SECTION- B 2.15

WIRING DEVICES

2.15.1 PREAMBLE

A. This section of specification defines the requirement of Wiring Devices as specified in accordance with the requirements of the Contract Documents and codes.
B. This section Includes wiring devices for common area, residential flat, plant room, electrical room etc as per layout drawings & contract documents. Following are specified in wiring devices:
   1. 6A Switch for lighting control
   2. 6A Switch Socket Outlet
   3. 16A Switch Socket Outlets
   4. 6/16A switch socket outlets
   5. 20A switch socket outlet
   6. Spur outlet
   7. Bell Push Switches
   8. TV outlet
   9. Telephone outlet RJ11
   10. Data outlet RJ45
   11. Cord and plug sets.
   12. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies
   13. Supply of all metal / PVC back boxes, Switches, Sockets, face plate as required to be supplied by Lodha as free issue item. Installation, testing and commissioning of above said material shall be in the scope of Electrical Contractor.

2.15.2 SUMMARY

A. Scope of work: Supply, Installation, Testing & Commission of wiring devices, complete as specified in the schedule of requirement meeting the intents of the Tender. This specification shall be used in conjunction with all drawings, Schedule of requirement and BOQ attached.
   1 The **Contractor** shall provide all accessories required to complete the installation.
   2 The **Contractor** shall provide details back box for each type of electrical outlet.
   3 Installation detail for each type of outlet in RCC wall, column, and block wall etc. shall be submitted for engineer's approval.
B. Code & Standards: - System shall be designed and executed in accordance with the latest applicable sections of the IEC/BS/IS codes. Since IS Standards are originated from IEC standards, technical requirements listed in the latest IEC standards supersedes IS standards requirements which do not cover them.

IEC 60169	Radio-frequency connectors. Part 1: General requirements and measuring methods
IEC 60884	Plugs and socket-outlets for household and similar purposes
IS 3854	Switches for domestic and similar purposes
IS 1293	Plugs and socket- outlets of rated voltage up to and including 250 volts
IS 732	Code of Practice for Electrical Wiring Installations
IS 3854	Back box confirming to above standard

C. In the adoption of standards and requirements, the Contractor shall take the following precedence:
   1. Engineer's decision
   2. Local codes of practice
   3. Drawings
   4. Specification
   5. International standards and requirements

2.15.3 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: List of legends and description of materials and process used for pre marking wall plates.
C. All technical submissions shall be approved by the Lodha Representative prior to the respective stages of construction.
D. Shop Drawings of the lighting and power positions, circuit numbers, cable routings, switching arrangement, mounting height, etc. The positions and mounting heights shall be coordinated with other services. Fixing details of all wiring accessories shall also be included.
E. Drawings showing the installation details Labeling system.
F. Builder's works requirement.
G. Samples: One for each type of device and wall plate specified, in each colour specified.
H. Field quality-control test reports.

I. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labelling conditions.

2.15.4 WORK DESCRIPTION

A. The drawings for the lighting and power points indicate approximate position of all lighting fittings, switches, power outlet points, isolating switch points etc. The actual position of all fittings, switches, the wiring details and cable routes shall be co-ordinated with other trades at site and submitted for the approval of the **Lodha Representative**. All time and cost required for adjusting the layout or complete installation to suit site requirement is included.
B. To determine the exact positioning of lighting and power points due consideration shall be given, for selection of the most accessible routes for wiring, convenience of switching and operational requirement of the installation.
   1. No extra cost will be paid should the final positions be relocated within the same room.
   2. For the purpose of specification and related drawing, each lighting & power point circuit shall be coded with a prefix to indicate the corresponding distribution board number.
   3. The electrical equipment / system may develop sudden changes due to low frequency / or direct electric current components such as fluorescent lamps, contactors, etc. shall be fitted with radio and television interference suppression components suitable to meet the levels specified in BS 800 “Limits of Radio Interference”.

2.15.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. In so far as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
B. Electrical Components, Devices, and Accessories: Listed and labelled as per IS 732 1989 (reaffirmed 2005), by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
C. Comply with IS 732 / NBC.

