

AS 5230:2021



# Safety of machinery — Electrical equipment of machines

**Part 32: Requirements for hoisting machines  
(IEC 60204-32:2008 (ED.2.0) MOD)**



AS 5230:2021

This Australian Standard® was prepared by ME-005, Cranes. It was approved on behalf of the Council of Standards Australia on 19 January 2021.

This Standard was published on 29 January 2021.

The following are represented on Committee ME-005:

- Australian Chamber of Commerce and Industry
- Australian Industry Group
- Australian Institute for Non-Destructive Testing
- Better Regulation Division (Fair Trading, Safework NSW, Testsafe)
- Bureau of Steel Manufacturers of Australia
- Crane Industry Council of Australia
- Department of Regional NSW
- Elevating Work Platform Association of Australia
- Engineers Australia
- National Heavy Vehicle Regulator
- Office of Industrial Relations, Qld
- Transport for NSW
- WorkSafe Division — Department of Mines, Industry Regulation and Safety (DMIRS) WA
- Victorian WorkCover Authority (WorkSafe Victoria)

This Standard was issued in draft form for comment as DR AS 5230:2020.

### **Keeping Standards up-to-date**

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

[www.standards.org.au](http://www.standards.org.au)

ISBN 978 1 76113 166 0

# **Safety of machinery — Electrical equipment of machines**

## **Part 32: Requirements for hoisting machines (IEC 60204-32:2008 (ED.2.0) MOD)**

First published as AS 5230:2021.



© IEC 2021 — All rights reserved  
© Standards Australia Limited 2021

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of either the IEC or the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth). If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please see the contact details on the back cover or the contact us page of the website for further information.

## Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee ME-005, Cranes. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to provide requirements for electrical and electronic equipment and systems to hoisting machines and related equipment.

NOTE 1 In this Standard, the term “electrical” includes both electrical and electronic matters (i.e., “electrical equipment” means both the electrical and the electronic equipment).

NOTE 2 In the context of this Standard, the term “person” refers to any individual and includes those persons who are assigned and instructed by the user or user’s agent(s) in the use and care of the hoisting machine in question.

The equipment covered by this Standard commences at the point of connection of the supply to the electrical equipment of the hoisting machine (crane-supply-switch) including systems for power supply and control feeders situated outside of the hoisting machine, for example, flexible cables or conductor wires or conductor bars.

NOTE 3 For the requirements for the electrical supply installation in buildings, refer to IEC 60364.

This Standard is applicable to equipment or parts of equipment not exceeding 1 000 V a.c. or 1 500 V d.c. between lines and with nominal frequencies not exceeding 200 Hz.

NOTE 4 For higher voltages, refer to IEC 60204-11 and AS 2067.

Additional and special requirements can apply to the electrical equipment of hoisting machines including those that —

- (a) are intended for use in open air (i.e., outside buildings or other protective structures);
- (b) handle or transport potentially explosive material (for example, paint or sawdust);
- (c) are intended for use in potentially explosive and/or flammable atmospheres; and
- (d) are intended for use in mines.

For the purposes of this Standard, hoisting machines include cranes of all types, winches of all types, and storage and retrieval machines. The following product groups are included:

- (i) Overhead travelling cranes.
- (ii) Mobile cranes.
- (iii) Tower cranes.
- (iv) Slewing luffing cranes.
- (v) Gantry cranes.
- (vi) Offshore cranes.
- (vii) Floating cranes.
- (viii) Winches of all types.
- (ix) Hoists and accessories.
- (x) Loader cranes.

- (xi) Cable cranes.
- (xii) Load holding devices.
- (xiii) Storage and retrieval machines.
- (xiv) Monorail hoists.
- (xv) Straddle carriers.
- (xvi) Rubber tyred gantry cranes (RTGs).

This Standard does not cover individual items of electrical equipment other than their selection for use and their erection.

