

## Design standards for Department of Education facilities

# Basketball equipment specification

Version 1.3 | July 2023

## 1. GENERAL

### 1.1 SCOPE

Supply and installation of basketball equipment and supporting structure.

### 1.2 DEFINITIONS

#### General

Meanings assigned to words and expressions in the Standard Offer Agreement shall apply to those words and expressions used in the Offer Documents.

#### Basketball equipment

The ring, the backboard, and the frame.

#### Supporting structure

Building structure for wall or ceiling mounted equipment (EN1270 – Types 3, 4 & 5). Footing for equipment with independent supporting frame (EN1270 – Type 6).

#### External/severe environment

Exposed to wind borne rain or salt laden air (within 1 km of the coastline).

#### Internal/mild environment

Protected from wind borne rain and greater than 1 km from the coastline.

#### Free space

The distance from the face of the backboard to the face of the supporting frame or structure.

#### Ring height

The distance from the playing surface to the top of the ring.

#### Backboard height

The distance from the playing surface to the underside of the backboard.

#### RPEQ

Registered Professional Engineer of Queensland, competent in the field of structural engineering or welding of steel structures.

#### Project manager

Person nominated in Schedule A.

### 1.3 STANDARD

#### General

Queensland Building Act

BCA Building Code of Australia

AS 4685.0: 2017 Playground equipment and surfacing, Part 0: Development, installation, inspection, maintenance and operation

AS 4685.1: 2021 Playground equipment and surfacing, Part 1: General safety and test methods

AS/NZS 1170.0 Structural design actions – General principles

AS/NZS 1170.2 Structural design actions – Wind actions

AS 4100 Steel Structures – Australian Standard

AS 3990 – Mechanical Equipment – Steelwork

AS 1554.1 – Structural Steel Welding Part 1: Welding of Steel Structures

### **Functional and safety requirements**

Comply with the functional and safety requirements (sections 3 & 4) of EN 1270: 1998+A1:2000

### **Materials**

AS 1163 – 1991 – Structural steel hollow sections – Australian Standard

AS 1442 – 1991 – Carbon steels and carbon-manganese steels – hot rolled bars and semifinished products

AS 1720 – Timber Structures – Australian Standard

AS/NZS 2269 – Plywood Structural – Australian & New Zealand Standard

AS/NZS 2312 – Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings – Australian & New Zealand Standard

AS 3600 – Concrete Structures – Australian Standard

### **Performance requirements**

#### ***Importance level***

The structure importance level of the equipment and support structure shall be level 1, in accordance with AS/NZS 1170.0:2002, for all free standing outside structures. For internal structures, the importance level of the building takes precedence. This is because the basketball structure is a mechanism attached to the wall and/or roof of the structure and ceases to be a separate structure.

#### ***Working life***

The design working life of the equipment frame and support structure shall be 25 years.

#### ***Imposed actions***

The equipment and support structure shall be of adequate strength to support the imposed actions specified in Figure 1.

#### ***Wind actions***

The equipment and support structure shall be of adequate strength to resist the wind actions defined in AS1170.2.

#### ***Load cycles***

The equipment and support structure shall be capable of sustaining 100,000 load cycles of the critical imposed cyclic action.

## **1.4 ADDITIONAL REQUIREMENTS**

### **Materials**

All materials shall be new.

Ring shall be steel with a minimum Grade 300 backboard shall be:

- External/severe environment – marine grade plywood or crezwood
- Internal/mild environment – plywood or crezwood or suitable transparent material

Frame shall be steel with a minimum Grade C250.

### **Corrosion protection**

The minimum corrosion protection shall be:

- External/severe environment – hot dipped galvanized after fabrication having a minimum nominal coating mass of 390 g/m<sup>2</sup> for removable equipment and 500 g/m<sup>2</sup> for sleeves cast-into concrete.
- Internal/mild environment – paint or metallic coating system as defined by AS/NZS 2312 to achieve a life to first maintenance of 25 years in Category B environment (Clause 2.3).

### **Connection to the supporting structure**

The equipment shall be removable from the supporting structure. Equipment must be connected to a supporting structure.

Independently supported equipment shall have a sleeve, with a minimum length of 800 mm, cast into the footing of the support structure.

Wall or ceiling mounted equipment shall be bolted to the supporting structure.

All welds used on attachment plates that support basketball structures should conform to AS 1554:Part 1 SP. All welds in the basketball structure itself should conform to AS 1554:Part 1 SP.

