

Glossary of

Electrotechnical, power, telecommunication, electronics, lighting and colour terms

Part 2. Terms particular to power engineering

Group 19. Power system protection

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Committees responsible for this British Standard

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- Association of Consulting Engineers
- British Cable Makers Confederation
- Electricity Association
- Federation of the Electronics Industry
- Institute of Physics
- Institution of Incorporated Executive Engineers

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Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
Guide to the glossary	iv
Glossary	
448-11 General terms	1
448-12 Reliability of protection	4
448-13 Power system faults	5
448-14 Protection	6
448-15 Protection using telecommunication	9
448-16 Automatic control equipment	11
Figures	14
Index	24

Foreword

This Group of BS 4727 : Part 2 has been prepared under the direction of the Electrotechnical Sector Board. It contains terms and definitions relating to power engineering. The terms and definitions are technically identical with the corresponding terms appearing in IEC 50 (448) : 1995 *International Electrotechnical Vocabulary Chapter 448 : Power system protection*, published by the International Electrotechnical Commission (IEC). This standard contains the English language version of the terms and definitions.

The glossary is divided into five Parts, each of which is subdivided into Groups. Each Group will comprise the terms and definitions used in a particular branch of electrical engineering and will be issued individually as soon as it is completed. This arrangement makes it possible to add new Groups or review existing Groups at any time without affecting the remainder of the glossary.

The five Parts of the glossary are as follows:

Part 1. *Terms common to power, telecommunications and electronics*

Part 2. *Terms particular to power engineering*

Part 3. *Terms particular to telecommunications and electronics*

Part 4. *Terms particular to lighting and colour* (withdrawn)

Part 5. *Terms particular to electromedical equipment*

Fundamental and general terms common to power, telecommunications and electronics from Groups 01 and 02 of Part 1. The specialist Groups (e.g. Groups 02 to 18 of Part 2) contain only the terms and definitions relating to their subject.

As far as has been practicable all terms and definitions established in current usage and falling within the scope of this glossary have been included. Experience has shown that it is rarely possible to replace, or even to modify, a well established term no matter what the logical or aesthetic shortcomings of that term may be. Current usage has therefore been accepted as the authority for terms and their meaning except where there has been a very good reason for doing otherwise, e.g. where terms have been considered to be fundamentally wrong, ambiguous, superfluous or in need of standardization.

Where two or more synonymous terms are in use, those which are deprecated are omitted from the body of the text but are entered in the alphabetical index with a cross-reference to the standard term. In cases where it was felt that the time was not yet right to deprecate a synonym, preferred terms are given first and other terms are printed in less prominent type to indicate the intention to deprecate them in the course of time. Where synonyms are considered of equal value they are shown in the same type.

Where terms are used with different meanings in different branches of electrical engineering, appropriate definitions are given in the Groups of the glossary corresponding to these branches. Such a definition, when taken out of the context of its Group, should if possible be quoted with a preamble indicating its proper context.

It is to be noted that the given definition of a term represents the generally accepted meaning of that term. Under no circumstances should it be regarded as taking the place of a specification.

As far as possible the terms are arranged in a logical order proceeding from the general to the specific and from the whole to the part and allied terms are placed close together.

In earlier editions of BS 4727, a special numbering system was used. However, to facilitate publication of future editions of BS 4727, only the International Electrotechnical Vocabulary numbering system is now used. Where terms are used in other Parts of the glossary, their additional reference number is given in brackets in medium type.

A general view of the position of the Group in the glossary can be obtained from the guide to the glossary. An alphabetical index of the terms of each Group is provided at the end of each group to facilitate reference to particular terms. It is recommended that the user of any Group of the glossary should consider the Group in association with the Groups covering general or fundamental terms within the Part and with Groups 01 and 02 of Part 1.

In this glossary parentheses () enclose words or phrases that are not part of the term or definition and can be omitted without affecting the meaning.

Square brackets [] enclose words which may replace a preceding part of an expression.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to vi, pages 1 to 25 and a back cover.

Guide to the glossary

Part 1 *Terms common to power, telecommunications and electronics*

Group 01 *Fundamental terminology*

Group 02 *Electrical and magnetic devices terminology*

Group 03 *Relay terminology*

Group 04 *Measurement terminology*

Group 05 *Semiconductor terminology*

Group 06 *Electronic tube terminology*

Group 07 *Magnetic materials and components*

Group 08 *Piezoelectric devices for frequency control and selection*

Group 09 *Electromagnetic compatibility*

Group 10 *Insulating solids, liquids and gases*

Group 11 *Printed circuits*

Group 12 *Insulators*

Group 13 *Electromechanical components for electronic equipment*

Titles to any further Groups will be added in due course.

