



TEST REPORT

EN 12810-1:2003

Façade scaffolds made of prefabricated components - Part 1: Products specifications

Report Reference No.....: 131023002SHJ-BP-1

Prepared by (name and signature) ...: Mason Wang

Approved by (name and signature) ..: Daniel Zhang

Date of issue.....: November 15, 2013

Contents: Total test report 21 pages including:
Report text: 13 pages
Appendix A for product photos: 2 pages
Appendix B for Installation manual: 5 pages
Appendix C for test process photos: 1 pages

Testing Laboratory name: Intertek Testing Services Building Products

Address.....: Plant 7, No. 6958 Daye Road, Fengxian District, Shanghai

Testing location.....: Same as above

Applicant's name: SEM Metalworks Co., Ltd.

Address.....: 8th, Xizhai road, Xin district, Wuxi

Test specification:

Standard: EN 12810-1:2003

Non-standard test method.....: None

Test item description.....: Components of ring-lock system scaffolding

Trade Mark: SEM

Model and/or type reference: Refer to general product information

Manufacturer: SEM Metalworks Co., Ltd.

Rating(s): Load class 3

Summary of testing:

The submitted samples were tested in accordance with EN 12810-1:2003 and the result was referred to text for detail. The service load on working area was specified as Load Class 3 by the applicant.

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Report Template Revision Date:3 Feb. 2009

Test item particulars	
Classification of installation and use	Façade scaffold components
Supply Connection	—
Possible test case verdicts	
- Test case does not apply to the test object	N/A
- Test object does meet the requirement.....	P (Pass)
- Test object does not meet the requirement	F (Fail)
Testing	
Date of receipt of test item	October 23, 2013
Date (s) of performance of tests	From October 23, 2013 to November 12, 2013
General remarks:	
<p>This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.</p> <p>Throughout this report a comma (point) is used as the decimal separator.</p> <p>When determining the test result, measurement uncertainty has been considered.</p>	

Copy of marking plate	
<p>Marking information on the packaging or instruction</p> <p>Example for marking template</p>	
<div style="border: 1px solid black; padding: 10px; text-align: center;"> Scaffold EN 12810 — 4D — SW09/250 — H2 — B — LS </div> <p>Service load class: see Table 1 drop tests on platforms (D) with drop tests or (N) without</p> <p>System width class: see Table 1 / bay length in cm</p> <p>Headroom class: see Table 1 (A) without cladding; (B) with cladding see Table 1 (LA) with ladder; (ST) stairs or (LS) both: see Table 1</p> <p>The example is of a scaffold of load class 4, system width at least 0,9 m and less than 1,2 m bay length 2,5 m, headroom between working areas and transom or tie member $\geq 1,9$ m, with cladding, with ladder and stair access.</p> <p>When a scaffold system includes more than one load classes and/or dimensions a separate line of designation shall be provided for each.</p>	

General product information:

Ring-lock system scaffolding was fabricated by Ledger, Base jack, Standard, Stairway, Steel plank, Bay brace and Board bracket which used façade scaffold, A completed set of ring-lock system scaffolding including following components:

NO.	Description	Model	Unit	Quantity
1	7' Horizontal (ledger)	S-HL7	Piece	69
2	2' Horizontal (ledger)	S-HL2	Piece	4
3	3'6" Horizontal (ledger)	S-HL3'6"	Piece	27
4	System Screw Jack 1.5" (base jack)	S-SJB	Piece	8
5	2M vertical with spigot (standard)	S-VP20	Piece	16
6	1.5M vertical with spigot (standard)	S-VP15	Piece	8
7	1M vertical with spigot (standard)	S-VP10	Piece	2
8	Stairway	Left Stair Stringer 7'	Piece	2
		Right Stair Stringer 7'		2
		30" Stair Tread		18
9	7' Steel plank galv. 2.0 mm thick	SP7	Piece	22
10	7' Bay Brace	S-BB7	Piece	16
11	2' Board Bracket	S-BRKT2	Piece	2

In order to evaluate the components, the client set up one unit by all the above components, all the tests were conducted on one unit, which size is 4869.6mm×2130mm×5551mm.

Refers to product photos for appearance.

