

Guidelines for Safe Use of Self-Climbing Perimeter Protective Screen (SCPPS)



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Construction Industry Development Board Malaysia (CIDB)

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FOREWORD

The Guidelines for Safe Use of SCPPS [Self-climbing Perimeter Protective Screen] in Construction are developed to assist manufacturers, suppliers, consultants and contractors to understand the importance of managing safety and health hazards and risks arising from the design, installation, inspection, use, maintenance and dismantling of SCPPS.

These guidelines aim to ensure the safety of SCPPS for contractors, workers and other persons who may be affected by hazard and risk arising from the work involving use and operation of SCPPS.

The provisions made in these guidelines should be interpreted in the context of conditions currently prevailing in the country. The authors make no representations, expressed or implied with regard to the accuracy of the information contained in these guidelines and cannot accept any legal responsibility or liability for any error and omissions that may have been made.

Compliance with these guidelines does not in itself confer immunity from legal obligations.

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List of Abbreviations

The abbreviations used in this Guidelines are as follows:

- BOE - Board of Examination
- BEM - Board of Engineers Malaysia
- BS - British Standard
- CB - Certification Body
- CIDB - Construction Industry Development Board Malaysia
- CIS - Construction Industry Standard
- C.Tech - Certified Technician (Designated Person)
- DOSH - Department of Occupational Safety and Health, Malaysia
- EHS - Environment, Health and Safety
- EN - European Standards
- HIRARC - Hazard Identification, Risk Assessment and Risk Control
- IEM - The Institution of Engineers, Malaysia
- ISO - International Organization for Standardization
- JPK - Jabatan Pembangunan Kemahiran
- MBAM - Master Builders Association Malaysia
- MBOT - Malaysia Board of Technologists
- MS - Malaysian Standard
- OSHA - Occupational Safety and Health Act
- O&M - Operation and Maintenance Manual
- P.Tech - Professional Technologist (PETW / Submitting Technical Manager)
- PEPC - Professional Engineer with Practising Certificate
- PETW - Professional Engineer for Temporary Works (Submitting Technical Manager)
- PTW - Permit to Work
- SCPPS - Self-climbing Perimeter Protective Screen with Working Platform
- SHO - Safety and Health Officer, registered with DOSH
- SWL - Safe Working Load
- TWC - Temporary Work Coordinator

1 GENERAL

1.1 Introduction

SCPPS is a self-climbing perimeter protective screen, equipped with controlled, synchronized climbing mechanism to prevent workers and objects falling when working at a height. SCPPS is a more intensively designed system compared to scaffolding and other falsework systems. It requires certain level of knowledge and competencies to supervise, install, inspect, use and dismantle.

This Guidelines have been developed to provide practical guidance to all the stakeholders for managing safety and health risks and hazards arising from the design, installation, inspection, use, maintenance and dismantling of SCPPS at construction sites. Stakeholders such as manufacturers, suppliers, designers and contractors may use the guidelines as a basis for safety programs as the guidelines explains what they should or shall do to comply with the law and good recommended practices.

The guidelines are based on five (5) key principles:

- i. Applying safety and health risk management approach and adopting the general principles of prevention¹;
- ii. Regulate the adoption of relevant engineering standards;
- iii. Engaging competent personnel and skills (refer Section 2.2 for details);
- iv. Adopting Safe Operating Procedure (SOP) orientated information flow and work processes top down; and
- v. Clear definition of roles and responsibilities of all tasks across entire project life cycle.

1.2 Scope

This Guidelines covers all self-performing working platform that are intended to position persons, tools and materials with perimeter protection device to prevent persons and objects from fall. Self-performing in this context refer to the ability of equipment to complete the programmed or designed activities such as elevating or lowering the working platform, with the use of electrical hoist or hydraulic jack or other equipment, which could perform similar functions or achieve equivalent results.

These guidelines focus on three major aspects:

- i. Compliance of product design standards required for design approval of SCPPS by DOSH;
- ii. Project compliance and guidelines for construction application, installation, inspection, use, maintenance and dismantling of SCPPS;
- iii. Competencies of personnel (refer to Section 2.1 and 2.2).

1.3 References

- i. Occupational Safety and Health Act 1994 (Act 514)
- ii. Factories and Machinery Act 1967 [Act 139] P.U. (A) 328/86
- iii. Guidelines for the Prevention of Falls at Workplaces, DOSH DP/G/127/379/4-35: March 2007.
- iv. Guidelines on Occupational Safety and Health in Construction Industry (Management) 2017, by Department of Occupational Safety and Health.
- v. Guidelines for Approval of Hoisting Machine Design, by Department of Occupational Safety and Health.
- vi. Registration of Engineers Act 1967 (Amendment 2015)
- vii. Registration of Technologists and Technicians Act 2015 (Act 768)

¹ Detailed risk management approach and general principles of prevention are available in the “Guidelines on Occupational Safety and Health in Construction Industry (Management) 2017”, by DOSH

- vii. Registration of Technologists and Technicians Act 2015 (Act 768)
- viii. Board of Engineers Malaysia, Guidelines No.:001 – Guidelines on The Role and Responsibility of Professional Engineers for Temporary Works During Construction Stage.
- ix. CIS 25:2018 Construction Activities Risk Assessment (CARA) Hazard Identification, Risk Analysis and Risk Control (HIRARC) – Construction Industry Development Board Malaysia
- x. Perintah Khas Ketua Pemeriksa, Bilangan 1 Tahun 2020, Pengurusan Keselamatan Struktur Sementara (Perencah, Acuan dan Penyangga).

1.4 Definitions

For the purpose of this Guidelines, the terms and definitions given in these guidelines are cited, and the following apply:

- i. “Consultant” refers to Professional Engineers with Practising Certificate (PEPC) registered with the Board of Engineers Malaysia (BEM) who are the Submitting Person (Qualified Person) to the Authority and Specialists and PEPC whose names appear in the drawings used for tender or construction,
- ii. “Contractor” refers to a person who carries out or completes or undertakes to carry out or complete any construction work.
- iii. “Designated Person” (Manufacturer/ Supplier/ Contractor) refers to a person with sufficient knowledge, experience and skills of supervision tasks relevant to SCPPS, which enable him to carry out his duties in relation to the SCPPS project, to ensure compliance with the safety regulations and SCPPS operational manual, supervise and educate the workers on site safety practices and safe use of SCPPS. A Designated Person, is also a Temporary Work Coordinator (TWC), must be qualified and agreed by submitting technical manager.
- iv. “Falsework” refers to temporary structure used to support a permanent structure while it is not self-supporting.
- v. “Formwork” refers to structure, usually temporary, but in some cases wholly or partly permanent, used to contain poured concrete to mould it to the required dimensions and support it until it is able to support itself.
- vi. “Hazard” refers to a source or a situation with a potential harm in terms of human injury or ill health.
- vii. “Owner” refers to a person or entity that has possession of a SCPPS by virtue of proof of purchase or legal possession of the SCPPS for the period of time.
- viii. “Manufacturer” refers to a person or business concern that manufactures SCPPS.
- ix. “Supplier” refers to a person or business concern that supply the SCPPS equipment and/ or provides services relevant to SCPPS. A SCPPS supplier may or may not be the SCP manufacturer however the supplier will be the party responsible for product compliance.
- x. “Permit to Work” refers to a management system used to ensure that the work is done safely and efficiently. It often refers to a documented procedure that authorises certain people to carry out specific work within a specified time frame.
- xi. “Professional Engineer” refers to Professional Engineers with Practising Certificate registered with Board of Engineers Malaysia under subsection 10(2) of the Registration of Engineers Act 1967 [Act 138] (Amendment 2015).
- xii. “Professional Engineer for Temporary Works” (PETW) refers to the Professional Engineer with Practising Certificate employed by contractors to carry out design, endorsement and supervision of temporary works.
- xiii. “Safe Working Load (SWL)” refers to the maximum load, calculated in accordance with sound and accepted engineering practice, which can be supported safely under normal working conditions.

- xiv. "SCPPS" refers to the self-performing perimeter protective screen with or without working platform using electric chain hoist or hydraulic jack or whatsoever lifting device, with or without.
- xv. "Shall" is used in places where there is a technical requirement to achieve the desired results.
- xvi. "Should" is used as a way of indicating a preference. It does not indicate a mandatory requirement as other alternatives may achieve an equivalent result.
- xvii. "Submitting Technical Manager" (Manufacturer/ Supplier/ Contractor) is a person with qualification of PETW or P.Tech who is responsible to submit relevant document to DOSH for approval for use of SCPPS at construction site.
- xviii. "Temporary work" refers to part of the works that allow or enable construction of, protect, support or provides access to, the permanent works and which might or might not remain in place at the completion of the works.

2 RESPONSIBILITIES AND COMPETENCIES

This Guidelines specify the roles and responsibilities of each person in regards with SCPPS to ensure the safe use of SCPPS in construction.

2.1 Roles and Responsibilities

(1) Supplier (of SCPPS)

The SCPPS Supplier shall submit design report and drawings of SCPPS system, which are prepared and endorsed by a PEPC, to DOSH for design approval prior to delivery of SCPPS to construction site.

The SCPPS Supplier shall provide technical information to owner and operator for all the key components of SCPPS, which shall include but not limited to, information on the lifting device and accessories, main structure frame, anti-fall device or auto-lock device or any mechanism to which prevent SCPPS from dropping or falling during accidental (unexpected drop) condition, and any important information with respect to safety and health.

The Supplier shall equip the owner and operator with operation and maintenance manual (O&M) which provides structured approach to use and maintain the SCPPS. The O&M shall also contain the hazard identification and safety procedures when operating the SCPPS.

(2) Project Manager (Contractor)

Project Manager shall provide oversight for the entire project, allocate resources to involve directly or indirectly in SCPPS operations in risk management, and ensure all aspects of the project are up to code.

(3) Safety and Health Officer (Contractor)

SHO refers to registered safety and health officer with DOSH.

SHO shall perform audit to ensure that construction workers are complying the established safety policies and safety regulations. SHO should be able to advise his employer so to achieve the objective of protecting fellow workers from construction work hazards.

(4) Submitting Technical Manager (Manufacturer/ Supplier/ Contractor)

Submitting Technical Manager shall prepare and endorse the design report and drawings, ensure the design is compliant to recognised standards and submit to DOSH for certification before it can be used at construction site. The design report and drawings shall cover the potential risks and hazards and the mitigative measures. He shall also submit the JKJ 103 form with other documents as stipulated in 4.2(2) to DOSH. Submitting Technical Manager shall be provided by Project Manager or Main Contractor.

A set of all the originally approved signed and dated documents and drawings for the project shall be kept on site, and also made easily accessible for inspection by DOSH.

