

LIST OF RAIL STANDARDS USED IN INDIA

Codes, standards and specifications:

The following codes, standards and specifications applies to all systems and equipments, as the case maybe, forming part of the project:

- **NFPA 130: Standard for Fixed Guideway Transit and Passenger Rail Systems**: This standard specifies fire protection and life safety requirements for underground, surface, and elevated fixed guideway transit and passenger rail systems. [Read more](#)
- **BS EN 50126**: Railway applications-The specification demonstrate reliability, availability, maintainability and safety (RAMS). This is a multi-part standards divided into many parts such as:
 - **BS EN 50126-1: Railway applications. The specification and demonstration of reliability, availability, maintainability and safety (RAMS). Basic requirements and generic process**
- **EN 50119 Railway applications - Fixed installations - Electric traction overhead contact lines**
- **EN 50121: Railway applications- Electromagnetic compatibility**: This is a multi-part document divided into the following parts:
 - **EN 50121-1: Railway applications. Electromagnetic compatibility. General**
 - **EN 50121-2: Railway applications. Electromagnetic compatibility. Emission of the whole railway system to the outside world**
 - **EN 50121-3-1: Railway applications. Electromagnetic compatibility. Rolling stock. Train and complete vehicle**
 - **EN 50121-3-2: Railway applications. Electromagnetic compatibility. Rolling stock. Apparatus**
 - **EN 50121-4: Railway applications. Electromagnetic compatibility. Emission and immunity of the signalling and telecommunications apparatus**
 - **EN 50121-5: Railway applications. Electromagnetic compatibility. Emission and immunity of fixed power supply installations and apparatus**
- **BS EN 50122: Railway applications, Fixed installations, Electrical safety, earthing and the return circuit**: This is a multi-part document divided into the following parts:
 - **BS EN 50122-1 Railway applications. Fixed installations. Protective provisions relating to electrical safety and earthing**

- **BS EN 50122-2** Railway applications. Fixed installations. Protective provisions against the effects of stray currents caused by d.c. traction systems
- **BS EN 50122-3** Railway applications. Fixed installations. Electrical safety, earthing and the return circuit. Mutual Interaction of a.c. and d.c. traction systems
- **EN 50163: RAILWAY APPLICATIONS - SUPPLY VOLTAGES OF TRACTION SYSTEMS:** This European Standard specifies the main characteristics of the supply voltages of traction systems, such as traction fixed installations, including auxiliary devices fed by the contact line, and rolling stock, for use in the applications such as Railways, Guided mass transport systems such as tramways, elevated and underground railways mountain railways, and trolleybus systems and Material transportation systems.
- **IEC 60364 (4-41): Electric installation of Buildings - Electric Shocks having following as applicable releases.**
 - **IEC 60364-4-41 Amd.1 Ed. 5.0 b:2017** (Amendment 1 - Low voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock)
 - **IEC 60364-4-41 Ed. 5.0 b:2005**
 - **IEC 60364-4-41 Ed. 5.1 b:2017**
- **IEEE 80-2013: Guide for Safety in AC Substation Grounding:** This guide is primarily concerned with outdoor ac substations, either conventional or gas-insulated. These include distribution, transmission, and generating plant substations.
- **IEEE 519-2014: Recommended Practice and Requirements for Harmonic Control in Electric Power Systems:** Goals for the design of electrical systems that include both linear and nonlinear loads are established in this recommended practice.
- **IS 1893: CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES**

Rolling Stock:

- **IEC 62278: RAILWAY APPLICATIONS SPECIFICATION AND DEMONSTRATION OF RELIABILITY, AVAILABILITY, MAINTAINABILITY AND SAFETY (RAMS):** This International Standard a) Defines RAMS in terms of reliability, availability, maintainability and safety and their interaction; b) Defines a process, based on the system life cycle and tasks within it, for managing RAMS; c) Enables conflicts between RAMS elements to be controlled and managed effectively; d) Defines a systematic process for specifying requirements for RAMS and demonstrating that these requirements are achieved; e) Addresses railway specifics; f) Does not define RAMS targets,

quantities, requirements or solutions for specific railway applications; g) Does not specify requirements for ensuring system security; h) Does not define rules or processes pertaining to the certification of railway products against the requirements of this standard; i) Does not define an approval process by the safety regulatory authority.

