

# **STANDARD INDUSTRI PEMBINAAN**

Stage Public Comment

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## **DRAFT CIS 23: 2018 (FINAL DRAFT)**

### **SAFE USE OF FALSEWORK AND FORMWORK IN CONSTRUCTION**

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**Construction Industry Development Board  
Malaysia (CIDB)**

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## **COMMITTEE REPRESENTATION**

This Construction Industry Standard was developed and reviewed by the Construction Industry Development Board Malaysia with the assistance of the Technical Committee on falsework and formwork, which comprises representative from the following organisations:

Association of Consulting Engineers Malaysia  
Board of Engineers Malaysia  
BWYS Group  
Construction Research Institute of Malaysia  
Doka Formwork Malaysia Sdn. Bhd.  
DSCAFF Group  
Institution of Engineers Malaysia  
IQRAMXPERT Sdn. Bhd.  
Jabatan Kerja Raya Malaysia  
Jabatan Keselamatan dan Kesihatan Pekerjaan Malaysia  
Lembaga Lebuhraya Malaysia  
Malaysian Iron & Steel Industry Federation  
Master Builders Association Malaysia  
Persatuan Kontraktor Melayu Malaysia  
PERI Formwork Malaysia Sdn. Bhd.  
Pertubuhan Arkitek Malaysia  
Real Estate and Housing Developers Association  
SGS Malaysia Sdn. Bhd.  
Sudut Swasta Sdn. Bhd.  
Universiti Teknologi Malaysia

## FOREWORD

This Malaysian Construction Industry Standard (hereinafter referred as this CIS) is the standard for Safe Use of Falsework and Formwork in Construction and was developed by the Construction Industry Development Board Malaysia (CIDB) and its Technical Committee on falsework and formwork.

This CIS provides guidance for the safe use of falsework and formwork in construction, which addresses the applicable requirements of the Occupational Safety and Health Act 1994 (Act 514), Factories And Machinery Act 1967 (Building Operations and Works of Engineering Construction - BOWEC) (Safety) Regulations 1986, CIDB Act 520 (Amendment 2011), Board of Engineers Guideline No. 001 and BS 5975:2008 + A1:2011 (Code of Practice for temporary works procedures and the permissible stress design of falsework).

This CIS also highlights the professional responsibilities of the Professional Engineer for Temporary Works (PETW) on design and supervision of the falsework and formwork, as well as the responsibility the Designated Person under the contractor in procurement, erection, inspection, maintenance, alteration and dismantling of the falsework and formwork.

This CIS takes the form of a standard of guidance and it should not be quoted as if it were a specification. Particular care should be taken by any user claiming compliance to ensure that claims of compliance are not misleading.

Falsework, formwork and scaffolding fall under the same category of temporary works. However this CIS 23 only covers falsework and formwork. It does not include scaffolding, which is covered in CIS 22.

Compliance with this document does not in itself confer immunity from legal obligations.

## **SECTION 1: GENERAL**

### **1.1 Introduction**

Numerous reports on the failures of temporary works in construction have taken place in Malaysia. These failures can be attributed to the lack of quality in the material used, structural integrity and inadequate attention to safety aspects - supervision, inspection, erection, maintenance, alteration and dismantling of the falsework and formwork.

Failures or collapses may and have resulted in human injuries or fatalities, property damage, delays in delivering services and/or loss of revenue to project owners and all parties involved. Hence, prevention of failures or collapses is necessary.

CIDB Malaysia, with the assistance of numerous relevant stakeholders, has developed the Construction Industry Standard (CIS) 23 on the safe use of falsework and formwork in construction, in its effort to promote safety at construction sites.

This CIS, although not exhaustive, has taken the effort to review and highlight provisions already specified in the following:

- i. Building Operations and Works of Engineering Construction (BOWEC)
- ii. Board of Engineers Malaysia (BEM) Guideline 001 "Guidelines on the Role and Responsibility of Professional Engineers for Temporary Works During Construction Stage"
- iii. Occupational Safety and Health Administration (OSHA) requirements on the need to engage Professional Engineer for Temporary Works (PETW) and use of calculation and working drawing that are endorsed by PETW
- iv. The Institution of Engineers, Malaysia's (IEM) position statement entitled "Prevention of Collapse of - Part A: Scaffolding and Part B: Falsework", January 2015
- v. Master Builders Association of Malaysia (MBAM) "Handbook For Hazard Identification, Risk Assessment & Risk Control (HIRARC)"

This CIS aims to create a better understanding and awareness on the hazards and risk associated with common construction activities.

CIDB, with the provision of the CIDB Act 520 (Amendment 2011) that authorises the organisation as per sections 33C (1), 33D and 33D (2), has further intensified its efforts in promoting construction safety through the regulatory enforcement of standard compliance for all construction materials/products that are listed in the Fourth Schedule of Act 520 (Amendment 2011). It states that construction materials/products must obtain CIDB's Certificate of Standards Compliance or PPS (Perakuan Pematuhan Standard) for use in construction.