(5) Designated Person (DP) (for SCPPS) (Manufacturer/ Supplier/Contractor)

Designated Person/ TWC shall supervise the workers or installers during all SCPPS operations. He should be able to assess the level of supervision that is required by the workers based on the skills, experience and training of the workers concerned. Other factors that should be considered when assessing the level of supervision needed include the level of individuals' safety awareness, education, physical agility and attitude.

Designated Person/ TWC shall submit a PTW to a person responsible for operational control of SOP in a project such as project manager, and to SHO for review prior to commencement of work. The supervisor shall also be able to conduct briefing on the safety, risks and hazards to the workers to ensure the workers understand the content of PTW and implement it.

Designated Person/ TWC shall be able to perform inspection independently after installation, before lifting (climbing) and after lifting (climbing) of SCPPS. Designated Person/ TWC shall be appointed by the Submitting Technical Manager as his site representative to ensure operational compliance required.

Designated Person/ TWC shall be provided by Main Contractor.

(6) SCPPS Installer

SCPPS Installer shall install and dismantle the SCPPS according to method statement provided by SCPPS manufacturer or supplier, under direct supervision of Designated Person/ TWC.

2.2 Competencies

Appointing the right people, or 'competent personnel' in this context, to complete their duties is one of the key elements to securing construction safety and health. This means all key personnel who carry out their duties directly with SCPPS shall possess the minimum professional qualifications in terms of measurable skills and knowledge, namely:

- (1) **PEPC** (Professional Engineer with Practicing Certificate) shall have registered under subsection 10(2) of the Registration of Engineers (Amendment) Act 2015. PEPC should possess design knowledge and experience for both reinforced concrete and steel structure and product knowledge of the SCPPS.
- (2) **P.Tech** and **C.Tech** shall have registered under the Technologists and Technicians Act 2015 (Act 768). P.Tech should possess design knowledge and experience for both reinforced concrete and steel structure and product knowledge of the SCPPS. C.Tech should possess the product knowledge, experience and skills in operating a SCPPS.
- (3) **Submitting Technical Manager** shall possess at minimum the qualification as a PETW (registered with BEM) or P.Tech (registered with MBOT).
- (4) **Designated Person (TWC)** shall be a SCPPS competent person and must have receive the required SCPPS training under a skill training program developed by the supplier or the manufacturer in compliance to this guidelines with the approval of the Submitting Technical Manager.
- (5) **Approved SCPPS Installer** shall have undergone on-site training under supervision of Designated Person / TWC based on the training content prepared by the SCPPS manufacturer or supplier, or to be trained by the manufacturer or supplier; and approved by the Submitting Technical Manager. (Refer Appendix H).

Attendance and competency certificate to be managed by BOE.

3 PRODUCT STANDARDS AND CERTIFICATION

3.1 Product Standard

SCPPS system shall be designed according to recognised standards listed below (or other equivalent standards as approved by DOSH):

- (1) BS 5950-5 Structural use of steelwork in building. Code of practice for design of cold formed thin gauge sections
- (2) EN 1993-1-3 Design of steel structures – Part 1-3: General rules – Supplementary rules for cold-formed members and sheeting
- (3) EN 1993-1-8 Design of steel structures – Part 1-8: Design of joints
- (4) EN-ISO 898-1 Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs
- (5) EN 292-2 Safety of machinery. Basic concepts, general principles for design. Technical principles and specifications
- (6) BS 7212 Code of practice for the safe use of construction hoist
- (7) BS EN 60034-1:2010 Rotating Electrical machines: Rating and performance
- (8) BS EN 60204-32:2008 Safety of machinery – Electrical equipment of machines – Requirements for hoisting machines
- (9) EN 818-1 Short link chains for lifting purposes – Safety – Part 1: General conditions of acceptance
- (10) EN 818-2 Short link chains for lifting purposes – Safety – Part 2: Medium tolerance chain for chain slings – Grade 8
- (11) EN 818-6 Short link for lifting purposes – Safety – Part 6: Chains slings – Specification for information for use and maintenance to be provided by manufacturer.
- (12) EN 1991-1-1 Eurocode 1: Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for buildings
- (13) EN 1991-1-4 Eurocode 1: Actions on structures – Part 1-4: General actions – Wind actions
- (14) EN 294 Safety of machinery – Safety distances to prevent danger zones from being reached by the upper limbs
- (15) EN 349 Safety of machinery – Minimum gaps to avoid rushing of parts of the human body
- (16) EN 418 Safety of machinery – Emergency stop equipment, functional aspects, principles of design
- (17) EN 982 Safety of machinery – Safety requirements for fluid power systems and their components – Hydraulics
- (18) EN ISO 12100-1 Safety of machinery – Basic concepts, general principles for design Basic terminology, methodology
- (19) EN ISO 12100-2 Safety of machinery – Basic concepts, general principles for design Technical principles
- (20) EN 60204-1 Safety of machinery – Electrical equipment of machines
- (21) EN 1995-1-1 Eurocode 5: Design of timber structures – Part 1-1: General – Common rules and rules for buildings.
- (22) EN 12811-1 Temporary works equipment – Part 1: Scaffolds – Performance requirements and general design
- (23) EN 12812 Falsework – Performance requirements and general design
- (24) MS 544-2 Permissible stress design of solid timber
- (25) MS 544-3 Permissible stress design of glued laminated timber

3.2 Design Approval of SCPPS (Product Certification)

- (1) The SCPPS manufacturer, supplier, contractor, project owner, and the Submitting Technical Manager shall be responsible for the compliance of product design and system design to the standards listed in 3.1 or equivalent.
- (2) The SCPPS Supplier shall submit the design of SCPPS system and all relevant documents with endorsement by a PEPC, to DOSH (Bahagian Keselamatan Industri) for design approval. The SCPPS Supplier shall also keep a copy of the relevant documents and make available for DOSH's inspection (product submission).
- (3) SCPPS without design approval (refer to sample approval letter in Appendix I) by DOSH for item 3.2(2) is not allowed to be used in construction site.
- (4) The SCPPS Supplier, if required, shall install a mock-up SCPPS of the applied system for DOSH's inspection.
- (5) The certification shall be based on compliance to product standard (refer to Section 3.1) for SCPPS as submitted by the manufacturer, which shall consist of the following:
 - i. Complete component list of the SCPPS system which includes the model, size, capacity and manufacturer details of the components
 - ii. Design calculations and typical drawings endorsed and certified by PEPC
 - iii. General method statement for the installation, lifting/climbing, dismantling process and utilisation of SCPPS
 - iv. Operating manual
 - v. Design calculation including HIRARC document and technical description for anti-fall mechanism
 - vi. Factory Acceptance Test (FAT) report for SCPPS lifting / hoisting device by manufacturer
- (6) A certificate issued by the DOSH should contain the following information:
 - i. Name and address of the manufacturer
 - ii. DOSH reference and equipment classification
 - iii. SCPPS model and capacity (safe working load and dimensional control)

4 PRODUCT IMPLEMENTATION CONTROL (PROJECT SUBMISSION AS TEMPORARY WORKS BY SUBMITTING TECHNICAL MANAGER)

The flow chart in Appendix C provides informative guidelines on steps that could be considered by project owner, contractor and project manager, for compliance with the DOSH's requirement on the installation, operating, lifting/climbing, maintenance and dismantling of SCPPS.

4.1 Planning and Design for SCPPS Modularization

- (1) The Submitting Technical Manager shall study the building geometry and façade to confirm the feasibility of utilizing SCPPS in a project. They shall be able to evaluate and identify the potential hazards associated with the use of SCPPS for that particular project. He/she shall advise the project client accordingly about the suitability of using and selecting SCPPS as access to the project throughout the entire project life cycle.
- (2) All mechanical or electrical lifting equipment (electrical chain block and hydraulic system) of SCPPS system shall be pre-tested and labelled with test date and ID number by the supplier before delivery. The test report shall be submitted and approval by the Submitting Technical Manager who shall compile and make it available for DOSH's inspection on site.

- (3) During project phase, the Submitting Technical Manager, shall prepare a detailed design of SCPPS zoning or modularization and submit to the DOSH. The Submitting Technical Manager shall keep a copy of the detailed design and make it available for inspection by DOSH.
- (4) SCPPS modularization best practice as recommended below: -
 - i. Zoning hazards² due to differential climbing of climb zone shall not be greater than 1-floor difference under any circumstances. See Figure 2.
 - ii. Partial enclosure should be avoided. In the event of non-compliance, 'non-coverage' area shall be identified and solutions shall be included in a report and submitted to DOSH. See Figure 1.
 - iii. Discontinuity gap of more than 300mm shall not be allowed. In the event there is discontinuity gap ($\leq 300\text{mm}$), it shall be covered with the same material with the SCPPS system.
 - iv. If the SCPPS is used for construction of building structure, the SCPPS shall always be at least 1.5m above the highest working level. See Figure 2.
- (5) The Submitting Technical Manager shall ensure the safe operation procedures, installation method statement and operating manual are provided as part of the required document by manufacturer, supplier, owner or contractor for the project involving SCPPS.

In the event that the manufacturer's manual is missing, the owner or contractor shall obtain the replacement manuals from the SCPPS Supplier under the request of the Submitting Technical Manager. It is the obligation of SCPPS Supplier to provide the replacement manuals.
- (6) The SCPPS design approval number from DOSH, manufacturer or supplier name and project number shall be displayed on the façade of the SCPPS as required by DOSH.
- (7) Any modifications, additions, or alterations to SCPPS, or the fabrication or mounting of any attachments for holding tools, materials or equipment onto SCPPS shall be made only with approval from the Submitting Technical Manager.

² Zoning hazard refers to potential hazard imposed when there is discontinuity of modularized SCPPS due to different ratio of climbing or lifting. In this case, certain SCPPS sides are not covered with safety perimeter screen which subsequently impose risks of falling from height.

