

## A Guide to Specifying Current Transformers (CT's)

Current transformers are generally toroidal – sometimes rectangular – transformers which are used to monitor a current in one circuit (primary) and deliver a proportional current in a second (secondary) circuit.

There are 2 main applications for CT's

- Measurement
- Protection

In Australia there are 2 main standards for CT's

- AS1675-1986
- AS60044.1-2007

When CT's are designed, made and tested to one of these standards they do not automatically comply with the other. Therefore it is important to understand the two standards, to use the correct standard in each application and to be consistent at the quoting and ordering stage.

The difference may be in:

- The construction of the CT,
- The way the rating is stated on the nameplate,
- The routine testing of the CT, or
- The way the documentation of testing is provided.

Appendix B of AS1675 gives a guidance to the application of CT's and is very useful reading.

### Measurement CT's

Both standards require the current and VA to be specified.

AS1675 has classes M and ME. ( Measurement, Measurement Extended). Two tables in the standard show the error limits at various percentages of the rated current. The accuracy classes are 0.1, 0.2, 0.5, 1, 2, and 5 percent.

AS60044.1 has classes M, ME, and S. ( Measurement, Measurement Extended and Special). Three tables in the standard show the error limits at various percentages of the rated current. The accuracy classes are 0.1, 0.2, 0.5, 1.0, 3, and 5 percent.

The size of the CT is significantly affected by the differing test requirements of the 2 standards. Under AS1675 the CT is to be tested more stringently, requiring better performance at the low current (2.5 or 5% of rated current) than AS60044.1. Under AS1675 the maximum difference in performance between various percentages of load is set – not so in AS60044.1.

Therefore it is important to specify the standard to which the CT is to be made and the correct nomenclature and accuracy class in line with that standard.

The instrument security factor and limiting instrument current given in AS60044.1 provide for the maximum current the CT will deliver to the instrument before saturation of the CT core.

### Protection CT's

There are 2 types of protection CT's

- P class
- PL class (AS1675), PX class (AS60044.1)

#### P Class

Both standards have P class but specify them differently

AS1675 specifies the rated composite error, rated secondary reference voltage and rated accuracy limit factor.

AS60044.1 specifies the rated output (VA), rated composite error and rated accuracy limit.

There is a conversion formula in appendix H of AS1675 as follows:

$$\text{Rated secondary reference voltage} \times \text{Rated secondary current} \\ = \text{Rated output (VA)} \times \text{Rated accuracy limit.}$$

When the CT is incorrectly specified the resulting conversion often gives unrealistic values, especially for the VA.

#### PL class (AS1675) and PX class (AS60044.1)

The design of the PL and PX classes is identical. The difference exists in the test results required to be submitted by the standard. AS1675 requires one typical excitation curve to be supplied for each batch of PL class CT's while AS60044.1 requires an excitation curve to be supplied for each PX class CT.

It is essential that the correct designation, according to the standard required, is used when specifying protection CT's:

#### AS1675

5P60F20 100/5A

0.15PL200R1.2 500/2A

#### AS60044.1

15VA 5P20 100/5A

0.15PX200R1.2 500/2A

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## **STANDARDS & CLASSES:**

### **AS1675**

#### Metering

Eg “class 5M 15VA”, “class 0.2ME2 10VA”, “class 0.5M 30VA”

#### Protection

Eg “class 5P 100 F20”, “class 10P 50 F10”

#### Special Protection

Eg “0.1 PL 100 R5”, “0.05 PL 1500 R12”

### **AS60044.1, BSEN60044.1, IEC60044.1, IEC185** (Virtually identical)

#### Metering

Eg “15VA class 5M”, “10VA class 0.2M Ext 200%”, “5VA class 0.5S”

#### Protection

Eg “15VA class 5P20”, “30VA class 10P10”

#### Special Protection

Eg “0.1 PX 100 R5”, “0.05 PX 1500 R12”

### **BS3938, BS7276** (Virtually identical)

#### Metering

Eg “15VA class 5M”, “10VA class 0.2M Ext 200%”, “5VA class 0.5S”

#### Protection

Eg “15VA class 5P20”, “30VA class 10P10”

#### Special Protection

Eg “0.1 X 100 R5”, “0.05 X 1500 R12”

### **Notes:**

AS1675 class PL is equivalent to AS/IEC/BSEN60044.1 class PX and BS3938 class X

BS3938 & BS7276 are similar to AS/IEC/BSEN60044.1 standards