This Standard is an adoption with national modifications and has been reproduced from IEC 60204-32, *Safety of machinery — Electrical equipment of machines — Part 32: Requirements for hoisting machines*. The modifications are additional requirements and are set out in [Appendix ZZ](#), which has been added at the end of the source text.

[Appendix ZZ](#) lists the variations to IEC 60204-32, for the application of this Standard in Australia.

As this Standard is reproduced from an International Standard, the following applies:

- (A) In the source text “this International Standard” should read “this Australian Standard”.
- (B) A full point substitutes for a comma when referring to a decimal marker.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

## CONTENTS

FOREWORD.....	9
INTRODUCTION.....	11
1 Scope.....	14
2 Normative references.....	15
3 Terms and definitions .....	18
4 General requirements .....	26
4.1 General considerations .....	26
4.2 Selection of equipment .....	27
4.2.1 General .....	27
4.2.2 Selection of power contactors .....	27
4.2.3 Electrical equipment in compliance with the IEC 60439 series .....	27
4.3 Electrical supply .....	27
4.3.1 General .....	27
4.3.2 AC supplies .....	27
4.3.3 DC supplies .....	28
4.3.4 On-board power supply .....	28
4.4 Physical environment and operating conditions .....	29
4.4.1 General .....	29
4.4.2 Electromagnetic compatibility (EMC) .....	29
4.4.3 Ambient air temperature.....	30
4.4.4 Humidity .....	30
4.4.5 Altitude .....	30
4.4.6 Contaminants .....	30
4.4.7 Ionizing and non-ionizing radiation .....	30
4.4.8 Vibration, shock, and bump.....	30
4.5 Transportation and storage .....	30
4.6 Provisions for handling .....	31
4.7 Installation.....	31
5 Incoming supply conductor terminations and devices for disconnecting and switching off .....	31
5.1 Incoming supply conductor terminations.....	31
5.2 Terminal for connection to the external protective earthing system .....	31
5.3 Supply disconnecting and switching devices.....	32
5.3.1 General .....	32
5.3.2 Type .....	32
5.3.3 Requirements .....	34
5.3.4 Operating means .....	34
5.3.5 Crane-supply-switch.....	34
5.3.6 Crane-disconnector.....	35
5.3.7 Crane-switch.....	36
5.3.8 Special circuits .....	37
5.4 Devices for switching off for prevention of unexpected start-up.....	37
5.5 Devices for disconnecting electrical equipment .....	38
5.6 Protection against unauthorized, inadvertent and/or mistaken connection.....	39
6 Protection against electric shock.....	39
6.1 General .....	39

6.2	Protection against direct contact .....	39
6.2.1	General .....	39
6.2.2	Protection by enclosures .....	39
6.2.3	Protection by insulation of live parts .....	40
6.2.4	Protection against residual voltages .....	41
6.2.5	Protection by barriers .....	41
6.2.6	Protection by placing out of reach or protection by obstacles .....	41
6.3	Protection against indirect contact .....	41
6.3.1	General .....	41
6.3.2	Prevention of the occurrence of a touch voltage .....	42
6.3.3	Protection by automatic disconnection of supply .....	42
6.4	Protection by the use of PELV .....	43
6.4.1	General requirements .....	43
6.4.2	Sources for PELV .....	43
7	Protection of equipment .....	43
7.1	General .....	43
7.2	Overcurrent protection .....	44
7.2.1	General .....	44
7.2.2	Supply conductors .....	44
7.2.3	Power circuits .....	44
7.2.4	Control circuits .....	45
7.2.5	Socket outlets and their associated conductors .....	45
7.2.6	Lighting circuits .....	45
7.2.7	Transformers .....	45
7.2.8	Location of overcurrent protective devices .....	45
7.2.9	Overcurrent protective devices .....	45
7.2.10	Rating and setting of overcurrent protective devices .....	46
7.3	Protection of motors against overheating .....	46
7.3.1	General .....	46
7.3.2	Overload protection .....	47
7.3.3	Over-temperature protection .....	47
7.3.4	Current limiting protection .....	47
7.4	Abnormal temperature protection .....	47
7.5	Protection against supply interruption or voltage reduction and subsequent restoration .....	47
7.6	Motor overspeed protection .....	48
7.7	Earth fault/residual current protection .....	48
7.8	Phase-sequence protection .....	48
7.9	Protection against switching surges and lightning .....	48
8	Equipotential bonding .....	49
8.1	General .....	49
8.2	Protective bonding circuit .....	51
8.2.1	General .....	51
8.2.2	Protective conductors .....	51
8.2.3	Continuity of the protective bonding circuit .....	52
8.2.4	Exclusion of switching devices from the protective bonding circuit .....	52
8.2.5	Parts that need not be connected to the protective bonding circuit .....	53
8.2.6	Protective conductor connecting points .....	53

