

Low-voltage switchgear and controlgear — Overcurrent protective devices —

Part 1: Application of short-circuit ratings

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National foreword

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**Low-voltage switchgear and controlgear – Overcurrent protective devices –
Part 1: Application of short-circuit ratings**

**Appareillage à basse tension – Dispositifs de protection contre les surintensités –
Partie 1: Application des caractéristiques de court-circuit**

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INTRODUCTION

Low-voltage equipment standards IEC 60947 and IEC 60439 currently include short-circuit ratings for products and assemblies respectively, defined in terms of the ability of the equipment to operate at a level of peak current, an r.m.s. current for a specified time and/or a level of current conditional upon a short-circuit protective device in series. In practice the correct application of the various short-circuit ratings needs to be fully understood by the circuit designer to avoid leaving a circuit or equipment with inadequate short-circuit protection. It is also useful to take full advantage of the capability of devices and systems to avoid over-engineering, with the consequent unnecessary additional cost.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR – OVERCURRENT PROTECTIVE DEVICES –

Part 1: Application of short-circuit ratings

1 Scope

This technical report, which serves as an application guide for the short-circuit ratings given in IEC standards for low-voltage switchgear and controlgear and assemblies, summarises the definitions of the ratings and provides examples of their application.

NOTE This document does not concern itself with household (domestic) installations.

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 60255 (all parts), *Electrical relays*

IEC 60269-1, *Low-voltage fuses – Part 1: General requirements*

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60439-1, *Low-voltage switchgear and controlgear assemblies – Part 1: Type-tested and partially type-tested assemblies*

IEC 60439-2, *Low-voltage switchgear and controlgear assemblies – Part 2: Particular requirements for busbar trunking systems (busways)*

IEC 60898-1, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Part 1: Circuit-breakers for a.c. operation*

IEC 60947-1, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60947-2, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 60947-3, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

IEC 60947-4-1, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*

IEC 60947-6-2, *Low-voltage switchgear and controlgear – Part 6-2: Multiple function equipment – Control and protective switching devices (or equipment) (CPS)*

IEC 61009-1, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules*

3 Alphabetical list of definitions and characteristics

	Clause
B	
Breaking capacity of a fuse-link	6.3.1
C	
Circuit-breaker according to IEC 60898-1	6.2 b) ii)
Circuit-breaker according to IEC 60947-2	6.2 b) ii)
Conditional short-circuit rating (back-up protection)	4
Control and protective switching device (CPS) according to IEC 60947-6-2	6.2 b) iv)
Cut-off current of a circuit-breaker according to IEC 60947-2	6.3.2
Cut-off current of a fuse-link	6.3.1
F	
Fuse-combination unit to IEC 60947-3	6.2 b) i)
O	
Operating I^2t (Joule integral) of a circuit-breaker according to IEC 60947-2	6.3.2
Operating I^2t (Joule integral) of a fuse-link	6.3.1
P	
Peak short-circuit current I_p	4
Prospective (available) short-circuit current I_{cp}	4
Protected starter according to IEC 60947-4-1	6.2 b) iii)
Protected switching device according to IEC 60947-4-1	6.2 b) iii)
R	
Rated conditional short-circuit current I_q of a contactor or motor starter	7.4.2
Rated conditional short-circuit current I_{cc} of a circuit of an assembly	5
Rated peak withstand current I_{pk} of a circuit of an assembly	5
Rated service short-circuit breaking capacity I_{cs} of a circuit-breaker according to IEC 60947-2	6.3.2
Rated short-circuit breaking capacity I_{cs} of a CPS	6.3.3
Rated short-circuit capacity I_{cn} of a circuit-breaker according to IEC 60898-1 and of a residual current operated circuit-breaker with integral overcurrent protection (RCBO) according to IEC 61009-1	6.3.4
Rated short-circuit making capacity I_{cm} of a circuit-breaker according to IEC 60947-2	6.3.2
Rated short-time withstand current I_{cw} of a circuit of an assembly	5
Rated short-time withstand current I_{cw} of a circuit-breaker according to IEC 60947-2	6.3.2
Rated ultimate short-circuit breaking capacity I_{cu} of a circuit-breaker according to IEC 60947-2	6.3.2
Residual current operated circuit-breaker with integral overcurrent protection (RCBO) according to IEC 61009-1	6.2 b) ii)
S	
Service short-circuit capacity I_{cs} of a circuit-breaker according to IEC 60898-1 and of a residual current operated circuit-breaker with integral overcurrent protection (RCBO) according to IEC 61009-1	7.5
Short-circuit protective device (SCPD)	4
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Symmetrical short-circuit breaking current I_b	4