

PROJECT NAME

ACTIVITY– INSTALLATION, TESTING & COMMISSIONING OF SPRINKLER SYSTEM

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| Serial No. | Sub-Activities | Hazards Identified (Generic & Task) | Risks Involved (People & Property) | Risk Rating | | | Control Measures | Residual Risk |
|------------|-------------------|---|--|-------------|-------------|--------------|---|---------------|
| | | | | Severity | Probability | Initial Risk | | |
| 1. | Prepare work area | <ul style="list-style-type: none"> Unauthorized, untrained workers | <ul style="list-style-type: none"> Cuts Abrasions | 2 | A | L | <ul style="list-style-type: none"> TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement Task specific safety training to be provided Authorized personnel to undertake the job Daily safety inspection should be carried and eliminate the hazard. | Low (ALARP) |
| 2. | Manual Handling | <ul style="list-style-type: none"> Incorrect lifting of loads Sharp edges. Placing the object while fingers underneath. Slip/trip/fall (same level) Unsafe posture | <ul style="list-style-type: none"> Back Injuries Cut to finger Strain Musculoskeletal Injuries | 3 | C | M | <ul style="list-style-type: none"> Any lifting tasks shall be carried out by persons physically capable to do so No employee should be asked to carry loads above his capacity and in any case no load shall exceed 30kg per man. Mass of the load is more then to be equally shared Deploy enough number of personnel for lifting shall be appointed to the task depending upon the type of load to be lifted. Use easy mode of transport like trolley etc. Load not to be lifted above your shoulder height Keep your fingers away from pinch point While placing the load Area to be illuminated with adequate lighting. PPE to be worn at all times. (helmet, shoe, overall, vest, gloves, goggles, mask) | Low (ALARP) |

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| | | | | Severity | Probability | Initial Risk | | |
| 3. | Transportation of materials to site using with trailer, pickup, fork lift and crane | <ul style="list-style-type: none"> • Unauthorized, Untrained Workers • Failure of lifting equipment • Failure of lifting tools & tackles • Unsafe lifting. • Swinging of material • Damaged sling/wire rope or a chain • Poor maintenance of vehicle • Speedy operation • Over turn • Over load | <ul style="list-style-type: none"> • Fatality • Fractures • Property damage • Injury to personal • Sprain and strain | 4 | C | H | <ul style="list-style-type: none"> • Ensure the crane and forklift engaged is tested and having valid license and the operator has valid license and approved 3rd party certificate. • Engage trained and certified banks man. • Barrication and warning signs in to the area where lifting operation is carried out and restrict the entry. • Check list should be carried out to their vehicles by the operator prior to start any work • Use tagline for control of swing and alignment. • The crane must be stopped when the wind speed exceeds 38km/hr. • SWL should be clearly marked on the crane and should be check that is functioning. • The crane and trucks shall be periodically maintained and a periodical check has been done by the maintenance team. • Vehicle not to be left unattended at site (ie, to be switch off mode if required and keys removed) • SWL shall not be exceeded. • Load should be secured properly with the equipment. • Operators and rigger must wear high level of reflecting vest and adequate PPE (Shoe, helmet, leather gloves, goggles, over all) • Vehicle routes to be kept free of obstructions (with spillages being cleaned up promptly) • Any reversing that is necessary should be overseen by a trained flagman / Banks man. | M (ALARP) |

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| | | | | Severity | Probability | Initial Risk | | |
| | | | | | | | <ul style="list-style-type: none"> Operator should follow the site speed limit and obey the traffic rules. Colour coded system to be implemented to all lifting equipments as per the month. | |
| 4. | Stacking and Storing | <ul style="list-style-type: none"> Unauthorized, untrained workers Material fall from height Improper stacking Collapse of materials | <ul style="list-style-type: none"> Crush Cut and abrasion Damage to property | 3 | B | M | <ul style="list-style-type: none"> All materials shall be stored below 2 meter height. If the material is too heavy, use hydraulic trolley to shift the material. No storage of materials to be done in the work place, only required quantity to be taken for the job. Personnel protective equipment must wear at all time during the activity. (Helmet, shoe, vest, overall, gloves, goggles, mask.) | Low (ALARP) |
| 5. | Installation of sprinkler system and accessories | <ul style="list-style-type: none"> Untrained, unauthorized Workers Material Fall Sharp edges Unsafe posture Slip, trip and fall | <ul style="list-style-type: none"> Cut and abrasion Back Injuries Fatigue Musculoskeletal Injuries | 3 | C | M | <ul style="list-style-type: none"> Authorized personnel to undertake the job Work location shall be inspected by concerned supervisor / foreman. Close supervision to be done at all times Materials should not kept in walkways, edge of the opening. Deploy enough number of personnel for material lifting shall be appointed to the task depending upon the distance Proper communication to be maintained between the workers while doing the installation Maintain a good housekeeping policy to prevent from slip, trip, and fall hazards. PPE to be worn at all times(Gloves, goggles, mask, helmet, shoe, vest, overall) | Low (ALARP) |