- **IEC 61508: Functional safety of electrical/electronic/programmable electronic safety-related systems**: IEC 61508 applies to safety-related systems when one or more of such systems incorporate electrical and/or electronic and/or programmable electronic (E/E/PE) devices. It covers possible hazards caused by failure of the safety functions to be performed by the E/E/PE safety-related systems, as distinct from hazards arising from the E/E/PE equipment itself (for example electric shock etc).
- **NFPA 130: Standard for Fixed Guideway Transit and Passenger Rail Systems**
- **EN 15227: Railway applications - Crashworthiness requirements for railway vehicle bodies**
- **BS EN 12663:2000: Railway applications. Structural requirements of railway vehicle bodies**
- **CSN EN 15663: Railway applications - Definition of vehicle reference masses**: The purpose of this document is to define a set of reference masses that can be used as a common starting point for specifying the requirements for the design, testing, delivery acceptance, marking and operation of rail vehicles
- **EN 14752: Railway applications - Body side entrance systems for rolling stock**: This European Standard is applicable to passenger body side entrance systems of all newly designed railway vehicles such as tram, metro, suburban, mainline and high-speed trains that carry passengers.
- **BS EN 16286: Railway Applications Gangway Systems between Vehicles**
 - **BS EN 16286-1:2013: Railway applications. Gangway systems between vehicles. Main applications**
 - **BS EN 16286-2:2013: Railway applications. Gangway systems between vehicles. Acoustic measurements**
- **BS EN 13272:2012: Railway applications. Electrical lighting for rolling stock in public transport systems**
- **BS EN 15153: Railway applications- External visible and audible warning for high speed trains**: This is a multi-part document divided into the following parts:
 - **BS EN 15153-1: Railway applications. External visible and audible warning devices for high speed trains. Head, marker and tail lamps**
 - **BS EN 15153-2: Railway applications. External visible and audible warning devices for high speed trains. Warning horns**
- **EN 45545- Fire protection on railway vehicles**: This is a multi-part document divided into the following parts:

- **CSN EN 45545-1 : 2013**- Railway applications - Fire protection on railway vehicles - Part 1: General
- **CSN EN 45545-2+A1:2015** - Railway applications - Fire protection on railway vehicles - Part 2: Requirements for fire behavior of materials and components
- **CSN EN 45545-3 : 2013** - Railway applications - Fire protection on railway vehicles - Part 3: Fire resistance requirements for fire barriers
- **CSN EN 45545-4 : 2013** - Railway applications - Fire protection on railway vehicles - Part 4: Fire safety requirements for rolling stock design
- **CSN EN 45545-5+A1:2015** - Railway applications - Fire protection on railway vehicles - Part 5: Fire safety requirements for electrical equipment including that of trolley buses, track guided buses and magnetic levitation vehicles
- **CSN EN 45545-6:2013** - Railway applications - Fire protection on railway vehicles - Part 6: Fire control and management systems
- **CSN EN 45545-7:2013** - Railway applications - Fire protection on railway vehicles - Part 7: Fire safety requirements for flammable liquid and flammable gas installations

- **EN 14750: Air conditioning for urban and suburban rolling stock:** This is a multi-part document divided into the following parts:
 - **CSN EN 14750-1: Railway applications - Air conditioning for urban and suburban rolling stock - Part 1: Comfort parameters:** This European Standard is applicable to suburban and/or regional vehicles and also metro and tramway vehicles equipped with cooling and/or heating/ventilation systems.
 - **CSN EN 14750-2 Railway applications - Air conditioning for urban and suburban rolling stock - Part 2: Type tests:** This European Standard is applicable to suburban and/or regional vehicles and also metro and tramway vehicles equipped with cooling and/or heating/ventilation systems