Any fastener must have sufficient preload to prevent fatigue of the joint during operation. (Locknuts without preload will not prevent fatigue.)

A locking device shall prevent the equipment moving during use.

### **Sharp or protruding objects**

No sharp or protruding object shall be located within a height of 3250 mm within the playing court.

(EN1270 Clause 4.1 defines requirements for corners and edges up to a height of 2900 mm and the edges of the backboard. EN1270 Clause 4.5 defines requirements for padding. In addition to these requirements components above 2900 mm with edges rounded with a radius of at least 3 mm and protrude less than 10 mm from the face of the member are acceptable along with hexagonal bolt heads and nuts located behind the backboard provided their thread projection is less than 3 mm).

### **Warning signs**

Attach two warning signs as shown in Figure 2 to each structure. Attach one on the pole at 1200 mm above the ground and the other in the top left corner on the front of the backboard. Each sign shall be the size as shown and shall be clearly visible. The lettering shall be black on a white background. The sign materials including adhesive shall be suitable for external/severe environment.

## **1.5 DIMENSIONS**

### **Ring**

Internal diameter: 450 mm +7 mm –0 mm

Solid steel diameter: 20 mm +0 mm –4 mm

Conform to EN1270 (Figure 10)

### **Ring height**

3050 mm ± 6 mm

### **Backboard**

As specified in Schedule A.

Minimum of 1800 mm wide × 1050 mm high.

Locate the face of the backboard at 1.2 m from the end line.

### **Backboard height**

2900 mm ± 30 mm

### **Free space**

As specified in Schedule A.

Minimum 1.2 m

## **2. SUPPLY OF EQUIPMENT**

### **2.1 GENERAL**

Equipment supplied shall be marked with manufacturers name, model number and year of manufacture.

Equipment shall comply with the project specific requirements detailed in Schedule A.

## 2.2 CERTIFICATION

Compliance of the equipment with the requirements of this specification shall be certified by a Registered Professional Engineer of Queensland (RPEQ). The certification shall be supported by prototype testing. All basketball backboard structures of the same model with shorter supporting arms will be deemed to have satisfied these criteria if the variant with the longest supporting arms satisfactorily completes the prototype load testing and fatigue testing regime. Education Queensland reserves the right to nominate a representative engineer and project officers to witness the prototype and/or fatigue testing. Manufacturers need to contact Education Queensland when such testing is to be carried out with sufficient notice to allow the witnessing to occur.

### 2.2.1 Prototype load testing

Equipment shall be prototype load tested for the imposed loads shown in Figure 1. The prototype load test load shall be the imposed load factored by a load factor of 1.5 (this is factored into the 1.8 kN) and a test factor of 1.2 giving a load at the backboard of 2.2 kN and 1.5 kN for the basketball ring. The permanent deformation resulting from prototype testing shall not exceed 10 mm. For ease of inspection, it is recommended that the testing be carried out on an unpainted structure and that the structure be tested for cracking using the magnetic particle method both prior and following completion of the load testing. The prototype load test shall be supervised, reported and certified by a Registered Professional Engineer of Queensland (RPEQ). The test report shall detail the equipment tested, the test procedure, test loads and performance.

### 2.2.2 Cyclic load testing (fatigue testing)

Cyclic testing of the assembly shall be 100,000 load cycles from zero imposed action to the prototype cyclic test load. The prototype cyclic test load is 1.2 kN applied downward at the face of the backboard. The equipment is acceptable after test if the permanent deformation is less than 10 mm, and no cracks are present. For ease of inspection, it is recommended that the testing be carried out on an unpainted structure and that the structure be tested for cracking using the magnetic particle method both prior and following completion of the fatigue testing. The cyclic load test shall be supervised, reported, and certified by a Registered Professional Engineer of Queensland (RPEQ). The test report shall detail the equipment tested, the test procedure, test loads and performance.

## 3. INSTALLATION OF EQUIPMENT

### 3.1 GENERAL

Equipment shall be installed to comply with the project specific requirements detailed in Schedule A. Steel structures should be erected in accordance with section C15 of AS 4100 – Sup 1 – 1999. Do not install equipment without written direction from the project manager.

### 3.2 DESIGN CERTIFICATION

Compliance of the support structure and the fixing of the equipment to the support structure shall be certified by a Registered Professional Engineer of Queensland (RPEQ). Prototype and cyclic testing documentation must be available for perusal by the engineer performing the certification.

All inspection needs to occur prior to certification and all welding performed as part of the installation needs to be in accordance with AS 1554:1 SP.