Although falsework, formwork and scaffolding are categorised under the same heading of temporary works, this CIS focuses on falsework and formwork alone. For scaffolding, it is highly recommended for readers to refer to CIS 22 on the Safe Use of Scaffolding.

## 1.2 Scope

The scope of this CIS 23 is on falsework<sup>1</sup> and formwork<sup>1</sup> for use in construction.

**Note:**

<sup>1</sup> Two typical examples of falsework and formwork are shown in Appendix A - Figure 1a and Figure 1b.

## 1.3 Normative References

This CIS incorporates dated and undated references as well as provision from other publications. For dated references, subsequent amendments to and/or revisions of any of the following publications are only applicable to this CIS when they are incorporated accordingly. For undated references, the latest edition of the normative references (including amendments) referred are applicable.

- i. CIDB Act 520 (Amendment 2011) - Fourth Schedule - Standards for Certification of Construction Materials
- ii. Occupational Safety and Health Act 1994 (Act 514)
- iii. Factories and Machinery Act 1967 [ACT 139] P.U. (A) 328/86 - Factories and Machinery (Building Operations and Works Of Engineering Construction - BOWEC) (Safety) Regulation 1986
- iv. Registration of Engineers Act 1967 (Amendment 2015)
- v. Board of Engineers Malaysia (BEM) Guidelines No. 001 - The Role and Responsibility of Professional Engineers for Temporary Works During Construction Stage
- vi. The Institution of Engineers Malaysia (IEM) - Revised Position Statement January 2015 - Prevention of Collapse of Part A: Scaffolding and Part B: Falsework - prepared by the Civil and Structural Technical Division
- vii. Handbook on Hazard Identification, Risk Assessment & Risk Control (HIRARC) (2nd reprint 2015) - Master Builders Association Malaysia
- viii. BS 5975 - Code of practice for temporary works procedures and the permissible stress design of falsework
- ix. BS EN 12812 - Falsework. Performance requirements and general design
- x. BS EN 12813 - Temporary works equipment. Load bearing towers of prefabricated components. Particular methods of structural design
- xi. CIS 22 - Safe use of scaffolding in construction
- xii. MS 544 - Code of practice for structural use of timber
- xiii. BS EN 13670 - Execution of concrete structures
- xiv. MS EN 1065 - Adjustable telescopic steel props. Product specifications, design and assessment by calculations and test
- xv. BS EN 16031 - Adjustable telescopic aluminium props. Product specifications, design and assessment by calculation and tests
- xvi. BS EN 13377 - Prefabricated timber formwork beams. Requirements, classification and assessment
- xvii. MS 1553 - Code of practice on wind loading for building structures

## 1.4 Definitions and Abbreviations

### 1.4.1 Definitions

For the purpose of this CIS, the terms and definitions given in the Acts are cited, and the following apply:

- i. “Adjustable telescopic steel prop” refers to a prop consisting of two tubes, which are telescopically displaceable within each other.
- ii. “Backpropping” refers to propping installed at levels below the slabs that supports the falsework in order to distribute the load on the uppermost slab to suitable supports, such as slabs or the foundations.
- iii. “Class 1 Temporary Works (Minor)” refers to temporary works that when subject to any failures, defects or losses of serviceability, would unlikely affect the public and workers safety and life.
- iv. “Class 2 Temporary Works (Major)” refers to temporary works that when subject to any failures, defects or losses of serviceability would likely affect the public and workers safety and life.
- v. “Class 3 Temporary Works” refers to temporary works that form part of Permanent Works.
- vi. “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.
- vii. “Contractor” refers to a person who carries out or completes or undertakes to carry out or complete any construction work.
- viii. “Component” refers to part of the temporary works structure used and identifiable as a distinct unit.
- ix. “Competent person” refers to person with sufficient knowledge of the specific tasks to be undertaken and the risks which the work will entail, and with sufficient experience and training and ability to which enable them to carry out their duties in relation to the project, to recognise their limitations, and to take appropriate action in order to prevent harm to those carrying out construction work, or those affected by the work.
- x. “Designated person” refers to a competent person appointed by a contractor to carry out any supervision or inspection or to perform any task or prescribe duty for the erection, maintenance, alteration and dismantling of falsework and formwork.
- xi. “Falsework” refers to temporary structure used to support a permanent structure while it is not self-supporting.