- **BS EN 16186: Railway applications- Driver's cab:** This is a multi-part document divided into the following parts:
 - **BS EN 16186-1:2014: Railway applications. Driver's cab. Anthropometric data and visibility**
 - **BS EN 16186-2:2017: Railway applications. Driver's cab. Integration of displays, controls and indicators**
 - **BS EN 16186-3:2016: Railway applications. Driver's cab. Design of displays**

- **UIC 515:**
 - **UIC 515-4 (E): PASSENGER ROLLING STOCK - TRAILER BOGIES - RUNNING GEAR - BOGIE RUNNING GEAR - BOGIE FRAME STRUCTURE STRENGTH TESTS**

- UIC 515-5 (E): POWERED AND TRAILING STOCK - BOGIES - RUNNING GEAR - TESTS FOR AXLE-BOXES
- **UIC 615-4: MOTIVE POWER UNITS BOGIES AND RUNNING GEAR BOGIE FRAME STRUCTURE TESTS**
- **UIC 541-05 (E): BRAKES - SPECIFICATIONS FOR THE CONSTRUCTION OF VARIOUS BRAKE PARTS - WHEEL SLIDE PROTECTION DEVICE (WSP)**
- **BS-EN-13262: Railway applications- Wheel sets and bogies. Wheels. Product requirements**
- **EN 13260+A1: Railway applications - Wheelsets and bogies - Wheelsets – Product requirements:** This standard is applicable to wheelsets comprising elements that conform to the following European Standards: EN 13262 for wheels; EN 13261 for axles; This standard is not fully applicable to wheelsets undergoing maintenance.
- **EN 13749: Railway applications - Wheelsets and bogies - Method of specifying the structural requirements of bogie frames:** This European Standard specifies the method to be followed to achieve a satisfactory design of bogie frames and includes design procedures, assessment methods, verification and manufacturing quality requirements.
- **EN 13104+A2: Railway applications - Wheelsets and bogies - Powered axles - Design method:** This standard: - defines the forces and moments to be taken into account with reference to masses, traction and braking conditions; - gives the stress calculation method for axles with outside axle journals; - specifies the maximum permissible stresses to be assumed in calculations for steel grade EA1N defined in EN 13261; - describes the method for determination of the maximum permissible stresses for other steel grades; - determines the diameters for the various sections of the axle and recommends the preferred shapes and transitions to ensure adequate service performance.
- **BS EN 13103: RAILWAY APPLICATIONS - WHEELSETS AND BOGIES - NON-POWERED AXLES - DESIGN METHOD and in case of Axle Box Bearing shall conform to the following standards:**

Sl. No.	Spec. No.	Description
1	EN 12080	Railway Applications Axle Box- Rolling Bearings
2	EN 12081	Railway Applications Axle Box- Lubrication Grease
3	EN 12082	Railway Applications Axle Box- Performance Testing
4	EN ISO 6508- 1 to 3	Metallic material- Rockwell hardness test- Test method, verification and calibration of testing machines and calibration of reference of blocks respectively.
5	ISO 281	Rolling Bearings- Dynamic load rating and rating life
6	UIC 515-1	Powered and trailing stock Bogie-running gear "Test for Axle-Boxes".
7	UIC 515-5	Passenger rolling stock- trailer bogies-running gear- General provisions applicable to the components of trailers bogies.

8	UIC 814	Technical Specification for official testing and supply of grease intended for the lubrication of railway vehicle roller bearing axle boxes.
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- **EN 13452-1: Railway applications - Braking - Mass transit brake systems - Performance requirements**
- **EN 13452-2: Railway applications - Braking - Mass transit brake systems - Methods of test**
- **BS EN 50155: Railway applications. Electronic equipment used on rolling stock**
- **BS EN 50207:2001: Railway applications. Electronic power converters for rolling stock**
- **IEC 60077: RAILWAY APPLICATIONS - ELECTRIC EQUIPMENT FOR ROLLING STOCK**
 - **IEC 60077-1: RAILWAY APPLICATIONS - ELECTRIC EQUIPMENT FOR ROLLING STOCK - PART 1: GENERAL SERVICE CONDITIONS AND GENERAL RULES**
 - **IEC 60077-2:2017: Railway applications - Electric equipment for rolling stock - Part 2: Electro-technical components - General rules**
- **BS EN 60529: Degrees of Protection Provided by Enclosures (IP Code)**
- **RGS GM/RT/2472: Requirements for Data Recorders on Trains**
- **BS EN 12663:2000: Railway applications. Structural requirements of railway vehicle bodies**
- **EN 15227+A1: Railway applications - Crashworthiness requirements for railway vehicle bodies**
- **IEC 61133: Railway applications - Rolling stock - Testing of rolling stock on completion of construction and before entry into service**
- **EN 14363: Railway applications - Testing and Simulation for the acceptance of running characteristics of railway vehicles - Running behaviour and stationary tests**