Magnetic particle or other non-destructive examination of the welds may be required by the engineer to confirm the quality of the welding.

A load test on each attachment point on internal structures should occur.

Submit design drawings and certification to the project manager prior to installation.

### 3.3 INSPECTIONS

The construction certifier is to inspect:

- foundations of independently supported equipment prior to pouring including sleeve
- fixing of the equipment to the support structure.

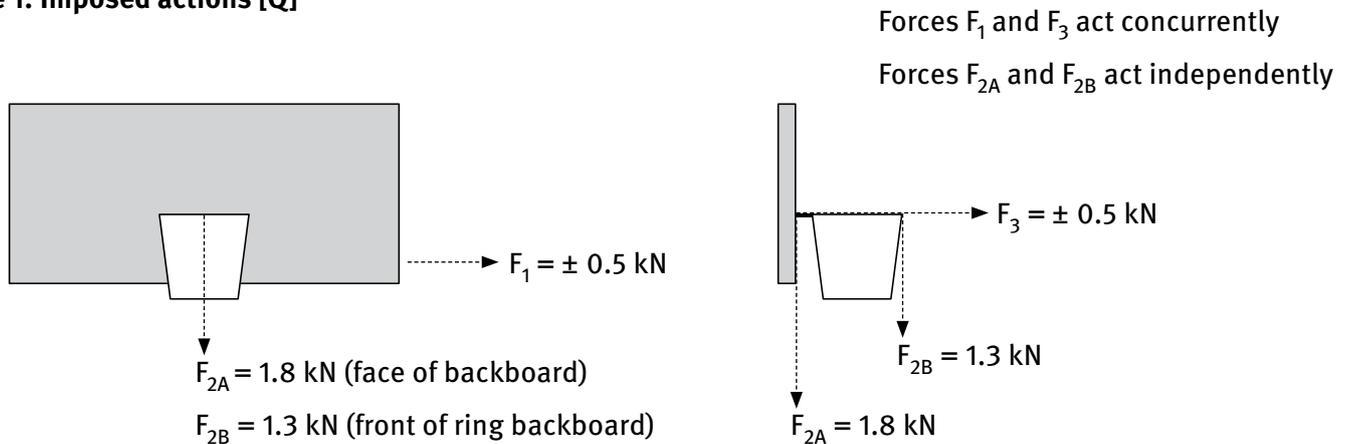
Welding should be certified in accordance with AS 1554 Part 1 SP.

Qualifications and experience of the RPEQ must be stated.

### 3.4 CERTIFICATION OF THE COMPLETED WORKS

Inspection of the completed work, for compliance with the design shall be certified by an RPEQ or building surveyor competent in mechanical structures. An inspection of the roof and wall mounting points should be carried out prior to any scaffolding being removed. Submit certification of the completed works to the project manager.

Figure 1: Imposed actions [Q]



**Notes:**

- (a) Figure 1 presents imposed actions [Q] in terms of AS1170. The loads are consistent with the rigidity and stability proof test loads specified in EN1270, based upon a load factor of 1.5 incorporated in the 1.8 kN force  $F_{2A}$  and a prototype load test factor of 1.2 to allow for variability of units. In addition to the requirements of EN1270 forces  $F_1$  and  $F_3$  may act in either the + or - direction.
- (b) For forward roof retractable structures, the load  $F_3$  shall be applied in a rearward direction and for rearward roof retractable structures the load  $F_3$  shall be applied in the forward direction. For all other structures load  $F_3$  is applied both forward and rearwards.
- (c) For side swinging structures attached to a wall the loads  $F_1$  and  $F_3$  shall be applied once the structure has been swung to and locked in the playing position.
- (d) Ultimate design action shall be determined in accordance with AS1170.0 – Section 4 Clauses 4.2.1 & 4.2.2, with  $\psi_c = 0$

Figure 2: Warning sign



**Notes:**

- (a) Font type: Arial (Bold and Regular)
- (b) Font size: line 1 – 72.5 pt; lines 2–4 – 32.5 pt; lines 5–7 – 22 pt
- (c) Sign size: 160 wide mm × 120 mm high

# Schedule A: Project Description

- To be submitted by the building applicant to the building surveyor with Schedules B and C.

## Project

**Project number**

**School**

**Address**

Court	Location

## Equipment schedule

Court	Equipment type	Exposure	Backboard dimensions	Free space (m)	Number required

### Notes:

**1) Equipment type**

Wall or ceiling mounted equipment: EN1270 Type 3 – Wall mounted (folding); Type 4 – Wall mounted (fixed); Type 5 – ceiling mounted  
Independently supported equipment: EN1270 Type 6 – Removal from socket in footing

**2) Exposure:** External/severe environment or internal/mild environment

**3) Backboard dimensions:** Minimum 1800 mm wide × 1050 mm high

**4) Free space:** Minimum 1.2 m; Australian Sports Commission recommend 2.25 m minimum; FIBA recommend 3.25 m minimum

**5) Number required:** Two per court

## Project manager

- Person to whom all correspondence is directed and who provides all directions to the supplier/contractor.

**Name**

**Position**

**Mobile**

**Email**

## Schedule B: Design Documentation

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- To be submitted by the building applicant to the building surveyor for approval to construct.
- To be completed for each combination of type/exposure/backboard/free space.

### Project

**Project number** **Court/s**

**School**

**Address**

### Equipment (attach manufacturer's description)

**Manufacturer** **ABN**

**Model number** **Number to be supplied**

**Backboard dimensions** **mm wide** × **mm high**

**Free space** **mm**

### Equipment certification (attach certificate)

**Equipment design and testing certification by**

**Date of certification** **RPEQ number**

### Installation contractor

**Company** **ABN**

**QBSA**

**Contact name** **Position**

**Mobile** **Email**

### Supporting structure design certification (attach certificate)

**Installation design certification by**

**Date of certification** **RPEQ number**

# Schedule C: Construction Documentation

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- To be submitted by the building applicant to the building surveyor for Building Act compliance.

## Project

**Project number**

**Court/s**

**School**

**Address**

## Installation certification (attach certificate)

**Installation design certification by**

**Date of certification**

**RPEQ number**

**as applicable**

## USER INSTRUCTIONS

1. This specification incorporates the requirements of the Building Code of Australia and the European Standard for Basketball Equipment, but does not incorporate all of the requirements for basketball equipment to comply with the International Basketball Federation (FIBA) standard<sup>1</sup>.
2. The Queensland Government Department of Local Government Planning Sport & Recreation and the Australian Sports Commission support the recommendations for the dimensions for playing areas published by the Western Australia Ministry for Sport and Recreation<sup>2</sup>.
3. Free space is dependent on the space available for the court. FIBA specifies 3.25 m (minimum) and the Australian Sports Commission recommends 2.25 m (minimum).
4. The procurement procedure is summarised as:
  - 4.1.1 Project manager completes Schedule A
  - 4.1.2 Project manager invites quotations from equipment suppliers/installer based upon the specification with Schedule A completed.
  - 4.1.3 Project manager reviews the quotations, obtains financial approval.
  - 4.1.4 Project manager awards a contract in writing for supply/installation.
  - 4.1.5 Equipment suppliers/installers to complete Schedule B and submit to the project manager.
  - 4.1.6 Project manager submits a copy of the specification with completed schedule A and B with supporting documentation to the building surveyor for approval to construct.
  - 4.1.7 Upon receipt of the approval to construct from the building surveyor the project manager directs in writing the installer to install the equipment.
  - 4.1.8 Construction certifier is to inspect the construction and certify.
  - 4.1.9 Equipment installer is to complete Schedule C and submit to the project manager.
  - 4.1.10 The project manager is to submit Schedule C along with a copy of the design approval to the building surveyor for Building Act Compliance.
  - 4.1.11 The equipment may be used following receipt of the Building Act Compliance.

Version	Date	Changes
1.0	October 2007	<ul style="list-style-type: none"><li>• New Basketball Equipment Specification document created.</li></ul>
1.1	April 2017	<ul style="list-style-type: none"><li>• Update of Department name, sign, footer and TRIM Number added.</li></ul>
1.2	5 July 2023	<ul style="list-style-type: none"><li>• Document layout updated to DoE's latest style.</li><li>• Figure 2 <i>Warning</i> sign updated to adhere with the <a href="#">Australia Committee Industrial Warning Signs</a> standard.</li></ul>
1.3	6 July 2023	<ul style="list-style-type: none"><li>• Changes from QBuild received and actioned.</li></ul>

<sup>1</sup> Official Basketball Rules 2004 – Basketball Equipment, FIBA, June 2004. ([www.fiba.com](http://www.fiba.com))

<sup>2</sup> Sport – Dimensions for Playing Areas – Basketball, Ministry of Sport and Recreation, Government of Western Australia, 4th Edition 1998 ([www.ausport.gov.au](http://www.ausport.gov.au))