frames)

OTHER CONSIDERATIONS

-Roof anchors should be inspected by a qualified person on an annual basis. The report of this inspection should be included in the building's logbook and distributed to contractors prior to starting work.

-Anchors should be re-certified when there is re-roofing or renovating, or at periods not to exceed 10 years. The report of this inspection shall be included in the building's logbook.

-If the structural integrity of a roof anchor becomes suspect at any time, a test procedure shall be performed under the approval of a registered Professional Engineer (PE).

-Post installation testing should include applying a minimum static load equal to half the maximum capacity of the anchor in the most adverse loading direction that the load might be applied.. For example, an anchor designed for a 5000 pound ultimate load should be tested at 2500 pounds.

LIFE CYCLE SOLUTION BENEFITS

-A well thought out plan for roof anchors can be beneficial during maintenance because workers will have a structurally sound, certified, convenient place to tie off .