Alignment and Track Work:

- **UIC 710: MINIMUM TRACK GAUGE IN CURVES**
- **UIC 700: Classification of lines- Resulting load limits for wagons**
- **UIC 774-3: TRACK / BRIDGE INTERACTION RECOMMENDATIONS FOR CALCULATIONS.**
- **UIC Leaflet 719 R: Earthworks and track bed for railway lines**
- **60E1 (UIC 60): Rail model based on European standard EN 13674-1**
- **IRS- T-12- 2009: Flat bottom railway rails**
- **EN 13146 1 to 7: Railway applications - Track - Test methods for fastening systems**

- **BS EN 13481-5: RAILWAY APPLICATIONS - TRACK - PERFORMANCE REQUIREMENTS FOR FASTENING SYSTEMS PART 5: FASTENING SYSTEMS FOR SLAB TRACK WITH RAIL ON THE SURFACE OR RAIL EMBEDDED IN A CHANNEL**
- **DD ENV 13481-6: Railway Applications- RAILWAY APPLICATIONS - TRACK - PERFORMANCE REQUIREMENTS FOR FASTENING SYSTEMS - PART 6: SPECIAL FASTENING SYSTEMS FOR ATTENUATION OF VIBRATION**
- **BS EN 13231-1:2013: Railway applications. Track. Acceptance of works. Works on ballasted track. Plain line, switches and crossings**
- **BS EN 13231-2: RAILWAY APPLICATIONS TRACK ACCEPTANCE OF WORKS PART 2: WORKS ON BALLASTED TRACK SWITCHES AND CROSSINGS**
- **BS EN 13231-3:2012: Railway applications. Track. Acceptance of works. Acceptance of reprofiling rails in track**
- **BSI - BS EN 13231-4: RAILWAY APPLICATIONS - TRACK - ACCEPTANCE OF WORKS PART 4: ACCEPTANCE OF REPROFILING RAILS IN SWITCHES AND CROSSINGS**
- **BS EN 13848-6:2014: Railway applications. Track. Track geometry quality. Characterisation of track geometry quality**
- **BS EN 13848-2:2006: Railway applications. Track. Track geometry quality. Measuring systems. Track recording vehicles**
- **UIC 505-1 (E): RAILWAY TRANSPORT STOCK - ROLLING STOCK CONSTRUCTION GAUGE**
- **UIC 505-4 (E): EFFECTS OF THE APPLICATION OF THE KINEMATIC GAUGES**
- **UIC 505-5 (E): HISTORY, JUSTIFICATION AND COMMENTARIES ON THE ELABORATION AND DEVELOPMENT OF UIC LEAFLETS OF THE SERIES 505 AND 506 ON GAUGES**

Signaling and Train Control:

The signalling and train control system shall be designed, developed and validated using Good Industry Practices including but not limiting to the following CENELEC/ equivalent IEC standards with their latest versions issued:

S.No.	CENELEC	IEC	Subject
1	EN 50121	IEC 62236	Railway applications-Electromagnetic Compatibility (Part 1 to 5)
2	EN 50124	IEC 62497	Railway applications- Insulation Coordination (Part 1 to 2)
3	EN 50125	IEC 62498	Railway applications- Environmental conditions for equipments (Part 1 to 3)