Performance test						
Clause	Requirement - Test			Result - Remark	Verdict	
6	Material					
6.1	General Materials shall, unless otherwise stated in 6.2, be chosen in accordance with clause 4 of EN 12811-1:2003 and with prEN 12811-2. Information about the most commonly used materials is given in prEN 12811-2.....:			See clause 6.2.2	P	
6.2	Specific material requirements					
6.2.1	Types of material The standards shall be made of steel or aluminum alloy.....:			Material: Steel tube	P	
6.2.2	Steel tubes (circular) Steel tubes with an outer diameter of 48.3 mm shall be in accordance with the specification in Table 2.			Diameter of steel tubes(circular): 48.7mm Wall thickness: 3.5mm Yield stress: 455 N/mm ²	P	
		Nominal wall thickness mm	Minimum yield stress N/mm ²			Minus tolerances the wall thickness mm
	1	2.7≤t≤2.9	315			0.2
	2	t≥2.9	235			Pre EN 10219-2
6.2.3	Aluminum tubes (circular) Aluminum tubes with an outer diameter of 48.3 mm shall conform to the specification in Table 3.			Steel tubes (circular)	N/A	
		Nominal wall thickness mm	Minimum yield stress N/mm ²			Minus tolerances of th wall thickness mm
	1	3.2≤t≤3.6	250			0.2
	2	3.6≤t<4.0	215			0.2
	3	t≥4.0	195			Pre EN 755-8

Performance test			
Clause	Requirement - Test	Result - Remark	Verdict
6.3	<p>Inspection documents</p> <p>The materials used for load bearing elements shall be supplied with a test report 2.2 in accordance with EN 10204 or a specific test report 2.3. The following materials require inspection certificates 3.1B of EN 10204 at least:</p> <ul style="list-style-type: none"> - steel with a nominal yield stress higher than 235 N/mm²; - cast iron; - aluminium alloys; - steel tubes for standards with a nominal wall thickness less than 2,9 mm. <p>The certificates for the tubes shall include the weight, the dimensions and the minus tolerance of Table 2 or Table 3 as appropriate. For materials not covered by EN 10204 comparable certificates shall be provided.....:</p>	See clause 6.2	P
7	General requirements		
7.1	<p>Completeness of the range of components of the scaffold system</p> <p>The scaffold system shall comprise a complete set of all the components necessary to erect the standard set of the system configurations, which shall be declared by the manufacturer. In detail, it means:</p> <ul style="list-style-type: none"> a) the necessary vertical and horizontal components, see A.1; b) the components necessary to provide side protection at the outer side and ends of a scaffold, see A.2; c) the components necessary for the access method provided. See clause 4 and A.3); d) the following ancillary components (see A.4): <ul style="list-style-type: none"> - for all scaffold systems: bridging ledgers;- for the system width classes SW06 and SW09: platform extension components such as hop-up brackets with matching platform units; - if offered by the manufacturer: platform extension components for other system width classes, pedestrian frame, safety net, netting, sheeting, protection fan.....: 	Refer to appendix B Instruction manual	P
7.2	The standard set of system configurations		

Performance test			
Clause	Requirement - Test	Result - Remark	Verdict
7.2.1	General The standard set shall encompass system configurations for all components and anchorage patterns declared by the manufacturer in accordance with 7.1. For all system configurations, the provisions of 7.2.2, and, for particular system configurations, the provisions of 7.2.3 shall be taken into account. The standard set shall also include system configurations with all numbers of bays between 1 and n where n is the number of bays where the construction repeats.....:	Test specimen wasn't system configuration, only one unit fabricated by scaffold components.	N/A
7.2.2	Requirements valid for all system configurations The system configurations shall have: a) height which is between 24 m and 25,5 m depending on the headroom class of the system and the length of the base jacks; this height is measured from the underside of the base plate to the surface of the topmost platform; b) a complete platform and side protection - for the system width classes SW06 and SW09, at all levels approximately 2,0 m apart; - for all other system width classes, at five adjacent levels approximately 2,0 m apart; c) adjustable base plates fully extended.....:	Test specimen wasn't system configuration, only one unit fabricated by scaffold components.	N/A
7.2.3 Requirements valid for certain system configurations			
7.2.3.1	For the system width classes SW06 and SW09 and for other classes when offered by the manufacturer, platform extensions shall be able to be fitted inside at each platform level (see 7.2.2.b)) over the full length of the system configuration under consideration.....:	Test specimen wasn't system configuration, only one unit fabricated by scaffold components.	N/A
7.2.3.2	For unclad system configurations, there shall be the possibility of a zone of 3,8 m height free of all ties above and below a tied level. This requirement does not apply in zones of the system configurations where there are ancillary components, e. g. bridging ledgers.....:	Test specimen wasn't system configuration, only one unit fabricated by scaffold components.	N/A
7.2.3.3	The dimensions for bridging shall fulfil the requirements of 7.3.6.1.....:	See clause 7.3.6.1	P
7.3	Further requirements		