8.2.7	Additional protective bonding requirements for electrical equipment having earth leakage currents higher than 10 mA a.c. or d.c.....	53
8.3	Functional bonding .....	54
8.4	Measures to limit the effects of high leakage current .....	54
9	Control circuits and control functions.....	54
9.1	Control circuits .....	54
9.1.1	Control circuit supply .....	54
9.1.2	Control circuit voltages.....	54
9.1.3	Protection .....	55
9.2	Control functions .....	55
9.2.1	Start functions .....	55
9.2.2	Stop functions.....	55
9.2.3	Operating modes .....	55
9.2.4	Suspension of safeguarding.....	55
9.2.5	Operation .....	56
9.2.6	Other control functions.....	58
9.2.7	Cableless controls .....	59
9.3	Protective interlocks .....	61
9.3.1	Reclosing or resetting of an interlocking safeguard.....	61
9.3.2	Exceeding operating limits .....	61
9.3.3	Operation of auxiliary functions .....	62
9.3.4	Interlocks between different operations and for contrary motions .....	62
9.3.5	Reverse current braking.....	62
9.4	Control functions in the event of failure .....	62
9.4.1	General requirements .....	62
9.4.2	Measures to minimize risk in the event of failure .....	63
9.4.3	Protection against mal-operation due to earth faults, voltage interruptions, and loss of circuit continuity .....	64
9.4.4	Protection against mal-operation of a motion control system.....	66
10	Operator interface and hoisting machine mounted control devices.....	66
10.1	General .....	66
10.1.1	General device requirements .....	66
10.1.2	Location and mounting.....	66
10.1.3	Protection .....	67
10.1.4	Position sensors .....	67
10.1.5	Portable and pendant control stations .....	67
10.2	Push-buttons .....	67
10.2.1	Colours.....	67
10.2.2	Markings.....	68
10.3	Indicator lights and displays .....	69
10.3.1	General .....	69
10.3.2	Colours.....	69
10.3.3	Flashing lights and displays .....	70
10.4	Illuminated push-buttons.....	70
10.5	Rotary control devices .....	70
10.6	Start devices .....	70
10.7	Emergency stop devices .....	70
10.7.1	Location of emergency stop devices.....	70
10.7.2	Types of emergency stop device .....	71

