IEC 60076-10-1

Edition 2.0 2020-11

INTERNATIONAL STANDARD

AMENDMENT 1

Power transformers –
Part 10-1: Determination of sound levels – Application guide

IEC 60076-10-1:2016-03/AMD1:2020-11(en)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
67 000 electrotechnical terminology entries in English and French extracted from the Terms and definitions clause of IEC publications issued between 2002 and 2015. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC 60076-10-1

Edition 2.0 2020-11

INTERNATIONAL STANDARD

AMENDMENT 1

Power transformers –
Part 10-1: Determination of sound levels – Application guide

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.180

ISBN 978-2-8322-8996-9

FOREWORD

This amendment has been prepared by IEC technical committee 14: Power transformers.

The text of this amendment is based on the following documents:

CDV	Report on voting
14/1037/CDV	14/1047/RVC

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

7.10 Converter transformers with saturable reactors (transductors)

Delete the existing text of 7.10 and replace it with the following:

7.10 Converter transformers with saturable reactors (transductors)

It is normally not possible to perform factory sound level measurements on converter transformers with built-in saturable reactors with the reactors functioning as in service, i.e. with nominal d.c. current. During factory test, a.c. currents are applied, and the saturable reactors thereby experience strong saturation in both directions. This saturation generates a specific audible noise that normally significantly exceeds the generated sound level of the transformer itself.

The main operating component of a saturable reactor is the magnetic core, which is the source of the noise. When the reactor cores enter saturation during transformer testing with a.c. load current, the accompanied magnetic flux in the saturable reactor cores is heavily distorted and causes vibration components of higher harmonic frequencies that dominate the measured converter transformer sound level. Converter transformer sound levels measured under such conditions are consequently found to be significantly higher than those of regular transformers of same power rating.

The service sound level of converter transformers with built-in saturable reactors due to load current is normally dominated by the presence of current harmonics produced by the converters (see Annex A). However, higher frequency sound components are also produced by the saturable reactors in regular service condition. There are no reliable methods to calculate the sound level of saturable reactors.

NOTE Sound levels from converter transformers are also discussed in IEC TS 61973:2012, IEC 61378-3:2015, CIGRÉ Technical Brochure 202: "HVDC stations audible noise" and CIGRÉ Paper "Sound contribution of saturable reactors in rectifier transformers during FAT".

Bibliography

Add:

PYROG, S., BENZMÜLLER, F., GREVE, G., PLOETNER, C. *Sound contribution of saturable reactors in rectifier transformers during FAT.* CIGRE SC A2 Colloquium, Cracow, Poland 2017