Performance test			
Clause	Requirement - Test	Result - Remark	Verdict
7.3.1	General The scaffold system shall conform to clause 5 of EN 12811-1:2003 and the following additional requirements.....:	Width of platform: 194cm Width class: SW18 Height between the bottom platform and the top platform: 2m	P
7.3.2	Side protection Purpose made components shall be provided for side protection.....:	Cross-bar and diagonal bar used as side protection	P
7.3.3	Base jacks Base jacks shall have a minimum adjustment of 200 mm.....:	The adjustment of base jacks was more than 200mm.	P
7.3.4	Platforms		-
7.3.4.1	For the versatility of platform height, the scaffold system shall include components to enable a) the erection of adjacent pairs of standards on surfaces which differ in level by any amount up to 2,0 m; b) the erection of a single platform at any height between 2,0 m and 24,0 m.....:	Test specimen wasn't system configuration, only one unit of facade scaffold	N/A
7.3.4.2	The platform surface shall be level and free from trip hazards. The scaffold system shall include appropriately dimensioned decking components in order to close any gap between them wider than 25 mm.....:	The platform surface was level and with anti-slip surface. The gap between the platforms was 20mm. Material of platform: metal	P
7.3.4.3	Where a standard separates parts of a platform, the distance between these parts shall not be more than 80 mm (see 7.3.4.2).....:	The maximum distance between platform and side protection was 70mm	P
7.3.5	Connections		-
7.3.5.1	Every connection device shall be effective, easy to monitor and the components shall be easy to assemble and dismantle. The securing of connections forming part of the structure including its side protection shall make them incapable of coming undone except by direct intentional action.....:	Connection device was effective, easy to monitor and the components shall be easy to assemble and dismantle. Connection device can't undone easily except direct intentional action.	P

Performance test			
Clause	Requirement - Test	Result - Remark	Verdict
7.3.5.2	Platform units shall be locked against unintentional lifting. It is preferable that the platform units are locked in position as part of the erection procedure by the addition of subsequent components. As an alternative, a fixing device may be provided which prevents their unintentional lifting up, whose satisfactory installation can be visually checked from above or below.....:	Platform units can be locked against unintentional lifting. Refer to appendix A	P
7.3.5.3	Adjacent platform units may be connected to reduce relative deflections, but where this is done by a separate component, that component shall not be taken into account in the assessment.....:	Adjacent platforms were locked on the same steel tube.	P
7.3.5.4	Means to connect a loose tube in accordance with EN 39 to a standard of the scaffold shall be provided. a) Where the standard conforms to the requirements of Table 2 or Table 3 of this standard, couplers to EN 74 may be used. b) Where the standard conforms to line 1 of Table 2 or lines 1 and 2 of Table 3, no account of characteristics other than slip and pull apart may be taken. c) For standards of any other type, a connection device shall be provided capable of transmitting at least the forces given in b).....:	See clause 6.2 The connection device can be provided capable of the tensile forces.	P
7.3.5.5	Movable parts of a connection device such as wedges or pins shall be permanently attached to one side or the other of the connection with the exception of pins forming part of the connections of standards, which transmit tensile forces.....:	The wedges and pins were permanently attached to the position.	P
7.3.6 Ancillary components			
7.3.6.1	The gap for bridging through the scaffold at the bottom shall have a minimum clear width of 3,5 m and a minimum clear height of 3,5 m.....:	No bridging through scaffold at the bottom	N/A
7.3.6.2	Where provision is made to extend the platform laterally beyond the chosen width class, the components used shall increase the overall width by at least 260 mm.....:	No extend the platform laterally	N/A
7.3.6.3	Where provision is made for a pedestrian passage below the length of the scaffold, the space shall be in accordance with Figure 2.....:	No pedestrian passage	N/A
8	Requirements for structural design		

Performance test			
Clause	Requirement - Test	Result - Remark	Verdict
8.1	<p>Actions</p> <p>All system configurations shall resist the actions given in 6.2 of EN 12811-1:2003 in the combinations specified in 6.2.9. The working wind load shall be determined in accordance with 6.2.7.4.2 of EN 12811-1:2003. For the purposes of this standard the maximum wind shall be calculated using Figure 3 to obtain the velocity pressure.....:</p>	See clause 8.3	N/A
8.2	<p>Resistances, stiffnesses</p> <p>Resistances and stiffnesses of elements, components and connection devices shall be determined in accordance with prEN 12811-1 or by testing in accordance with EN 12811-3.....:</p>	No obvious defects after application of wind loads	P
8.3	<p>Application of wind loads</p> <p>The maximum and the working wind shall be applied separately parallel and normal to the façade. For unclad system configurations, all components including access components shall be taken into account. The characteristic value of the wind force, F_K, is given by equation (1):</p> $F_K = c_s \times \sum_{i=1}^{i=n} (A_i \times c_f \times q_i)$	<p>Velocity pressure: 870Pa</p> <p>Test area is 11m²</p> <p>$F_K=12.5\text{kN}$</p>	—
8.4	<p>Drop tests for platforms</p> <p>For scaffold systems of class D, platforms and their supports shall pass the drop tests in accordance with annex B of EN 12810-2:2003.....:</p>	The tested assembly is capable of carrying the static load of the steel ball after being tested	P
8.5	Durability		

Performance test			
Clause	Requirement - Test	Result - Remark	Verdict
8.5.1	<p>General</p> <p>In general, fatigue design does not need to be carried out for components, connection devices and configurations of scaffold systems. However, welded aluminium treads in stairways shall be checked with respect to durability either by calculation or by testing. The basis of the design shall be as follows.</p> <p>The load shall be 1, 5 kN and applied over an area 100 mm × 100 mm. A tread shall be checked separately at two load positions:</p> <p>a) at the centre of the tread ;</p> <p>b) With the centre of the load not more than 100 mm from the stringer; A tread shall be capable of 300 000 loadings and unloadings.....:</p>	Not applicable for one unit of facade scaffolds	N/A
8.5.2	<p>Design by calculation</p> <p>The durability shall be checked in accordance with ENV 1999-2 treating the load defined in 8.5.1 as an "equivalent fatigue loading" according to 1.5 of ENV 1999-2:1998:</p>	Not applicable for one unit of facade scaffolds	N/A
8.5.3	<p>Design by testing</p> <p>The durability shall be checked in accordance with annex C of EN 12810-2:2003.....:</p>	Not applicable for one unit of facade scaffolds	N/A
8.6	<p>Vibration tests</p> <p>Vibration tests in accordance to 7.4 of EN 12811-3:2002 shall be carried out for connection devices, such as wedged connections, which are susceptible to loosening under the effects of frequent load reversals. No connection shall loosen under vibration. The minimum criteria given in that document apply.....:</p>	Not applicable	N/A
8.7	<p>Deflection</p> <p>Deflections shall not exceed those specified in 6.3 of EN 12811-1:2003, see also 7.3.5.3 of this standard.....:</p>	Refer to below test result	P