- xii. "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.
- xiii. "Falsework system" or "formwork system" refers to a manufactured proprietary falsework or formwork owned by a person, manufacturer or supplier.
- xiv. "Steel frame falsework system" refers to a fabricated falsework structure, manufactured according with MS 1462-1.
- xv. "Hazard" refers to a source or a situation with a potential for harm in terms of human injury or ill health, damage to property, damage to the environment or a combination of these.
- xvi. "Perakuan Pematuhan Standard (PPS)" refers to certificate issued by CIDB for a particular product that has complied with standard(s) specified by CIDB for regulatory purpose under Schedule IV of CIDB Act 520 (Amendment 2011).
- xvii. "Professional Engineer" refers to Professional Engineers with Practicing Certificate (PEPC) registered with Board of Engineers Malaysia under subsection 10(2) of the Registration of Engineers Act 1967 [Act 138] (Amendment 2015).
- xviii. "Professional Engineer for Temporary Works" (PETW) refers to the Professional Engineer with Practicing Certificate (PEPC) employed by contractors to carry out design, endorsement and supervision of temporary works.
- xix. "Prop" refers to compression member used as a temporary support.
- xx. "Product standard" refers to a normative standard, which prescribed specification for a product.
- xxi. "Re-propping" refers to system used during construction in which the temporary supports to a recently cast slab are removed and replaced in a planned sequence.
- xxii. "Re-shoring" has the same meaning as re-propping.
- xxiii. "Shoring" in this CIS has the same meaning as propping.
- xxiv. "Standard compliance" refers to conformity to standards specified in Fourth Schedule of CIDB ACT 520 (Amendment 2011) or compliance to this CIS.
- xxv. "Temporary works" refers to parts 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.

## 1.4.2 Abbreviations

The abbreviations used in this CIS are as follows:

BEM - Board of Engineers Malaysia  
BS - British Standard  
CB - Certification Body  
CIDB - Construction Industry Development Board Malaysia  
CIS - Construction Industry Standard  
DOSH - Department Of Occupational Safety and Health, Malaysia  
EN - European Standards  
HIRARC - Hazard Identification, Risk Assessment and Risk Control  
IEM - The Institution of Engineers, Malaysia  
ISO - International Organization for Standardization  
MBAM - Master Builders Association Malaysia  
MS - Malaysian Standard  
OSHA - Occupational Safety and Health Act  
PEPC - Professional Engineer with Practising Certificate  
PSQC - Periodic Site Quality Check  
PPS - Perakuan Pematuhan Standard (Certificate of Compliance Standard)  
PETW - Professional Engineer for Temporary Works  
QPASS - Quality Product in Accordance to Specified Standard  
RSQC - Routine Site Quality Check  
SAMM - Skim Akreditasi Makmal Malaysia (Malaysian Laboratory Accreditation Scheme)

## SECTION 2: ACTS AND REGULATIONS

The manufacturers, suppliers, contractors, PETW and the consultants shall familiarise and understand the following requirements to ensure compliance to acts and regulations, standards and design practice for safe use of falsework and formwork in construction.

### 2.1 CIDB Act 520 (Amendment 2011) - Fourth Schedule - Standards for Certification of Construction Materials

- i. With the Act 520 (Amendment 2011), CIDB is authorised to enforce and regulate construction products with the provisions<sup>2</sup> of the CIDB Act. All construction materials/products listed in the Fourth Schedule of Act 520 (Amendment 2011) are required to obtain CIDB's PPS.
- ii. The procedure for applying the CIDB PPS is under the QPASS programme (Appendix B).

**NOTE:**

2 The related provisions of the CIDB Act 520 (Amendment 2011) are:

- a) "Section 33C - The Board shall, in the manner determined by the Board, certify the construction material used in the construction industry and specified in the Fourth Schedule is in accordance with the standard specified in that Schedule".
- b) "Section 33D(1) - A person shall not deal or undertake to deal, whether directly or indirectly, with the construction materials specified in the Fourth Schedule unless the construction materials have been certified by the Board".
- c) "Section 33D(2) - Any person who deals or undertakes to deal with the construction materials specified in the Fourth Schedule without the certification of the Board shall be guilty of an offence and shall, on conviction, be liable to a fine of not less than RM10,000 but not more than RM500,000".

## **2.2 Occupational Safety and Health Act 1994 (Act 514)**

OSHA<sup>3</sup> specifies responsibilities to the contractor to ensure the safety, health and welfare at work, and to the designers, manufacturers and suppliers on the safety and risk on the use of product at the work site.

**NOTE:**

- 3 Part V of OSHA specified general duties of designers, manufacturers and suppliers under Section 20, Section 21 and Section 23 as follows:  
Section 20. General duties of manufacturers, etc. as regards plant for use at work.  
Section 21. General duties of manufacturers, etc. as regards substances for use at work.  
Section 23. Penalty for an offence under section 20 or 21.

## **2.3 Factories and Machinery Act 1967 [ACT 139] P.U. (A) 328/86**

Factories and Machinery - Regulation 1986 (Building Operations and Works of Engineering Construction - BOWEC) (Safety).

- i. Under Regulation 4 of BOWEC, every contractor and employer have the obligation:
  - To comply with such of the requirements of these Regulations as affect him or any person employed by him.
  - To comply with such of the requirements of these Regulations as relate to any work, act or operations performed or about to be performed by any such contractor or employer.

## **SECTION 3: PRODUCT STANDARDS, CERTIFICATION AND MARKING**

### **3.1 Product Standard**

The standards for falseworks and formwork identified are:

- i. MS EN 1065 - Adjustable telescopic steel props. Product specifications, design and assessment by calculations and test
- ii. BS EN 16031 - Adjustable telescopic aluminium props. Product specifications, design and assessment by calculation and tests
- iii. BS EN 13377 - Prefabricated timber formwork beams. Requirements, classification and assessment.