10.7.3	Colour of actuators .....	71
10.7.4	Local operation of the crane-supply-switch and the crane-disconnector to effect emergency stop.....	71
10.8	Emergency switching-off devices .....	71
10.8.1	Location of emergency switching-off devices .....	71
10.8.2	Types of emergency switching off device.....	71
10.8.3	Colour of actuators .....	72
10.8.4	Local operation of the crane-supply-switch and the crane-disconnector to effect emergency switching off .....	72
10.9	Enabling control device.....	72
11	Controlgear: location, mounting, and enclosures .....	72
11.1	General requirements .....	72
11.2	Location and mounting.....	73
11.2.1	Accessibility and maintenance.....	73
11.2.2	Physical separation or grouping .....	73
11.2.3	Heating effects .....	74
11.3	Degrees of protection .....	74
11.4	Enclosures, doors and openings .....	74
11.5	Access to switchgear and to controlgear .....	75
11.5.1	General .....	75
11.5.2	Access to gangways .....	75
11.5.3	Gangways in front of switchgear and controlgear.....	76
11.5.4	Gangway and door restrictions .....	76
12	Conductors and cables .....	76
12.1	General requirements .....	76
12.2	Conductors.....	76
12.3	Insulation.....	77
12.4	Current-carrying capacity in normal service.....	78
12.5	Voltage drop.....	79
12.6	Flexible cables.....	80
12.6.1	General .....	80
12.6.2	Mechanical rating.....	80
12.6.3	Current-carrying capacity of cables wound on drums .....	80
12.7	Conductor wires, conductor bars and slip-ring assemblies.....	81
12.7.1	Protection against direct contact .....	81
12.7.2	Protective conductor circuit.....	83
12.7.3	Protective conductor current collectors.....	83
12.7.4	Removable current collectors with a disconnector function .....	83
12.7.5	Clearances in air.....	83
12.7.6	Creepage distances .....	83
12.7.7	Conductor system sectioning .....	84
12.7.8	Construction and installation of conductor wire, conductor bar systems and slip-ring assemblies .....	84
13	Wiring practices.....	84
13.1	Connections and routing .....	84
13.1.1	General requirements .....	84
13.1.2	Conductor and cable runs .....	85
13.1.3	Conductors of different circuits.....	85
13.1.4	Connection between pick-up and pick-up converter of an inductive power supply system.....	85

13.2	Identification of conductors .....	86
13.2.1	General requirements .....	86
13.2.2	Identification of the protective conductor .....	86
13.2.3	Identification of the neutral conductor .....	86
13.2.4	Identification by colour .....	86
13.3	Wiring inside enclosures .....	87
13.4	Wiring outside enclosures .....	87
13.4.1	General requirements .....	87
13.4.2	External ducts .....	87
13.4.3	Connection to the hoisting machine and to moving elements on the hoisting machine .....	88
13.4.4	Interconnection of devices on the hoisting machine .....	89
13.4.5	Plug/socket combinations .....	89
13.4.6	Dismantling for shipment .....	90
13.4.7	Additional conductors .....	90
13.5	Ducts, connection boxes and other boxes .....	90
13.5.1	General requirements .....	90
13.5.2	Percentage fill of ducts .....	91
13.5.3	Rigid metal conduits and fittings .....	91
13.5.4	Flexible metal conduits and fittings .....	91
13.5.5	Flexible non-metallic conduits and fittings .....	91
13.5.6	Cable trunking systems .....	91
13.5.7	Hoisting machine compartments and cable trunking systems .....	92
13.5.8	Connection boxes and other boxes .....	92
13.5.9	Motor connection boxes .....	92
14	Electric motors and associated equipment .....	92
14.1	General requirements .....	92
14.2	Motor enclosures .....	92
14.3	Motor dimensions .....	92
14.4	Motor mounting and compartments .....	92
14.5	Criteria for motor selection .....	93
14.6	Protective devices for mechanical brakes .....	93
14.7	Electrically operated mechanical brakes .....	93
15	Accessories and lighting .....	94
15.1	Accessories .....	94
15.2	Local lighting on the hoisting machine and for the equipment .....	94
15.2.1	General .....	94
15.2.2	Supply .....	94
15.2.3	Protection .....	95
15.2.4	Fittings .....	95
16	Marking, warning signs and reference designations .....	95
16.1	General .....	95
16.2	Warning signs .....	95
16.2.1	Electric shock hazard .....	95
16.2.2	Hot surfaces hazard .....	95
16.3	Functional identification .....	96
16.4	Marking of equipment .....	96
16.5	Reference designations .....	96
17	Documentation .....	96

