

# Data Bulletin

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## Transformer Key Features Dry-Type, Cast-Resin, and Liquid-Filled Transformers Class 7300

Retain for future use.

### INTRODUCTION

This data bulletin contains key features about Square D/Schneider Electric® dry-type, cast-resin, and liquid-filled transformers.

### PRODUCT FEATURES AND BENEFITS

Table 1: Dry-Type, Cast-Resin, and Liquid-Filled Transformers

Product	Key Features	Benefits	Additional Information: See	Best Application for Use
Ventilated Dry-Type Vacuum-Pressure Impregnation (VPI) Transformers 225–13,000 kVA	150° C Rise 220° C Insulation	Lowest first cost Light weight	"Temperature Winding Rise and Insulation Class" and "Nonflammable Transformers" on page 2	General applications, where cost of power is a major concern
	Optional 115° C or 80° C Rise 180° C Insulation	Overload capability and/or low watts loss = low operating costs		High ambients or where cost of losses is important
	Can be fan-cooled @ 33% overload (OL)	Handles peak load with less cost than larger units	"Fan-Cooled Ratings" on page 2	Environments where load varies
Power-Cast™ Transformers 500–13,000 kVA	Cast coil	Max protection from the environment; max short-circuit strength	"Cast Epoxy" on page 2	In damp environments; where chemical fumes, high fault probability, and high impact loads exist
		No pre-drying before energizing		Periods of no-loads and/or cold, damp environments
		Ease of cleaning coil		Dusty and dirty environments
	80° C Rise	Low watts loss	"Temperature Winding Rise and Insulation Class" and "Nonflammable Transformers" on page 2	Where cost of power is a major concern
	Solid dielectric	Partial discharge tested	"Solid Dielectric Insulation" on page 2	Where max reliability is important
	Can be fan-cooled @ 33% (1000–5000) kVA 50% OL	Handles peak loads with less cost than larger units	"Fan-Cooled Ratings" on page 2	Where load varies greatly
Oil-Filled Substation 225–20,000 kVA	Basic Insulation Level (BIL) equivalent to liquid-filled transformers	More protection from voltage surges inherent in the design	"Transformer Basic Insulation Levels" on page 3	When used as a replacement (no need to rework the system design if used to replace a liquid-filled transformer)
	Oil coolant and dielectric	Least expensive of liquid-filled transformers	"Oil-Filled Transformers" on page 2	Where first cost is a factor
	Can be fan-cooled @ 15% (225–2500 kVA) or 25% (2500–10,000 kVA) or 33% above 10,000 kVA	Handles moderate overloads with less cost than larger units	"Fan-Cooled Ratings" on page 2	Where load varies moderately
High Fire Point Liquid-Filled Substation 225–20,000 kVA	Higher BIL than dry-type transformers	Less vulnerable to voltage surges	"Transformer Basic Insulation Levels" on page 3	Outdoor environments
	High fire point fluid coolant and dielectric	Less flammable than oil	"High Fire Point Fluids" on page 3	Indoors without a vault, with some restrictions
	Can be fan-cooled @ 15% (225–2500 kVA) or 25% (2500–10,000 kVA) or 33% above 10,000 kVA	Handles moderate overloads with less cost than larger units	"Fan-Cooled Ratings" on page 2	Where load varies moderately
Oil-Filled, Pad-Mounted Transformers 75–10,000 kVA	Higher BIL than dry-type transformers	Less vulnerable to voltage surges	"Transformer Basic Insulation Levels" on page 3	Indoor or outdoor environments
	Oil coolant and dielectric	Least expensive	"Oil-Filled Transformers" on page 2	Where first cost is a factor
	Pad-mounted	Tamperproof construction and underground feeds	"Pad-Mounted Transformers" on page 3	Where exposed to public access (normally outdoors)
High Fire Point Liquid-Filled, Pad-Mounted Transformers 75–10,000 kVA	Higher BIL than dry-type transformers	Less vulnerable to voltage surges	"Transformer Basic Insulation Levels" on page 3	Outdoor environments
	High fire point fluid coolant and dielectric	Less flammable than oil	"High Fire Point Fluids" on page 3	Anywhere an oil fire hazard is unacceptable
	Pad-mounted	Tamperproof construction and underground feeds	"Pad-Mounted Transformers" on page 3	Where exposed to public access (normally outdoors)
Oil-Filled, Pad-Mounted Transformers 75–10,000 kVA	Higher BIL than dry-type transformers	Less vulnerable to voltage surges	"Transformer Basic Insulation Levels" on page 3	Indoor or outdoor environments
	Oil coolant and dielectric	Least expensive	"Oil-Filled Transformers" on page 2	Where first cost is a factor

## ADDITIONAL TRANSFORMER INFORMATION

### Temperature Winding Rise and Insulation Class

This section provides additional transformer information as outlined in Table 1 on page 1.

Table 2 lists the full load temperature rise of each type transformer and the insulation class normally used for that temperature rise.

**Table 2: Temperature Winding Rise and Insulation Class**

Transformer Type	Temperature Winding Rise	Insulation Class
Dry-Type (VPI)	80° C (Optional)	220° C
	115° C (Optional)	
	150° C (Normal)	
Power-Cast™ II	80° C (Normal)	185° C
	100° C (Optional)	
	115° C (Optional)	
Liquid-Filled	55° C (Optional)	120° C
	65° C (Normal)	

### Nonflammable Transformers

Both VPI dry-type and Power-Cast II transformers are considered by codes to be nonflammable. However, they will burn if subjected to a continual source of flame, such as being exposed to a structural fire of the building in which the transformer is installed.