## **3.2 Product Certification**

### **3.2.1 Product with product standard**

The manufacturer, supplier, contractor or owner of falsework and formwork shall be responsible for the compliance of product and system to the relevant standards (see 3.1) and shall make arrangements with an independent third-party certification body, which is recognised by CIDB for product certification to this CIS.

### **3.2.2 Product without product standard**

For falsework and formwork, which are proprietary-design base, the product certification are as follows:

- i. The certification shall be based on appropriate design standards and code of practice applicable for a falsework or formwork system. BS 5975 Annex C - Initial testing, quality control and inspection of falsework equipment, should be used as basis for the evaluation.
- ii. The falsework or formwork, as declared by the manufacturer, shall consists of:
  - a set of complete components of the falsework or formwork system
  - design, calculation and drawing endorsed and certified by PETW
  - the assessed standard set of system configurations
  - the product manual

## **3.3 Certificate Issued by Certification Body**

A certificate issued by the certification body shall contain at least the following information:

- i. Name and address of the manufacturer
- ii. Type of falsework or formwork (where applicable)

Other relevant information may be included, subject to mutual agreement between the certificate holder and the certification body.

## **3.4 Product marking**

The manufacturer or supplier shall be responsible for the product marking.

Each falsework or formwork component and its accessory shall be legibly marked on the body (either embossed or waterproof sticker) with the following information:

- i. The manufacturer's or supplier's name (embossed on body or fixed metal plate)
- ii. Standard number (for appropriate falsework or formwork system)
- iii. Year of manufacture

- iv. CIDB PPS number
- v. CB marks (only applicable for product certification)

Marking shall be so arranged that it will remain legible<sup>4</sup> for the life of the component. The size of the lettering may take into account the size of the component.

**NOTE:**

4 Any components and accessories at a construction site with illegible markings shall not be used and removed from site

For small items, where it is not practical to mark even with a sticker on the component and already approved by CIDB, these items may be used and subjected to inspection by contractor's designated person and approval by PETW.

## **SECTION 4: PLANNING, PRODUCT APPROVAL, DESIGN AND DRAWING, MATERIAL SELECTION AND SUBMISSION**

The flowchart in Appendix C provides informative guidance on steps that should be considered by contractor for compliance with the regulatory requirement of the CIDB Act 520 (Amendment 2011) and Factories and Machinery Act 1967 (BOWEC) in the construction of falsework and formwork.

### **4.1. Planning for Temporary Work and HIRARC**

A contractor shall be equipped with proper planning and conduct HIRARC<sup>5</sup> to ensure safety in the use of falsework and formwork. The risk levels<sup>6</sup> of falsework and formwork activities should be established and appropriate action should be taken.

**NOTE:**

5 MBAM has published a "Handbook For Hazard Identification, Risk Analysis & Risk Control". The Handbook has, among others, identified hazards related to work activities for falsework and formwork.

6 The Handbook in Note 12 has three risk levels.

- HIGH: A HIGH risk requires immediate action to control the hazard, as detailed in the hierarchy of control. Actions taken must be documented on the risk assessment form including date of completion.
- MEDIUM: A MEDIUM risk requires a planned approach to controlling the hazard and applies temporary measure, if required. Any action taken must be documented on the risk assessment form, including date of completion.
- LOW: A risk identified as LOW may be considered as acceptable and further reduction may not be necessary. However, if the risk can be resolved quickly and efficiently, control measures should be implemented and recorded.

Contractors shall engage a PETW<sup>7</sup> to deal with the design (which includes analysis and design calculation, specification and working drawing), endorsement and supervision of the falsework and formwork.

**NOTE:**

- 7 a) The Professional Engineers with Practicing Certificates (see 4.1 (17)).
- b) The BEM Guidelines No.:001, has established "Guidelines on the Role and Responsibility of Professional Engineers".

## **4.2 CIDB Approval for Product**

The contractor shall only use falsework and formwork that conform to the appropriate standard, and have been approved in the form of PPS issued by CIDB.

## **4.3 Design and Drawing, Steel Frame Falsework System and Re-shoring**

### **4.3.1 Design and drawing**

The structural analysis, design calculation, specifications and drawings of falsework and formwork shall be performed and endorsed by a PETW.

Where required, refer to BOWEC Part iii, 30 (4), a copy of design and calculation shall be submitted to DOSH before commencement of work.

### **4.3.2 Steel frame falsework system**

The use of steel frame falsework system (refer clause 1.4.1 (xiv)) shall be subjected to design and analysis by PETW and complying to BS 5975 or equivalent. The steel frame falsework system shall be tested according to BS EN 12813 and the assembly shall be subjected to full capacity testing. The components of steel frame falsework system shall be subjected to quality check, as explained in 5.2.

### **4.3.3 Re-shoring**

The requirements of BOWEC under clause 32 are:

#### **32. Re-shoring.**

(a) Reshoring shall be provided when necessary to safety support slabs and beams after stripping, or where such members are subjected to superimposed loads due to construction above these slabs and beams.

(b) The requirements of subsections (1) and (2) of regulation 30 shall apply to re-shores.