Performance test																															
Clause	Requirement - Test	Result - Remark	Verdict																												
	<p>Elastic deflection of platform units</p> <p>When subjected to the concentrated loads specified in Table 3, columns 3 and 4 the elastic deflection of any platform unit shall not exceed 1/100 of its span. Furthermore, when the appropriate concentrated load is applied, the maximum deflection difference between adjacent loaded and unloaded platform units shall not exceed 25 mm.....:</p> <table border="1"> <thead> <tr> <th>Load class</th><th>Uniformly distributed load q_1 kN/m²</th><th>Concentrated load on area 500 mm x 500 mm F_1 kN</th><th>Concentrated load on area 200 mm x 200 mm F_2 kN</th></tr> </thead> <tbody> <tr><td>1</td><td>0,75²</td><td>1,50</td><td>1,00</td></tr> <tr><td>2</td><td>1,50</td><td>1,50</td><td>1,00</td></tr> <tr><td>3</td><td>2,00</td><td>1,50</td><td>1,00</td></tr> <tr><td>4</td><td>3,00</td><td>3,00</td><td>1,00</td></tr> <tr><td>5</td><td>4,50</td><td>3,00</td><td>1,00</td></tr> <tr><td>6</td><td>6,00</td><td>3,00</td><td>1,00</td></tr> </tbody> </table>	Load class	Uniformly distributed load q_1 kN/m ²	Concentrated load on area 500 mm x 500 mm F_1 kN	Concentrated load on area 200 mm x 200 mm F_2 kN	1	0,75 ²	1,50	1,00	2	1,50	1,50	1,00	3	2,00	1,50	1,00	4	3,00	3,00	1,00	5	4,50	3,00	1,00	6	6,00	3,00	1,00	<p>Load Class: 3</p> <p>Uniformly distributed load</p> <p>Length of platform: 2.1m</p> <p>1/100 of its span: 21mm</p> <p>Area of platforms: 4.41m²</p> <p>Test load: 8.82KN</p> <p>No obvious defects on connection devices and platforms after being tested</p> <p>Concentrated load on area</p> <p>Test load: 1,5KN on the area of 500mmx500mm and 1,0KN on the area of 200mmx200mm</p> <p>Deflection: 5.1mm and 3.5mm</p>	P
Load class	Uniformly distributed load q_1 kN/m ²	Concentrated load on area 500 mm x 500 mm F_1 kN	Concentrated load on area 200 mm x 200 mm F_2 kN																												
1	0,75 ²	1,50	1,00																												
2	1,50	1,50	1,00																												
3	2,00	1,50	1,00																												
4	3,00	3,00	1,00																												
5	4,50	3,00	1,00																												
6	6,00	3,00	1,00																												
	<p>Elastic deflection of the side protection</p> <p>Each principal or intermediate guardrail and toeboard, regardless of its span, shall not have an elastic deflection greater than 35 mm, when subjected to the horizontal load specified in 6.2.5.2. This is measured with reference to the supports at the points where the component is fixed.....:</p>	<p>Test load: 300N</p> <p>The maximum deflection was 1.5mm.</p>	P																												
	<p>Deflection of fencing structures</p> <p>When subjected to the horizontal load specified in 6.2.5.2, the grid of a fencing structure shall not deflect more than 100 mm with reference to its supports.</p> <p>When a fencing structure is combined with a guardrail, the requirements for a guardrail shall be satisfied</p> <p>Separately.....:</p>	No fencing structures	N/A																												
9	Manual																														
9.1	<p>General</p> <p>The manufacturer shall produce a set of instructions forming the product manual. It will be part of the basis of the structural design. The content is given in 9.2.</p> <p>The manufacturer shall also produce an instruction manual for use on site, which is a subset of the product manual. The content is given in 9.3.....:</p>	Refer to Appendix B: Installation manual	P																												

Performance test			
Clause	Requirement - Test	Result - Remark	Verdict
9.2	<p>Content of a product manual</p> <p>The product manual shall include the following information subdivided as outlined in clause 8 of EN 12811-1:2003:</p> <p>a) A list of all components with descriptions from which each can be identified; for example with a drawing;</p> <p>b) instructions for the sequence of erection and dismantling the components and for the way to handle them;</p> <p>c) the layout of each system configuration of the standard set giving its class for loading and width, its overall dimensions, its anchorage pattern and how to include the ancillary components;</p> <p>d) instructions for tying under all these circumstances;</p> <p>e) a statement of limitations of use with reference to wind velocity pressure, to ice and to snow;</p> <p>f) a full specification of the items which are not purpose designed components, e. g. loose tubes and couplers;</p> <p>g) loads imposed on the façade to which the scaffold is tied and loads on the foundation from baseplates;</p> <p>h) an indication that obviously damaged components may not be used;</p> <p>i) any instructions for storage, maintenance or repair which the manufacturer considers appropriate;</p> <p>j) structural data for components and connection devices such as resistances and stiffnesses evaluated by tests;</p> <p>k) how to obtain further information should the circumstances of the potential application be outside the standard set of system configurations, for example temporary removal of ties, or a height greater than 25,5 m;</p> <p>l) information about the restriction of the application of loads via EN 74 couplers to the standards stated in 7.3.5.4.....:</p>	Refer to Appendix B: Installation manual	P
9.3	<p>Content of the instruction manual</p> <p>The instruction manual shall include the items a) to i) and k) of 9.2.....:</p>	Refer to Appendix B: Installation manual	P