Figure 1: Best practice for SCPPS modularization

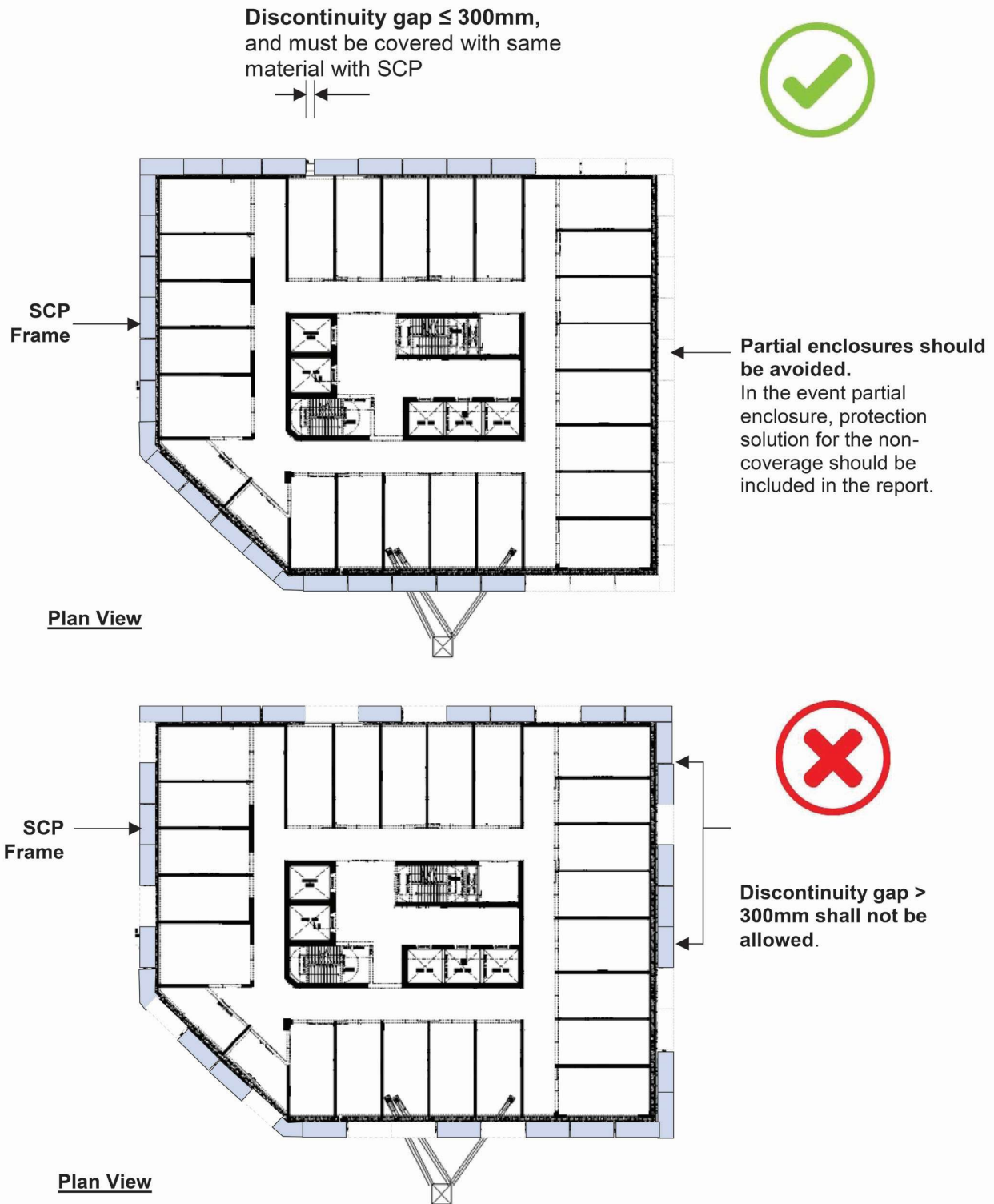
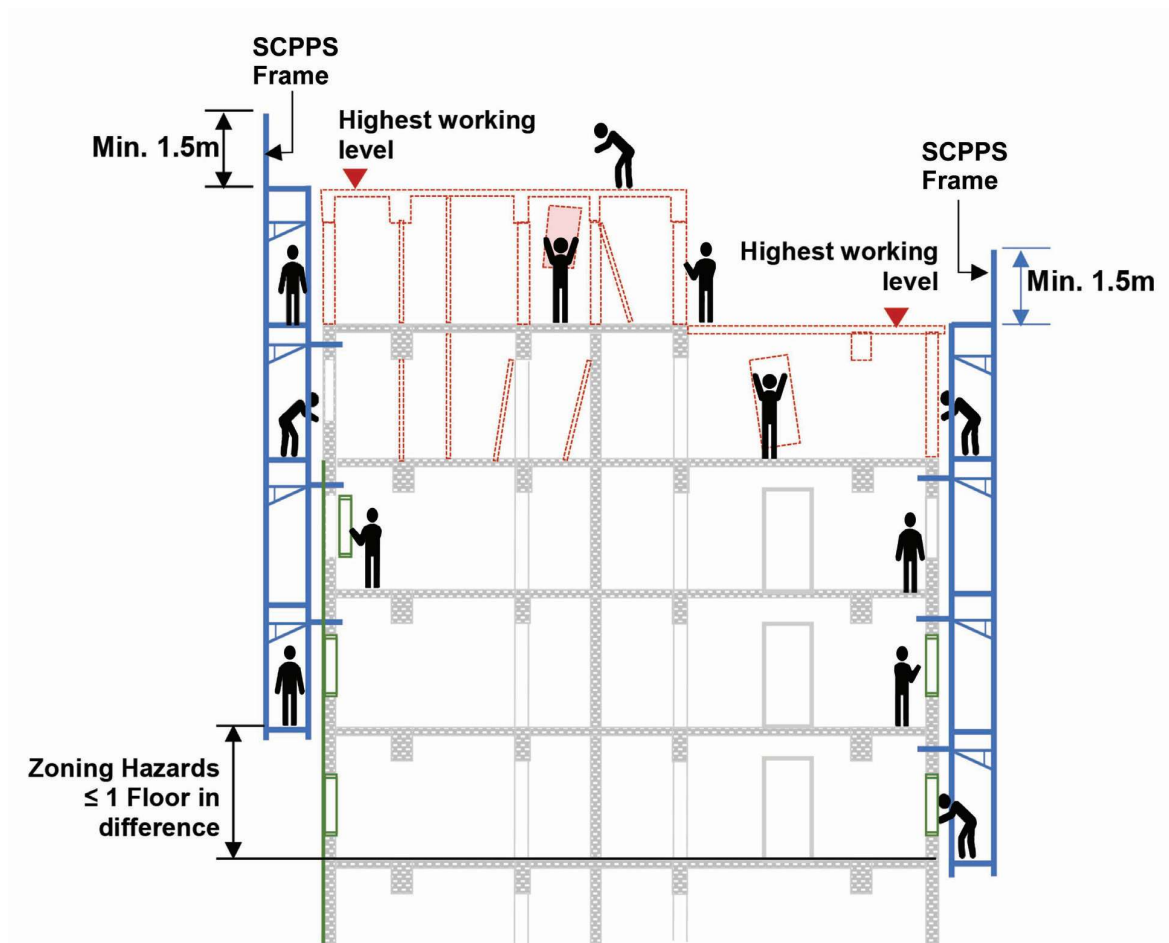


Figure 2: Best practice for SCPPS frame height



4.2 Project Submission to DOSH

- (1) The SCPPS manufacturer, supplier, contractor, project owner shall appoint a qualified person as Submitting Technical Manager for project submission to DOSH.
- (2) The submission shall be submitted to DOSH for approval within reasonable time frame (30 days processing time). Installation work shall be completed within maximum 90 days (duration of validity of approval) for DOSH site inspection.
- (3) The submission of document shall contain at minimum the following;
 - i. JKJ 103 form
 - ii. JKJ 105 form
 - iii. HSE plan for project including site layout
 - iv. Safety operation procedure / manual for SCPPS
 - v. Organization chart
 - vi. Site location plan
 - vii. Project schedule including SCPPS usage duration
 - viii. Copy of SCPPS design approval from DOSH (*Bahagian Keselamatan Industri*)
 - ix. Endorsed SCPPS calculation as temporary works by Submitting Technical Manager

4.3 Preparation and Installation

- (1) Project specific method statement, standard operation procedure, role and responsibilities associated with SCPPS shall be established prior to commencement of SCPPS installation.

- (2) The Submitting Technical Manager shall appoint a Designated Person/ TWC to supervise all SCPPS relevant work at construction site. The Submitting Technical Manager has the responsibilities to ensure that the Designated Person/ TWC possesses relevant knowledge of SCPPS system and operation procedures, and operation procedures, and as per 2.2.(4).
- (3) The Submitting Technical Manager shall appoint competent workers as 'approved SCPPS installers' for the installation of SCPPS at construction site.
- (4) The project manager shall involve in all SCPPS related meetings from induction to operation including testing and commissioning, including the safe operation activities of SCPPS in construction. All meetings related to SCPPS shall be recorded and kept as part of the Safety File of the project for DOSH inspection.
- (5) Prior to commencement, the Designated Person/ TWC shall submit PTW and obtain approval for installation work. The Designated Person/ TWC shall also conduct a special tool-box meeting with approved SCPPS installers to inform them about the safe operation procedures, safety requirement, HIRARC in regards to the works.
- (6) No SCPPS shall be installed, modified or dismantled without the approval of the Submitting Technical Manager and standing supervision of a Designated Person/ TWC.

4.4 Inspection

The inspection and quality check for SCPPS shall be performed by the Designated Person / TWC representing Submitting Technical Manager as internal party for routine operational requirement and DOSH as authority for SCPPS project initialization requirement.

4.4.1 Project Initialization Inspection by DOSH

- (1) Submitting Technical Manager shall coordinate with DOSH for inspection of SCPPS upon completion of installation to initiate the SCPPS into operational stage.
- (2) Site test(s) shall be performed to the requirement of DOSH to ensure the integrity and safe use of SCPPS:
 - a. Static load test – This test is to verify the loading capacity of the SCPPS components.
 - b. Dynamic test – This test is to verify the SCPPS anti-fall mechanism during the unplanned event such as power cut. The drop / fall of SCPPS shall be within the tolerance of the single distance for steps spacing of the climbing guide rail component.
- (3) DOSH at its discretion shall issue certificate deemed required for the tested mechanical component of the SCPPS including but not limited to PMA license.

4.4.2 Project Operation Inspection and Control

- (1) The Submitting Technical Manager shall ensure all checklist for pre-lifting (before climbing) and post-lifting (after climbing) of SCPPS are completed prior to any activity related to SCPPS. Examples of checklist for pre-lifting and post-lifting are attached in Appendix D.
- (2) The tagging for SCPPS safe to use shall be performed and signed by Designated Person / TWC (Refer Appendix E).
- (3) Need to call out frequency of inspections or exactly when to conduct inspections. E.g.: The SCPPS must be inspected prior to start work, etc.

4.5 SCPPS Safe Operational Procedures

- (1) No SCPPS activities shall be carried out without inspection approval from the Submitting Technical Manager (represented by a Designated Person/ TWC) and the approved PTW.
- (2) No SCPPS activities shall be carried out without standing supervision of the Designated Person/ TWC appointed by the Submitting Technical Manager.
- (3) SCPPS shall be properly tagged with Red Tags (see Appendix E) and the area barricaded prior to and during lifting (climbing) operation and no personnel are allowed to access to the SCPPS.

- (4) After lifting operation of SCPPS, a Designated Person/ TWC shall perform an inspection on the SCPPS based on the check list.

SCPPS shall be properly tagged with Green Tags (see Appendix E) upon approval to use. The Green Tags indicate that the SCPPS is safe to use.

