

RiskTopics

Fire Safety Precautions for Hot-Tar Applied Roofing Systems July 2017

Introduction

Molten tar or asphalt is commonly used in the construction of commercial, low-slope built up roofing systems (BUR roofs). A typical BUR system consists of several alternating layers of roofing felts rolled into a layer of hot, liquid asphalt or coal-tar. The asphalt or tar is often heated in a tar kettle and applied with mops or mechanical spreaders at the point of application. BUR systems can be surfaced with a variety of materials such as a modified bitumen cap sheet, aggregate ballasts, elastomeric coatings, hot-mopped asphalt, etc. BUR systems have been in use for over 100 years and remain popular because they offer long service life, high durability and excellent waterproofing properties when properly applied and maintained.

Discussion

BUR roofs involve heating the asphalt or coal-tar product into a liquid form that releases flammable vapors in the process. The material in these tar kettles can easily reach the product's flash point if the operations are not properly monitored and controlled. Additionally, tar kettles require a local fuel source such as LP gas or natural gas that presents additional fire and safety hazards.

Extreme caution should be exercised while installing fluid applied roof coverings. Site-specific procedures should be developed for the safe use of tar kettles and applicators to prevent a fire from occurring at the kettle or on the roof during application. The list below describes some basic fire-safety precautions when using a hot tar roof kettle or similar material heating vessel. In addition to building, roofing and kettle fire hazards, there are numerous personnel safety considerations when working with molten asphalt; however, it is not the intent of this RiskTopic to cover worker safety hazards associated with tar kettle operations, such as burns, inhalation, slips, trips and falls, etc.

Project-specific safety requirements along with the fire-prevention practices listed below should be reviewed and confirmed with your roofing subcontractor during a Pre-Construction Meeting and again with a Job Hazard Analysis prior to the start of roofing.

Guidance

Fire safety considerations

- The best practice is to locate the kettle and fuels at grade (away from the building) and pump material to the roof.
- The kettle should be attended and operated by a competent person at all times (within eyesight and 25 feet of kettle). The kettle operator should remain on the same level as the kettle.
- The competent person should be knowledgeable of the material's temperature limits and kettle features to prevent heating above the flash point.
- Working and flash point temperatures should be available on keg packaging or SDS sheets and vary depending on the asphalt's ASTM type. Never heat contents above working temperature (usually 50° F under the flash point) to improve workability at application point (a common practice in colder weather).
- The kettle or operator must have a functional, readable thermometer.
- Locate kettle greater than 10 feet from the building and any egress paths or exits.
- Keep combustible materials, packaging, debris, etc. at least 20 feet from the kettle; require daily removal of roofing debris and product packaging.
- Spontaneous combustion of improperly stored roofing mops and rags is possible. Remove excess asphalt from roofing mops at conclusion of work. Remove used mops and rags from the roof and store away from the tar kettle, combustible materials and fuel sources.
- At least (2) 20 lb. fire extinguishers are recommended within 25 feet of the kettle. Note - do not place fire extinguisher on the kettle or immediately next to it since the kettle could be on fire preventing access to the fire extinguisher.
- Keep propane cylinders greater than 10 feet from the kettle, secure cylinders at all times and limit quantity to a two-day supply.
- Follow all OSHA regulations and NFPA 58 Standards (Standard for the Storage and Handling of Liquefied Petroleum Gases) concerning handling and storage of propane or other burner fuel sources. Propane storage is not allowed within a building.
- Store all cleaning solvents away from the kettle and fuel cylinders.
- Kettle should have a tight fitting, metal cover (minimum 14 gauges) capable of smothering a potential fire and a quick closing valve at the spigot.
- Ensure the kettle outlet has a quick-closing valve. An extension handle is necessary as well for access to the valve in the event of a kettle fire.
- Maintain a 30-minute fire watch after kettle and torches are turned off each day.
- Do not attempt to move or relocate kettle while it is at operating temperature.
- Whenever possible, transfer hot tar in wheeled carts instead of hand-held buckets; pump product to upper or lower roof levels instead of using ladders to carry or hoist product.
- Prohibit smoking on the roof during any roofing activity.

Additional fire safety considerations when the tar kettle must be located on the roof

Best Practices are to always place the kettle at grade (reference NFPA 241, Chapter 9.2.2); however, there may be circumstances where the placement of the kettle on the roof is unavoidable (e.g., high rise buildings, project logistics, etc.) In such cases, these additional fire safety considerations should be followed.

Note - this arrangement often requires prior approval or permitting from the local Authority Having Jurisdiction to ensure compliance with local building codes. In any event, it is a “best practice” to notify the fire department whenever a tar kettle and fuels will be located on the roof.

- Verify weight of full kettle and asphalt kegs do not exceed structural capacity of roof.
- Locate kettle and fuels greater than 20 feet from egress paths and roof exits and greater than 6 feet from roof edges unless suitable guardrails are in place.
- Locate kettle at least 10 feet from walls and roof mounted equipment. Locate kettle at least 20 feet from walls with combustible framing, insulation or EIFS systems (or use a fire resistive barrier if adequate spacing is not possible).
- Place the kettle on a noncombustible base.
- Consider spill containment means in the event of tank or hose leak (i.e., ensure liquid asphalt cannot flow into a floor opening or over the roof edge exposing workers and materials below).
- Any mops and rags must be safely disposed of and not left in buckets or unattended on the roof. Buckets or buggies must not leak.
- Make sure kettle wheels are chocked or locked to prevent rolling or movement from bumping. Kettle must be leveled prior to operation.
- For Mid and High Rise construction – the building’s fire protection standpipe and hose connections should be completed up to the roof level prior to firing the roof kettle.
- Use a daily Hot Works Permit procedure to monitor and control kettle fire hazards and to keep all parties informed as to when kettle is in operation.

Conclusion

The hot tar applied roofing work should be considered a high hazard activity. It is important to pre-plan the work to make sure all unnecessary hazards and risks are eliminated prior to the start of roofing and to perform routine equipment and work area inspections during hot tar roofing operations. Kettle operations and asphalt temperatures should carefully follow all manufacturer guidelines. All hazards should be reviewed and specific procedures should be developed which take into account any site specific considerations. These procedures should be reviewed with all involved and affected site personnel prior to the start of roofing operations.

References

NFPA 241 – Standard for Safeguarding Construction, Alteration and Demolition Operations.

NFPA 58 - Standard for the Storage and Handling of Liquefied Petroleum Gases.

ASTM D312 – Standard Specification for Asphalt used in Roofing.

Asphalt Roofing Manufacturers Association – Technical Bulletin
Recommendations Regarding Built-Up Roofing Asphalt. www.asphaltroofing.org

OSHA Regulation 29 CFR 1926 – Construction Industry Regulations.

Michigan Administrative Code Part 24 – Tar Kettles (MIOSHA-STD-1319).

Zurich RiskTopic - Spontaneous Combustion of Rags and Roofing Mops, June 2016.

The Zurich Services Corporation
Risk Engineering
1299 Zurich Way, Schaumburg, Illinois 60196-1056
800 982 5964 www.zurichna.com

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