

Contents		Page
European foreword		6
Introduction		7
1	Scope	8
2	Normative references	8
3	Terms and definitions	10
4	Requirements	14
4.1	Introduction	14
4.2	Validation of safety functions	14
4.3	General requirements	14
4.4	Energy sources	16
4.5	Travel and brake control systems.....	18
4.6	Electrical load handling system	26
4.7	Steering.....	29
4.8	Software design.....	32
4.9	Other protective measures	32
4.10	Electrical verifications.....	34
5	Additional requirements for high voltage trucks	36
5.1	General	36
5.2	Battery.....	36
5.3	Protection against electric shock	37
6	Information for use	39
6.1	General	39
6.2	Electrical diagram	39
6.3	Electrical interface for external systems	39
6.4	Safety checks	39
6.5	Capacitors	39
6.6	Marking.....	39
6.7	Non-ionising radiation	40
6.8	Interoperability of energy sources	40
Annex A (normative) Connectors for energy sources		41
A.1	General	41
A.2	Terms and definitions	41
A.3	Requirements	41
A.3.1	Mounting bracket	41
A.3.2	Physical properties.....	41
A.3.3	Contacts.....	41
A.3.4	Auxiliary contacts.....	42
A.3.5	Reversal-polarity protection.....	42
A.3.6	Temperature resistance	42
A.3.7	Protection of half-connector fitted to the battery	42

A.3.8	Coding.....	42
A.3.9	Locking of half-connectors	42
A.3.10	Emergency disconnection.....	42
A.3.11	Additional requirements.....	42
A.4	Type-test methods.....	43
A.4.1	General.....	43
A.4.2	Coding test	43
A.4.3	Samples.....	43
A.4.4	Preconditioning.....	44
A.4.5	Temperature rise test.....	44
A.4.6	Testing 2 of 4 connectors	44
A.4.7	Testing the other 2 of 4 connectors.....	45
A.4.8	Dielectric test.....	46
A.5	Quality assurance.....	46
A.6	Information for use	46
Annex B (normative)	Electromagnetic contactors.....	47
B.1	General.....	47
B.2	Terms and definitions	47
B.3	Types of contactor	48
B.3.1	General.....	48
B.3.2	Type A.....	48
B.3.3	Type B.....	48
B.3.4	Type C.....	48
B.3.5	Type D	48
B.3.6	Classification.....	49
B.4	Product information	49
B.4.1	Nature of information.....	49
B.4.2	Marking.....	50
B.4.3	Instructions for installation, operation and maintenance.....	50
B.5	Normal service, mounting and transport conditions.....	50
B.5.1	Normal service conditions	50
B.5.2	Mounting	50
B.5.3	Conditions during transport and storage.....	50
B.6	Constructional and performance requirements.....	51
B.6.1	Constructional requirements	51
B.6.2	Performance requirements.....	51
B.7	Tests.....	52

B.7.1 Kind of tests.....52

B.7.2 Tabulation of tests53

B.8 Type test sequences60

B.8.1 Kind of tests.....60

Annex C (normative) Energy sources.....62

C.1 Lead-acid batteries62

C.1.1 General.....62

C.1.2 Ventilation and protection.....62

C.1.3 Internal surface.....62

C.1.4 Battery with nominal voltage exceeding 96 V DC.....62

C.1.5 Prevention of flowing back of the electrolyte.....63

C.1.6 Information63

C.2 Lithium-ion batteries.....63

C.2.1 General.....63

C.2.2 Terms and definitions64

C.2.4 Requirements65

C.2.5 Electromagnetic radiation66

C.2.6 Information67

Annex D (normative) Electric drive system (motors, converters, generators, energy sources).....69

D.1 General.....69

D.2 Special requirements.....69

D.2.1 Electrical protection.....69

D.2.2 Insulation69

D.2.3 Maximum rotational speed.....69

D.2.4 Type plates.....69

D.3 Testing.....70

D.3.1 Type tests70

Annex E (normative) Assistance systems71

E.1 General.....71

E.2 Requirements71

E.2.1 Control by the operator.....71

E.2.2 System design71

E.2.3 Reliability.....71

E.3 Information for use.....72

Annex F (informative) Steering systems.....73

F.1 General.....73

F.2	Electric steering without backup	73
F.3	Electric steering with backup	74
F.3.1	General.....	74
F.3.2	Electric powered assistance.....	74
F.3.3	Hydraulic powered assistance	75
F.4	Assisted steering systems	75
Annex G (normative)	Electrical components	77
G.1	Conductors and cables	77
G.1.1	General.....	77
G.1.2	Protection	77
G.1.3	Cross-sectional area.....	77
G.1.4	Wiring practices	77
Annex H (informative)	Cross reference with industrial truck types of ISO 5053-1... 	79
Annex I (informative)	List of significant hazards	82
Annex J (informative)	Explanations of safety functions.....	94
Annex ZA (informative)	Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered	100
Bibliography.....		103