4	EN 50126	IEC 62278	Railway applications- The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS)
5	EN 50128	IEC 62279	Railway applications-Communications, signalling and processing systems - Software for railway control and protection systems
6	EN 50129	IEC 62425	Railway applications- Communication, signaling and processing systems - Safety related electronic systems for signalling
7	EN 50159	IEC 62280	Railway applications- Communication, signalling and processing systems-Safety-related communication(Part1&2)
8	EN 50238	IEC 62427	Railway applications- Compatibility between rolling stock and train detection systems
9	EN 50155	IEC 60571	Railway applications- Electronic equipment used on rolling stock
10	EN 62290	IEC 62290	Railway applications- Urban guided transport management and command/control systems
11	EN 60529	IEC 60529	Specification for degree of moisture provided by enclosures (IP codes)
12	EN 60204	IEC 60204	Safety of Machinery- Electrical equipment of machines Part 1 (for Point machines)
13	EN 50289-4-16	IEC 60331	Tests for electrical cables under fire conditions-circuit integrity
14	EN 60332	IEC 60332	Tests on electric and optical fibre cables under fire conditionsManual of Specifications and Standards for Urban Rail Systems27

- **IEEE 1474.1-2004 - IEEE Standard for Communications-Based Train Control (CBTC) Performance and Functional Requirements**
- **IEEE 1474.2-2003 - IEEE Standard for User Interface Requirements in Communications-Based Train Control (CBTC) Systems**
- **IEC 62290-1: Railway applications - Urban guided transport management and command/control systems - Part 1: System principles and fundamental concepts**
- **IEC 62290-2:2014 : Railway applications - Urban guided transport management and command/control systems - Part 2: Functional requirements specification**
- **IEC 60331 (Fire Resistant): Functional integrity and fire resistance of electric cables.**

- **IEC 60332** (Flamability tests for electrical cables): Tests on electrical cables and optical fibre cables under fire conditions
- **BS 4575**: Fluid power transmission and control systems
- **IEC 60204-1**: Safety of machinery - Electrical equipment of machines

Electric power system:

- **IEC 60255**: Electrical Relays
- **IEC 60850**: RAILWAY APPLICATIONS – SUPPLY VOLTAGES OF TRACTION SYSTEMS
- **EN 50163** : Railway applications - Supply voltages of traction systems
- **IEC 60913:2013** : Railway applications - Fixed installations - Electric traction overhead contact lines
- **BS 7865**: Specification for steel electrical conductor rail for railway motive power supply
- **EN 50122-1**: RAILWAY APPLICATIONS - FIXED INSTALLATIONS - ELECTRICAL SAFETY, EARTHING AND THE RETURN CIRCUIT - PART 1: PROTECTIVE PROVISIONS AGAINST ELECTRIC SHOCK
- **EN 50122-2**: RAILWAY APPLICATIONS - FIXED INSTALLATIONS - ELECTRICAL SAFETY, EARTHING AND THE RETURN CIRCUIT - PART 2: PROVISIONS AGAINST THE EFFECTS OF STRAY CURRENTS CAUSED BY D.C. TRACTION SYSTEMS
- **IEC 60332-3**: Tests on electric cables under fire conditions - Part 3: Tests on bunched wires or cables
- **IEC TR 60870-1-1** : Telecontrol equipment and systems. Part 1: General considerations. Section One: General principles
- **IEC 60870-2-1** : Telecontrol equipment and systems - Part 2: Operating conditions - Section 1: Power supply and electromagnetic compatibility
- **IEC 60870-3:1989** : Telecontrol equipment and systems. Part 3: Interfaces (electrical characteristics)
- **IEC 60870-4:1990** : Telecontrol equipment and systems. Part 4: Performance requirements
- **IEC 60870-5:2017 SER Series**: Telecontrol equipment and systems - Part 5: Transmission protocols - ALL PARTS
- **IEC 619361**: Power installation exceeding 1 KVAC
- **IEC 60364-4-41**: Low voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock
- **BS 7430**: CODE OF PRACTICE FOR PROTECTIVE EARTHING OF ELECTRICAL INSTALLATIONS

- **EN 50124-1**: Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment
- **EN 50124-2**: Railway applications - Insulation coordination - Part 2: Over voltages and related protection

Communication systems:

- **IEEE 802.11** : Standards for Wi-Fi and WLAN applications and the associated WLAN equipment and the use of wifi hotspots.
- **ISO/IEC/IEEE 8802-3:2017** : Information Technology – Telecommunications and Information exchange between system – Local and metropolitan area networks – Specific requirements – Part 3: Standards for Ethernet
- **IEC- 268**: Part 1 to 17- Sound System Equipment

Automotive Fare Collection System:

- **ISO/IEC 14443** Identification cards -- Contactless integrated circuit cards -- Proximity cards is an international standard that defines proximity cards used for identification, and the transmission protocols for communicating with it.
 - **ISO/IEC 14443-1:2016** : Identification cards - Contactless integrated circuit cards - Proximity cards - Part 1: Physical characteristics
 - **ISO/IEC 14443-2:2016** : Identification cards - Contactless integrated circuit cards - Proximity cards - Part 2: Radio frequency power and signal interface
 - **ISO/IEC 14443-3:2011/AMD6:2014** : Amendment 6 - Identification cards -- Contactless integrated circuit cards -- Proximity cards -- Part 3: Initialization and anticollision - Bit rates of $3fc/4$, fc , $3fc/2$ and $2fc$ from PCD to PICC
 - **ISO/IEC 14443-4:2016** : Identification cards - Contactless integrated circuit cards - Proximity cards - Part 4: Transmission protocol

Station planning and Design:

The Station design shall conform to the following standards & policies:

- (i) The Persons with Disabilities Act;
- (ii) National Building Code;

- (iii) NFPA70-‘National Electrical Code’;
- (iv) NFPA72-‘National Fire Alarm Code’; and
- (v) NFPA130-‘Standard for Fixed Guideway Transit and Passenger Rail Systems’

- **I.S. 3218 : 2013**- Fire Detection & Alarm Systems
- **BS EN 81-73:2016**: Safety rules for the construction and installation of lifts. Particular applications for passenger and goods passenger lifts. Behavior of lifts in the event of fire
- **BS 7255:2012**: Code of practice for safe working on lifts
- **IS 14665-1**: Electric Traction Lifts, Part 1: Outline Dimensions(Superseding IS 3534:1976)
- **IS 14665 : Part 2** : Sec 1 and 2 : 2000- Electric Traction Lifts - Part 2 : Code of Practice for Installation, Operation and Maintenance - Section 1 : Passenger and Goods Lifts - Section 2 : Service Lifts
- **IS 14665 : Part 3** : Sec 1 and 2 : 2000-Electric Traction Lifts - Part 3 : Safety Rules - Section 1 : Passenger and Goods Lifts - Section 2 : Service Lifts
- **IS 14665 : Part 4** : Sec 1 to 9 : 2001-Electric Traction Lifts - Part 4 : components - Section 1 : Lifts Buffers - Section 2 : Lift Guide Rails and Guide Shoes - Section 3 : Lift Carframe, Car, Counterweight and Suspension - Section 4 : Lift Safety Gears and Governors - Section 5
- **BIS - IS 15330**: CODE OF PRACTICE FOR INSTALLATION AND MAINTENANCE OF LIFTS FOR HANDICAPPED PERSONS –
- **IS 1860**: Code of Practice for Installation, Operation and Maintenance of Electric Passenger and Goods Lifts
- **BIS - IS 15785**: CODE OF PRACTICE FOR INSTALLATION AND MAINTENANCE OF LIFT WITHOUT CONVENTIONAL MACHINE ROOMS
- **BSI - BS EN 115-1**: SAFETY OF ESCALATORS AND MOVING WALKS PART 1: CONSTRUCTION AND INSTALLATION
- **BSI - BS EN 115-2**: SAFETY OF ESCALATORS AND MOVING WALKS PART 2: RULES FOR THE IMPROVEMENT OF SAFETY OF EXISTING ESCALATORS AND MOVING WALKS

Building services:

- **IEC 60331-1:2009** Tests for electric cables under fire conditions - Circuit integrity - Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm
- **BS EN 50121-2:2015** Railway applications. Electromagnetic compatibility. Emission of the whole railway system to the outside world