Part 2 *Terms particular to power engineering*

Group 01 *General power terminology* (withdrawn)

Group 02 *Power electronics terminology*

Group 03 *Rotating machinery terminology*

Group 04 *Power transformers and reactors*

Group 05 *Voltage fluctuation terminology*

Group 06 *Switchgear and controlgear terminology (including fuse terminology)*

Group 07 *Tariffs terminology*

Group 08 *Electric cables*

Group 09 *Transducer terminology*

Group 10 *Industrial electroheating terminology*

Group 11 *Generation, transmission and distribution of electricity terminology*

Group 12 *Telecontrol terminology*

Group 13 *Electrical apparatus for explosive atmospheres*

Group 14 *Power capacitors*

Group 15 *Overhead lines*

Group 16 *Instrument transformers*

Group 17 *Secondary cells and batteries*

Group 18 *Electric traction*

Group 19 *Power system protection*

Titles to any further Groups will be added in due course

Part 3 Terms particular to telecommunications and electronics

Group 01 General telecommunication and electronics terminology

Group 02 Telephony

Group 03 Telegraphy, facsimile and data communication

Group 04 Broadcasting and television terminology

Group 05 Propagation and media terminology

Group 06 Radio location and navigation terminology

Group 07 Radiocommunication terminology

Group 08 Acoustics and electroacoustics terminology

Group 09 Transmission lines and waveguides

Group 10 Recording and reproduction of sound and video terminology

Group 11 Space radiocommunications terminology

Group 12 Telecommunications, channels and networks

Group 13 Optical fibre communication

Group 14 Oscillations, signals and related devices

Group 15 Antennas

Group 16 Switching and signalling in telecommunications

Group 17 Transmission

Titles to any further Groups will be added in due course.

Part 4 Terms particular to lighting and colour (withdrawn)

Part 5 Terms particular to electromedical equipment

Group 01 Radiology and radiological physics terminology

Titles to any further Groups will be added in due course.

Glossary

No.	Term	Definition
448-11	General terms	
448-11-01	protection	The provisions for detecting faults or other abnormal conditions in a power system, for enabling fault clearance, for terminating abnormal conditions, and for initiating signals or indications. NOTE 1. The term 'protection' is a generic term for protection equipments or protection systems. NOTE 2. The term 'protection' may be used to describe the protection of a complete power system or the protection of individual plant items in a power system e.g. transformer protection, line protection, generator protection. NOTE 3. Protection does not include items of power system plant provided, for example, to limit overvoltages on the power system. However, it includes items provided to control the power system voltage or frequency deviations such as automatic reactor switching, load-shedding, etc.
448-11-02	protection relay protective relay (USA)	A measuring relay which, either solely or in combination with other relays, is a constituent of a protection equipment.
448-11-03	protection equipment relay system (USA)	An equipment incorporating one or more protection relays and, if necessary, logic elements intended to perform one or more specified protection functions. NOTE. A protection equipment is part of a protection system. EXAMPLES. Distance protection equipment, phase comparison protection equipment. (One-phase comparison equipment is part of one line-end of a phase comparison protection system.)
448-11-04	protection system	An arrangement of one or more protection equipments, and other devices intended to perform one or more specified protection functions. NOTE 1. A protection system includes one or more protection equipments, instrument transformer(s), wiring, tripping circuit(s), auxiliary supply(s) and, where provided, communication system(s). Depending upon the principle(s) of the protection system, it may include one end or all ends of the protected section and, possibly, automatic reclosing equipment. NOTE 2. The circuit-breaker(s) are excluded.
448-11-05	protected section	That part of a power system network, or circuit within a network, to which specified protection has been applied.
448-11-06	selectivity of protection	The ability of a protection to identify the faulty section and/or phase(s) of a power system.
448-11-07	section selectivity of protection	The ability of a protection to identify the faulty section of a power system.
448-11-08	phase selectivity of protection	The ability of a protection to identify the faulty phase or phases of a power system.
448-11-09	unit protection	A protection whose operation and section selectivity are dependent on the comparison of electrical quantities at each end of the protected section. NOTE. In the USA, the term 'unit protection' designates the protection provided for an electrical generator.