#### **30. Beams, Floors and Roofs.**

(a) Horizontal and diagonal bracing shall be provided in both longitudinal and transverse directions, as may be necessary to provide structural stability. Shores shall be properly seated top and bottom, and shall be secured in place.

(b) Where shores rest upon the ground, base plates shall be used.

**SECTION 5: MATERIAL RECEIVING, QUALITY CHECK, ERECTION, SUPERVISION, INSPECTION, MAINTENANCE, ALTERATIONS, DISMANTLING, STORAGE AND CARE**

In general, falsework and formwork are likely to be used repeatedly in its life cycle - from its first usage until it is discarded. The flowchart in Appendix D illustrates a possible process flowchart of a falsework and formwork from receiving of material, quality check, erection, supervision, inspection, maintenance, dismantling, storage and care.

**5.1 Material receiving**

All falsework and formwork components and materials received at a construction site shall be visually inspected for damages and proper markings by the contractor’s designated person.

Damaged or not marked component shall be rejected and shall be removed from the construction site. The results of inspection shall be recorded in the receiving inspection form (Appendix E).

**5.2 Quality check**

There are two types of checks for steel frame falsework system component, which are routine site quality check and periodic site quality check. (Refer to 4.3.2 Steel frame falsework system)

**5.2.1 Routine site quality check (RSQC)**

- i. Testing for RSQC, applicable only to used and refurbished material, shall be carried out on the steel frame falsework system components at the construction site. The selection of sample shall be conducted by PETW on a random basis at any time during construction. The sample size, frequency and testing shall comply with the requirement in Table 1.

**Table 1. Testing, Frequency and Sampling for RSQC**

Testing	Product	Number of Sample and Frequency of Testing	Sampling	
			Place	Sampling By
Load Test on Component (See 5.2.2 ii.) Visual & Dimensional	Steel frame falsework system	1 sample for each component for every 30,000 pieces or less of each frame	Construction site	PETW

- ii. The test report shall be submitted by the contractor to PETW, who shall review the test results. All tested component shall comply with the requirements in the product standards before the falsework is allowed to be erected at the construction site.
- iii. If the sample fails the RSQC, a second test shall be carried out on a new sample randomly selected by PETW. Should the second test fail too, the batch of falsework at the construction site shall be removed by the contractor from the construction site.

### 5.2.2 Periodic site quality check (PSQC)

A PSQC should be conducted for the purpose to ensure all steel frame falsework system component at site comply with the set standard. The sample size, frequency and testing shall comply with the requirement in Table 2.

**Table 2. Testing, Frequency and Sampling for PSQC**

Testing	Product	Number of Sample and Frequency of Testing	Sampling	
			Place	Sampling By
Load Test on Component (See 5.2.2 ii.) Visual & Dimensional	Steel frame falsework system	1 sample for each component for every 60,000 pieces or less of each frame every twelve (12) months	Construction site	PETW

- i. All testing in Tables 1 and 2 shall follow the applicable testing requirements and method prescribed in the falsework materials and product standards respectively, unless specified otherwise in this CIS.
- ii. Component testing shall follow the testing requirements of the applicable material and product standard and shall be tested by laboratories accredited under SAMM or laboratories recognised by CIDB.
- iii. The requirements of (ii) and (iii) in segment 5.2.1 apply for both random RSQC and periodic PSQC tests.

### 5.3 Erection, supervision, inspection, maintenance, alteration, dismantling, storage and care

- i. The erection<sup>8</sup>, alteration<sup>8</sup> and maintenance<sup>8</sup> of falsework or formwork shall be performed under a direct supervision of a designated person, engaged by the contractor.
- ii. The falsework or formwork shall be inspected<sup>9</sup> by designated person, engaged by the contractor and the inspection record (Appendix F) shall be maintained.
- iii. The dismantling<sup>9</sup> and repropping<sup>9</sup> shall be performed under the direct supervision<sup>9</sup> of a designated person, engaged by the contractor. Contractor or falsework or formwork owner should provide good storage and care for the dismantled components<sup>10</sup>.

**NOTE:**

8 a) BOWEC Clause 30 (5), where the formwork structure is designed by a Professional Engineer, he shall be responsible for the supervision of the construction and the stability of such structure.

9 b) BOWEC Clause 29

**29. Inspection and Supervision.**

(1) A designated person shall supervise the erection of the formwork including the shores, braces and other supports.

(2) Upon the erection of the formwork, the designated person shall make a thorough inspection to ensure that the formwork is safe.

(3) A designated person shall regularly inspect the formwork, shores, braces and other supports during the placing of concrete. Re-shores shall be similarly inspected.

(4) Any unsafe condition discovered during the inspection mentioned in sub-regulations (2) and (3) shall be remedied immediately.

