Display Safety Record

Fillable form for one laser show. Based on clause 7.5 of AS/NZS IEC 60825.3:2022, items a to k.

How to use it. Blue boxes are fields. Dropdowns show the usual answer already selected. Most text boxes carry a typical entry from a worked sample show (one Class 4 projector on a truss, operator in continuous control). Change anything that does not match your show. Check results, measurements, signatures and approvals start empty or "not yet checked" on purpose: a record must only show a check that was done.

Keep the finished record at the show site and keep it up to date at every stage, from design to dismantling [cl. 7.5]. National rules can ask for more than the Standard lists, so check them. Save a new copy for each revision.

Document control

DSR number	
Revision	A
Status	Draft
Show name	
Venue and address	
Bump-in date	
Show date(s)	
Dismantle date	
Equipment owner / operator company	
Prepared by and date	
LSO (keeps this record at the site)	

1. The show (items a and c)

Record the equipment, the location, the venue layout, the types of effect, and where the beams go in relation to spectators, ancillary staff and performers. Attach plan and elevation drawings that show where everyone is [cl. 7.2.2].

1.1 Equipment

Label	Equipment	Position	Notes	Mount type
P1	RGB laser projector, galvo scanning	Truss, above head height	Rigid clamp mount plus safety bond.	Truss, above head height
C1	Laser controller and show computer	Control position	Operator can see every projection.	
E1	Emergency stop, fail-safe, hard-wired	At the control position	Tested before every show.	
E2	Emergency stop, fail-safe, hard-wired	Stage wing	Tested before every show.	
M1	Physical aperture mask	Fitted to P1 window	Blocks all output below horizontal.	

1.2 Location and layout

Hall or site size and ceiling height	
Audience area and numbers	Audience stands on a flat floor in front of the stage, behind a crowd barrier.
Where performers and ancillary staff are	Performers on the stage. Ancillary staff (bar, security, catering) at the side walls and back of the hall.
Balcony, tiered seating or windows facing beams	No
Exits clear of equipment and projections	Yes
Plan and elevation drawings attached	No

1.3 Effects and who could be reached

Effect	Category (Table 2)	Who could be reached	Why
Beam fans and tunnels over the audience	Potentially accessible	Nobody is meant to be reached	Beams stay above the separation height.
Graphics on the back wall	Non-accessible	Nobody	Beams end high on the wall.
Audience scanning	Non-accessible	Not used	Items j and k then do not apply.

2. Beam characteristics (items b and i)

Maximum power, wavelength, divergence, scan rates, and the scan-fail fault conditions and response time, plus relevant details from the maker's manual. Total power, response time and hazard distance work out by themselves in Adobe Reader.

Projector label	P1
Laser class on the label	Class 4

Source	Wavelength (nm)	Power (W)	Note
Red	638	1.0	Typical show red
Green	520	1.0	Older 532 nm green: check the infrared filter
Blue	445	1.0	Below 500 nm, injury builds up over time
Total power when all are on (W)		3.0	Works out automatically

Beam diameter at the aperture (mm)	3
Divergence, full angle (milliradians)	1
Scan rate: maximum (points per second)	30000
Scan rate: minimum used (points per second)	8000

Scan-fail safeguard (SFS)	Fitted: backup only
What the SFS detects	A still beam, by watching the x and y mirror speed signals.

SFS response time	**Time (ms)**		
T1: time to react to the fault	2		The maker often quotes only this one
T2: time to trigger the control	1		
T3: time for the control to take effect	1		
Full response time (ms)	4		T1 + T2 + T3. Works out automatically

Other maker details used	Key control, emission indicator, remote interlock connector and beam stop fitted as the manual describes (IEC 60825-1). Manual copy is with the equipment.

3. Risk assessment conclusions (item d)

Key findings and the controls you chose for each phase. The Standard sets no scoring method, so use your organisation's [cl. 7.2.5, 8.2.1]. Assess dismantling too.

