VanTran TRANSFORMERS BY FORGENT

UL Combination Classification Listing with FM Requirements

Certification of Less-Flammable Liquid-Filled Transformers

The NEC 450-23 defines generally accepted guidelines for less-flammable liquid filled transformers. Underwriters Laboratory (UL) and Factory Mutual (FM) are common third-party organizations that certify transformer designs for use in areas that require less flammable insulation fluid.

"UL Combination Classification Listing" vs. "Factory Mutual Approval"

FM and UL use slightly different methods for complying with NEC 450-23. FM has chosen to formulate a dedicated standard for transformers complying with NEC450-23. UL has combined a Listed transformer with a Classified fluid for complying with NEC 450-23 within the Classification of the fluid; therefore, UL has a Combination Classification/Listing.

UL Combination Classification Listing

When required, VanTran can provide a UL Combination Classification listing for less flammable liquid-filled transformers. The UL Combination Classification Listed Transformer includes the following features:

- Transformer designed to requirements of IEEE C57.12.00
- Tank designed for minimum withstand of 12 psi before rupture
- Fluid fire point of at least 300°C
- Pressure relief device with a flow rate suitable for the transformer kVA rating (per Table 1)
- Transformer primary overcurrent protection (per Table 1)

UL Combination with FM Requirements

FM Listed less-flammable liquid filled transformers include additional devices. While VanTran does not have FM Approval, VanTran can provide a UL Combination Classification with the following FM requirements.

- Tank designed for 7 psi pressure without permanent distortion
- Tank designed for minimum withstand of 15 psi before rupture
- Liquid level indicator
- Liquid temperature indicator
- Pressure-vacuum gage
- Pressure relief device with alarm contacts above 2500 kVA (outdoor)
- Pressure relief device with alarm contacts above 500 kVA (indoor)

CLASSIFIED UL

Liquid-Filled Distribution Transformer. E349116

ALSO CLASSIFIED FOR USE AS LESS-FLAMMABLE LIQUID-INSULATED TRANSFORMER IN ACCORDANCE WITH SEC. 450-23 OF THE NATIONAL ELECTRICAL CODE (NEC) AND MARKED USE RESTRICTIONS ON THE TRANSFORMER

Transformer	Required Protection*			Required PRD
3-phase Transformer Rating kVA	Current Limiting Fusing Maximum I^2t	Or	Overcurrent Protection Maximum I^2t	Flow Rate SCFM
45	500000		700000	35
75	500000		800000	35
112.5	550000		900000	35
150	600000		1000000	50
225	650000		1300000	100
300	750000		1400000	100
500	900000		1900000	350
750	1100000		2200000	350
1000	1250000		3400000	350
1500	1500000		4500000	700
2000	1750000		6000000	700
2500	2000000		7500000	5000
3000	2250000		9000000	5000
3750	2500000		11000000	5000
5000	3000000		14000000	5000
7500	3000000		14000000	5000
10000	3000000		14000000	5000

*A power system coordination study must be conducted by others to ensure proper overcurrent protection of the transformer to limit the I^2t let through current available in the system.

Table 1