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| | | | | Severity | Probability | Initial Risk | | |
| 6. | Working in near floor openings | <ul style="list-style-type: none"> Material/equipment fall from height Slip/trip/fall | <ul style="list-style-type: none"> Fatality Property Damage Fracture | 4 | B | M | <ul style="list-style-type: none"> PTW to be applied and obtained prior to start work Authorized person to do the job. Rigid barrication and toe board to be provided to all external edges and where a fall can occur. Warning signboards to be provided in those areas. PPE to be used at all times (Helmet, Shoes, Vest, Overall, Harness) | Low (ALARP) |
| 7. | Working with Hand tools (Hack saw, torch wrench, hammer) | <ul style="list-style-type: none"> Slip, trip and fall Damaged worn out hand tools Flying objects Mushroom Heads Using incorrect type | <ul style="list-style-type: none"> Fatigue Trigger finger Cuts and abrasions | 3 | C | M | <ul style="list-style-type: none"> Defective tools should not be issued or used to perform the task, to be checked by store keeper Don't extend the spanner by using a pipe as an extension bar Hand tools shall be free from oil, grease & etc. Chisel's head shall have safety cap to avoid finger injury. Never use a file as a lever Never use a screw driver as a chisel Use eye/ face protection when there is flying materials hazard, wear gloves while required to protect the hands Use right tools for the job | Low (ALARP) |
| 8. | Working with power tools (Drill, grinding, pipe cutting machine) | <ul style="list-style-type: none"> Defective equipment Electricity Improper use of equipment Poor maintenance Untrained workers Flying object | <ul style="list-style-type: none"> Hearing losses Eye injury Crushing Back injury Burns | 3 | C | M | <ul style="list-style-type: none"> PTW to be applied and obtained prior to start, If spark producing activity is performed Defective tools should not be issued or used to perform a task. Monthly inspection should be carried out by the electrician and record to be kept at the store | M (ALARP) |

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| | | | | Severity | Probability | Initial Risk | | |
| | | <ul style="list-style-type: none"> • Noise and vibration • Fire • Dust | <ul style="list-style-type: none"> • Electrocutation • Ringing in the ear / Deafness | | | | <ul style="list-style-type: none"> • All portable power tools should be fitted with adequate fuse protection either in the tool body or in its electrical plug. • All portable power tools should be fitted with adequate fuse protection either in the tool body or in its electrical plug. • The weight, size and type of tool should be selected to suit the job being carried out. • Don't lay the cables around the access way, it should be proper routing • Industrial distribution board and socket only to be used at site • No joints shall be made in electrical cable. • Cable hangers shall be used to avoid the direct contact of power tools cable with the scaffolding members. • Electrical connection shall be routed through ELCB only. • Correct rate of ELCB should be used (Ex:- 30ma only acceptable) • Only those persons who have been adequately trained and experienced in the use of the tool should be allowed to use the same. Power tools shall have inspection sticker. • Tools should be stored and maintained in good working condition. • Appropriate PPE Should use (Goggles, Mask, Ear plug, Gloves, Shoe, Helmet, Overall, Vest) | |

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| | | | | Severity | Probability | Initial Risk | | |
| 9. | Working with ladder | <ul style="list-style-type: none"> Person/ material falling from height Over reaching Over loading Obstructing the access way Slippery or uneven surface | <ul style="list-style-type: none"> Sprain and strain Fracture Injury to the person | 3 | C | M | <ul style="list-style-type: none"> The ladder should extend minimum one meter from the top for safe movement Heavy materials should not be carried Do not erect in slippery, uneven surface Should be set up with a 4 vertical to 1 horizontal slope (4:1) Inspection and maintenance to be registered and recorded by the store keeper Step ladder must fully open and lock and the devices to be as per manufacturer Defective ladder should not be used and report it immediately Do not work from the top of two rungs Remember the 3 point contact. Do not work in front of the door. If work is carried then locked the door or blocked off Ladder to be used for short duration works only limited to 15 min. Colour coded system to be implemented | Low (ALARP) |
| 10. | Working on mobile scaffold | <ul style="list-style-type: none"> Uneven surface Overhead structure and cable Materials and worker fall from height Untrained, unauthorized Workers Collapse of scaffold | <ul style="list-style-type: none"> Sprain and strain Fracture Spinal cord damage Musculoskeletal Injury Fatality | 3 | C | M | <ul style="list-style-type: none"> Do not stack materials on to the scaffold Visual inspection should carry before use Out rigger fitted and breaks are locked on Only trained scaffolders shall be involved in erection & dismantling activities. No person to be on the scaffold while it is being moved Scaffold only use in on level and surface area Safety harness to be used above 2mtr height and anchored in above shoulder height at all time Tagging system to be implemented (i.e., all safe scaffolds shall be provided with green tags and unsafe scaffolds with red tag) | Low (ALARP) |

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| | | | | Severity | Probability | Initial Risk | | |
| | | | | | | | <ul style="list-style-type: none"> • Keep walkways free of obstacles, tools and equipment • Never stand and sit on the hand rails • Mobile scaffold height should be restricted to 3.5 to 4 times the shortest base width, If height of scaffold exceeds raker support or it should be tied to the structure properly. | |
| 11. | Handling chemicals (Solvent cement) | <ul style="list-style-type: none"> • Unauthorized, untrained workers • Spillage • Poor ventilation • Fire • Health hazards (External / Internal) | <ul style="list-style-type: none"> • Skin injury • Ingestion • Eye injury • Environment affect • Property damage • Occupational health | 3 | C | M | <ul style="list-style-type: none"> • Ensure the chemicals are stored as per the manufacturer recommendation and identification. • Adequate lighting and ventilation to be provided • MSDS to be referred prior and to follow the manufacturer instruction • Trained and authorized person to do the job • Only required quantity to take for the work • Do not store chemicals at non designated areas. • Old/ empty container return to store for proper Dispose • Container should check for leakage before Handling • Personnel hygiene to be maintained while after use of chemicals • All spillage shall be clean by sand or other absorbent materials • Rubber gloves, overall, helmet, vest, shoe, Goggles, mask to be worn while during the activity | Low (ALARP) |
| 12. | Welding work (arc) | <ul style="list-style-type: none"> • Fire • Untrained, Unauthorized Worker • Poor signage and barricade • Lighting and ventilation | <ul style="list-style-type: none"> • Electric Shock • Burns • Skin Effect • Eye Injury • Property damage | 4 | C | H | <ul style="list-style-type: none"> • PTW to be applied and obtained prior to start, If spark producing activity is performed • Certified person only undertake the welding job | Low (ALARP) |

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| | | | | Severity | Probability | Initial Risk | | |
| | | | | | | | <ul style="list-style-type: none"> • All Flammable /combustible materials should be removed from the area where welding & gas cutting operations are carried out. • Fire blankets should be used to contain sparks and molten metal's within the floor and should not be allowed to fall from height. • Warning signs and boards should be provided And area to be well barricaded • Appropriate fire extinguisher should be placed in to the work area (Dry powder, CO2, Fire blanket) • Adequate lighting and ventilation to be Provided. • Close supervision to be done at all times. • Hoses should be of approved type and should be free. • Appropriate PPE Should use (Welding helmet, Dust mask, Goggles, Gloves, Shoe, Helmet, Overall, Vest) | |
| 13. | Operating with Thread Machine | <ul style="list-style-type: none"> • Defective Machine • Improper use of Machine • Poor maintenance • Untrained, Unauthorized Workers • Slip, trip and fall • Spillage | <ul style="list-style-type: none"> • Cuts • Crush • Skin Effect • Entanglement • Eye, finger injury • Fracture | 3 | C | M | <ul style="list-style-type: none"> • Polythene sheets to be laid and drip trays to be placed below the machine to prevent spillages. • Defective machine should not be used to perform a task. • Only those persons who have been adequately trained and experienced in the use of the machine should be allowed to use the same. • Machine should be maintained in good working Condition. • All spillages must be clean immediately • Waste oil should be disposed in an approved Manner. | M (ALARP) |

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| | | | | Severity | Probability | Initial Risk | | |
| | | | | | | | <ul style="list-style-type: none"> • Operator should check the machine condition prior to start the work. • Adequate lighting and ventilation to be Provided. • Don't lay the cables around the access way, it should be proper routing • Industrial distribution board and socket only to be used at site • No joints shall be made in electrical cable. • Electrical connection shall be routed through ELCB only and should be used (Ex:-30ma only acceptable) • Fire extinguisher to be provided • Area to be barricade and provide signage. | |
| 14. | Working with electricity | <ul style="list-style-type: none"> • Electricity • Conductors (water, metal, concrete) • Broken wires • Improper plug, case • Overloading | <ul style="list-style-type: none"> • Electrocutation or death • Burns and shocks • Muscle contraction • Heart , lung Paralysis • Fire | 4 | B | M | <ul style="list-style-type: none"> • Only those persons who have been adequately trained and certified in the work of electricity to allow for the same. • Temporary live cable management plan shall develop and implement during the activity. • Electrical work shall not carry out in wet Conditions. • Lock out tag out (LOTO) procedure to be followed during testing & commissioning. • Do not overload to the circuits. • Communicate to all personnel about testing & commissioning. • Don't use homemade electrical accessories and use industrial type only. • Disconnect main supply before commencing of work. • Defective tools and equipment should not be used, report it and replaced it immediately. | Low (ALARP) |

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| | | | | Severity | Probability | Initial Risk | | |
| | | | | | | | <ul style="list-style-type: none"> • Barricade the location and signage to be placed where circuits and equipments are energized. • PPE should worn at all time where working in energized circuits. (Insulated gloves, Electric resistivity shoe) | |
| 15. | Flushing, pressure and leakage testing | <ul style="list-style-type: none"> • Untrained, unauthorized Workers • Faulty pressure gauge • Poor lighting • Improper identification • Bursting of pipes | <ul style="list-style-type: none"> • Fatality • Property damage • Fractures • Full body injury | 4 | B | M | <ul style="list-style-type: none"> • PTW to be applied and obtained prior to start work • Calibrated pressure gauge only to be used for pressure testing • Never pressure test the system/ pipe above its designed pressure. • Never do hot work on a pressurized system (always de-pressurize) • Close supervision to be done at all times • Proper lighting to be provided in around the working area. • Use always regulators and never pressurize the system directly without regulator. • Warning signs and boards should be provided And area to be well barricaded • Only qualified and trained person to do the job. • Emergency procedure to be briefed to all personnel prior to start the activity. • Emergency evacuation plan shall be readily available according to site condition and briefed to the workforce prior to start. • Trained first aider, fire warden and emergency vehicle to be available at the site during the activity. • Calibrated instrument only to be used. • All personnel's involved shall be made aware of first aid treatment related to electric injuries. | Low (ALARP) |

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| | | | | Severity | Probability | Initial Risk | | |
| 16. | Working in hot weather | <ul style="list-style-type: none"> Heat Stress | <ul style="list-style-type: none"> Dehydration Sunburn Skin Cancer | 2 | B | M | <ul style="list-style-type: none"> Drink plenty of water Employees shall be trained about heat stress symptoms & first aid measures. Avoid highly physical tasks during the hottest part of the day Isotonic drinks to be provided Provide sufficient rest breaks based on the humidity & temperature conditions | Low (ALARP) |
| 17. | While working at night shift | <ul style="list-style-type: none"> Poor illumination Slip/trip/fall | <ul style="list-style-type: none"> Fatality Cuts | 3 | B | M | <ul style="list-style-type: none"> Proper illumination to be provided light post to be secured from fall Proper cable management system to be Followed All materials to be staged in proper manner without obstacles | Low (ALARP) |
| 18. | Work Completion | <ul style="list-style-type: none"> Poor housekeeping Slip/trip/fall | <ul style="list-style-type: none"> Fire | 2 | A | L | <ul style="list-style-type: none"> General housekeeping, Remove all surface, unwanted waste materials from the building All necessary precautions will be adopted to prevent fire | Low (ALARP) |

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RISK MATRIX

| | | | | | Probability | | | | |
|---------------|---|------------------|------------------|----------------------|-------------------------------------|--------------------------------|----------------------------------|----------------------------|---------------------------|
| | | | | | A | B | C | D | E |
| Severity | People | Assets | Environment | Reputation | Improbable 1 in 100,000 Years | Remote 1 in 10,000 Years | Occasional 1 in 1000 years | Probable 1 in 100 years | Frequent 1 in 10 years |
| 5-Catstrophic | Multiple fatalities or permanent total disabilities | Extensive damage | Massive effect | International impact | Medium Risk (ALARP) | High Risk | | | |
| 4-Severe | Single fatalities or permanent total disabilities | Major damage | Major effect | National impact | | | | | |
| 3-critical | Major injury or health effects | Local damage | Localised effect | Considerable impact | | | | | |
| 2-Marginal | Minor injury or health effects | Minor damage | Minor effect | Minor impact | | | | | |
| 1-Negligible | Slight injury or health effects | Slight Damage | Slight effect | Slight impact | | | | | |
| | | | | | Low Risk | | | | |

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|---------------|--|
| HIGH | 3-E 4-C,D,E 5-B,C,D,E |
| MEDIUM | 1-D,E 2-B,C,D,E 3-A,B,C,D 4-A,B 5-A |
| LOW | 1-A,B,C 2A |