

IEEE STANDARDS
ARCHIVES
DO NOT REMOVE

AIEE
No. 52
March 1951

Application Guide
for
**GROUNDING of INSTRUMENT TRANSFORMER
SECONDARY CIRCUITS *and* CASES**

(Published for trial use)



Published by
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
33 West Thirty-ninth Street, New York 18, N. Y.

CONTENTS

37.050 General	3
37.100 Scope	3
37.150 Grounding of Secondary Circuits	3
37.200 Grounding of Cases	5
Appendix	6

ACKNOWLEDGMENT

The Institute wishes to acknowledge its indebtedness to those who have so freely given their time and knowledge, and have conducted experimental work on which many of the AIEE publications are based.

The work of preparing this application guide was carried out by a Working Group of the Instrument Transformer Subcommittee of the AIEE Committee on Transformers. The personnel of this Working Group was as follows:

H. Bany, *Chairman*

M. V. Eardley

W. K. Sonnemann

E. K. Huntington

G. S. Whitlow

H. R. Paxson

APPLICATION GUIDE

for

GROUNDING of INSTRUMENT TRANSFORMER SECONDARY CIRCUITS and CASES*

37.050 GENERAL

It has been common practice for a long time in this country to ground the secondary circuits and cases of most instrument transformers used in switching stations, substations and generating stations and in certain other types of installations for reasons of safety to personnel and equipment.

The object of the grounding is to limit the voltage on the secondary circuits and cases due to the effects of

(1) possible insulation failure or other accidental contact between the primary circuit and the secondary circuit and/or case, which can subject them to full primary voltage, and

(2) the capacitive coupling† between the primary and secondary circuit and case, which may impart to the secondary circuit and/or case objectionable or dangerous voltages to ground.

However, there has been no general agreement among manufacturers and users whether all such instrument transformers, including auxiliary transformers, irrespective of voltage, should be grounded or just how this grounding should be done. The object of this Guide, based to a large extent on the findings and conclusions contained in a report by the AIEE Relay Committee titled "Grounding of Instrument Transformer Secondary Circuits" published in the April 1947 issue of *Electrical Engineering*, is to give recommendations in this respect.

37.100 SCOPE

This Guide contains general and specific recommendations for grounding of the secondary circuits and cases of instrument, i.e., potential and current, transformers in all types of installations. These recommendations apply to all instrument transformers irre-

* The general term "case" is intended to designate the exposed metallic parts of the transformer, depending upon its detailed design and construction, such as the tank, frame, mounting structure, feet or core (if exposed).

† The capacitive coupling may cause the normal primary voltage to build up a charge on the secondary winding or case that will result in radio interference from intermittent leakage to ground or other undesirable phenomena or damage. It may also cause abnormal primary voltages due to switching or lightning surges to build up a charge of sufficient magnitude on the secondary winding or case that is hazardous to personnel and may possibly result in a flashover from the secondary circuit or case.

Overvoltages may further occur on the secondary circuit due to voltage surges in the primary circuit as a result of the inductive coupling between these two circuits. Grounding is, however, of no particular benefit in reducing these voltages, nor will it reduce the overvoltage resulting from the accidental opening of a current transformer secondary circuit.

spective of the value of primary voltage or whether the primary windings of the transformers are connected to, or in, power circuits or whether these primary windings are connected in the secondary circuits of other instrument transformers.

Exceptions to grounding are permissible where the advantages obtained by not grounding in certain instances or in certain types of installations are considered to outweigh the safety or other advantages obtained by grounding. However, such exceptions should be made only

(1) when the instrument transformers form part of a separate metering or network installation and not part of a switching station, substation or generating station, and

(2) when the primary windings are connected to circuits of 600 volts or less.

Furthermore, for reasons of increased safety in those metering or network installations where the instrument transformers or live parts of the secondary circuit are accessible to other than authorized personnel,

(1) the exceptions to the grounding of the secondary circuits should be made only if the voltage of the primary circuit is 300 volts or less to ground and

(2) the exceptions to the grounding of the cases should be made only if the voltage of the primary circuit is 150 volts or less to ground.

37.150 GROUNDING OF INSTRUMENT TRANSFORMER SECONDARY CIRCUITS

Each secondary circuit should be a completely self-contained metallic circuit insulated from ground, except at one point in this circuit and at one location in the installation and there the circuit should be positively and solidly grounded through a conductor of adequate size. (See 37.100 for permissible exceptions)

For purposes of this Guide, an instrument transformer secondary circuit consists of all instrument transformer secondary windings which are connected together electrically along with all of the coils, contacts, and other components of the group of devices which they supply and to which they are electrically connected.