- (5) Zoning hazards should be avoided under any circumstances during lifting (climbing) operation. The Submitting Technical Manager shall include all counter measures in the method statement in the Safe Operation Procedure to manage such zoning hazards, if it happens, with the approval of the Project Manager.

The Submitting Technical Manager has the responsibility to inform DOSH on the unplanned zoning hazards with the approved counter measures for record purpose.

4.6 Dismantling of SCPPS

- (1) No SCPPS dismantling activities shall be carried out without inspection approval from the Submitting Technical Manager (represented by a Designated Person/ TWC) and the approved PTW.
- (2) No SCPPS dismantling activities shall be carried out without standing supervision of the Designated Person/ TWC appointed by the Submitting Technical Manager.
- (3) SCPPS shall be properly tagged with Red Tags (see Appendix E) and the area barricaded prior to dismantling operation and no personnel are allowed to access to the SCPPS.
- (4) Movement of dismantled SCPPS segments shall require 'crane lifting plan' to be submitted and approved by SHO / Project Manager with Lifting Supervisor.

4.7 Maintenance

4.7.1 Maintenance Inspection

- (1) The minimum requirements for frequency of maintenance inspection shall be based on SCPPS operation, hence all checklist shall be incorporated in the SOP described in 4.4.2.
- (2) In the event malfunctions are identified during the maintenance inspections, they shall be rectified / replaced before the SCPPS is allowed for operation.

4.7.2 Preventive Maintenance

- (1) A preventive maintenance programme shall be established by the Submitting Technical Manager in accordance with the manufacturer's recommendations. Similar to the maintenance inspection, the manufacturer's recommendations shall be the minimum requirements. The preventive maintenance programme shall be reviewed based on the environment and severity of the use of SCPPS.
- (2) Maintenance personnel shall be trained and approved by the Submitting Technical Manager or a team who are trained from the manufacturer to maintain the SCPPS.
- (3) Before maintenance or repairs commence, the following safety precautions shall be strictly adhered to:
 - a. Instruction and precautions provided by the SCPPS manufacturer have been read and understood;
 - b. Only trained maintenance personnel are performing maintenance or repair on SCPPS;
 - c. Power supply has been safely shut down; and proper Lock-out Tag-out (LOTO) procedure is followed.
 - d. SCPPS lowered to the full down position, if possible, or otherwise secured to prevent dropping;
 - e. Anti-fall device or safety props are activated.
- (4) When a part or component is replaced, it shall be identical or an approved equivalent to the original SCPPS or component.
- (5) Where certain maintenance work can only be carried out with SCPPS in operating condition, extra safety measures shall be followed as described in the manufacturer's maintenance instructions.

Appendix A – Example of A Typical SCPPS

Figure A1: General Arrangement of a Typical SCPPS and Its Functionality

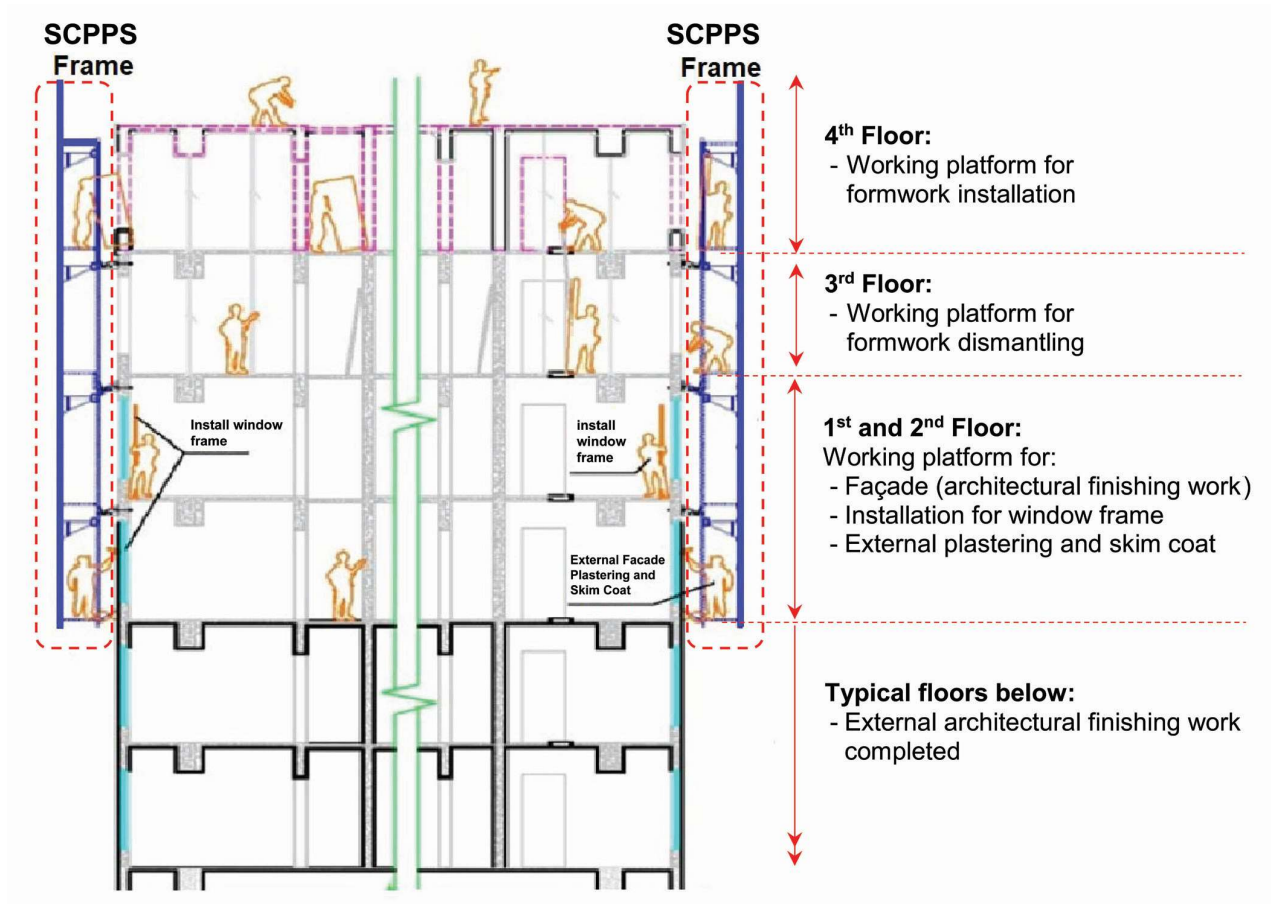
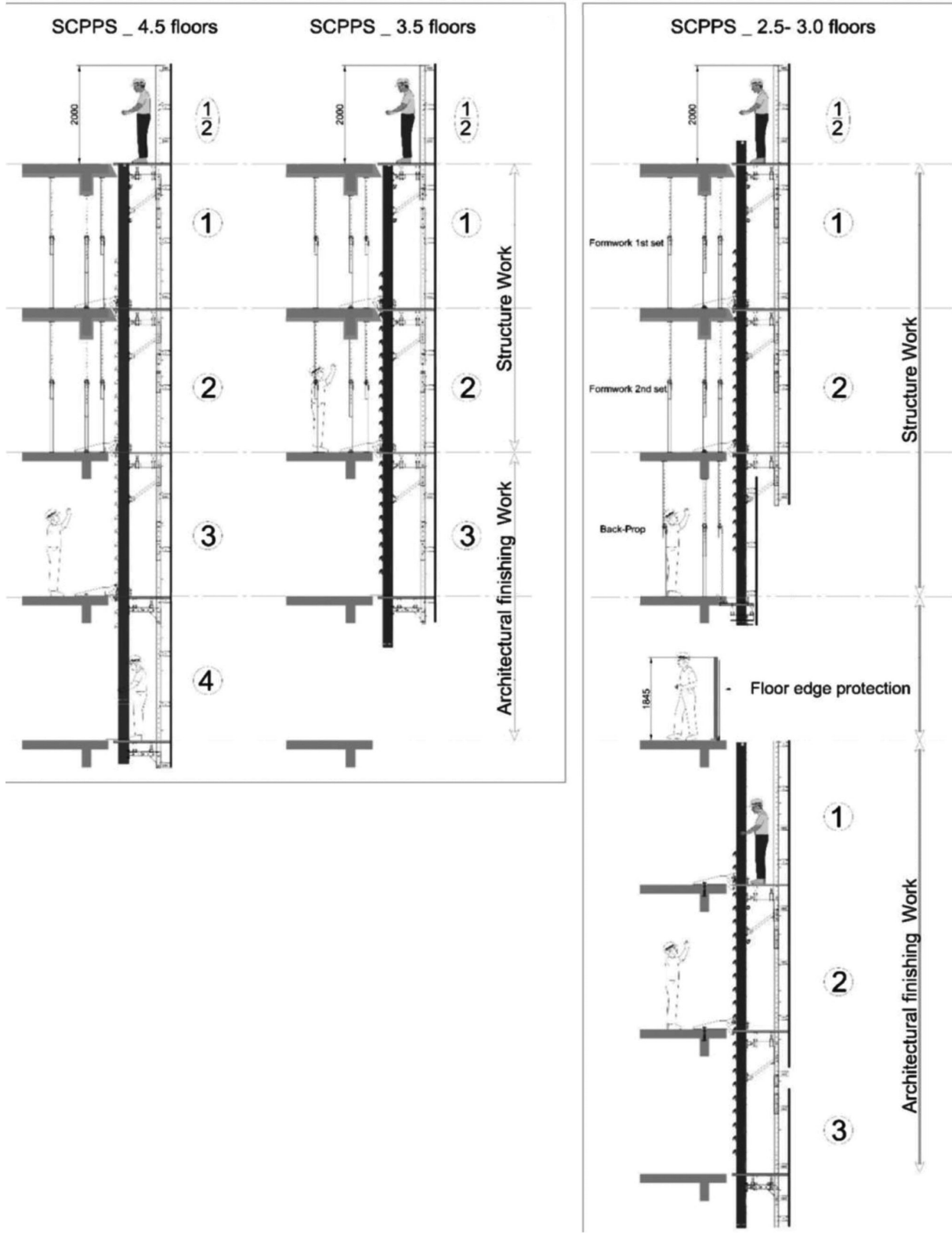