Phase	Main hazards	People reached	Controls chosen	Residual
Design	Beams too low over the audience. Reflective surfaces in beam paths.	Spectators	Mount high. Mask below horizontal. Walk the venue for shiny items.	Low
Install and build	Falls from height at the truss. Beam on during rigging.	Installers	Output off while rigging. Key removed. Safety bonds.	Low
Alignment	Stray beams and reflections at low and full power.	Alignment crew and any staff nearby	Laser controlled area before alignment. Lowest practical power. E-stop in reach. Two people.	Low
Operation (rehearsal and show)	A projector moves. A control failure. Someone climbs into a beam path. Reflective items from guests.	Spectators, performers, ancillary staff	Mask. Rigid mount. E-stops. Operator in continuous control. Security briefed. Reflective items banned.	Low
Dismantle	Beam on by mistake. Hot optics.	Crew	Key out and stored. Output off until packed.	Low

4. Control measures in place and the reasons (item e)

Tick each control that is in place. Edit the reason so it matches your show. Prefer engineering controls to procedures: people forget or ignore instructions [cl. 8.1].

In place	Control	Type	Reason	Cl.
☐	Projector mounted above head height	Engineering	Removes the need for a rule telling people to keep clear.	7.2.3
☐	Physical mask on the aperture, blocking output below horizontal	Engineering	Keeps beams at least 3 m above where spectators stand even if the aim drifts. A physical mask is preferred over a software mask.	6.2
☐	Rigid mount and safety bond	Engineering	Vibration, knocks and wind can move projectors.	6.4
☐	Fail-safe, hard-wired e-stop (one or more)	Engineering	Esc and a DMX blackout are not reliable e-stops. It must not depend on the control signal.	6.8
☐	Control link fault switches the output off	Engineering	A break in the link must not leave the beam on.	6.7

☐	Scan-fail safeguard	Engineering (backup)	Cuts the output if scanning fails. It takes time to act, so it is a backup, not the main control.	9.6
☐	Operator in continuous control, with direct sight of every projection	Procedure	Allows the 3 m and 2.5 m separation of cl. 6.10 instead of 6 m.	7.4.3
☐	Laser controlled area before alignment	Procedure	Alignment can send beams above the limit into areas where people work.	8.2.1
☐	Warning signs and crowd barrier	Warning and barrier	Signs name the responsible person. A sign alone is not a control, so explain it at induction.	8.2.4
☐	Announcement or notice about laser effects	Information	Tell the public, as you would for strobes and smoke.	8.2.5
☐	Reflective items banned over the audience	Procedure	Balloons, flags and selfie sticks can send a beam where it should not go.	7.3.11
☐				
☐				
☐				

5. Separation distances (clause 6.10 to 6.12)

Pick the case that applies. Where an operator is in continuous control, beams above the spectator limit stay at least 3 m above any surface where spectators can stand and at least 2.5 m away sideways. Measure from every surface spectators can stand on, not only the main floor.

Case used	Operator in continuous control (cl. 6.10)
Required height above where spectators stand	3 m (operator in control)
Required sideways distance	2.5 m
Lowest beam measured above the audience floor (m)	
Nearest beam to a spectator, sideways (m)	
Result	Not yet measured
Where beams end	Back and side walls, above the separation height.
Binoculars and long lenses	Not expected. Limit not reduced
Tiered seating, balcony or raised floor measured	Not applicable
If the room is too small for the distances	Not applicable

6. Contingency plans (item g)

The plan covers three cases [cl. 7.6]: an actual eye injury, an actual skin injury, and an exposure above the limit that could have injured an eye. In every case, end the laser emission first.

1	End the emission: press the e-stop. Do not restart until the cause is understood and the controls are reviewed [cl. 7.4.5].
2	Sit the person down. Do not let them rub, press or medicate the eye.
3	Eye injury or any concern: take them to an accident and emergency hospital, because of the risk of shock. Do not let them drive. Call 000 (Australia) or 111 (New Zealand) if serious.

4	Send basic laser details with them: the wavelengths in use and the part of the eye most at risk (the retina).
5	A quick check, not a diagnosis: an Amsler grid at the control position, or a reading test.
6	Skin burn: treat it like a flame or hot-surface burn and get medical advice.
7	Record the time, the cue running, where the person stood and what they said. Keep the show log. Tell the LSO and the venue manager. Report to the laser company's management [cl. 7.7].

