Dr Trevor Wheatley
Chief LSO
(02) 6268 8162

UNSW CANBERRA | Australia's Global University

# Laser Product Safety Standard Compliance Risk Mitigation Sheet

Laser products used by UNSW personnel are required to be compliant with the Australian laser product safety standard (AS/NZS IEC 60825.1:2014 or equivalent IEC/EN 60825-1:2014 edition 3). The following is a non-exhaustive list of simple pre-purchase compliance checks that a laser purchaser should do **prior** to ordering lasers for use at UNSW. The checks are intended to pick up major non-compliances with the AS/NZS IEC 60825.1 (as amended) to mitigate safety risks associated with non-compliant products. If there is any doubt contact your laser safety officer or the Chief LSO or refer to AS/NZS IEC 60825.1 (as amended).

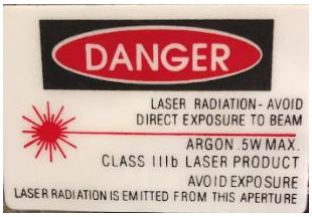
- **Safety features** – Depending on its class a laser must have various incorporated safety features to facilitate lower risk to management/use and for compliance. Safety features or controls should NOT require the operator to be exposed to laser radiation (of 3R or greater) to operate/view. Required safety features are NEVER optional and should be visible in photos or discussed in the manual. If they are not, then seek validation from OEM or don't purchase. The main safety features are:
  - **Class 3B & 4** – Interlock connector (with manual reset Class 4 only), keylock (or equivalent), separate permanently attached means of attenuation (e.g. shutter), permanently attached emission output indicator (e.g. light, buzzer), output aperture label, warning labels and a manual.
  - **Class 3R** – Warning label, output aperture label, a manual and if invisible an emission indicator (e.g. light or momentary switch).
  - **Lower classes (classes 1, 1M, 2, 2M)** – Warning labels (Class 1 may be in manual) and a manual. Note Class 2 & 2M must be visible (400 – 700 nm).
  - **Embedded lasers** – A Class 1 to 3B laser product where all or some of the laser emissions are inaccessible to users, e.g. total laser power does not exit the manufacturers housing. In general, as per assigned class (above), but additionally maintenance (user performed) shall not permit access to class 3B or 4 levels. Access panels should be labelled or interlocked or require a tool to remove, this should be detailed in the manual.
- **Label** – your laser should have a visible label that conveys safety information e.g.:


or



Alternate IEC label (see section 7 of 60825.1)

NOT[1]

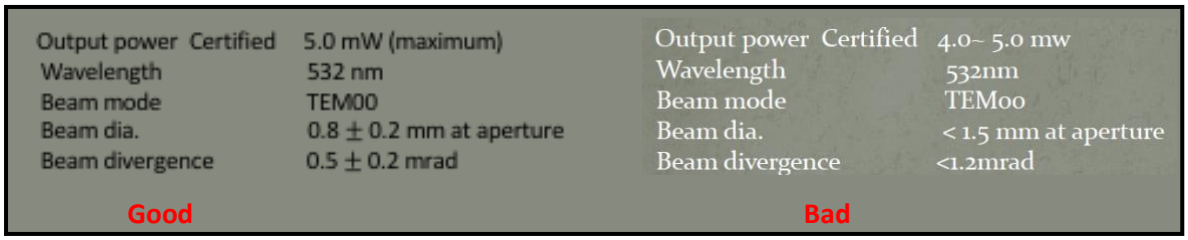




For AS/NZS IEC compliance the label should indicate the laser's class (in arabic numbers not roman numerals), wavelength, power or pulse energy, the standard number, should be yellow with black border (with exception of alternate IEC label shown above) and should (except class 1) have the laser hazard triangle. Note, if it looks like lower labels, consider reclassification or a different product – consult with LSO.

[1] These may be an indicator of non-compliance in other areas or compliance with older standards, a more detailed analysis (see LSO) or reclassification is advised. Exemptions possible if no alternate solution and no impact on safety.

- **User instructions or manuals** – All lasers should have user instructions or a manual (may be a single page for low risk simple lasers) that must contain certain safety information for compliance. The full list is at section 8 of AS/NZS IEC 60825.1, but the absence of the following key items introduces safety concerns and are often a good indicator of build quality or shortcomings in other areas:
  - Reproductions of the labels & clear indication of the laser output aperture locations (e.g. picture);
  - Instructions for assembly, maintenance and safe use including description of controls;
  - Emitted laser specifications[2] - wavelength, beam divergence, maximum output power/energy, pulse duration/s & repetition frequencies (description if modulated), e.g.




  - For embedded lasers information about incorporated laser including safety instruction to avoid exposure;
  - For Class 3B & 4 applicable maximum permissible exposure, hazard distances and eye protection information, e.g. optical density, maximum level incident on equipment.
- **Retailer accountable/reputable** – Cheap lasers purchased online or from less reputable overseas suppliers are often poor build quality, non-compliant, lack safety features, have inadequate warnings and instructions and mislabelled.
- **Questionable claims and certification** – beware of markings and certificates claiming compliance e.g. CE markings claiming IEC 60825.1 compliance when manual is not compliant. Markings and claims should be believable and sensible.
- **Standards** – IEC, IEC/EN, BS 60825-1 are equivalent (identical) to AS/NZS IEC 60825.1 but US Standards (e.g. US FDA/CDRH[3] 21 CFR §1040.10 and §1040.11, ANSI ASC Z136.1) may not be, so if in doubt ask your LSO or seek (re)classification to AS/NZS IEC 60825.1.

[2] (relevant & usable e.g. stating less than for divergence or greater than for power is typically a bad sign)
[3] US FDA/CDRH - United States, Food and Drug Administration, Center for Devices and Radiological Health.