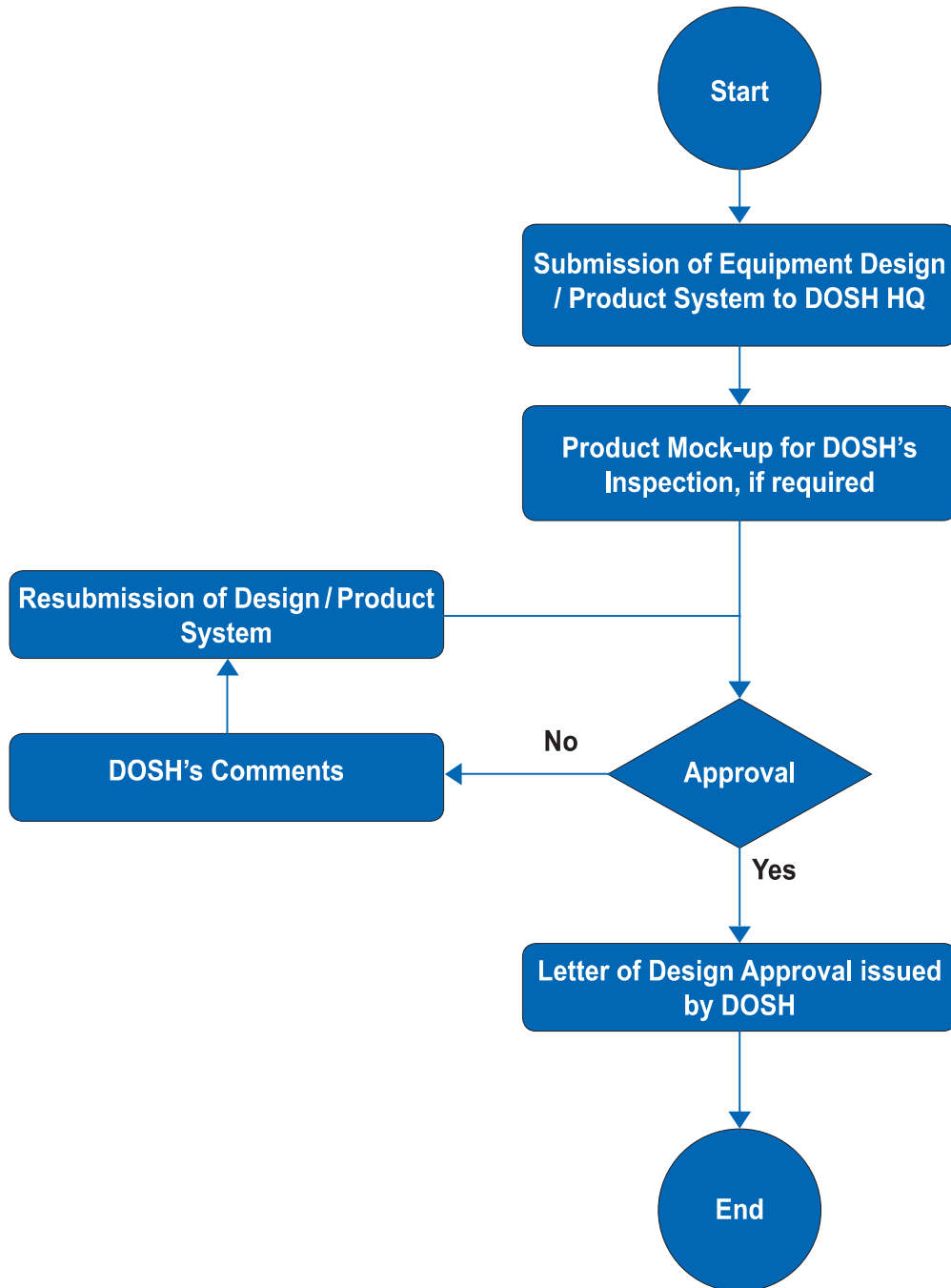
Figure A2: General Arrangement of a Typical SCPPS and Its Functionality

Basic Concept of SCPPS



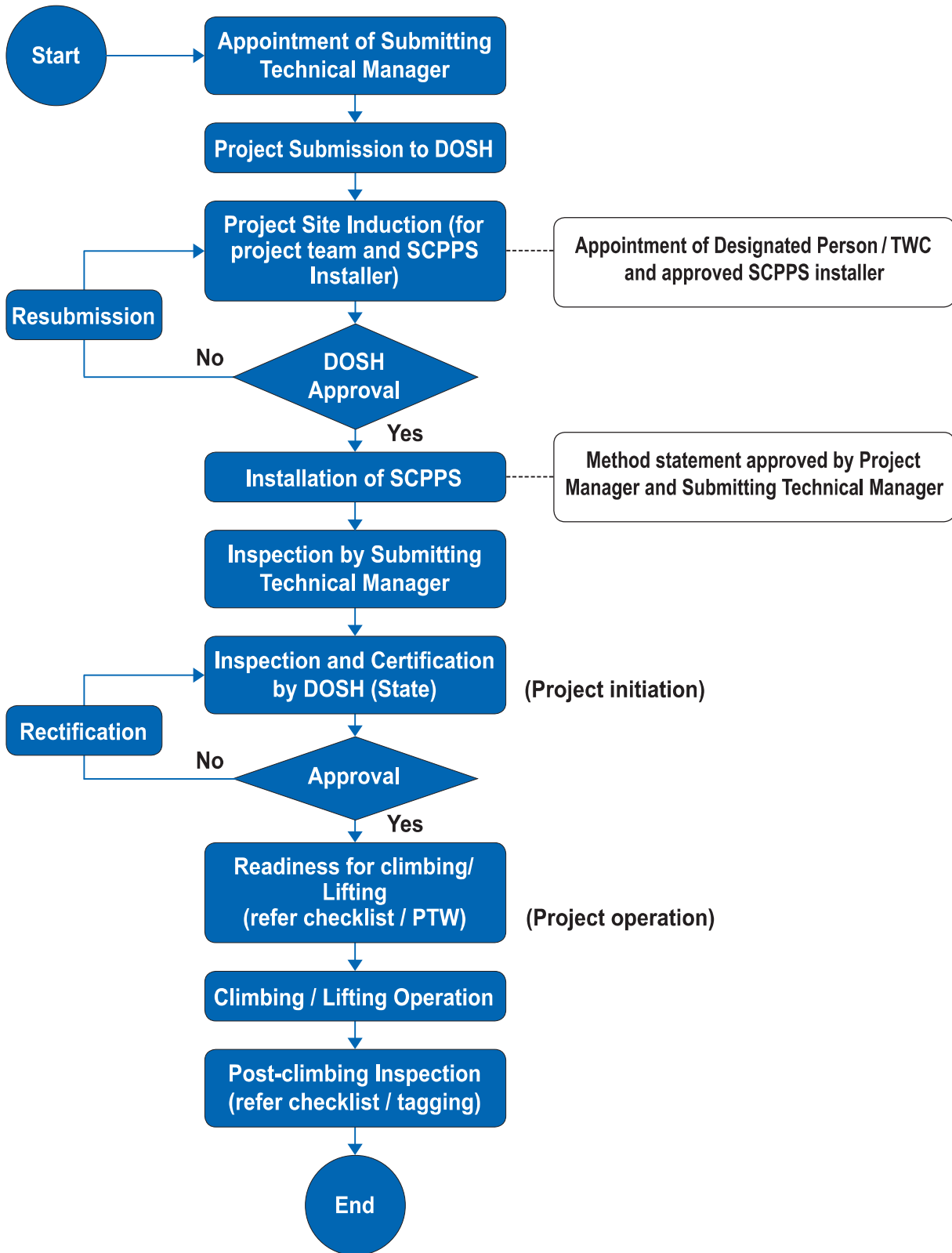
Appendix B – Product System Certification Process Flow

Process A: Product System Design Approval (Product Development Stage)



Appendix C – Product Implementation Control (Project Submission as Temporary Works by Submitting Technical Manager)

Process Flow : Project Submission to DOSH for Certificate of Fitness (Project Implementation Stage)



Appendix D – Example of SCPPS Inspection Checklist

Figure D1: Example of SCPPS Inspection Checklist

| <u>SCPPS INSPECTION CHECKLIST</u> | | | | |
|--|---|-----|----|---------|
| <u>(CRITICAL PARTS)</u> | | | | |
| Ref. No. : _____ | | | | |
| Manufacturer : _____ | | | | |
| Supplier : _____ | | | | |
| No. | Component and Checking Criteria (Refer to Component Diagram Enclosed Overleaf) | Yes | No | Remarks |
| 1 | Guide rail (mechanism to direct SCPPS moving upward or downward) <ul style="list-style-type: none"> • Properly attached to building • Not distorted • Properly coated (not rusty) or lubricated (if any) • Component dimensions as per design drawing | | | |
| 2 | Main frame – vertical post or column <ul style="list-style-type: none"> • Size and specs according to the design and material list • Not distorted • Bolted connections are tightened • Properly coated (not rusty) | | | |
| 3 | Main frame – horizontal truss or members <ul style="list-style-type: none"> • Size and specs according to the design and material list • Properly connected to vertical posts • Bolted connections are tightened • Properly coated (not rusty) | | | |
| 4 | Safety screen <ul style="list-style-type: none"> • Properly secured to the SCPPS structural frame • Coated and not rusty • SCPPS on external size are fully covered by safety screen | | | |
| 5 | Chain block / hydraulic lifting system <ul style="list-style-type: none"> • Must be certified • PMA to be displayed | | | |
| 6 | Padeyes <ul style="list-style-type: none"> • All padeyes must be load-tested at fabrication yard | | | |
| 7 | Wall bracket / Floor support <ul style="list-style-type: none"> • Size and specs according to design and material list • Properly connected SCPPS main framing | | | |

| | | | | |
|----|--|--|--|--|
| 8 | <p>Flooring / steel plank</p> <ul style="list-style-type: none"> • Does not have excessive deflection | | | |
| 9 | <p>Distribution board</p> <ul style="list-style-type: none"> • DB should be protected from rain/water. • DB should be vermin proof. • Single diagram should be displayed. • Proper fuses and CB provided at main and sub DB. • No loose wiring • Wiring are tagged correctly | | | |
| 10 | <p>Anti-fall mechanism</p> <ul style="list-style-type: none"> • Functionality – able to stop SCPPS from falling • Fall should not exceed the single distance for steps spacing of the climbing guide rail component. • Shall be integrated with SCPPS | | | |

Other comments:

Inspected by,

Verified by,

Approved by,

Designated Person / TWC

Submitting Technical Manager

Project Manager

Name

Name

Name

Company

Company

Company

Notes:

1. The SCPPS shall be pre-inspected at supplier yard before delivery at site.
2. **The actual checklist shall be customised to the actual product based on manufacturer's specification and recommendation and subject to the approval of Submitting Technical Manager**

Figure D2: Example of SCPPS Components Diagram (1)