- **BS EN 50081-1:1992 Electromagnetic compatibility. Generic emission standard. Residential, commercial and light industry**
- **BS EN 50081-2:1994 Electromagnetic compatibility. Generic emission standard. Industrial environment**
- **BS EN 50082-1:1998 Electromagnetic compatibility. Generic immunity standard. Residential, commercial and light industry**
- **BS EN 50082-2:1995 Electromagnetic compatibility. Generic immunity standard. Industrial environment**
- **EN 50121-5: Electromagnetic Compatibility Standard for Railway Applications**
- **IEC 60439-1: Low-voltage switchgear and controlgear assemblies - Part 1: Type-tested and partially type-tested assemblies**
- **IEC TR 60890:2014 A method of temperature-rise verification of low-voltage switchgear and controlgear assemblies by calculation**
- **EN 60947: Low-voltage switchgear and controlgear**
- **IEC 60947-1:2007 Low-voltage switchgear and controlgear - Part 1: General rules**
- **BS 6346:1997 : Electric cables. PVC insulated, armoured cables for voltages of 600/1000 V and 1900/3300 V**
- **BS 6007:2006: Electric cables. Single core unsheathed heat resisting cables for voltages up to and including 450/750 V, for internal wiring**
- **BS EN 60898:1991: Specification for circuit-breakers for overcurrent protection for household and similar installations**
- **BS 7375:2010: Distribution of electricity on construction and demolition sites. Code of practice**
- **IEC 60947-2:2016 : Low-voltage switchgear and controlgear - Part 2: Circuit-breakers**
- **IEC 60408: Low-voltage air-break switches, air-break disconnectors, air-break switch-disconnectors and fuse-combination units**

The lighting system requirements shall comply with following standards:

- (i) BS 5266 - Emergency Lighting;
- (ii) EN 13201- Road Lighting;
- (iii) BS-EN 60598 - Luminaires;
- (iv) National Building Code;
- (v) Recommended practice of Illuminating Engineering Society (IES) of North America;
- (vi) Code of Practice for Int

- **IS 3217:2013 Emergency lighting**

Earthing systems shall comply with the following standards:

- (i) BS 7671 Requirements for Electrical Installations;
 - (ii) BS 7430 Code of Practice for Earthing;
 - (iii) BS EN 50122-1 Protective Provisions relating to Electrical Safety and Earthing; Manual of Specifications and Standards for Urban Rail Systems 42
 - (iv) BS EN 50122-2 Protective Provisions against the effects of Stray Currents on DC systems;
 - (v) BS 7375 Code of Practice for Distribution of Electricity on Construction Sites;
 - (vi) IEEE S 80 Guide for Safety in AC Substation Grounding; and
 - (vii) IEEE 1100 Recommended Practice for Powering and Grounding of Sensitive Electronic Equipment
- **BS 6651: Code of Practice for protection of Structures against lightning;**
 - **BS 5514-7:1996. Reciprocating internal combustion engines: performance. Codes for engine power**
 - **IEC 60034-1:2017 : Rotating electrical machines - Part 1: Rating and performance**
 - **NFPA 14: Standard for the Installation of Standpipe and Hose Systems**
 - **NFPA 20: Standard for the Installation of Stationary Pumps for Fire Protection**
 - **NFPA 10: Standard for Portable Fire Extinguishers**
 - **BS EN ISO 1461:2009 Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods**
 - **BS 5155:1984 Specification for butterfly valves**
 - **BS 5150:1990 Specification for cast iron gate valves**
 - **BS 5153:1974 Specification for cast iron check valves for general purposes**
 - **BS EN 752:2008 Drain and sewer systems outside buildings**
 - **BS 8301:1985 Code of practice for building drainage**
 - **BS EN 598:1995 Ductile iron pipes, fittings, accessories and their joints for sewerage applications. Requirements and test methods**
 - **BS EN 545:2010 Ductile iron pipes, fittings, accessories and their joints for water pipelines. Requirements and test methods**
 - **EN 1092-2 Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges**
 - **BS 4190:2014 ISO metric black hexagon bolts, screws and nuts. Specification**
 - **BS EN ISO 1461:2009 Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods**