

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Power transformers –
Part 6: Reactors

STANDARD PREVIEW
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Transformateurs de puissance –
Partie 6: Bobines d'inductance

[IEC 60076-6:2007](#)

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POWER TRANSFORMERS –

Part 6: Reactors

FOREWORD

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International Standard IEC 60076-6 has been prepared by IEC technical committee 14: Power Transformers.

This first edition of IEC 60076-6 cancels and replaces the second edition of IEC 60289 published in 1988. This first edition constitutes a technical revision.

This edition included the following significant technical changes with respect to the previous edition:

- wide extension of the “Definitions”, “Rating” and “Tests” Clauses,
- more consequent distinction between definition and rating,
- “Tests” subclauses take into account the latest revisions of relevant IEC 60076 standards,
- dielectric testing of reactors is now in line with dielectric testing of transformer according IEC 60076-3:2000,
- consequent distinction between oil-immersed and dry-type reactor,
- document offers an easier handling and is a more stand-alone document than IEC 60289,

- introduction of the discharge reactor as part of Clause 9,
- introduction of the turn-to-turn overvoltage test for dry-type reactors (Annex E),
- important background information given by newly introduced informative annexes,
 - ANNEX A (informative) – Information on shunt reactor switching and on special applications
 - ANNEX B (informative) – Magnetic characteristic of reactors
 - ANNEX C (informative) – Mutual reactance, coupling factor and equivalent reactances of three-phase reactors
 - ANNEX D (informative) – Temperature correction of losses for liquid-immersed gapped-core and magnetically shielded air-core reactors
 - ANNEX F (informative) – Short-circuit testing
 - ANNEX G (informative) – Resistors – Characteristics, Specification, Tests

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

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14/538/CDV	14/547A/RVC

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

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This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 60076 series, under the general title Power transformers, can be found on the IEC website.

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INTRODUCTION

This part of IEC 60076 is intended to provide the basis for the specification and testing of the types of reactor given in the scope. The document also gives some important information on certain reactor applications to aid the preparation of a reactor specification.

Wherever possible, references to technical Clauses in the other parts of IEC 60076 which are relevant to power transformers have been made. However, because reactors have some fundamental differences to transformers there are special considerations that apply to the specification, testing and application of reactors. These are included in this part of IEC 60076.

Clauses 1 to 6 form the general parts of the document, which apply to all types of reactor. Clauses 7 to 12 deal individually with each different type of reactor. Generally, only one of the Clauses 7 to 12 will apply to a specific reactor.

This part of IEC 60076 has more than one definition Subclause. The general definitions given in Clause 3 apply to the whole document. Each of the Clauses 7 to 12 dealing with a certain type of reactor includes a definition Subclause relevant and applying only to that Clause.

Clauses 7 to 12 have been given a uniform structure. Within this structure, the Rating Subclause sets out the minimum information that a purchaser shall supply with the reactor specification. The test Subclause in each Clause defines the relevant tests that can be applied to that particular type of reactor and may include some additional items that shall be agreed on at the time of order.

Annexes A, B, C, D, F and G provide further information for certain reactor applications and testing. Annex E describes the dielectric turn-to-turn test.

This part of IEC 60076 covers both dry-type and liquid-immersed reactors and where Clauses or Subclauses apply to only one type this is made clear.

Where possible, the requirements of this part of IEC 60076 have been harmonised with the equivalent IEEE standard.

POWER TRANSFORMERS –

Part 6: Reactors

1 Scope

This part of IEC 60076 applies to the following types of reactors:

- shunt reactors;
- series reactors including current-limiting reactors, neutral-earthing reactors, power flow control reactors, motor starting reactors, arc-furnace series reactors;
- filter (tuning) reactors;
- capacitor damping reactors;
- capacitor discharge reactors;
- earthing transformers (neutral couplers);
- arc-suppression reactors;
- smoothing reactors for HVDC and industrial application;

with the exception of the following reactors:

- reactors with a rating less than 1 kvar single-phase and 5 kvar three-phase;
- reactors for special purposes such as high-frequency line traps or reactors mounted on rolling stock.

Where IEC standards do not exist for small or special reactors, this part of IEC 60076 may be applicable as a whole or in part.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60060-1:1989, *High-Voltage test techniques – Part 1: General definitions and test requirements*

IEC 60076-1:1993, *Power transformers – Part 1: General*
Amendment 1 (1999)

IEC 60076-2:1997, *Power transformers – Part 2: Temperature rise*

IEC 60076-3:2000, *Power transformers – Part 3: Insulation levels, dielectric tests and external clearances in air*

IEC 60076-4:2002, *Power transformers – Part 4: Guide to lightning impulse and switching impulse testing – Power transformers and reactors*

IEC 60076-5:2006, *Power transformers – Part 5: Ability to withstand short-circuit*

IEC 60076-7:2005, *Power transformers – Part 7: Loading guide for oil-immersed power transformers*

IEC 60076-8:1997, *Power transformers – Part 8: Application guide*

IEC 60076-10:2005, *Power transformers – Part 10: Determination of sound levels*

IEC 60076-11:2004, *Power transformers – Part 11: Dry-type transformers*

IEC 60137, *Insulated bushings for alternating voltages above 1 000 V*

IEC 60270, *High-voltage test techniques – Partial discharge measurements*

IEC 60721-2-6, *Classification of environmental conditions – Part 2: Environmental conditions appearing in nature. Earthquake vibration and shock*

IEC 60815, *Guide for the selection of insulators in respect of polluted conditions*

IEC 60905:1987, *Loading guide for dry-type power transformers*

IEC 60943:1998, *Guidance concerning the permissible temperature rise for parts of electrical equipment, in particular for terminals*

iTeh STANDARD PREVIEW

3 Terms and definitions (standards.iteh.ai)

For the purposes of this document, the following terms and definitions apply.

[IEC 60076-6:2007](https://standards.iteh.ai/catalog/standards/sist/0eeb37a7-1d2b-4369-909e-0b86ebdaeca7/iec-60076-6-2007)

The definitions given in this Clause are of a general nature. Additional definitions are given in those Clauses of this part of IEC 60076 which are specific to a particular type of reactor or which are given a particular meaning when related to that type of reactor.

There are frequent references to technical Clauses in IEC 60076 concerning transformers and transformer testing. The terminology of those standards may not always be strictly relevant in the context of reactors. For example “induced a.c. withstand voltage test” is a test on a reactor where there is a test voltage across the winding although it is not “induced” from another winding, but applied directly from the test source.

3.1 Types of reactor

3.1.1

shunt reactor

reactor connected phase-to-earth, phase-to-neutral or between phases in a power system to compensate for capacitive current

3.1.2

current-limiting reactor

reactor connected in series in a power system to limit the current under system fault conditions

3.1.3

neutral-earthing reactor

reactor connected between the neutral of a power system and earth to limit the line-to-earth current under system earth fault conditions to a desired value