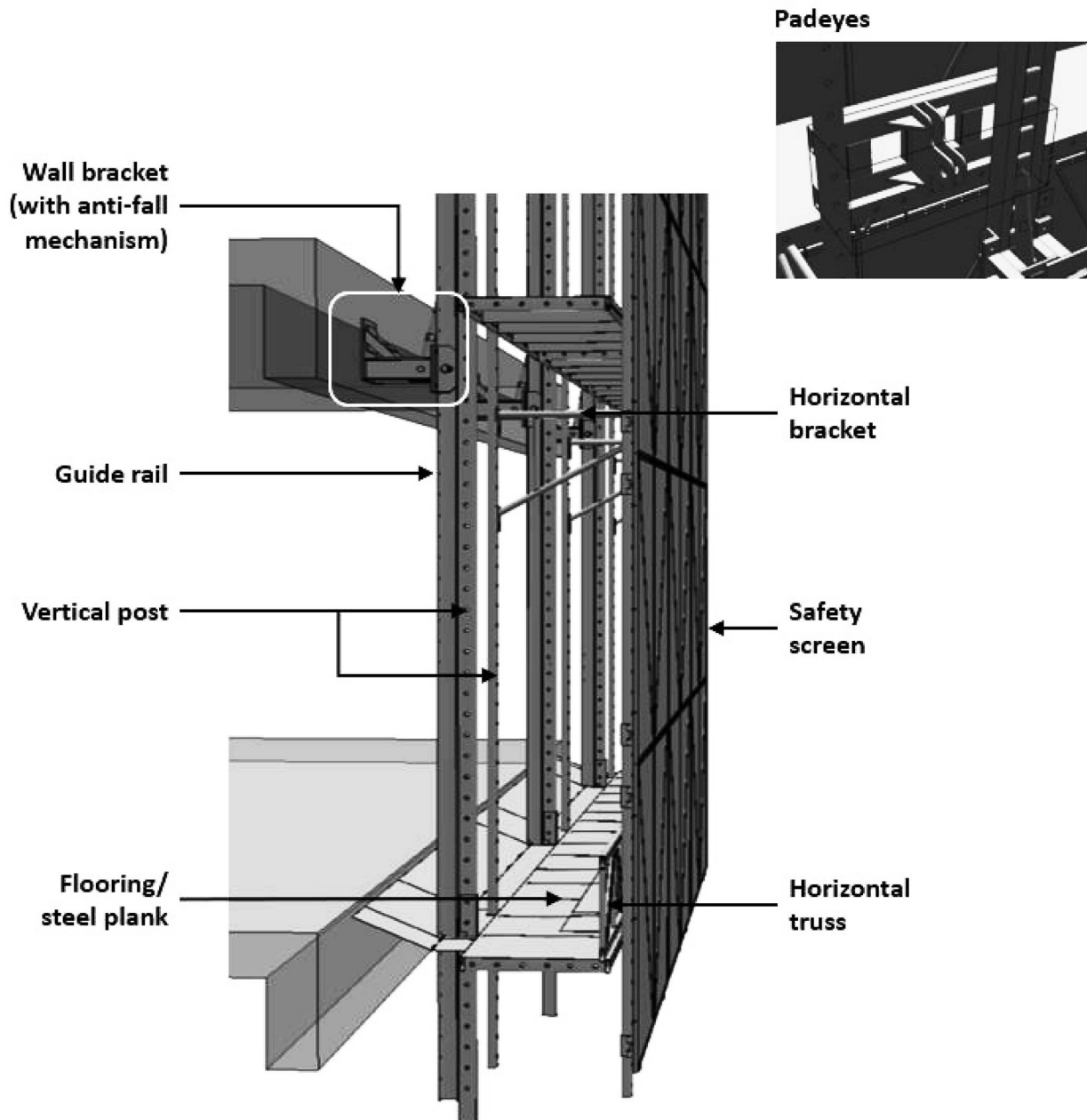


Figure D3: Example of SCPPS Components Diagram (2)

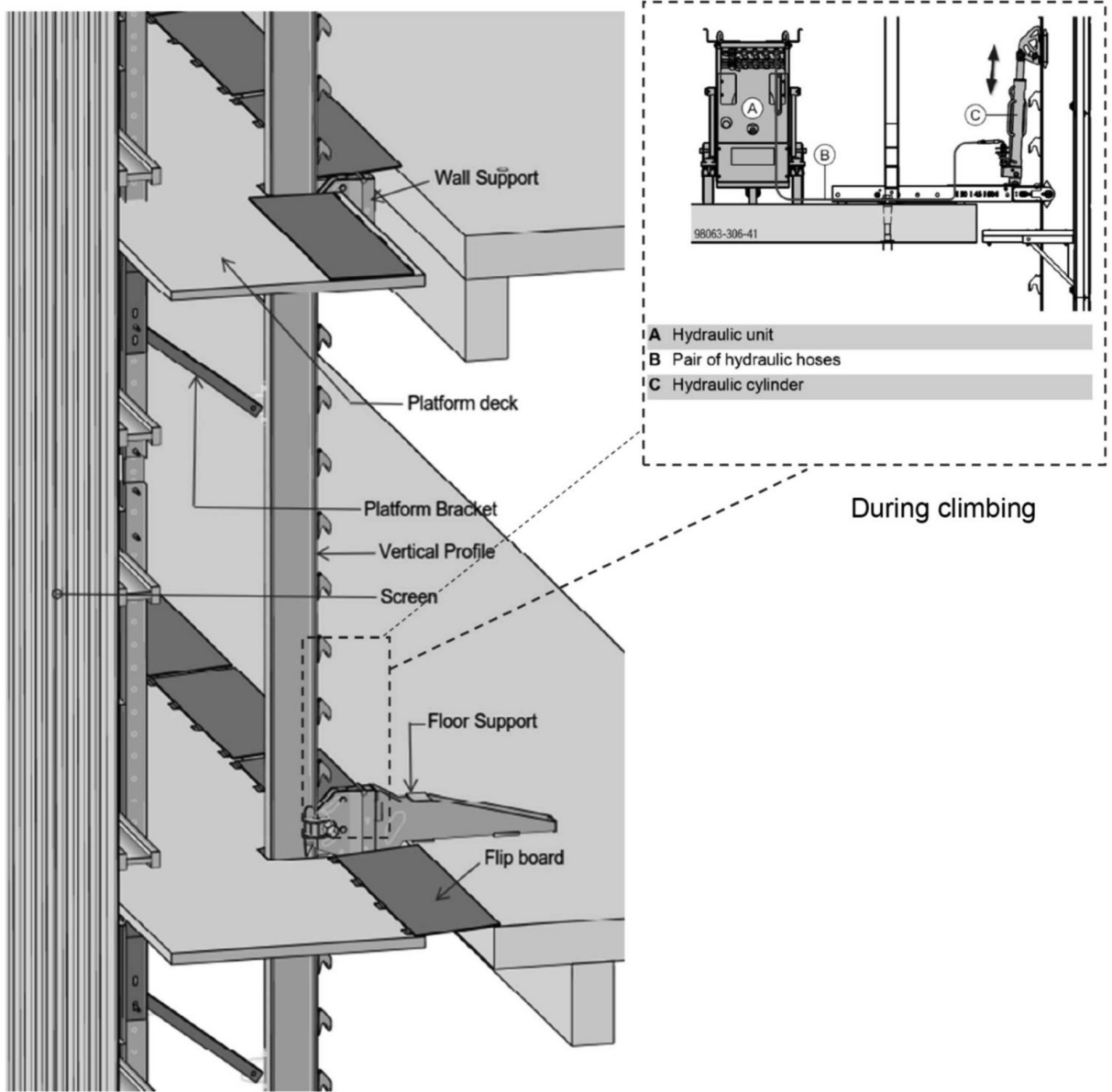


Figure D4: Example of SCPPS Inspection Checklist

| <u>SCPPS INSPECTION CHECKLIST</u> | | | | |
|--|--|------------------------------|--------|-----------------|
| <u>Before Climbing</u> | | | | |
| Ref. No.: | | Location / Site : | | |
| Client : | | Block / Zone : | | |
| Climbing Level from (Top Floor) : | | To : | Date : | |
| No. | Checking Criteria | Yes | No | Remarks |
| 1 | Are the SCPPS installed at site comply to approved design (by DOSH). | | | |
| 2 | Are the support structures with/ achieving sufficient strength? (Required minimum strength shall be strictly follow PE-endorsed calculation report) | | | |
| 3 | <u>For electric chain block</u> Are the SCPPS main DB and sub DB connected to correct power source and neutral line? | | | |
| | <u>For hydraulic jack</u> Are the control panel, hydraulic power pack, hoses and tubes connected properly according to operating manual? | | | |
| 4 | Are all the support brackets installed properly to all designated floors / levels? | | | |
| 5 | <u>For electric chain block</u> Are the chain blocks in good condition? Are the chain blocks installed properly? | | | |
| | <u>For hydraulic jack</u> Are the hydraulic cylinders in good condition? Are the hydraulic cylinders installed properly? | | | |
| 6 | Installation of Steel Plank & Safety Screen. Are all the bolts and nuts or other fasteners of steel plank and safety screen tightened up? | | | |
| 7 | Is the SCPPS clear of obstruction during climbing / lifting? E.g. all the hinged plank has been opened up | | | |
| 8 | Are the anti-fall devices installed properly? | | | |
| 9 | Housekeeping In SCPPS. Is the SCPPS clean & clear from all rubbish and construction debris before climbing / lifting? | | | |
| 10 | Others | | | |
| Inspected by, | | Verified by, | | Approved by, |
| _____ | | _____ | | _____ |
| Designated Person / TWC | | Submitting Technical Manager | | Project Manager |
| Name | | Name | | Name |
| Company | | Company | | Company |

Note:

- The actual checklist shall be customised to the actual product based on manufacturer's specification and recommendation and subject to the approval of Submitting Technical Manager**

Figure D5: SCPPS Inspection Checklist (After Climbing)

| <u>SCPPS INSPECTION CHECKLIST</u> | | | | | | | |
|---|---|---|----|---------|--|--|---|
| <u>After Climbing</u> | | | | | | | |
| Ref. No.: _____ | | Location / Site : _____ | | | | | |
| Client : _____ | | Block / Zone : _____ | | | | | |
| Climbing Level from (Top Floor) : _____ To _____ | | Date : _____ | | | | | |
| No. | Checking Criteria | Yes | No | Remarks | | | |
| 1 | Are the power supply for electrical chain blocks or hydraulic jack has been switched off? | | | | | | |
| 2 | Are the new supporting brackets installed properly | | | | | | |
| 3 | Are the anti-fall device engaged with guide rail or other designated holders? | | | | | | |
| 4 | Are all the planks connected and installed properly? Bolts and nuts or other fasteners tightened? | | | | | | |
| 5 | Are all the safety screens connected and installed properly? Bolts and nuts or other fasteners tightened? | | | | | | |
| 6 | Are all the gaps and interface between building and SCPPS covered with plank and safety screen and other solid protection mechanism?) | | | | | | |
| 7 | Recheck and reconfirm all the SCPPS structure connections are tightened or intact. | | | | | | |
| | Others, please notify: | | | | | | |
| <table style="width: 100%; border: none;"> <tr> <td style="width: 33%; vertical-align: top;"> Inspected by, _____ Designated Person / TWC Name Company </td> <td style="width: 33%; vertical-align: top;"> Verified by, _____ Submitting Technical Manager Name Company </td> <td style="width: 33%; vertical-align: top;"> Approved by, _____ Project Manager Name Company </td> </tr> </table> | | | | | Inspected by, _____ Designated Person / TWC Name Company | Verified by, _____ Submitting Technical Manager Name Company | Approved by, _____ Project Manager Name Company |
| Inspected by, _____ Designated Person / TWC Name Company | Verified by, _____ Submitting Technical Manager Name Company | Approved by, _____ Project Manager Name Company | | | | | |

Appendix E – Green Tagging and Red Tagging

Green tag is applied when the SCPPS is open for workers to perform their duties.