17.1	General .....	96
17.2	Information to be provided .....	97
17.3	Requirements applicable to all documentation.....	97
17.4	Installation documents .....	98
17.5	Overview diagrams and function diagrams .....	98
17.6	Circuit diagrams .....	99
17.7	Operating manual .....	99
17.8	Maintenance manual.....	99
17.9	Parts list.....	99
18	Verification .....	100
18.1	General .....	100
18.2	Verification of conditions for protection by automatic disconnection of supply .....	100
18.2.1	General .....	100
18.2.2	Test methods in TN-systems.....	100
18.2.3	Application of the test methods for TN-systems .....	101
18.3	Insulation resistance tests .....	103
18.4	Voltage tests .....	103
18.5	Protection against residual voltages .....	104
18.6	Functional tests .....	104
18.7	Retesting.....	104
	Annex A (normative) Protection against indirect contact in TN-systems.....	105
	Annex B (informative) Inquiry form for the electrical equipment of hoisting machines .....	109
	Annex C (informative) Current-carrying capacity and overcurrent protection of conductors and cables in the electrical equipment of machines.....	112
	Annex D (informative) Conductor selection for intermittent duty .....	117
	Annex E (informative) Explanation of emergency operation functions.....	120
	Annex F (informative) Comparison of typical conductor cross-sectional areas .....	121
	Bibliography.....	123
	Index .....	128
	Figure 1 – Block diagram of combined working cranes in a typical material handling system in a seaport.....	12
	Figure 2 – Block diagram of a typical crane and its associated electrical equipment.....	13
	Figure 3 – Examples of electrical supply systems .....	33
	Figure 4 – Example of equipotential bonding for electrical equipment of a hoisting machine.....	50
	Figure 5 – Protection against mal-operation due to earth faults – Method a).....	65
	Figure 6 – Protection against mal-operation due to earth faults – Method b).....	65
	Figure 7 – Limits of arm's reach .....	82
	Figure A.1 – Typical arrangement for fault loop impedance measurement.....	108
	Figure C.1 – Methods of conductor and cable installation independent of number of conductors/cables .....	113
	Figure C.2 – Parameters of conductors and protective devices .....	115

Figure D.1 – Example of current and time of the segments of the operating cycle of a variable speed a.c. hoist drive .....	119
Table 1 – Minimum cross-sectional area of the external protective copper conductor .....	32
Table 2 – Colour-coding for push-button actuators and their meanings .....	68
Table 3 – Symbols for push-buttons .....	69
Table 4 – Colours for indicator lights and their meanings with respect to the condition of the hoisting machine .....	69
Table 5 – Minimum cross-sectional areas of copper conductors .....	77
Table 6 – Classification of conductors .....	77
Table 7 – Examples of current-carrying capacity ( $I_Z$ ) of PVC-insulated copper conductors or cables under steady-state conditions in an ambient air temperature of +40 °C for different methods of installation .....	79
Table 8 – Derating factors for cables wound on drums .....	81
Table 9 – Minimum permitted bending radii for the forced guiding of flexible cables .....	89
Table 10 – Application of the test methods for TN-systems .....	101
Table 11 – Examples of maximum cable length from each protective device to its load .....	102
Table A.1 – Maximum disconnecting times for TN systems .....	105
Table C.1 – Correction factors .....	112
Table C.2 – Derating factors from $I_Z$ for grouping .....	114
Table C.3 – Derating factors from $I_Z$ for multi-core cables up to 10 mm <sup>2</sup> .....	114
Table C.4 – Maximum allowable conductor temperatures under normal and short-circuit conditions .....	116
Table D.1 – Correction factor for 10 min cycle .....	118
Table D.2 – Thermal time constant of conductors .....	118
Table F.1 – Comparison of conductor sizes .....	121

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY OF MACHINERY –  
ELECTRICAL EQUIPMENT OF MACHINES –****Part 32: Requirements for hoisting machines**

## 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) 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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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.

International Standard IEC 60204-32 has been prepared by IEC technical committee 44: Safety of machinery – Electrotechnical aspects.

This second edition cancels and replaces the first edition published in 1998 and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition.