2.15.6 TECHNICAL REQUIREMENT

2.15.6.1 LIGHTING POINT

A. Wiring accessories like Ceiling rose, down rod, junction boxes etc including wires (300mm , from Ceiling rose to light fixture) and required to complete installation shall be in the scope of Electrical contractor.

B. Surface mounted light fitting shall terminate at junction box having entries appropriate to the run of conduit. This shall be complete with porcelain / PVC connector suitable for the size and number of connections and wiring points to be connected with the specified fitting. Wiring to the light fittings within the false ceiling space shall be by means of 3 core flexible cables i.e. between the junction box and the lamp holder/terminal blocks, in flexible conduits.

C. At every light fitting an approved type earth terminal shall be provided for connection of the circuit protective conductor of the final circuit.

D. Ferrous metal work shall be of minimum of 1mm thickness and treated against corrosion by galvanizing after welding or lead primer or other approved process. Metal work shall be painted with one priming coat, one under-coat and two final coats with stove-enameled matt white paint unless otherwise specified.

E. Cables used for internal wiring of the lighting fittings shall be with appropriate type and size, number with conductor of size not less than 1.5 sq mm single core. The insulation of the cables shall withstand the maximum temperature throughout the life of the fitting It will be subject to normal use without deterioration which could affect the safety of the fitting.

F. Cables within the lighting fittings shall be neatly bundled by nylon self locking cable ties. Wiring shall be properly routed and secured away from control gear etc. wherever possible.

G. All cable terminations within the light fittings shall be suitably shrouded.

H. All light fittings shall be supported with appropriate fixing accessories such as clips, supporting brackets, suspension sets, nuts, washers, screws etc. for their proper installation on different types of ceiling panels. Suspension sets shall be of adjustable type suitable to carry the weight of the lighting

fittings unless otherwise stated or indicated on drawings. The suspension sets shall be generally of 900 mm length. Exact lengths required shall be provided to suit the site requirement.

I. All lamps in operational condition with proper control gear shall be provided together with the light fittings as required and specified.

2.15.6.2 6A SWITCHES/ SWITCH SOCKET OUTLETS

A. Light switches unless otherwise specified, shall be single pole, quick make and break, silent action type with solid silver alloy contacts and totally enclosed for flush or surface mounting as required.

B. Light switches shall be suitable for the environment in which they shall be installed. Manufactured galvanized steel boxes completed with conduit knockouts shall be in single or multi-gang units using a grid switch system of interchangeable components at standard fixing centres. Switches of different types and ratings shall be the same dimensions to include push buttons, neon indicator lamps, blanking units, grids, steel boxes and plates all capable of integration into standard composite assemblies in any combination as required.

C. Grids shall be adjustable for a variation in depth of plaster, for squaring errors and the same type for surface or flush mounting.

D. Switches in mechanical plant rooms, electrical sub-stations and switch rooms shall be IP 44 rated polycarbonate body in flush or surface conduit boxes.

E. Switches on brick or concrete walls shall be mounted in a horizontal arrangement in plaster depth steel boxes or in galvanized steel boxes using box suspension straps and cover plates. Countersunk screws shall be provided for fixing to the conduit boxes.

F. Switches for external use shall be a weatherproof construction with an IP65 rating.

G. Switches shall be rated for 6 Amps (minimum light switch rating 6A, 16 Amps or 20 Amps. Inductive lighting circuits shall be at twice the steady state connected load current. Lighting switches shall be fixed at a height as agreed with Architect & Lodha policy. Position & setting out of light fixture shall follow interior design (ID) drawings provided by architect.

H. Switches served by UPS/inverter shall be provided with a blue cover plate and shall be provided with red text labels (Applicable for commercial office space).

I. Earth continuity terminals shall be provided and connected to the circuit protective conductor at the light switch position.

J. Single pole switches shall be connected to separate the phase wire of the supply. The neutral wire shall not be routed through switch boxes.

