

Edition 1.2 2020-05 CONSOLIDATED VERSION

## INTERNATIONAL STANDARD



Railway applications – Fixed installations – DC switchgear – Part 6: DC switchgear assemblies

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 45.060.01 ISBN 978-2-8322-8411-7

Warning! Make sure that you obtained this publication from an authorized distributor.





Edition 1.2 2020-05

# **REDLINE VERSION**



Railway applications – Fixed installations – DC switchgear – Part 6: DC switchgear assemblies



## **-** 2 -

## **CONTENTS**

1	Scope						
2	Normative references						
3	Term	Ferms and definitions					
4	Servi	ce requ	irements	7			
5	Char	Characteristics of the assemblies					
6			characteristics				
•	6.1		al				
	6.2		tion requirements				
	6.3						
	6.4	•					
	6.5	Earthing					
	0.0	6.5.1					
		6.5.2	Earthing of the enclosure				
	6.6		e of protection and internal fault				
	0.0	6.6.1	Protection against approach to live parts and contact with moving				
		0.0.1	parts	10			
		6.6.2	Internal arcing				
	6.7	Covers	s and doors	11			
	6.8	Inspec	tion windows	11			
	6.9	Ventila	ating openings	12			
	6.10	Partitio	ons and shutters	12			
		6.10.1	General	12			
		6.10.2	Partitions	12			
		6.10.3	Shutters	12			
		6.10.4	Isolating distances	13			
	6.11	Interlo	cks	13			
	6.12						
	6.13	Dielec	tric strength	14			
	6.14	5.14 Painting and finishing					
	6.15	Noise	emission	14			
	6.16 Cooling and heating		g and heating	14			
	6.17	6.17 Operating temperature of auxiliary and control equipment					
	6.18	.18 Rated short-time withstand current of busbars					
7	Information and marking1						
	7.1						
	7.2						
8	Tests						
	8.1						
	8.2	List of the applicable tests					
	8.3	Performance of tests					
		8.3.1	Verification of conformity to the manufacturing drawings and to characteristics of the assembly				
		8.3.2	Operation test				
		8.3.3	Dielectric tests				
		8.3.4	Short-time withstand current tests				
		8.3.5	Mechanical operation test				
		5.5.5		1			

		06+AMD1:2014		
TAIVIDZ.Z	.020 C3 8.3.6	Verification of the degree of protection	21	
	8.3.7	Temperature-rise tests		
	8.3.8	Electrical operation test		
	8.3.9	Internal arc test		
Δηηρν Δ		ative) Information required		
A.1	· · · · · · · · · · · · · · · · · · ·			
A. 1 A.2				
	A.3 Manufacturer's tender specification			
A.3 A.4				
A.4			27	
	(norma	tive) Method for testing under conditions of arcing due to an internal		
B.1		se of the test	29	
B.2		cteristics – Rated short-circuit current under internal arcing conditions	29	
B.3		rrangements		
В.0	B.3.1	Test specimen		
	B.3.2	Test circuit		
	B.3.3	Voltage		
	B.3.4	Duration of the test		
B.4		rocedure		
Бт	B.4.1	Supply circuit		
	B.4.2	Arc initiation		
	B.4.3	Indicators		
	B.4.4	Repetition of the test		
B.5		sment of the test		
B.6		eport		
Figure 1	_ Test :	arrangement for short-time current withstand test on busbars	20	
•		arrangement for temperature-rise test on main circuits		
•		·		
_		arrangement for temperature-rise test on the busbars		
_		om simulation and indicator positioning, functional unit fitted with roof		
Figure B.	2 – Mo	unting frame for vertical indicators	35	
Figure B.	3 – Indi	cators arranged in a checkerboard pattern	35	
Table 1 -	- Degre	es of protection	11	
	_	applicable tests		

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

## RAILWAY APPLICATIONS – FIXED INSTALLATIONS – DC SWITCHGEAR –

Part 6: DC switchgear assemblies

#### **FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This consolidated version of the official IEC Standard and its amendments has been prepared for user convenience.

IEC 61992-6 edition 1.2 contains the first edition (2006-02) [documents 9/891/FDIS and 9/913/RVD], its amendment 1 (2014-04) [documents 9/1792/CDV and 9/1852/RVC] and its amendment 2 (2020-05) [documents 9/2542/CDV and 9/2584A/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

IEC 61992-6:2006+AMD1:2014

**-** 5 -

+AMD2:2020 CSV © IEC 2020

International Standard IEC 61992-6 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

IEC 61992 consists of the following parts, under the general title *Railway applications – Fixed installations – DC switchgear*:

Part 1: General

Part 2: D.C. circuit breakers

Part 3: Indoor d.c. disconnectors, switch-disconnectors and earthing switches

Part 4: Outdoor d.c. disconnectors, switch-disconnectors and earthing switches

Part 5: Surge arresters and low-voltage limiters for specific use in d.c. systems

Part 6: D.C. switchgear assemblies

Part 7-1: Measurement, control and protection devices for specific use in d.c. traction systems – Application guide

Part 7-2: Measurement, control and protection devices for specific use in d.c. traction systems – Isolating current transducers and other current measuring devices

Part 7-3: Measurement, control and protection devices for specific use in d.c. traction systems – Isolating voltage transducers and other voltage measuring devices

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site 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.

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

The content of the corrigendum 1 (2025-05) has been included in this copy.

## RAILWAY APPLICATIONS – FIXED INSTALLATIONS – DC SWITCHGEAR –

Part 6: DC switchgear assemblies

### 1 Scope

This part of IEC 61992 covers d.c. metal-enclosed and non-metallic enclosed switchgear assemblies used in indoor stationary installations of traction systems, with nominal voltage not exceeding 3 000 V.

It is intended that individual items of equipment, for example circuit breakers, housed in the assembly are designed, manufactured and individually tested (simulating the enclosure when necessary) in accordance with their respective parts of IEC 61992 or, when appropriate, with another applicable standard.

NOTE 1 The requirements covered in this part of IEC 61992 are those concerning the assembly as such, its enclosure and the mutual influence of the equipment enclosed.

NOTE 2 EMC requirements are covered by IEC 62236-5 and additional requirements concerning dependability (RAMS) are covered by IEC 62278.

#### 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 60243-1:1998, Electrical strength of insulating materials – Test methods – Part 1: Tests at power frequencies

IEC 60529:1989, Degrees of protection provided by enclosures (IP Code)

IEC 61992-1:2006+A1:2014, Railway applications – Fixed installations – DC switchgear – Part 1: General

IEC 61992-2:2006+A1:2014, Railway applications – Fixed installations – DC switchgear – Part 2: DC circuit-breakers

IEC 61992-3:2006, Railway applications – Fixed installations – DC switchgear – Part 3: Indoor d.c. disconnectors, switch-disconnectors and earthing switches





Edition 1.2 2020-05

## **FINAL VERSION**

Railway applications – Fixed installations – DC switchgear – Part 6: DC switchgear assemblies

## CONTENTS

1	Scop	Scopeb					
2	Norm	mative references6					
3	Term	s and d	efinitions	6			
4	Servi	rice requirements7					
5	Char	acteristi	ics of the assemblies	7			
6			characteristics				
0							
	6.2						
	6.3	•					
	6.4	•					
	6.5	Earthing					
	0.5	6.5.1	Earthing of the main circuit				
		6.5.2	Earthing of the enclosure				
	6.6		e of protection and internal fault				
	0.0	6.6.1 Protection against approach to live parts and contact with moving					
		0.0.1	parts	10			
		6.6.2	Internal arcing				
	6.7	Covers	s and doors				
	6.8	Inspec	tion windows	11			
	6.9	•	iting openings				
	6.10		ons and shutters				
		6.10.1	General	11			
			Partitions				
			Shutters				
		6.10.4	Isolating distances	12			
	6.11		cks				
	6.12		erature-rises				
		•	tric strength				
		14 Painting and finishing					
		5 Noise emission					
	6.16	16 Cooling and heating					
		6.17 Operating temperature of auxiliary and control equipment					
		6.18 Rated short-time withstand current of busbars1					
7			and marking				
	7.1	-					
	7.2		g				
8	Tests						
J	8.1		al				
	8.2						
	8.3	Performance of tests					
	0.5	8.3.1					
		0.0.1	characteristics of the assembly	16			
		8.3.2	Operation test				
		8.3.3	Dielectric tests				
		8.3.4	Short-time withstand current tests				
		8.3.5	Mechanical operation test				
		-	,	-			

		06+AMD1:2014 — 3 —		
+AMDZ:Z	8.3.6	SV © IEC 2020  Varification of the degree of protection	24	
		Verification of the degree of protection		
	8.3.7	Temperature-rise tests		
	8.3.8	Electrical operation test		
Λ Λ	8.3.9	Internal arc test		
	ex A (informative) Information required			
A.1				
A.2	Procurement specification			
A.3				
A.4		ation and data to be supplied by the manufacturer during the delivery	26	
	(norma	tive) Method for testing under conditions of arcing due to an internal		
B.1		se of the test		
B.2	•	cteristics – Rated short-circuit current under internal arcing conditions	20	
۵.۷	(/Narc)			
B.3		rrangements		
	B.3.1	Test specimen		
	B.3.2	Test circuit		
	B.3.3	Voltage		
	B.3.4	Duration of the test		
B.4	Test p	rocedure		
	B.4.1	Supply circuit		
	B.4.2	Arc initiation		
	B.4.3	Indicators		
	B.4.4	Repetition of the test		
B.5	Assessment of the test			
B.6		eport		
Figure 1	– Test :	arrangement for short-time current withstand test on busbars	20	
•		arrangement for temperature-rise test on main circuits		
•		arrangement for temperature-rise test on the busbars		
_				
-		om simulation and indicator positioning, functional unit fitted with roof		
		unting frame for vertical indicators		
Figure B.	.3 – Indi	icators arranged in a checkerboard pattern	34	
Table 1 -	- Degre	es of protection	10	
Table 2 -	- List of	applicable tests	16	

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

## RAILWAY APPLICATIONS – FIXED INSTALLATIONS – DC SWITCHGEAR –

Part 6: DC switchgear assemblies

#### **FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This consolidated version of the official IEC Standard and its amendments has been prepared for user convenience.

IEC 61992-6 edition 1.2 contains the first edition (2006-02) [documents 9/891/FDIS and 9/913/RVD], its amendment 1 (2014-04) [documents 9/1792/CDV and 9/1852/RVC] and its amendment 2 (2020-05) [documents 9/2542/CDV and 9/2584A/RVC].

This Final version does not show where the technical content is modified by amendments 1 and 2. A separate Redline version with all changes highlighted is available in this publication.

IEC 61992-6:2006+AMD1:2014

**-** 5 -

+AMD2:2020 CSV © IEC 2020

International Standard IEC 61992-6 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

IEC 61992 consists of the following parts, under the general title *Railway applications – Fixed installations – DC switchgear*:

Part 1: General

Part 2: D.C. circuit breakers

Part 3: Indoor d.c. disconnectors, switch-disconnectors and earthing switches

Part 4: Outdoor d.c. disconnectors, switch-disconnectors and earthing switches

Part 5: Surge arresters and low-voltage limiters for specific use in d.c. systems

Part 6: D.C. switchgear assemblies

Part 7-1: Measurement, control and protection devices for specific use in d.c. traction systems – Application guide

Part 7-2: Measurement, control and protection devices for specific use in d.c. traction systems – Isolating current transducers and other current measuring devices

Part 7-3: Measurement, control and protection devices for specific use in d.c. traction systems – Isolating voltage transducers and other voltage measuring devices

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site 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.

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

The content of the corrigendum 1 (2025-05) has been included in this copy.

## RAILWAY APPLICATIONS – FIXED INSTALLATIONS – DC SWITCHGEAR –

Part 6: DC switchgear assemblies

#### 1 Scope

This part of IEC 61992 covers d.c. metal-enclosed and non-metallic enclosed switchgear assemblies used in indoor stationary installations of traction systems, with nominal voltage not exceeding 3 000 V.

It is intended that individual items of equipment, for example circuit breakers, housed in the assembly are designed, manufactured and individually tested (simulating the enclosure when necessary) in accordance with their respective parts of IEC 61992 or, when appropriate, with another applicable standard.

NOTE 1 The requirements covered in this part of IEC 61992 are those concerning the assembly as such, its enclosure and the mutual influence of the equipment enclosed.

NOTE 2 EMC requirements are covered by IEC 62236-5 and additional requirements concerning dependability (RAMS) are covered by IEC 62278.

#### 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 60243-1:1998, Electrical strength of insulating materials – Test methods – Part 1: Tests at power frequencies

IEC 60529:1989, Degrees of protection provided by enclosures (IP Code)

IEC 61992-1:2006+A1:2014, Railway applications – Fixed installations – DC switchgear – Part 1: General

IEC 61992-2:2006+A1:2014, Railway applications – Fixed installations – DC switchgear – Part 2: DC circuit-breakers

IEC 61992-3:2006, Railway applications – Fixed installations – DC switchgear – Part 3: Indoor d.c. disconnectors, switch-disconnectors and earthing switches