Performance test			
Clause	Requirement - Test	Result - Remark	Verdict
10	<p>Marking</p> <p>Each purpose designed component shall be marked with:</p> <p>a) A symbol or letters to identify the scaffold system and its manufacturer;</p> <p>b) The year of manufacture, using the last two digits. Alternatively a code for tracing the year of manufacture may be used. Marking shall be so arranged that it will remain legible for the life of the component. The size of the lettering may take account of the size of the component.....:</p>	Not applicable for one unit of facade scaffolds	N/A
11	<p>Assessment</p> <p>An assessment shall be carried out by a person or an organisation different from the original designing person and organisation. On completion of a successful assessment a statement to that effect shall be given by the assessor. This statement shall identify the reference number of all examinations and the test report shall include:</p> <ul style="list-style-type: none"> - identification of the particular set of components examined; - identification of the standard set of system configurations; - structural data for components and connection devices such as resistances and stiffnesses evaluated by tests.....: 	—	—

*****End of Page*****

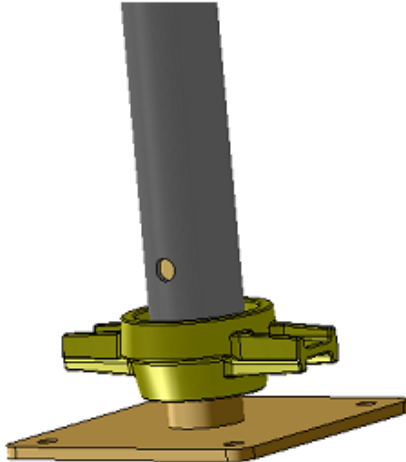
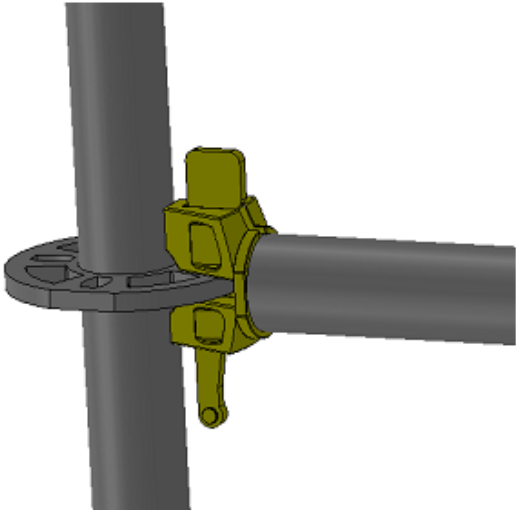
Appendix A**Product photos****A.1 Over view of product****A.2 Section view of ladder****A.3 Section view of platform**

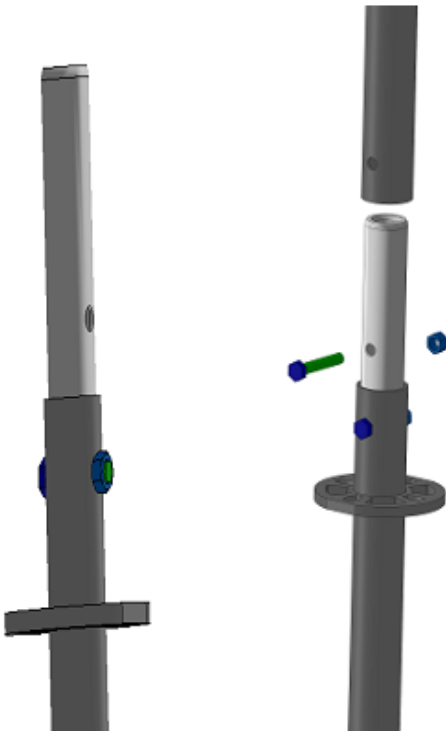
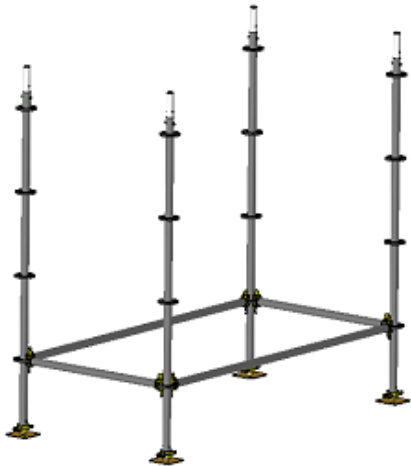