K. Switches which are mounted in the same location shall be multi-gang type, of the maximum number of gangs available.

L. All switches used shall be of approved by the local Authorities.

M. Circuit for mains and life safety shall have a separate switch cover plate.

N. Samples of isolators, switches, conduit boxes and plaster depth boxes shall be provided for approval prior to installation.

2.15.6.3 6 AMP SWITCH SOCKET OUTLETS

A. Switch socket outlets shall be single pole 6 Amp 3 round pin shuttered outlets, one or two gang for indoor service except otherwise specified and suitable for surface or flush mounting according to location.

B. Switches shall be quick-make and break type silent action totally enclosed with solid silver alloy contacts. Switched socket outlets for indoor use shall be housed in suitable galvanized steel boxes with conduit knockouts. Types and finishes of socket plates shall match those for the Light switches.

C. Switch socket outlet in all mechanical plant rooms, electrical switch rooms shall be IP44 rated polycarbonate, with recessed or protected switch dolly, mounted in flush or surface conduit boxes as specified.

D. All switch socket outlets used shall be approved prior to installation.

2.15.6.4 16 AMP SWITCH SOCKET OUTLETS

A. 16 Amp switch socket outlets shall be 3 pin round type shuttered, of finished similar to 6 Amp switch socket outlets and flush mounted in galvanised steel conduit boxes.

B. 16 Amps / 6 Amps combination switch shall be round type shuttered switch socket outlets and flush mounted in galvanised steel conduit boxes.

2.15.6.5 20 AMP DOUBLE POLE SWITCHES

A. 20 amp rated double pole switches shall be provided where shown and shall be suitable for use on 220 volt 50 Hz supply.

B. Each 20 amp DP switch shall be manufactured in accordance with respective codes. Each unit shall be either flush mounting complete with recessed pressed steel box or surface mounting, as appropriate, with front plate matching the local lighting switch and small power outlets.

C. The switch plate shall incorporate, where shown, on the drawings flex outlet and/or indicator light units in addition to the 20 amp double pole switch assembly. Switches for use with water heaters shall have the plate engraved water heater.

D. Wiring terminals shall each be capable of accepting a minimum of 2 No. 4mm sq conductors.

2.15.6.6 TELEPHONE/DATA OUTLETS

A. Telephone outlets shall be single or twin flush mounted type suitable to receive a plug-in telephone cable lead in accordance with the Telecom service provider's requirements. The finish of the telephone outlet plates shall match the Light switch finish. Outlets shall be a combined RJ11 & RJ45 outlet.

2.15.6.7 TV OUTLETS

A. TV outlets shall be single or twin flush mounted type suitable to receive a plug-in RF connector cable lead in accordance with the TV service provider's requirements. The finish of the TV outlet plates shall match the Light switch finish.

2.15.6.8 BELL PUSH SWITCHES

A. Bell push switches shall be flush-mounted having single-pole AC switch of 6 amps rating and marked with bell symbol.

2.15.6.9 WEATHERPROOF ISOLATORS, SWITCHES & SOCKETS

A. Weatherproof enclosure shall be of the high impact, water resistant to IP65. The isolator provided shall complete with lockable device. Isolators shall be double-pole, 4-pole as specified.
B. The IP55 socket outlet arrangement is suitable for surface or flush mountings.
C. The IP55 outlet should have uncut pierceable membrane at the top & seal at the bottom for easy cable terminations.
D. The IP55 modular boxes shall be equipped with an Nylbloc automatic connector.
E. The IP55 socket modular box shall have visible with transparent lid & accessible fixing points.
F. The IP55 socket modular box shall have locking facility & should allow operation of switches without opening cover.
G. The IP55 socket modular box shall be made up from ABS plastic.
H. The IP66 socket modular box shall be suitable for surface mounting.
I. The IP66 socket modular box shall be supplied with ISO make membrane glens and the caps for rear cabling works.
J. The IP66 socket modular box shall have stainless steel captive terminal screws supplied in backed off position.

2.15.6.10 POWER SUPPLY FOR LIGHTING AT WET CONDITION

A. Residual Current Circuit Breakers (10mA) shall be provided individually for each circuits serving lighting subject to wet condition.

2.15.6.11 SPUR UNITS

A. Flex outlet plates shall be suitable for flush or surface mounting, as required, and be complete with pressed steel box and cover plate. The flex outlet plates shall be finished to match the local lighting switch and small power outlets, as indicated.

B. Each unit shall be fitted with three pairs of terminals, each being able to accommodate the required size of conductor.
C. A cord grip shall be fitted into each unit.
D. Where flex outlets are to be installed in exposed, damp or similar areas the outlets shall be of a galvanised steel pattern or other heavy duty protection

2.15.6.12 CEILING ROSES

A. Ceiling roses shall be of the plug-in type and shall incorporate strain hooks. They shall be suitable for loads up to 5 kg.

2.15.7 EXECUTION

2.15.7.1 GENERAL

A. Comply with IS / IEC & IE rules, including the mounting heights listed in that standard, unless otherwise noted.
B. Coordination with Other Trades:
   1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes. The Contractor shall be responsible for their part of installation and protection of the same. In case any damages are caused due to interface with other trades the Contractor shall arrange to repair the damages without any extra cost.
   2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
   3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is flush with the face of the wall.
   4. Install wiring devices after all wall preparation, including painting, is complete.
   5. All devices and circuit tagging shall be done with lamicod engraved/laminated stickers with black letter on white background after testing & commissioning of the board.

C. Conductors:
   1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
   2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire. Under no condition during execution contractor is allowed to cut strands to suit the termination.
   3. The length of free conductors at outlets for devices shall be in line with NBC/NEC requirements, without pigtails.

D. Cable terminations to equipment shall be made one of the following methods:-
   1. Sweated lugs of the appropriate sizes for the cable used.
   2. Compression type lugs.
   3. Pinch type screw terminations of the type that do not spread the conductors.
   4. Clamp type conductors.

E. Existing Conductors:
   1. Cut back and pigtail, or replace all damaged conductors.
   2. Straighten conductors that remain and remove corrosion and foreign matter.
   3. Pigtailing existing conductors is permitted provided the outlet box is large enough.

F. Device Installation:
   1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
   2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
   3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
   4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.

5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/4 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. Tighten unused terminal screws on the device.
8. When mounting into metal boxes, remove the fibre or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

G. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up down, and on horizontally mounted receptacles to the right.
2. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

2.15.7.2 LUMINAIRE CONNECTION

A. In the case of fluorescent luminaires, two such conduit boxes shall be provided at appropriate fixing centres. A heat resisting flexible cord shall be connected from the terminal block to the fitting. Care shall be taken to ensure that the metalwork of the fitting is effectively earthed.
B. Final connection to each bulkhead luminaire shall be by a standard circular conduit box as per manufacturer recommendation and site requirement, mounted immediately adjacent to the wiring. Wiring of sub-circuit cables through luminaires shall not be allowed unless otherwise stated.
C. The Contractor shall ensure that all ceiling recess, fixed or plug-in, shall be accessible for maintenance and testing purposes.

2.15.7.3 POSITION OF LIGHTING SWITCHES

A. Particular attention shall be given to the position of switches with reference to the hanging of doors.
B. The Lodha Representative attention shall be drawn to locations where switch positions are at variance with drawings, consistent with the following conditions:-
1. Single doors: Switches shall be located adjacent to closing style.
2. Unequal two- Switches shall be located adjacent to leaf doors: hanging style of narrower portion of doors.
3. Equal two-Switches shall be located adjacent to the leaf doors: left hand side of the doors on entering.
4. Switches shall not be installed within1.5m of any water tap, wash basin or sink.

2.15.7.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
1. Test Instruments: Use instruments that comply with IS code.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
3. Perform earth loop impedance test on the power sockets on ring ckt.

B. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range 230 ± 10%.
2. Percent Voltage Drop: Maximum 5.8% acceptable at outlet
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in NEC 2011
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION- B 2.15