Responsible person on site, mobile	
LSO, mobile	
Venue manager, mobile	
Nearest accident and emergency hospital	
Emergency services	000 in Australia

7. Exposure assessment (items j and k)

For audience illumination: the spectator limit chosen, the measurements, and the instrument and set-up. For any effect that relies on a scan-fail safeguard: the performance criteria and the operational tests done.

j. Is audience illumination used?	No
If yes: spectator limit used	
If yes: exposure duration assumed (at least 10 s)	
If yes: instrument, detector aperture (7 mm) and set-up	
If yes: measurements and positions	
k. Does any effect rely on the SFS to stay within a limit?	No
If yes: performance criteria and tests	

Hazard distance (nominal ocular hazard distance)

Distance alone will not protect people. A show beam can stay hazardous for hundreds of metres. Keep beams away from people by position, masks and barriers [cl. 6.2].

Spectator limit, 10 s (W/m2)	10.1	10.1 for a visible small-source beam
Total power (W)	3.0	Copy of the total in section 2
Divergence (milliradians)	1	Copy of the value in section 2
Hazard distance (m)	615	Works out automatically. (1/divergence) x square root of (4 x power / (pi x limit))

Calculation checked by, and date	

8. People (item f)

Names and contact details of designers, installers, modifiers, operators, the LSO and the equipment owner. One person can hold several roles. The LSO role is in addition to the responsible person's [cl. 7.2.10].

Role	Name	Contact	Note
Designer			Decides effects, projections and equipment positions.
Installer			Places the equipment and helps align it.
Modifier			Only if the show or its safety parts were changed.
Operator			Has direct control of the laser.
Responsible person			In charge on site. Keeps to the agreed settings.
Laser safety officer (LSO)			Oversees hazard control. Keeps this record.
Laser protection adviser (LPA)			Independent. Only if the show needs one.
Equipment owner			
Venue manager			

Training and briefing

Site induction done, signs and controlled areas explained	No
Security agreed how to alert the operator in an emergency	No
Venue management told where beams could reach above the limit	No

9. Approvals and restrictions (item h)

Approvals and restrictions from regulators, local and national. Rules differ by state and change. Ask the regulator in writing before you quote or plan, and keep the answer.

Body	Status	Conditions	Reference or date
State or territory radiation regulator	Not yet confirmed		
Work health and safety regulator	Not yet confirmed		
Aviation authority (outdoor shows into airspace)	Not yet confirmed		
Maritime and port authorities (waterways)	Not yet confirmed		
Council (event permit)	Not yet confirmed		
Venue (written expectations)	Not yet confirmed		
	Not yet confirmed		

10. Check records

10.1 Pre-show checks, every show [cl. 7.3.7, 7.3.8]

Results start as "Not yet checked". Only change one after you have done the check, and record the time and your initials.

Check	Result	Time	Initials
Venue walk: new reflective items, blocked beam paths, moved barriers	Not yet checked		
Mask in place and tight	Not yet checked		
Projector mount and safety bond secure	Not yet checked		
Control link and cables undamaged, connectors locked	Not yet checked		
E-stop 1: output stops at once, resets, system returns normally	Not yet checked		
E-stop 2: output stops at once, resets, system returns normally	Not yet checked		
Scan-fail safeguard works (a still beam is cut)	Not yet checked		
Signs and barriers in place	Not yet checked		
Staff briefed: security and bar know where the e-stops are and how to alert the operator	Not yet checked		

10.2 Alignment and final check [cl. 7.3.4, 7.4.2]

Step	Result	Date and time
Laser controlled area set up before alignment	Not yet checked	
Alignment done at the lowest practical power, two people	Not yet checked	
Full-power check for stray beams at the end of alignment	Not yet checked	
Final low-power check before high power, recorded	Not yet checked	
Equipment protected from change after alignment	Not yet checked	

Checklists help, but do not rely on them alone. Rare problems can slip past a checklist [cl. 8.2.7]. Ask what is different tonight.

11. Show log and incident record [cl. 7.4.6, 7.7]

Record how the show went at the time, while memory is fresh. After any incident where a control failed, do not use the laser again until you know why and have fixed the controls. Report every incident to the laser company's management and the venue.

Date and time	Type	Entry	By

After the show: what worked and what could improve [cl. 7.2.5]	

12. Review and sign-off

Role	Name	Signature	Date
Prepared by (designer)			
Checked by			
Approved by (LSO)			
Show closed out (responsible person)			