No.	Term	Definition
448-11-10	non-unit protection	A protection whose operation and section selectivity are dependent on the measurement of electrical quantities at one end of the protected section by the measuring relays and, in some cases, on the exchange of logic signals between the ends. NOTE. The section selectivity of non-unit protection may depend upon its setting, particularly with regard to time.
448-11-11	phase segregated protection segregated phase protection (USA)	A protection, generally unit protection, which is phase selective.
448-11-12	non-phase segregated protection	A protection, generally unit protection, which is not phase selective. NOTE. Non-phase segregated unit protection generally employs means of deriving a single phase quantity representative of all three power phases, such as a summation transformer or phase sequence network.
448-11-13	main protection primary protection (USA)	Protection expected to have priority in initiating fault clearance or an action to terminate an abnormal condition in a power system. NOTE. For a given item of plant, two or more main protections may be provided.
448-11-14	backup protection	Protection which is intended to operate when a system fault is not cleared, or abnormal condition not detected, in the required time because of failure or inability of other protection to operate or failure of the appropriate circuit-breaker(s) to trip. NOTE. In the USA, the term 'backup protection' designates a form of protection that operates independently of specified devices in the main protection system. The backup protection may duplicate the main protection or may be intended to operate only if the main protection system fails or is temporarily out of service.
448-11-15	circuit local backup protection	Backup protection which is energized either from those instrument transformers which energize the main protection or from instrument transformers associated with the same primary circuit as the main protection. NOTE. In the USA, the term 'circuit local backup protection' is sometimes used as an alternative to the term 'breaker failure protection'.
448-11-16	substation local backup protection	Backup protection which is energized from instrument transformers located within the same substation as the corresponding main protection and not associated with the same primary circuit.
448-11-17	remote backup protection	Backup protection located in a substation remote from that substation in which the corresponding main protection is located.
448-11-18	circuit-breaker failure protection breaker failure protection (USA)	A protection which is designed to clear a system fault by initiating tripping of other circuit-breaker(s) in the case of failure to trip of the appropriate circuit-breaker.
448-11-19	standby protection	Protection normally not in service but which can be switched into service to replace another protection.
448-11-20	instantaneous protection	Protection with no intentional delay.

No.	Term	Definition
448-11-21	delayed protection time-delayed protection (USA)	Protection with an intentional delay.
448-11-22	directional protection	Protection designed to operate only for a fault located in one direction from the relaying point.
448-11-23	reach of protection	The zone expected to be covered by the protection beyond which the non-unit protection will not operate.
448-11-24	overlap of protection	Section protected by more than one protection applied to different items of primary plant.
448-11-25	residual current (for protection)	Current equal to sum of the phase currents.
448-11-26	residual voltage (for protection)	Voltage equal to sum of the phase-to-earth voltages.
448-11-27	positive (sequence) component (of a three-phase system)	One of the three symmetrical sequence components which exists in symmetrical and unsymmetrical three-phase system(s) of sinusoidal quantities and which is defined by the following complex mathematical expression: $\underline{X}_1 = 1/3(\underline{X}_{L1} + a\underline{X}_{L2} + a^2\underline{X}_{L3})$ where a is the 120 degree operator, and $\underline{X}_{L1}$, $\underline{X}_{L2}$, and $\underline{X}_{L3}$ are the complex expressions of the phase quantities concerned, and where $\underline{X}$ denotes the system current or voltage phasors.
448-11-28	negative (sequence) component (of a three-phase system)	One of the three symmetrical sequence components which exists only in an unsymmetrical three-phase system of sinusoidal quantities and which is defined by the following complex mathematical expression: $\underline{X}_2 = 1/3(\underline{X}_{L1} + a^2\underline{X}_{L2} + a\underline{X}_{L3})$ where a is the 120 degree operator, and $\underline{X}_{L1}$, $\underline{X}_{L2}$, and $\underline{X}_{L3}$ are the complex expressions of the phase quantities concerned, and where $\underline{X}$ denotes the system current or voltage phasors.
448-11-29	zero (sequence) component (of a three-phase system)	One of the three symmetrical sequence components which exists only in an unsymmetrical three-phase system of sinusoidal quantities and which is defined by the following complex mathematical expression: $\underline{X}_0 = 1/3(\underline{X}_{L1} + \underline{X}_{L2} + \underline{X}_{L3})$ where $\underline{X}_{L1}$, $\underline{X}_{L2}$ and $\underline{X}_{L3}$ are the complex expressions of the phase quantities concerned, and where $\underline{X}$ denotes the system current or voltage phasors.
448-11-30	inrush current	Transient current associated with energizing of transformers, cables, reactors, etc.
448-11-31 (604-02-31 MOD)	tripping	Opening of a circuit-breaker by either manual or automatic control or by protective devices.