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Transformer Processing and Testing

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7.1 INTRODUCTION

Testing is a very important stage in the manufacture of any product. Not only is the satisfactory outcome of the tests a guarantee to the customer that the equipment will meet the required specification, but it is also a confirmation to the design office of their calculations as well as providing them with valuable data for future designs.

Since the testing of transformers must be carried out in co-ordination with the works production programme, it is desirable, wherever possible, for a standard set of tests to be carried out. These must be acceptable to both the customer and the manufacturer, and an IEC publication 76G1.7 is intended to cover this requirement. The tests can be classified as follows.

(a) Routine tests. All transformers are subjected to these.
(b) Type tests. These are carried out on the first unit only of a new design.

Occasionally, the customer may require some non-standard tests which will be arranged when placing the order, or the design office may ask for special tests for their own information.

Whilst no particular order is specified officially, the tests detailed in this chapter have been set out in the order in which they would generally be carried out in practice.

7.2 PRELIMINARY TESTS

Certain tests are carried out in the shops before the transformer is assembled in its

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tank, in order to ensure that any faults which may be detected at this stage can be rectified before work is continued.

7.2.1 Core insulation

As soon as the core has been assembled, an alternating voltage test at 2 kV is applied between core bolts, side plates and core, in order to prove the insulation of the magnetic circuit.

7.2.2 Ratio

The tolerance allowed for ratio is $\pm 0.5\%$ of the declared ratio or $\pm 0.1\%$ of the percentage impedance voltage, whichever is the smaller. In order to obtain the accuracy necessary for this measurement it is usual to employ a ratiometer; the basic connection is shown in figure 7.1. R consists of variable decade resistors which are adjusted during the test until a balance is obtained on the vibration galvanometer VG. The ratio of the ratiometer arms is then the same as that of the transformer under test, and this value can be read directly on the ratiometer.

![Figure 7.1 Ratio test](image)

7.2.3 Polarity

Polarity tests are carried out to determine the phase relationship between the instantaneous induced voltages in the primary and secondary windings relative to the terminal markings.