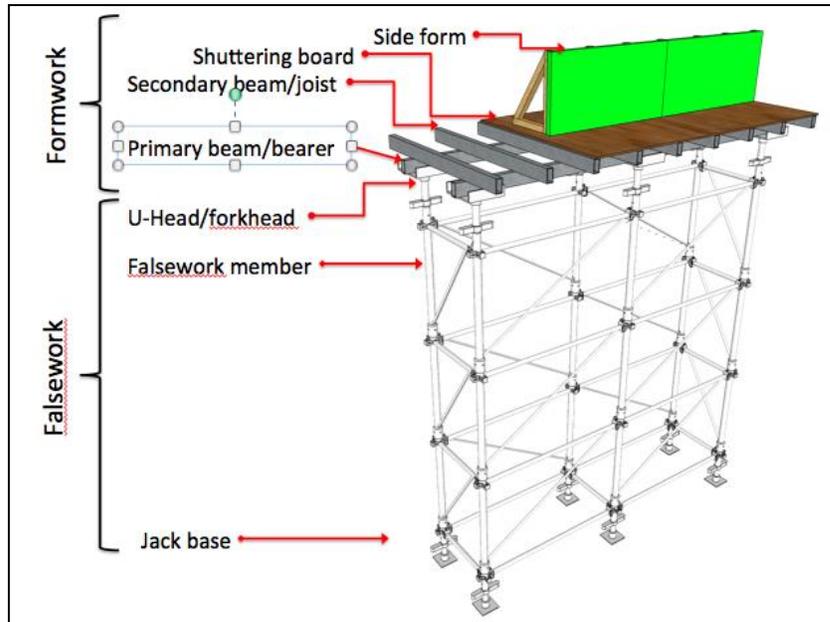
(5) The designated person shall keep all records of such inspections at the worksite and shall produce them for examination at the request of the Inspector.

10 Storage and care for falsework and formwork after dismantling

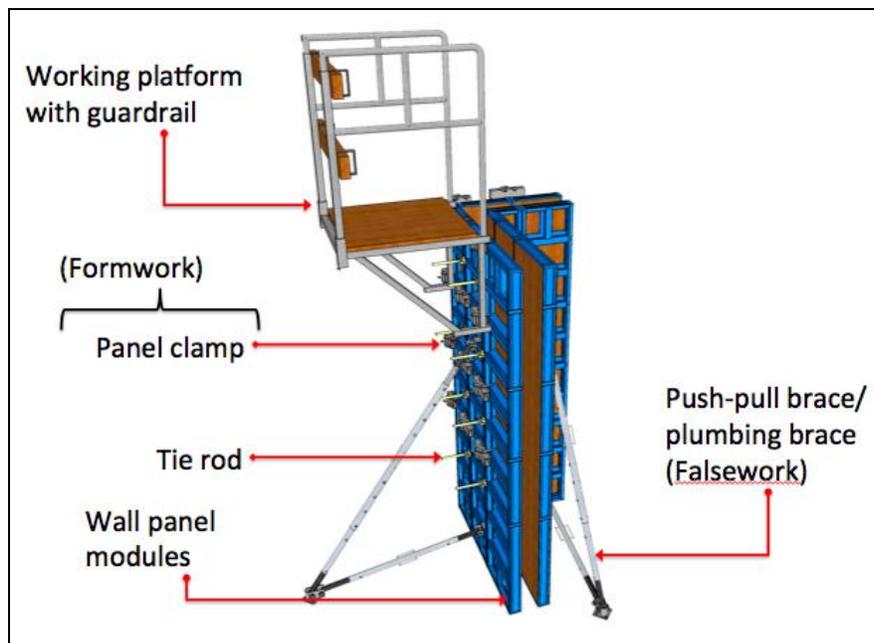
The contractor or the falsework or formwork owner should provide a proper place for storage and care to ensure they continue to comply with product standards after dismantling or not in use, and should have proper instruction for maintenance and repair of components. Any component that are badly corroded or damaged that could not be refurbished should be discarded and removed from the site.

