

# Suspended scaffold failure

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## Purpose

To provide information about the risks associated with the installation and operation of suspended scaffolds (i.e. swing-stage cradles), and control measures to minimise these risks.

Further information on the safe use of scaffolding can be obtained from the [Scaffolding Code of Practice 2004](#).

## Background

A number of serious incidents have recently occurred in Queensland and other parts of Australia when workers have fallen from swing-stage cradles. On 21 June 2008, two workers were fatally injured at a Gold Coast construction site when the support system to the suspended scaffold appeared to have failed.

An alert was first published in June 2008. This alert provides an update following recommendations from an [independent review by technical experts](#), and consultation with representatives from Workplace Health and Safety Queensland (WHSQ), the relevant trade unions and the construction (including scaffolding) industry.

## Obligations to ensure safe use

Following the independent review and industry consultation, WHSQ is implementing measures to improve safety and minimise the risks associated with suspended scaffolds.

Principal contractors, employers and self-employed persons have an obligation to assess and manage the risks of using suspended scaffolds. The principal contractor, building owner, or representative of the building owner/principal contractor is to sight all the relevant documentation as per the [Principal contractor or building owner swing-stage statement](#) (WHSQ SS 01) (PDF, 34KB). The documents to be kept on site, specific to swing-stage installation and operation, are:

- engineer's drawing for the swing-stage suspension system
- engineer's design certification letter for the design of the swing-stage
- engineer's verification statement that the swing-stage has been erected in accordance with the design documentation for the initial set-up of the swing-stage at this location (including a load test)
- engineer's certification letter to verify the supporting structure is adequate to support a swing-stage suspension system
- advanced scaffolding or advanced rigging certificate of person erecting swing-stage suspension system

- signed [Principal contractor or building owner swing-stage statement](#) (WHSQ SS 01) (PDF, 34KB)
- signed [Competent person benchmarks for swing-stage set-up verification](#) (WHSQ SS 02) (PDF, 39KB)
- competent person's [Swing-stage suspension system verification statement](#) (WHSQ SS 03) (PDF, 40KB) completed and signed, including load testing, for relocation of the system (not the initial set-up).

Risk assessment and risk management for suspended scaffolds includes:

### 1. Design and engineering verification

All components of the suspension rig should be designed and documented by a qualified and suitably experienced engineer.

All areas of design for a suspended scaffolding system need to receive a formal sign-off from a qualified and suitably experienced engineer. The formal sign-off for the swing-stage system is to include the needle suspension system, cradle, and hoist.

Prior to being set up, engineering verification of the structural adequacy of the suspension system and the cradle is to be obtained by the installer of the scaffold. The manufacturers of the cradle and hoist are to provide the structural verification and information on the maximum working load limit (WLL). The suspension and supporting structures are to be designed and verified by a suitably qualified engineer.

### 2. Site-specific induction

A principal contractor must ensure a person has had a site-specific induction before that person begins using the swing-stage.

The induction needs to address the contents of the [construction safety plan](#). In particular it must address the safe operation of the swing-stage scaffold.

The principal contractor must make a record of the people inducted and the date it was given. The record must be kept for the duration of the construction work.

### 3. Loading

The working load limit (WLL) is to be clearly marked on the cradle of the suspended scaffold. The WLL of a cradle will depend on factors such as its length, type of construction and material type. Longer cradles will generally have a reduced WLL. Materials loaded into the cradle should be evenly distributed and not be concentrated in one area.

To prevent overloading, swing-stage operators must verify the mass of the load to be included in the cradle.

A load test must be conducted in accordance with [Swing-stage load test procedure](#) (WHSQ SS 04) (PDF, 28KB) at each installation of a swing-stage system.

### 4. Load-limiting devices

[Australian Standard 1576 Part 4 - Suspended scaffolding](#) (non Queensland Government), specifies electric scaffold hoists shall have a device to limit the lifting capacity of the hoist to a maximum of 1.25 times the rating of the hoist. Whatever the hoist stall capacity is, the suspension system and the cradle is to be designed to withstand the stalling load applied by all scaffold hoists in use. This feature prevents failure in the event of the cradle snagging on an obstruction.

## 5. Installation

At the first installation of a swing-stage scaffold system, a qualified, experienced engineer must provide verification that the swing-stage scaffold system has been installed safely. Persons holding an advanced rigger or advanced scaffolder certificate under the National certification system must be engaged to install suspended scaffolds.

On subsequent moves and reinstallation of the swing-stage scaffold system on that project, the reinstallation must be reinspected and verified. If the reinstallation is different to that which was originally verified by the engineer, an engineer must approve the new installation. If the reinstallation is set-up as per the approved system originally verified by the engineer, then a competent person can check and verify the system's set-up. A competent person, for this activity, means a person who meets the criteria outlined in the [Competent person benchmarks for swing-stage set-up verification](#) (WHSQ SS 02) (PDF, 39KB). The competent person and their employer must sign WHSQ SS 02 to verify the competent person's statement of competency.

