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<b>Approved by:</b>	Technical Review Team
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<b>References:</b>	Factory Mutual Global Property Loss Prevention Data Sheet 5-4 2011 NEC Article 450.27, 2012 IBC, IEEE 979

**Issue:**

NEC 450.27 states: “Combustible material, combustible buildings, and parts of buildings, fire escapes, and door and window openings shall be safeguarded from fires originating in oil-insulated transformers installed on roofs, attached to or adjacent to a building or combustible material.

In cases where the transformer installation presents a fire hazard, one or more of the following safeguards shall be applied according to the degree of hazard involved: (1) Space separations, (2) Fire-resistant barriers, (3) Automatic fire suppression systems, (4) Enclosures that confine the oil of a ruptured transformer tank ...”

Questions arise as to how to consistently enforce this code section. How close can an oil-insulated transformer be to a building before it is considered a hazard?

**Guideline:**

Since this code section is not prescriptive, the judgment of the design professional is intended to be relied upon to determine the hazard involved as well as the required safeguards necessary for the project specific case. For code enforcement purposes, sufficient justification must be presented to show that the specific hazards have been evaluated and safeguarded against.

**Note:** This guideline is intended to apply to all Oil-Insulated Transformers installed outdoors, including utility owned and/or customer owned transformers. The following methods are considered acceptable justification:

1. Use of a widely accepted, nationally recognized standard, (acceptable to the AHJ), which gives specific separation distances, with respect to construction type, and containment requirements. A commonly used standard of this type is the FM Global Property Loss Prevention Data Sheet 5-4 for transformers. For example: FM gives minimum horizontal and vertical separation distances based on type and quantity of oil and type of construction. Other similar standards, such as IEEE 979, may be utilized if found acceptable to the AHJ.
2. A fire hazard study, performed by a professional registrant in the State of Arizona who is competent to determine the hazards involved with a fire involving oil-insulated transformers in proximity to combustibles.

Consideration must be given to building construction type/fire-resistive rating, wall and roof openings within required separation distances, proximity to means of egress doors, fire resistant barriers, etc.

- Ideally, space separation (as described in the FM Data Sheet) would be employed as the safeguarding means with design of the adjacent building conforming to the construction ratings indicated. If these distances cannot be attained, additional safeguarding means must be employed such as fire resistant barriers and/or fire suppression systems. As interpreted by FM, openings such as doors and windows located in the wall that is adjacent to the oil-insulated transformer will be required to maintain the same construction rating required for the wall.
- Typically containment would be required unless the finished grade slopes away from the building where the transformer is located.
- Elements of the means of egress such as exit doors, exit courts, exterior stairs, etc. shall be a minimum of 10' from the oil-insulated transformer (based on IBC Sections 1019.4 and 1026.5).

Unless other means are justified, as described in the above methods, the following minimum space separation distances will be used to verify compliance with NEC 450.27:

For Three-Phase Transformers:

	Provide rating to 25' vertical height Minimum Horizontal Distance to Building		
Construction type	2-hour	Non-Combustible	Combustible
Less than 500 gallons	5'	15'	25'

For Single-Phase Transformers:

Less than 100 gallons, 10' minimum horizontal distance to combustible construction