SCPPS No. _____

**SCPPS
IDENTIFICATION TAG**

Date Erected: _____

Expected Removal Date: _____

Job Number: _____

I have inspected and approved the SCPPS built and consider it to be safe and adequate for completion of the work specified.

Inspected By: _____

Date: _____

REINSPECTED

| NAME | DATE |
|------|------|
| | |
| | |
| | |

MODIFICATION DATE

| NAME | DATE |
|------|------|
| | |
| | |
| | |

**SCPPS
IDENTIFICATION TAG**

Erected by: _____

SAFE
FOR
USE

DO NOT ALTER
DO NOT OVERLOAD

Red tag is applied when the SCPPS is not safe to use.

SCPPS No. _____

**SCPPS
IDENTIFICATION TAG**

Date Erected: _____

Expected Removal Date: _____

Job Number: _____

I have inspected and approved the SCPPS built and consider it to be safe and adequate for completion of the work specified.

Inspected By: _____

Date: _____

REINSPECTED

| NAME | DATE |
|------|------|
| | |
| | |
| | |

MODIFICATION DATE

| NAME | DATE |
|------|------|
| | |
| | |
| | |

**SCPPS
IDENTIFICATION TAG**

Erected by: _____

UNSAFE
FOR USE

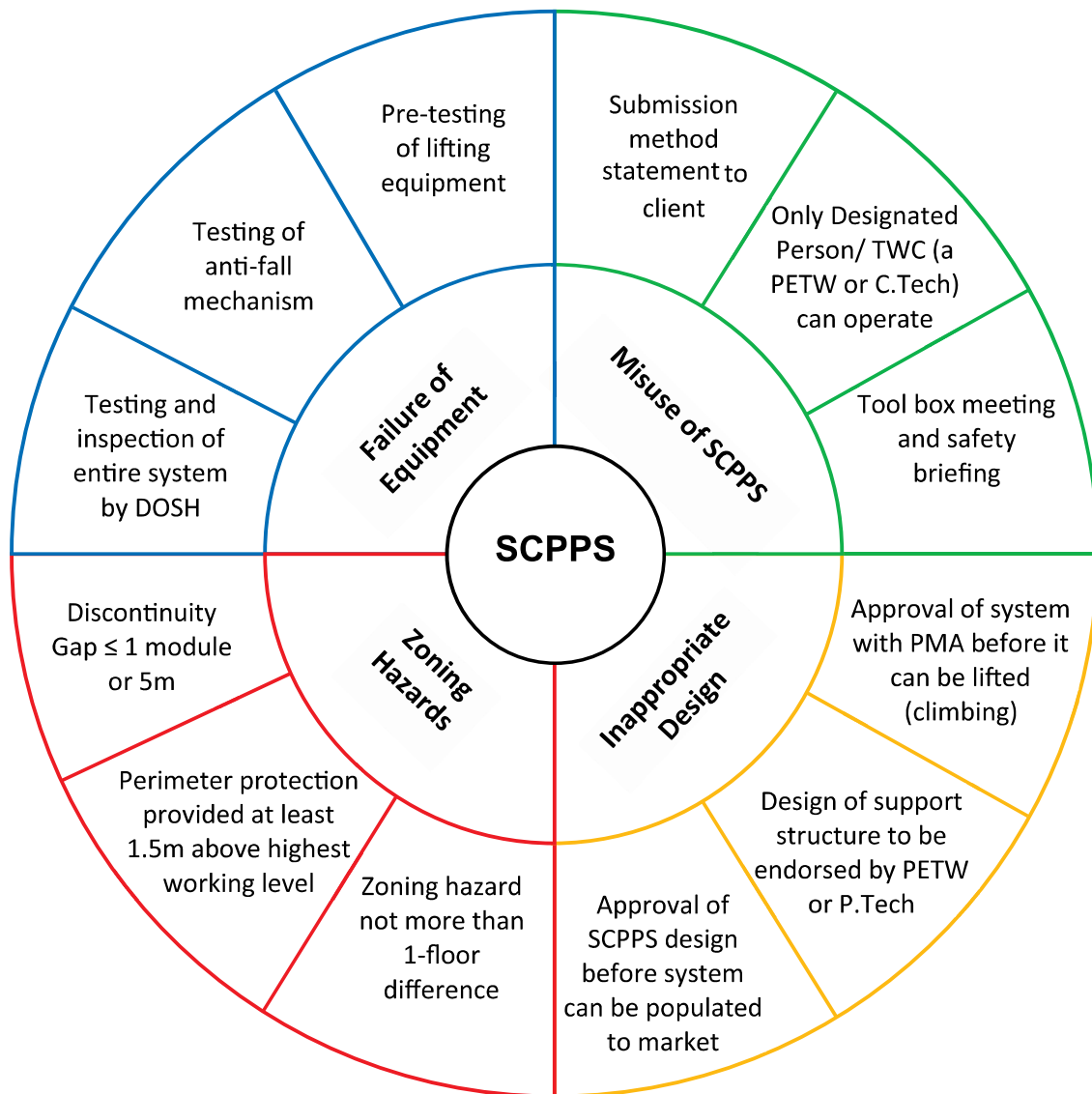
UNDER ERECTION

BEING DISMANTLED

REPAIRS REQUIRED

Appendix F – SCPPS Hazards and Solutions

Figure F1: SCPPS Risks/ Hazards and Mitigations for the Risks/ Hazards



Appendix G – Case Study: Comparison between Scaffolding and SCPPS

A case study is conducted by comparing scaffolding (that is erected with compliant to DOSH's Guidelines for Approval of Design Scaffolding, 2016 and Akta 520) to SCPPS, where both systems are used as working platform for a 54-storey building located in Kuala Lumpur. The parameters considered for the comparison calculation of equipment weight, labour force etc. are listed below. The outcome of comparison is tabulated in Table 1.

Tower perimeter: 300m
 Tower height: 162m
 No of typical floors: 54

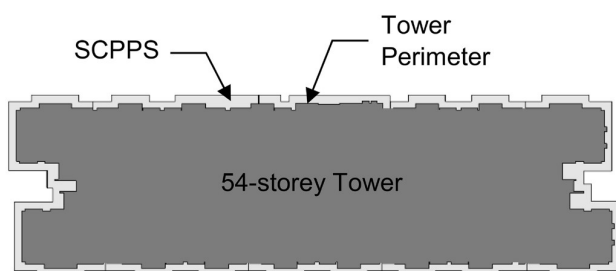


Figure G1 : Plan View

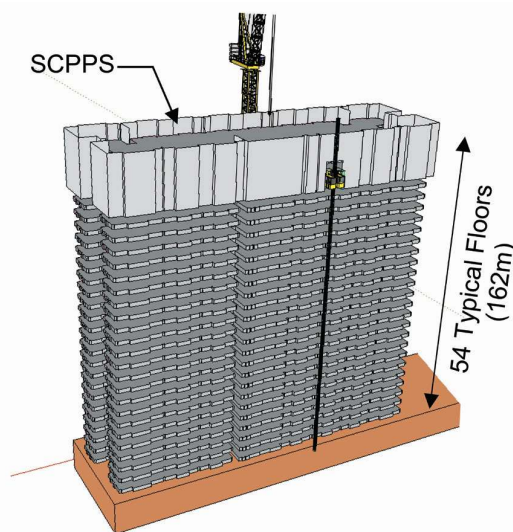


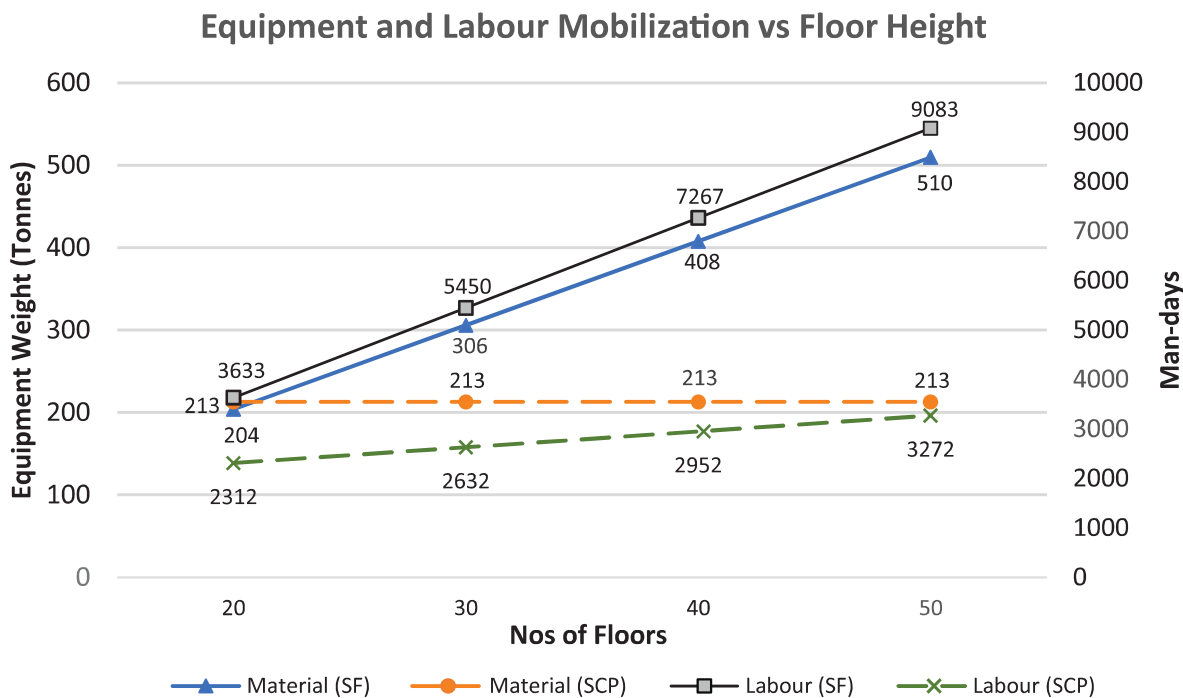
Figure G2 : Isometric View

Table G1: Comparison between Scaffolding and SCPPS

| Parameter | Scaffolding | SCPPS |
|-----------------------|--|---|
| Equipment Weight | 594.6-tonne A-frame and tie-back platform (exclude nylon netting). | 206-tonne steel (include steel protective screen) +6.9-tonne mechanical hoisting device; 212.9 tonnes in total. |
| Labour | 9,810 man-days for installation and dismantling. | 3,400 man-days for installation, climbing and dismantling. |
| Time | 1 day per floor (with 25 labours); | 4 hours for climbing a floor. |
| Combustible | Safety net is combustible | 100% incombustible material |
| Working Environment | Flexible nylon netting; little resistance to stop object falling outside scaffolding | Safer, with 100% enclosure with rigid, solid protective screen |
| Accessibility | Less accessibility | Better accessibility |
| Risks during erection | Erection risks increase with height | No incremental erection risks with height because SCPPS is self-performing / climbing |

A calculation adopting similar methodology in Table 1 is conducted to obtain the equipment weight and labour force for 20, 30, 40 and 50 floors, which are used to plot Chart 1.

