Medium-voltage transformer selector guide

Table 1. Transformer product selector

Transformer		Maximum voltage Primary	Maximum voltage Secondary	Available kVA	Types	Application considerations
Unit substation transformer—liquid-filled						
	**Primary unit substation** (Steps down utility service voltage)	69 kV	34.5 kV	500 kVA–20 MVA	**Mineral oil**—Typical outdoor installation. **Silicone**—Applied where flammability is a concern. **Vegetable oil**—Specified where flammability and clean-up are a concern.	Transformer is part of a close-coupled assembly that includes both primary and secondary equipment. High short-circuit strength. Sealed tank design is impervious to the environment.
	**Secondary unit substation** (Provides secondary system voltage)	34.5 kV	600 V	300 kVA–3750 kVA		
Pad-mounted transformer—liquid-filled						
		34.5 kV	5 kV	45 kVA–5 MVA	**Mineral oil**—Typical outdoor installation. **Silicone**—Applied where flammability is a concern. **Vegetable oil**—Specified where flammability and clean-up are a concern.	Stand-alone unit servicing underground distribution loads such as shopping centers, schools, and industrial and institutional facilities. Tamper-resistant compartmentalization allows unit to be installed in open access applications.
Network transformer (spot networks)—liquid-filled						
	**Secondary spot network**	34.5 kV	480 V	500 kVA–3000 kVA	**Mineral oil**—Typical outdoor installation. **Silicone**—Applied where flammability is a concern. **Vegetable oil**—Specified where flammability and clean-up are a concern.	Network transformers are part of a commercial spot network system where multiple transformer units feed large potential loads in parallel, such as four 2500 kVA units feeding 480/277 V loads. Liquid network transformers have fluid-filled primary mag-break integral switch and network protectors field-mounted on the secondary flange with safety interlocks. Installations are usually indoors, and multiple primary circuits and sources that can be paralleled must exist upstream, usually supplied by the utility. Government buildings with high levels of loads at the utilization voltage merit these systems. The loads are not adversely affected by one primary circuit outage, and may not be affected by two being down in four transformer spot network systems.

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Table 1. Transformer product selector (continued)

Transformer	Maximum voltage		Available kVA	Types	Application considerations
	Primary	Secondary			
Substation transformer—liquid-filled					
	69 kV	34.5 kV	750 kVA–20 MVA	**Mineral oil**—Typical outdoor installation. **Silicone**—Applied where flammability is a concern. **Vegetable oil**—Specified where flammability and clean-up are a concern.	Stand-alone unit servicing underground distribution loads such as shopping centers, schools, and industrial and institutional facilities. Tamper-resistant compartmentalization allows unit to be installed in open access applications.
Unit substation transformer—dry-type					
 **Primary unit substation** (Steps down utility service voltage)	34.5 kV	15 kV	500 kVA–10 MVA	**VPI**—Vacuum pressure impregnation with polyester resin. Used in commercial construction and industrial applications. **VPE**—Vacuum pressure encapsulated with silicon resin. Applied where MIL-1-24092 spec is required (salt-spray application). **Cast coil**—Uses the electrical and mechanical strength of epoxy to provide higher levels of performance and environmental protection in high-moisture, dust-laden, and chemical environments. Windings are hermetically sealed in epoxy. **Resibloc**—Coils insulated with epoxy and reinforced with roving glass fiber. Highly resistant to short-circuit forces, severe climate conditions, and cycling loads.	Transformer is part of a close-coupled assembly that includes both primary and secondary equipment. Explosion resistant, fire resistant, and nonpolluting to the environment.
 **Secondary unit substation** (Provides secondary system voltage)	34.5 kV	600 V	112.5 kVA – 3750 kVA		
Network transformer (spot networks)—dry-type					
 **Secondary spot network**	34.5 kV	480 V	500 kVA–3000 kVA	**VPI**—Vacuum pressure impregnation with polyester resin. Used in commercial construction and industrial applications. **VPE**—Vacuum pressure encapsulated with silicon resin. Applied where MIL-1-24092 spec is required (salt-spray application). **Cast coil**—Uses the electrical and mechanical strength of epoxy to provide higher levels of performance and environmental protection in high-moisture, dust-laden, and chemical environments. Windings are hermetically sealed in epoxy. **Resibloc**—Coils insulated with epoxy and reinforced with roving glass fiber. Highly resistant to short-circuit forces, severe climate conditions and cycling loads.	Network transformers are part of a commercial spot network system where multiple transformer units feed large potential loads in parallel, such as four 2500 kVA units feeding 480/277 V loads. Dry-type network transformers do not have an integral switch. Network protectors are field mounted on the secondary flange or assembly mounted in switchgear sections. Installations are usually indoors, and multiple primary circuits and sources that can be paralleled must exist upstream, usually supplied by the utility. Government buildings with high levels of loads at the utilization voltage merit these systems. The loads are not adversely affected by one primary circuit outage and may not be affected by two being down in four transformer spot network systems.

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1000 Eaton Boulevard
Cleveland, OH 44122
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Printed in USA
Publication No. TD202005EN / Z23575
November 2019

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