The competent person must complete a [Swing-stage suspension system verification statement](#) (WHSQ SS 03) (PDF, 40KB). This includes conducting a load test, in accordance with [Swing-stage load test procedure](#) (WHSQ SS 04) (PDF, 28KB), for each installation of the swing-stage system.

## 6. Inspection

Inspections to provide verification are to be carried out as outlined in previous sections. In addition, swing-stage components are to be inspected for damage, wear and cracks before use and at pre-determined intervals. Some cracks may not normally be visible to the eye. Non-destructive testing is to be performed to check for cracks in high stress areas.

## 7. Fall arrest systems

Persons located in swing-stage cradles are to wear fall arrest harnesses attached to a properly designed anchorage system. A travel restraint system, where a fall is not possible, attached to a static line in the cradle may be used. A thorough assessment needs to be undertaken to ensure appropriate control measures are in place to address any secondary risks that might arise.

Fall arrest systems must comply with part 20 of the [Workplace Health and Safety Regulation 2008](#) and are to be designed by a competent person. Guidance on the design of fall arrest systems is also provided in [Australian Standard AS 1891 - Industrial fall arrest systems and devices](#) (non Queensland Government).

## Legislative requirements

The [Workplace Health and Safety Act 1995](#) (PDF, 766 KB) imposes health and safety obligations on all persons conducting a business or undertaking, whether as employer, self-employed person or otherwise (and in their capacity as principal contractors) designers, manufacturers, suppliers, installers and owners of plant, and workers.

The information contained in this alert is designed to help people meet their obligations regarding the management of risks associated with swing-stages. More information on the safe use of scaffolding can be obtained from the [Scaffolding Code of Practice 2004](#).

Last updated 23 September 2008

## Principal contractor or building owner swing-stage statement

**Note:** This statement is to be completed by the principal contractor (or a nominated representative of the principal contractor) or the building owner (or a nominated representative of the building owner if a principal contractor does not exist). This statement declares that the representative has sighted the documentation referred to. **It is not an approval of the swing-stage.**

Swing-stage supplier:	Phone number:
Swing-stage installer:	Phone number:
Address where swing-stage is being used:	
Swing-stage identification no. (if more than one swing-stage on site):	

Document description	Tick to confirm document sighted
1. Engineer's drawing for the swing-stage suspension system.	
2. Engineer's design certification letter for the design of the swing-stage.	
3. Engineer's verification statement that the swing-stage has been erected in accordance with the design documentation for the <b>initial set-up of</b> the swing-stage at this location. This is to include a load test.	
4. Engineer's certification letter to verify supporting structure is adequate to support swing-stage suspension system.	
5. <i>Advanced scaffolding or advanced rigging certificate</i> of person erecting swing-stage suspension system.	
6. Signed <i>Competent person benchmarks for swing-stage set-up verification</i> (WHSQ SS 02).	
7. Competent person's <i>Swing-stage suspension system verification statement</i> (WHSQ SS 03) completed and signed, including load testing, for relocation of the system (not the initial set-up).	

Principal contractor or building owner statement	
I have sighted the documentation listed above (numbered 1 to 7) that relates to the installation and use of the swing-stage referred to on this statement.	
Name:	Signature and date:
Title:	

## WHSQ SS 02

V1.09.08

### Competent person benchmarks for swing-stage set-up verification

#### Purpose

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This document is intended to provide minimum benchmarks for competent persons used to verify that swing-stage installations comply with the engineer's specifications, **other than** for the initial verification. **This document is interim guidance only and expires on 30 June 2009.**

#### Background

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These guidelines apply to persons who verify that the engineering specifications for the swing-stage installation have been complied with at each movement of the swing-stage on site. The initial verification, when the swing-stage is set up for the first time on site, is to be provided by the engineer.

The competent person is not required to make engineering decisions such as calculations. Instead, he or she is to verify that the engineer's design specifications, as depicted on the swing-stage drawings, have been complied with.

#### Benchmarks

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Workplace Health and Safety Queensland (WHSQ) requires the competent person to meet the following benchmarks to verify the engineer's design has been complied with. The competent person is to:

1. Be a holder of an advanced scaffolding or advanced rigging certificate recognised by WHSQ.
2. Have a demonstrated ability to be able to read and interpret technical drawings that relate to the swing-stage installation. This includes the ability to accurately understand and interpret the following:
  - dimensions
  - drawing notes
  - drawing identification and the revision process,
  - structural member specifications
  - connection details
  - any special conditions nominated on the drawing
  - when a drawing has insufficient information or detail to be used (i.e. the drawing fails to mention key information and cannot be accurately followed).
3. Have a sound understanding of the current Queensland *Scaffolding Code of Practice 2004* and *Australian Standard AS 1576.4 Suspended scaffolding*.
4. Have a minimum of two years experience associated with the use and inspection of swing-stages.
5. Have a sound and accurate understanding of relevant benchmarks for the inspection and discard of scaffolding components, lifting gear, steel wire ropes, scaffold hoists and personal fall arrest equipment. Typical examples include the following:

- Correct inspection techniques for steel wire rope as detailed in *AS 2759 Steel wire rope – Use, operation and maintenance* and the associated criteria used for discarding the rope. This includes the correct interpretation of broken wires, broken strands, kinks, and any other wear or abnormalities specified in the standard.
  - Scaffold and other structural components that are bent, have cracked welds, or rust (other than surface rust), are to be removed from service and discarded. Scaffolding couplers with bent pins, damaged threads and cracked fittings are not to be used.
  - Scaffolding components from different manufacturers cannot be used together unless specifically approved for this application by an engineer or the scaffolding manufacturer for the specific application in which the scaffolding is being used. In other words, no “mixing and matching” of scaffolding components.
  - Scaffolding components manufactured from different materials (i.e. aluminium and steel) cannot be used together on the swing-stage installation unless specifically approved and certified by the engineer.
  - Scaffold hoists with obvious faults such as cracked and damaged parts, missing or loose fasteners, lack of manufacturer’s plates and inspection tags (both structural and electrical inspections), and damaged controls cannot be used.
  - Personal fall arrest equipment that fails the inspection criteria specified in the relevant part of *Australian Standard AS 1891, Industrial fall-arrest systems and devices* is not to be used. Examples of unacceptable equipment include torn or cut webbing, missing manufacturer’s tags, oil soaked harnesses, missing connectors, etc.
6. Clearly understand the role of the verification process and that the competent person is not authorised to permit a variation to the engineer’s instructions.

<b>Competent person statement</b>	
I meet all the aforementioned requirements of the benchmarks for a competent person to perform swing-stage verification set-up (other than for initial set-up).	
Competent person name:	Competent person signature and date:
Phone number:	

<b>Employer* statement</b>	
I verify that the aforementioned competent person meets all the requirements of the benchmarks for a competent person to perform swing-stage verification set-up (other than for initial set-up).	
Employer name:	Employer signature and date:
Phone number:	

\* If the competent person is a contractor, this statement must be signed by the person who engages them.



## Swing-stage suspension system verification statement

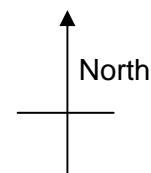
**Note:** The suspension system and cradle is to be inspected by an engineer at the time of the initial set-up on site. This verification is for the **relocation of the system and only applies to the suspension rig and ropes**. A new verification statement and checklist must be completed for each installation.

Swing-stage supplier:	Phone number:
Swing-stage installer:	Phone number:
Site address:	
Swing-stage identification no. (if more than one swing-stage on site):	

### Competent person verification statement

- I meet all the requirements of the benchmarks for a competent person to perform swing-stage verification set-up (other than for initial set-up), as set out in *Competent person benchmarks for swing-stage set-up verification* (WHSQ SS 02).
- I have inspected the swing-stage suspension system detailed above, completed the accompanying safety checklist and witnessed the load test.
- The swing-stage suspension system, including the suspension rig and wire ropes, complies with the engineer's specifications detailed in drawing number \_\_\_\_\_ dated \_\_\_\_\_ and certified by \_\_\_\_\_ (engineer's name).

Competent person name:	Competent person signature and date:
Phone number:	



**Plan diagram showing swing-stage location**

<b>Swing-stage suspension system verification checklist</b>		
<b>Item</b>	<b>Inspection result</b> (Tick for pass, cross for fail. If there are any failures they must be addressed immediately and a 2 <sup>nd</sup> check done)	
	<b>1<sup>st</sup> check</b> Date:	<b>2<sup>nd</sup> check</b> (if required) Date:
Length of outboard on needles <u>does not exceed</u> that specified in engineer's drawings		
Length of inboard on needles <u>is the same as</u> that specified in engineer's drawings		
All other dimensions are the same as those shown on engineer's drawing		
All connections are the same as those shown on engineer's drawing		
Components are undamaged – no bends, dents, rust (other than minor surface rust)		
Welds are undamaged – no cracks		
No mixing and matching of scaffold components (i.e. are all scaffolding components from the same manufacturer?)		
Suspension rig and needles are made from the same material unless specifically approved by engineer (i.e. steel or aluminium, not both)		
Number and position of counterweights is the same as those shown on engineer's drawing		
Counterweights are secured by positive restraint system (i.e. do not rely on friction devices such as couplers)		
Counterweights are secured with lock and key		
All suspension steel wire ropes are in good condition (refer AS 2759 - check strands, wires, kinks, etc)		
Engineer's certification letter, to verify supporting structure, is adequate, has been sited and applies to location of unit		
<b>Successful load test undertaken</b> Working Load Limit (WLL) of cradle is _____ kg		