Figure G3: Equipment and Labour Mobilization vs Floor Height



Appendix H – Competency of Installer

Training and competency for Installer

An approved SCPPS installer shall obtain the on-site training (as listed below) before he/she could carry out his/her duties. The training session obtained must be relevant to his/her duties. For instance, if an installer is going to carry out his/her duties to dismantle a SCPPS, he/she should obtain part 3 training.

- i. Part 1: Installation of SCPPS
- ii. Part 2: Climbing and maintenance of SCPPS
- iii. Part 3: Dismantling of SCPPS

The training content shall be prepared by the SCPPS manufacturer and supplier, and shall comply with these guidelines and approved by the Submitting Technical Manager.

Appendix I – Example HIRARC

| HIRARC REGISTER | | | | | | | | | |
|--------------------------|---|------------------------------------|---|--|-----------------------|----------|------|---|--|
| COMPANY | | CONDUCTED BY: DATE: | | | | | | | |
| PROCESS /LOCATION | | REVIEW DATE | | | | | | | |
| APPROVED BY | | NEXT REVIEW DATE | | | | | | | |
| DATE | | | | | | | | | |
| 1. HAZARD IDENTIFICATION | | 2. RISK ANALYSES | | | 3. RISK CONTROL | | | | |
| No. | WORK ACTIVITY | HAZARD | WHICH CAN CAUSE/EFFECT | EXISTING RISK CONTROL | LIKELIHOOD | SEVERITY | RISK | RECOMMENDED CONTROL MEASURE | PIC |
| 1 | Assemble walkway board | Working at height | Fall from height/ serious injury/ fatality | safety briefing, safety harness, safety shoes, safety helmet | 3 | 5 | 15 | Administrative Control: close supervision by Designated Person, safe working at height awareness training PPE : hook harness at proper anchorage point | Designated Persons, HSE Officer, Technical Submitting Manager, Project Manager |
| 2 | Fixing vertical post and horizontal truss | Unsecured material & tools at edge | Material fall from height/ serious injury/ fatality | Safety briefing | 3 | 4 | 12 | Engineering Control: wear tools bag/ container, provide tools lanyard when practicable Administrative Control: close supervision by Designated Person, safe working at height awareness training | Designated Persons, HSE Officer, Technical Submitting Manager, Project Manager |
| 3 | Install protective screen | Unsecured material at edge | Material fall from height/ serious injury/ fatality | Safety briefing, proper diagonal brace | 3 | 4 | 12 | Engineering Control: install diagonal brace to hold the protective screen in position to avoid falling outward Administrative Control: close supervision by Designated Person, safe working at height awareness training | Designated Persons, HSE Officer, Technical Submitting Manager, Project Manager |
| 4 | Install hoist | Lifting material | Material fall from height/ serious injury/ fatality | Competent personnel, safety briefing, safety helmet, safety shoes, permit to work, rigger and signal man | 3 | 5 | 15 | Engineering Control: secure sling and attachment properly Administrative Control: close supervision by Designated Person, safe working at height awareness training | Designated Persons, HSE Officer, Technical Submitting Manager, Project Manager |
| 5 | Install computerised control system | Lay electric cable on platform | Electrocuted | Safety briefing, cotton safety gloves | 3 | 5 | 15 | Administrative Control: provide manual handling training, SOP PPE : wear suitable/ thick hand gloves | Designated Persons, HSE Officer, Technical Submitting Manager, Project Manager |
| PREPARED BY: DATE: | | APPROVED BY: DATE: | | | VERIFIED BY: DATE: | | | | |

Appendix J – Example of Design Approval Letter



JABATAN KESELAMATAN DAN KESIHATAN PEKERJAAN MALAYSIA
KEMENTERIAN SUMBER MANUSIA
DEPARTMENT OF OCCUPATIONAL SAFETY AND HEALTH
MINISTRY OF HUMAN RESOURCES
Aras 1,3,4, & 5, Blok D4, Kompleks D
Pusat Pentadbiran Kerejaan Persekutuan
62530 PUTRAJAYA
MALAYSIA

Telefon : 603-8000 8000
Faks : 603-8889 2443
Laman Web : www.dosh.gov.my



KEMENTERIAN
SUMBER MANUSIA

Ruj. Tuan :

Ruj. Kami :

Tarikh :

Pengurus,

Tuan,

Kelulusan Rekabentuk Mesin Angkat 'Self Climbing Scaffold/Working Platform'

Model : SCP-3.0

Beban Kerja Selamat : 3000N/m² (pada *walkway plate*) untuk 2 layers
2000N/m² (pada *walkway plate*) untuk 3 layers

Pembuat : Senhy Construction Co. Ltd., China

No. Lukisan : JKP.TFB, KPJ-CQG, KPJ-DDHL, KPJ-DG6000, KPJ-FHW,
KPJ-FQGZA, KPJ-FQZZB, KPJ-GXZZ, KPJ-HTX, KPJ-JTTB,
KPJ-LG, KPJ-SGZ600, KPJ-XGZ600 & SCP-3.0

Adalah saya diarah merujuk kepada surat tuan yang bertarikh terima 06-Jul-2016 berkenaan perkara di atas.

2. Dimaklumkan bahawa rekabentuk mesin angkat yang tersebut di atas adalah diluluskan menurut spesifikasi pembuat dengan syarat-syarat berikut:-

i) Adalah menjadi tanggungjawab perekabentuk, pembuat dan pembekal untuk memastikan bahawa jentera ini telah direkabentuk dan dibina tanpa mendatangkan apa-apa bahaya apabila digunakan dengan sepatutnya.

ii) Mesin angkat mestilah dipasang dengan jentera angkat;

Buatan : BeiJing Ling Yang Lifting Machine Factory, China

Model : DHP

Keupayaan : 7500 kg.

iii). Segala kelengkapan mesin angkat tersebut mestilah dipasang menurut spesifikasi pembuat.

iv). Mesin angkat tersebut mestilah lulus semua ujian berikut dengan disaksikan oleh Pegawai Keselamatan dan Kesihatan Pekerjaan:

a) Ujian Fungsi Peranti Keselamatan (*load sensor, emergency stop button, anti-overturn device & anti-drop device*);

b) Ujian Statik dengan beban sebanyak 1025kg di setiap aras (2 aras) pada *walkway plate* selama 15 minit bagi memastikan tiada berlaku kegelinciran dan tidak menyebabkan apa-apa kecacatan kekal pada mana-mana struktur mesin angkat tersebut.

- v). Jurutera Bertauliah hendaklah mengesahkan bahawa rekabentuk dan pembinaan struktur asas (*anchorage*) di mana mesin angkat tersebut dipasang dapat menampung beban dan daya yang akan dikenakan.
 - vi). Mesin angkat tersebut hendaklah dipasang dengan peranti keselamatan beban lampau (*load sensor*) yang ditentukkan mengikut spesifikasi pembuat.
 - vii). Pemilik adalah bertanggungjawab bagi memastikan bahawa mesin angkat tersebut disenggara dengan baik dan mengikut spesifikasi pembuat.
 - viii) Mematuhi apa-apa arahan oleh Pegawai Keselamatan dan Kesihatan Pekerjaan.
3. Perlu diingatkan juga bahawa pemilik mesin angkat tersebut perlu mematuhi lain-lain kehendak Akta kilang dan Jentera 1967 dan Akta Keselamatan dan Kesihatan Pekerjaan, 1994 serta peraturan-peraturan di bawahnya.
4. Kelulusan ini boleh ditarik balik pada bila-bila masa atas budi bicara Ketua Pemeriksa Kilang dan Jentera.
5. Sila berhubung dengan Pengarah, Jabatan Keselamatan dan Kesihatan Pekerjaan tempatan untuk kebenaran memasang, ujian dan pemeriksaan ke atas mesin angkat tersebut.
6. Pihak tuan adalah diminta mengemukakan perkara-perkara berikut kepada Pegawai Keselamatan dan Kesihatan Pekerjaan yang berkenaan sebelum apa-apa ujian dijalankan.
- a) Sijil 'Hoist' dari pembuat.
 - b) Surat Pengesahan untuk para 2(v)

Sekian , terima kasih

“BERKHIDMAT UNTUK NEGARA”

Saya yang menurut perintah,

b.p Ketua Pengarah
Jabatan Keselamatan dan Kesihatan Pekerjaan
Malaysia.

s.k : Pengarah
Jabatan Keselamatan dan Kesihatan Pekerjaan
Tempatan

Tsai/2016220692



Hi my name is Selamat !
 Let's work together in creating a safe working culture !
 Wear proper PPE!



SAFETY GOGGLES



SAFETY HELMET
 WITH CHIN STRAP



SAFETY GLOVES



SAFETY SHOES / BOOTS



SAFETY VEST/
 REFLECTOR

SSS COURSES
 SITE SAFETY SUPERVISOR

LIFTING SUPERVISOR TRAINING

SCAFFOLDING COURSES

DP TRAINING
 Designated Person (DP) Training on Concreting

DP TRAINING on MEWP
 Mobile Elevating Work Platforms Training for Managers and Supervisors

RIGGING, SLINGING & SIGNALMAN TRAINING

CUSTOMIZED IN-HOUSE TRAINING



MASTER BUILDERS ASSOCIATION MALAYSIA (MBAM)
 No 2-1 1st Floor II, Jalan 2/109 E Desa Business Park 58100 Kuala Lumpur
 Tel : 03-7984 8636 H/P : 017-5744 377 Fax : 03-7982 9811
 Email : mbam23@mbam.org.my | mbam13@mbam.org.my

APPLICATION FORM & ENQUIRIES
 For Application Form and Training Calendar
 please download from MBAM Official
 Website: www.mbam.org.my