**APPENDIX A**  
(Informative)

**Examples of a typical set up of falsework and formwork**



**Figure 1a: A typical example of a falsework and formwork set up**



**Figure 1b: A typical example of a formwork set up**

**APPENDIX B**  
(Informative)

**About QPASS**

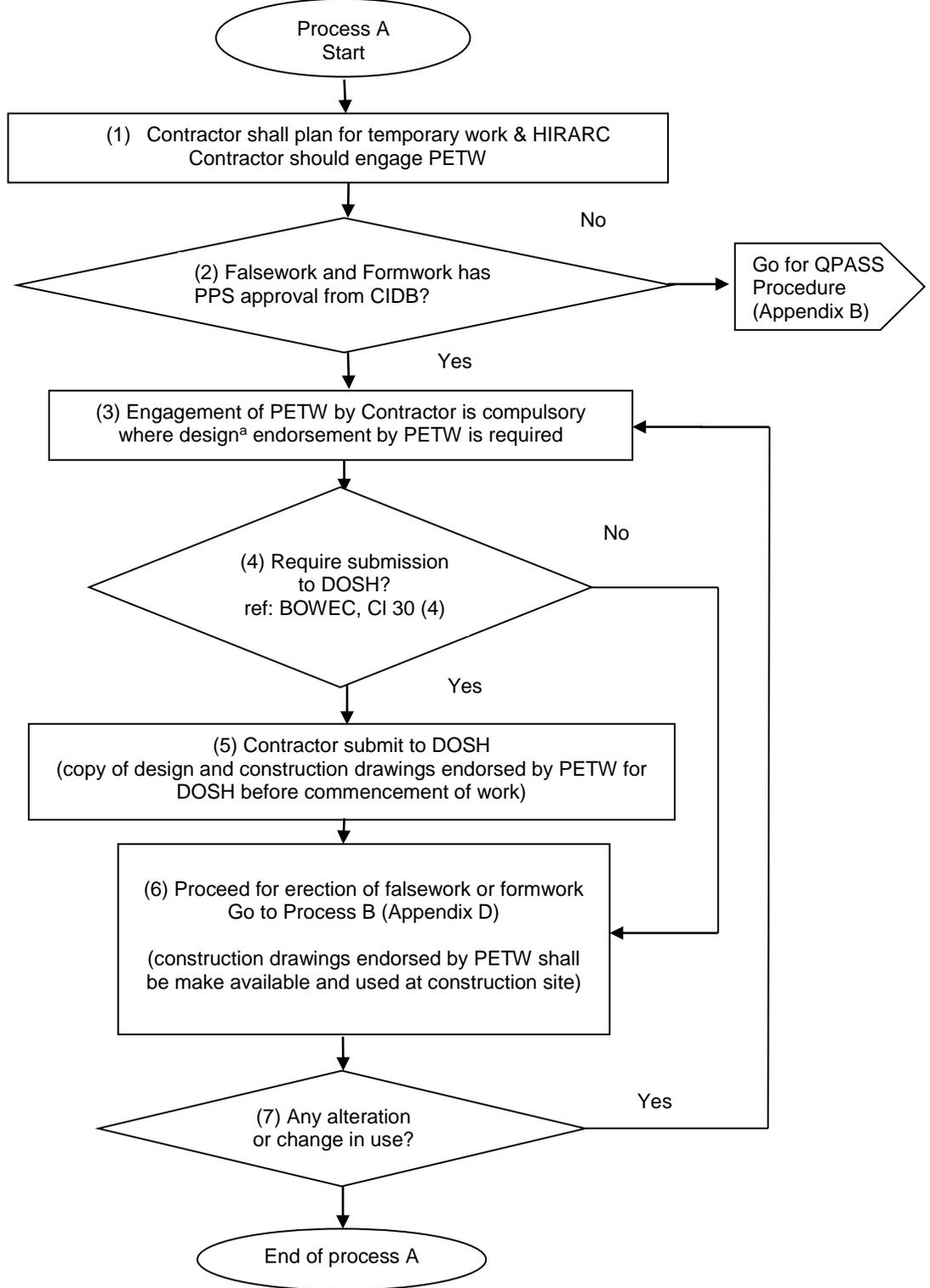
QPASS is an acronym for Quality Product in Accordance to Specified Standards. It is a CIDB programme to ensure products comply with standards specified in the Fourth Schedule of CIDB ACT 520 (Amendment 2011).

For further details, refer to the documents Tatacara Perakuan Pematuhan Standard (PPS) Bagi Bahan Binaan Tempatan and Procedures for Importing Construction Products which are available on the CIDB website ([www.cidb.gov.my](http://www.cidb.gov.my)).

## APPENDIX C

(Informative)