**Load test options** (Refer to *Swing-stage load test procedure* - WHSQ SS 04):

(a) 100 per cent working load limit with 100 per cent of load spread evenly across full length of cradle (e.g. cradle WLL 400 kg, evenly distribute 400 kg across the length), or

(b) Each needle tested with 60 per cent of the working load limit of the cradle per needle (e.g. cradle WLL is 400 kg, test load is 240 kg applied within 1 metre of end of cradle).

(c) Use of load cell(s) in accordance with engineer's test procedure.

**Note:** Tests cannot be undertaken in a way that puts testers, or anyone else at risk (see WHSQ SS 04 for further detail).

Verifier's signature:	Date:
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## **WHSQ SS 04**

V1.09.08

# **Swing-stage load test procedure**

## **Purpose**

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This document provides guidance on load testing of swing-stage cradles prior to use – testing is to be carried out prior to the initial use on site and prior to use each time the swing-stage is relocated on that site. This test is in addition to other testing specified in *Australian Standard 4576*, such as testing of the swing-stage hoists to determine the load limiting device is operational (i.e. 25 per cent overload test).

**This document is interim guidance only and expires on 30 June 2009.**

The testing is to be witnessed by the person responsible for inspecting the swing-stage suspension system (i.e. the person who completes the *Swing-stage suspension system verification statement* WHSQ SS 03).

## **Swing-stage load test procedure – using weights**

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### **1. Testing both needles at one time**

Test load size - Test load is to be equivalent to 100 per cent of the working load limit (WLL) with 100 per cent of load spread evenly across full length of cradle (e.g. cradle WLL 400 kg, evenly distribute 400 kg across the length). **Note: test weights must be clearly marked with the weight in kilograms.**

### **Procedure**

1. Ensure suspension system has been inspected and verification statement WHSQ SS 03 has been completed (except for load test part and final sign off).
2. Ensure remote control system has been fitted to each swing-stage hoist motor.
3. With cradle located on ground, or landing, load swing-stage cradle with test weights positioned evenly along length of cradle.
4. Standing away from, and to the side of the cradles (i.e. a distance of at least 3 metres to the side), operate remote control(s) and raise cradle 1/2 metre above landing.
5. Hold cradle at 1 metre above landing and check that cradle does not move. If cradle does not move, raise cradle to 3 metres above landing. Observe that cradle remains stationary.
6. Lower cradle to landing and remove test weights.

## 2. Testing one needle at a time

Test load size - Each needle is to be tested with 60 per cent of the working load limit (WLL) of the cradle per needle (e.g. cradle WLL is 400 kg, test load is 240 kg applied within 1 metre of end of cradle).

**Note: test weights must be clearly marked with the weight in kilograms.**

### Procedure

1. Ensure suspension system has been inspected and verification statement WHSQ SS 03 has been completed (except for load test part and final sign-off).
2. Ensure remote control system has been fitted to each swing-stage hoist motor.
3. With cradle located on ground, or landing, load one end of swing-stage cradle with weights positioned *within 1 metre of end of cradle*.
4. Standing away from, and to the side of the cradles (i.e. a distance of at least 3 metres to the side), operate remote control(s) and raise cradle 1/2 metre above landing.
5. Hold cradle at 1 metre above landing and check that cradle does not move. If cradle does not move, raise cradle to 3 metres above landing.
6. Lower cradle to landing and move test weights to the opposite end of the cradle, *within 1 metre of end of cradle*.
7. Repeat steps (4) and (5) above.
8. Lower cradle to ground and remove test weights.

### Test procedure – using load cells

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Load cells, anchored between a solid structure and the swing-stage cradle, may be used as an alternative to test weights. When using load cells to undertake the load test, the following conditions are to be complied with:

1. The test procedure is to be prepared and approved by a professional engineer. A copy of the documentation verifying this is to be located at the test location.
2. The loading is to accurately simulate 100 per cent of the working load limit to the swing-stage suspension system.
3. Application of the test load must not damage the swing-stage cradle in any way and it will likely be necessary to use a load spreading frame between the load cell(s) and swing-stage cradle. If such a frame is used its design is to be certified by the professional engineer.
4. The load cell(s) is to be calibrated at intervals not exceeding one year or at a more regular interval determined by the professional engineer. Calibration documentation is to be available upon request.
5. When using the load cell to carry out the load test, persons operating the swing-stage hoist motors are to stand away from, and to the side of, the cradles (i.e. a distance of at least 3 metres to the side).