### Fan-Cooled Ratings

Table 3 lists the available fan cooled ratings of Square D® transformers.

**Table 3: Fan-Cooled Ratings**

Transformer Type	Fan-Cooled Ratings		
Dry-Type (VPI)	33 <sup>1</sup> / <sub>3</sub> %	—	—
Power-Cast	33 <sup>1</sup> / <sub>3</sub> % through 750 kVA	50% through 1000–5000 kVA	33 <sup>1</sup> / <sub>3</sub> % above 10,000 kVA
Liquid-Filled	15% through 2000 kVA	25% through 2500–10,000 kVA	33 <sup>1</sup> / <sub>3</sub> % above 10,000 kVA

### Cast Epoxy

Cast epoxy provides the best protection from environment for the coil itself. It is non-hygroscopic (will not absorb water to a significant degree) and is not affected by common industrial chemicals and airborne pollutants.

### Solid Dielectric Insulation

Solid dielectric insulation provides long-term freedom from thermal aging and slow degradation of the dielectric system. Once the system is in place and tested satisfactorily, there is less chance of embrittlement than with conventional transformers.

### Oil-Filled Transformers

Oil-filled transformers are less expensive than high fire point liquid-filled, RTemp-filled, or other fluid units. They are normally less expensive than dry-type (VPI) or cast transformers as well, on a first-cost basis.

**Transformer Basic Insulation Levels**

Table 4 shows the basic insulation level (BIL) of the various transformer construction types.

**Table 4: Transformer Basic Insulation Levels**

kV Class	VPI Dry-Type	VPI Dry-Type •	Distribution-Class Liquid-Filled	Power-Class Liquid-Filled •	Power-Cast™ Transformers	Power-Cast Transformers •
1.2	10	30	30	45	10	30
2.5	30	45	45	60	45	60
5.0	30	60	60	75	60	75
7.2	45	60	60	75	60	75
8.66	45	60	75	95	75	95
15.0	60	95	95	110	95	110
25.0	110	125	125	150	125	150
34.5	150	—	150	200	150	200
46.0	—	—	—	250	—	—
69.0	—	—	—	350	—	—

• Represents optional available ratings

**High Fire Point Fluids**

High fire point fluids have a higher flash, fire, and auto-ignition points than oil and therefore, may be used inside buildings where oil is prohibited by codes. Refer to National Electrical Code® (NEC®), Article 450-23 through 450-26.

**Pad-Mounted Transformers**

The principal distinguishing feature of a pad-mounted enclosure is that it is tamper-resistant and completely barriers the transformer. This means it is impossible to reach any live part of the transformer (neither by poking a wire through an opening or hole nor by removing any nuts or bolts from outside the enclosure). Because of this construction, it is permissible to install a pad-mounted transformer where the general public has actual physical access to the outside of the enclosure.

**QUICK COMPARISONS**

Refer to Table 5 below and Tables 6 and 7 on page 4 for quick comparisons of transformer types.

**Environments**

Refer to Table 5 for transformer environments. Transformer types are listed in the order of first choice, then next preferred choice.

**Table 5: Transformer Environments and Types**

Environment	Transformer Type
<b>Outdoor</b>	Pad-Mounted
	Liquid-Filled
	Power-Cast
	VPI
<b>Contaminated Industrial</b>	Power-Cast
	Liquid-Filled (Oil or High Fire Point)
<b>High Humidity</b>	Liquid
	Power-Cast
<b>Indoor (Clean)</b>	VPI
	High Fire Point
	Power-Cast

### Cooling Characteristics

Refer to Table 6 for the cooling characteristics of transformers.

**Table 6: Transformer Types and Cooling Characteristics**

Transformer Type and Temperature	Fan Cooled	Self Cooled
80° C Power-Cast™	33% or 50%	15%
80° C VPI Watchdog®	33%	30%
115° C VPI Watchdog	33%	15%
150° C VPI	33%	—
55° C Liquid-Filled Substation	15%, 25%, or 33%	12%
65° C Liquid-Filled Substation	15%, 25%, or 33%	—
55° C Pad-Mounted	—	12%
65° C Pad-Mounted	—	—

### Weight (15 kV Class)

Refer to Table 7 for transformer types and weights. Weights are approximate and depend on many factors including primary and secondary voltages, BIL, %IZ, as well as kVA and temperature rise. High fire point liquid-filled substations weigh approximately 5% more than oil-filled substations.

**Table 7: Transformer Types and Weights**

kVA	150° C Dry	80° C Dry	80° C Power-Cast	65° C Oil Substation
225	6000	6000	6400	4800
500	6250	6530	8000	5400
1000	7500	9200	11,000	7300
2000	10,200	14,850	17,000	11,600
3000	17,000	20,850	25,000	19,000
5000	25,000	30,000	37,000	30,000

### SPECIAL CONSIDERATIONS

Check code requirements for oil- or high fire point liquid-filled units used indoors. Refer to NEC Article 450. In some circumstances, curbing and sprinkler systems are required.

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