- a) Changes to IEC 60204-1, 5th edition (2005), have been incorporated, especially:
  - deletion of Clause 11 of the previous edition;
  - modification of the structure of equipotential bonding (Clause 8);
  - separation of control functions (Clause 9) and devices (Clause 10);
  - structure of technical documentation (Clause 17);
  - verification of protection by automatic disconnection of supply (18.2).

b) Subclause 9.2.7 on cableless controls has been modified.

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

FDIS	Report on voting
44/574/FDIS	44/579/RVD

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

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

The following differences exist in some countries:

- 4.3.1: The voltage characteristics of electricity supplied by public distribution systems are given in EN 50160:1999, *Voltage characteristics of electricity supplied by public distribution systems* (Europe);
- 7.2.3: Disconnection of the neutral conductor is mandatory in a TN-S system (France);
- 12.2, Table 5: Cross-sectional area is specified according to American Wire Gauge (AWG) (USA);
- 13.2.2: For the protective conductor, the colour identification GREEN (with or without YELLOW stripes) is used as equivalent to the bicolour combination GREEN-AND-YELLOW (USA and Canada);
- 13.2.3: The colour identification WHITE or NATURAL GREY is used for earthed neutral conductors instead of the colour identification LIGHT BLUE (USA and Canada);
- 13.2.4: The colour YELLOW is used instead of ORANGE for that purpose (USA).

The list of all the parts of the IEC 60204 series, under the general title *Safety of machinery – Electrical equipment of machines*, can be found on the IEC web site.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

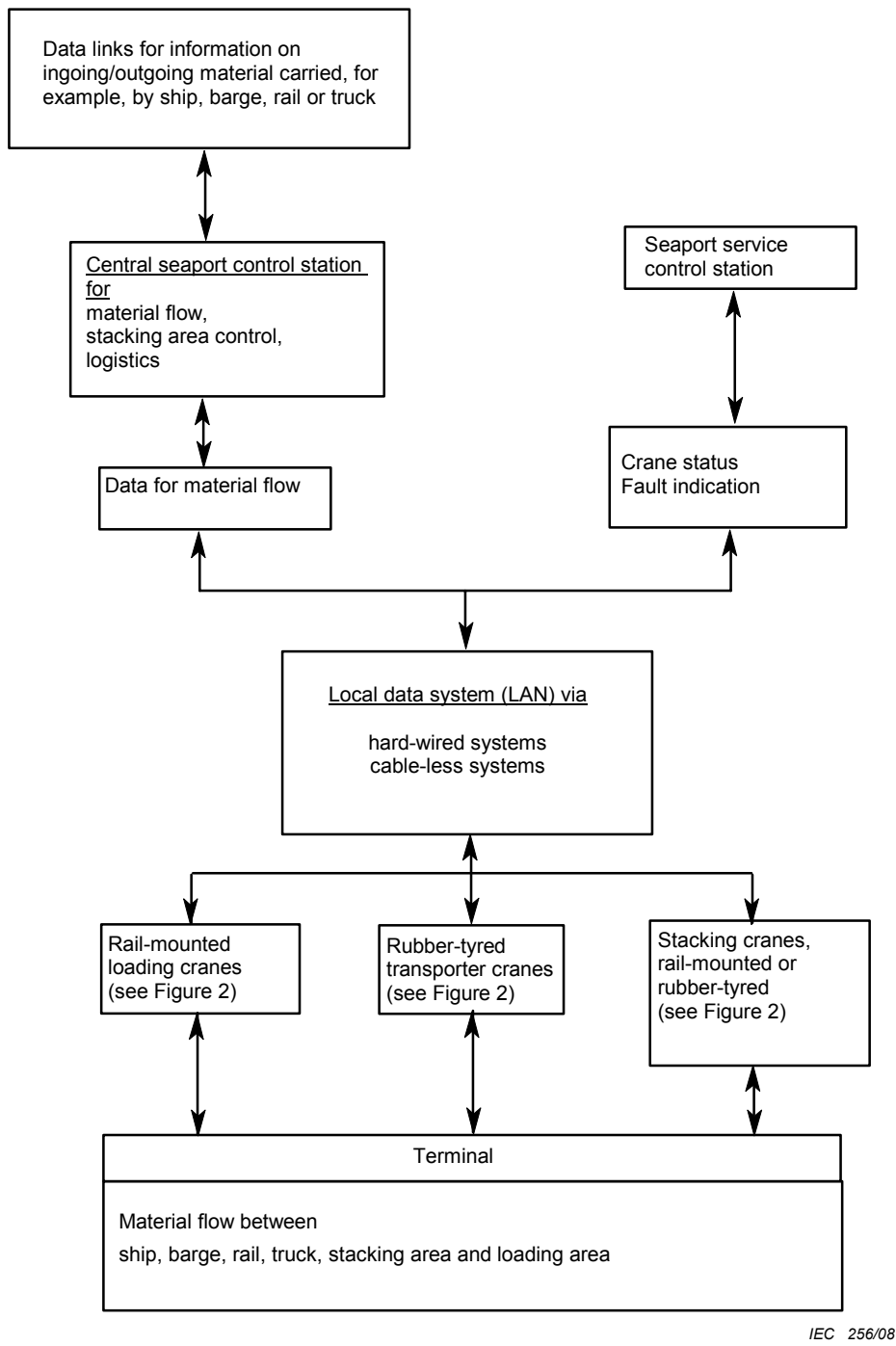
## INTRODUCTION

This part of IEC 60204 provides requirements and recommendations relating to the electrical equipment of hoisting machines so as to promote

- safety of persons and property;
- consistency of control response;
- ease of maintenance.

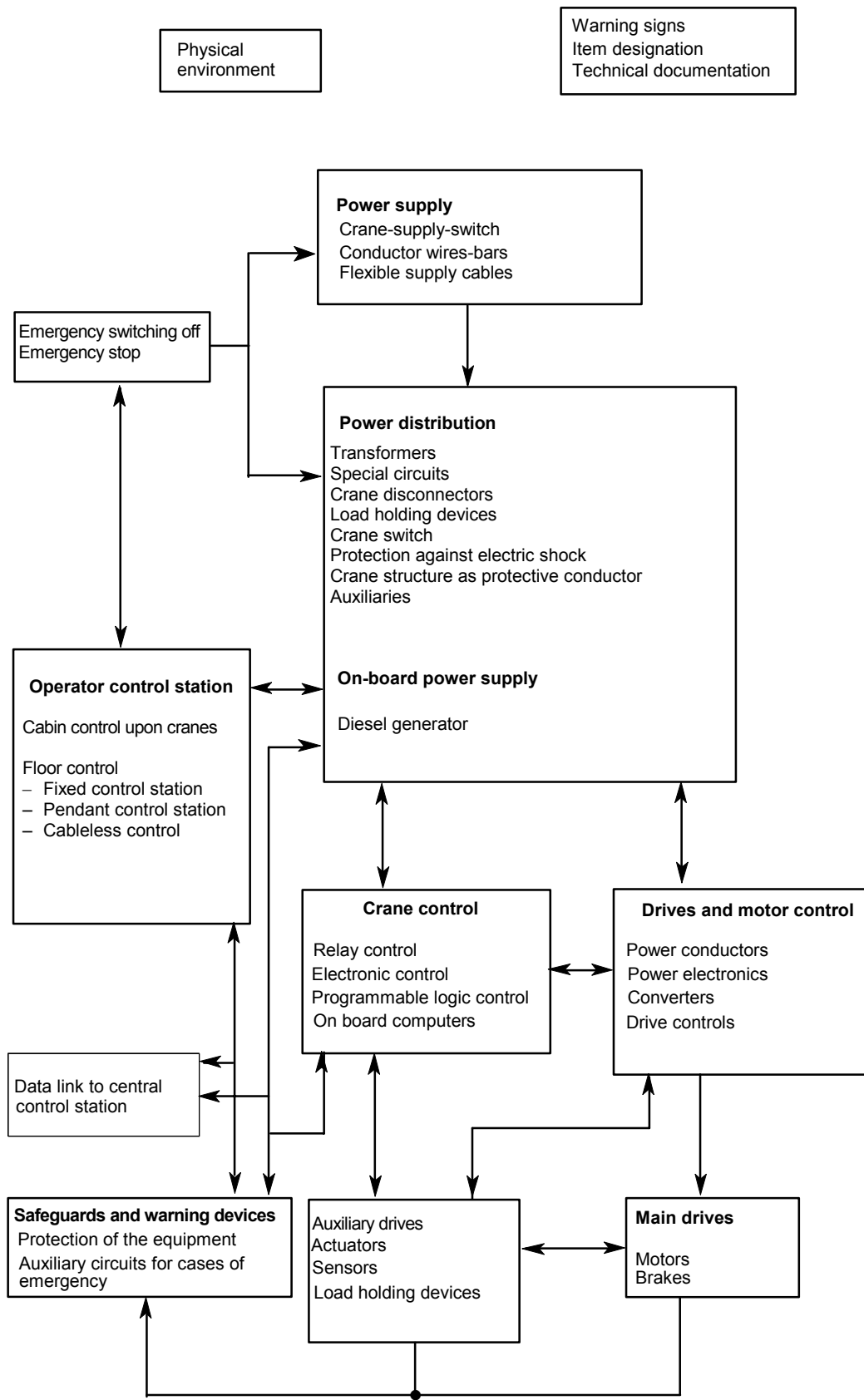
High performance is not to be obtained at the expense of the essential factors mentioned above.

Figures 1 and 2 have been provided as an aid to understanding the interrelationship of the various elements of a hoisting machine and its associated equipment. Figure 1 is an overall block diagram of a typical material handling system (a group of cranes working together in a coordinated manner) and Figure 2 is a block diagram of a typical crane and associated equipment showing the various elements of the electrical equipment addressed in this standard.



IEC 256/08

**Figure 1 – Block diagram of combined working cranes in a typical material handling system in a seaport**



IEC 257/08

Figure 2 – Block diagram of a typical crane and its associated electrical equipment

## SAFETY OF MACHINERY – ELECTRICAL EQUIPMENT OF MACHINES –

### Part 32: Requirements for hoisting machines

#### 1 Scope

This part of IEC 60204 applies to the application of electrical and electronic equipment and systems to hoisting machines and related equipment.

NOTE 1 In this standard, the term “electrical” includes both electrical and electronic matters (i.e., “electrical equipment” means both the electrical and the electronic equipment).

NOTE 2 In the context of this standard, the term “person” refers to any individual and includes those persons who are assigned and instructed by the user or user’s agent(s) in the use and care of the hoisting machine in question.

The equipment covered by this standard commences at the point of connection of the supply to the electrical equipment of the hoisting machine (crane-supply-switch) including systems for power supply and control feeders situated outside of the hoisting machine, for example, flexible cables or conductor wires or conductor bars (see Figure 3).

NOTE 3 For the requirements for the electrical supply installation in buildings, see IEC 60364.

This standard is applicable to equipment or parts of equipment not exceeding 1 000 V a.c. or 1 500 V d.c. between lines and with nominal frequencies not exceeding 200 Hz.

NOTE 4 For higher voltages, see IEC 60204-11.

Additional and special requirements can apply to the electrical equipment of hoisting machines including those that

- are intended for use in open air (i.e., outside buildings or other protective structures);
- handle or transport potentially explosive material (for example, paint or sawdust);
- are intended for use in potentially explosive and/or flammable atmospheres;
- are intended for use in mines.

For the purposes of this standard, hoisting machines include cranes of all types, winches of all types, and storage and retrieval machines. The following product groups are included:

- overhead travelling cranes;
- mobile cranes;
- tower cranes;
- slewing luffing cranes;
- gantry cranes;
- offshore cranes;
- floating cranes;
- winches of all types;
- hoists and accessories;
- loader cranes;
- cable cranes;
- load holding devices;
- storage and retrieval machines;