### Process A: Flowchart for design and drawing approval for construction of falsework and formwork



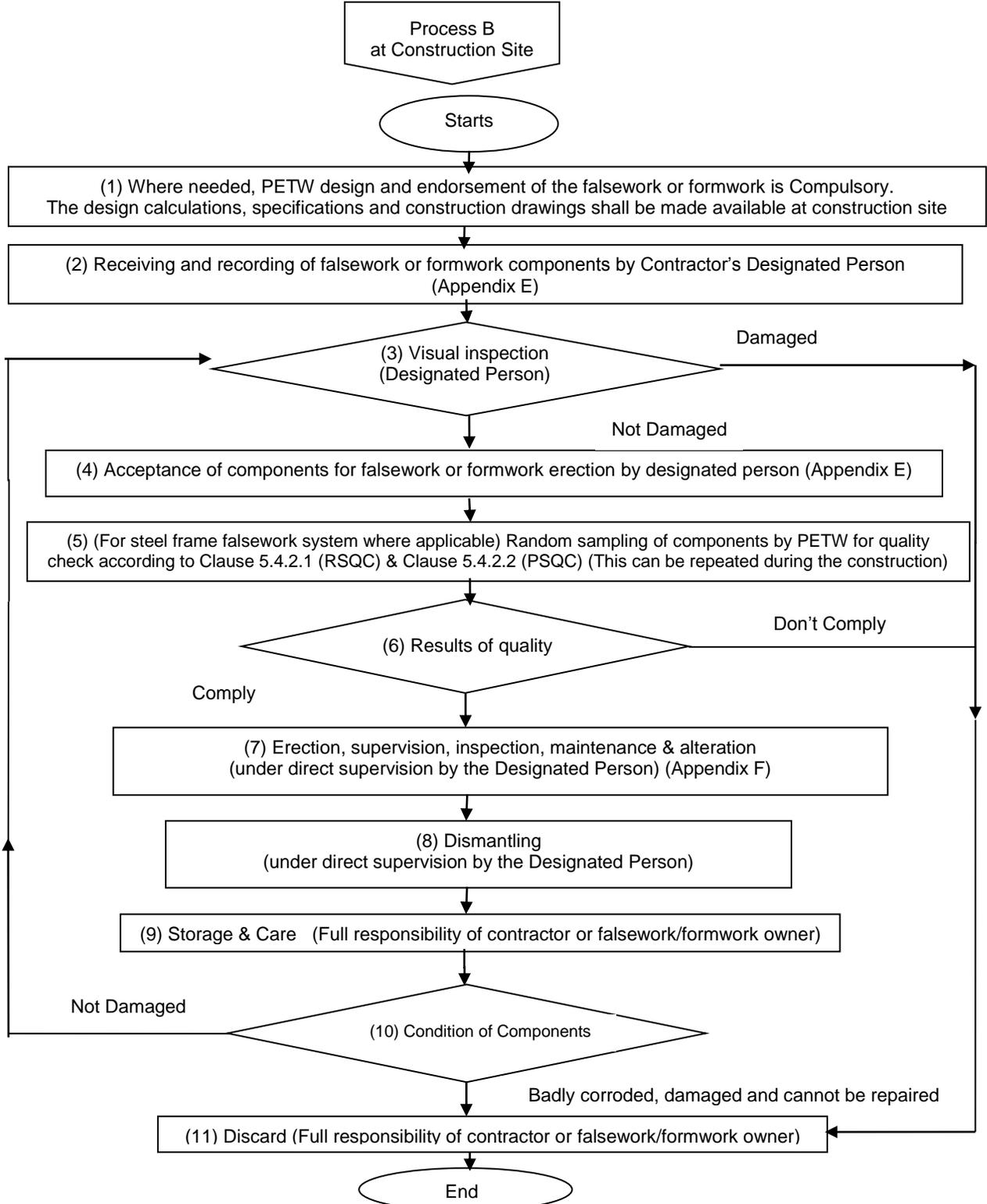
**NOTE:**

<sup>a</sup>Design (includes analysis and design calculation, specification and working drawing)

## APPENDIX D

(normative)

### Process B: Flowchart for receiving and selection of material, quality check, erection, supervision, inspection, alteration, maintenance dismantling, storage and care of falsework or formwork



**NOTE:**

Process 9, 10 and 11 are not under the scope of this CIS. They are included in the Flowchart to remind the contractor or falsework/formwork owner for good practice and to ensure good care for the falsework/formwork in anticipation of its repeated use.



**APPENDIX F**  
(Normative)

**Falsework/Formwork  
Inspection Checklist**  
Typical example of a checklist form containing necessary information

<b>FALSE WORK/FORMWORK INSPECTION CHECKLIST</b>				
Inspection Form Ref No. : _____ Date : _____ Time : _____				
Contractor : _____				
Project & Address. : _____				
Location : _____ Area : _____ Drawing Ref No. : _____				
No	Description	Yes	No	Remark
1	PETW <sup>1</sup> ENDORSED SPECIFICATION AND DRAWINGS (As applicable)			
	a) Falsework / formwork erected as per PETW endorsed drawings			
2	FOUNDATION			
	a) Falsework erected on firm ground/proper foundation			
	b) Ground properly compacted and levelled			
	c) Falsework not endangered by open excavation			
3	SOLE PLATES			
	a) Proper sole plates used			
4	BASE PLATES			
	a) Base plates are fitted to all standards			
5	ALIGNMENT OF FALSEWORK			
	a) Vertical standards/posts or vertical frames			
	b) Ledgers and transoms levelled			
6	FALSEWORK COMPONENT CONNECTION			
	a) Connections are tightened and secured			
7	BRACING			
	a) Braces are tightened and secured			
8	TIE			
	a) Ties are placed in position as per drawing.			
9	SOFFIT FORMWORK			
	a) Soffit formwork is installed as per drawing.			
10	RE-SHORING/BACK PROP			
	a) Reshoring/back prop is erected as per drawing.			
<b>NOTE:</b>				
<sup>1</sup> PETW means Professional Engineer with Practising Certificate employed by contractor to carry out design, endorsement and inspection and supervision of falsework/formwork.(see 1.4.1 (xiv)).				
General comments:				
Inspected by Designated Person:			Approved by PETW:	
-----			-----	
Name :			Name :	
I.C No.:			BEM Registration Stamp:	
Date :			Date :	

## ACKNOWLEDGEMENT

The committee, which developed the Malaysian Construction Industry Standard consists of the following representatives:

Ir. Noraini Bahri (Chairman) Haji Razuki Haji Ibrahim Haji Sazali Che Amat Nor Hamiza Zahar Noor Faziera Yaakub Nur Hanis Amsari	Construction Industry Development Board Malaysia
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