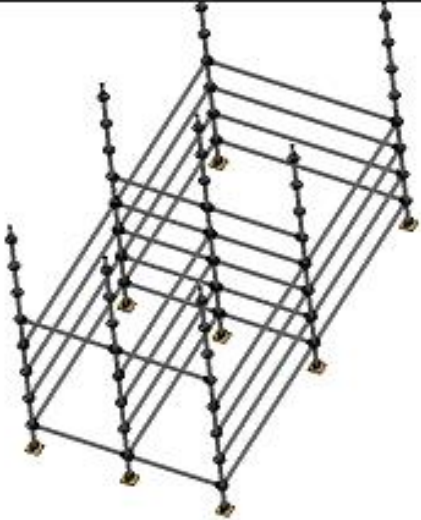
A.4 Section view of connections

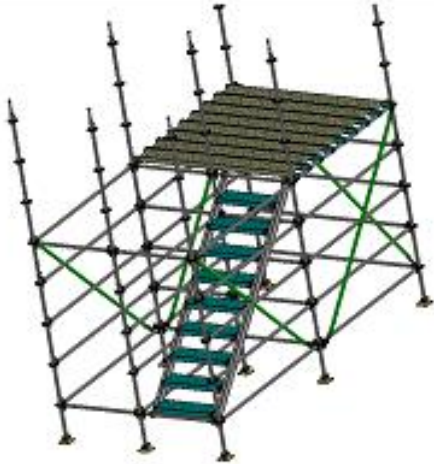
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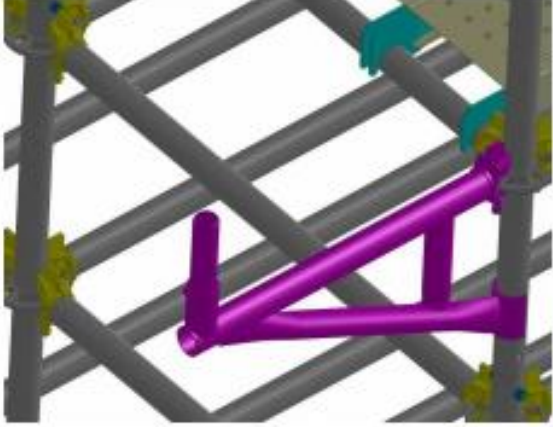
Appendix B**Installation manual**

	SEM Metalworks Co., Ltd. Scaffolding installation instructions
1. First assemble adjustable screw jack with vertical post.	
2. Put the wedge into the collar of vertical as picture shows. Fix it with a hammer.	

<p>3. Each vertical post should be assembled with a coupling pin except the top one. In this way, vertical can be easily connected with upper one. Fix the bolt to avoid any loose.</p>	 The diagram illustrates the assembly of a vertical post. On the left, a single vertical post is shown with a coupling pin and a bolt. On the right, a vertical post is shown being connected to an upper section, with a coupling pin and a bolt being used to secure the connection.
<p>4. Connect the vertical post with horizontal ledger to set up a frame.</p>	 The diagram shows a frame structure composed of four vertical posts connected by horizontal ledgers. The posts are connected to the ledgers using coupling pins and bolts, forming a rectangular frame.

<p>5. Set up more frames in the same way as picture shows.</p>	
<p>6. Assemble the left and right Stair Stringer (SSL7/SSR7), then assemble the stairs.</p>	
<p>7. Assemble the stairs on the first layer.</p>	

<p>8. Assemble the bay brace.</p>	 A 3D perspective diagram of a single bay of a scaffold. It shows a rectangular frame of vertical and horizontal poles. A diagonal brace, highlighted in green, runs from the bottom-left corner to the top-right corner. A wooden plank floor is visible at the top of the bay.
<p>9. The scaffold on upper layer in the same way.</p>	 A 3D perspective diagram of a two-level scaffold. It shows two rectangular bays stacked vertically. The lower bay has a wooden plank floor and a green diagonal brace. The upper bay is built on top of the lower one, also featuring a green diagonal brace. A wooden plank floor is visible on the upper level.

<p>10. Assemble board bracket. The inner plug pin should get through the disk of post and fix it with a hammer to assure no loose.</p>	
<p>11. Assemble the other parts in the same way. Then assembling is finished.</p>	

*****End of Page*****

Appendix C

Test process photos



C.1 Drop tests for platforms



C.2 Application of wind loads



C.3 Concentrated load on area

*****End of report*****