

LightSAFE[®] Laser Welding Enclosure System for IPG LightWELD hand held laser welders.

The LightSAFE[®] system was specifically designed to produce a Laser Controlled Area when used in conjunction with the IPG LightWELD system and conform to ANSI 136.1 Safe Use of Lasers. The IPG LightWELD system has specific PPE requirements and other operating procedures which must be followed to allow safe operation of the LightWELD within the LightSAFE[®] laser welding enclosure.

laser controlled area (LCA). A laser use area where the occupancy and activity of those within is controlled and supervised. This area may be defined by walls, barriers, or other means. Within this area, potentially hazardous beam exposure is possible.

4.4.2.1 Protective Housings (All Classes). A protective housing shall be provided for all classes of lasers or laser systems (except as noted in 4.4.2.1.4). The protective housing may require interlocks (4.4.2.1.3) and labels (4.6.6).

Specifically the LightSAFE[®] includes :

- 1. Dual Interlock magnetic switches which tie into the LightWELD interlock circuit. This is a redundant fail safe interlock – if one switch fails the system will not work – and conforms to the requirement or ANSI 136.1 Safe Use of Lasers for interlock door entry.**

fail-safe interlock. An interlock where the failure of a single mechanical or electrical component of the interlock will cause the system to go into, or remain in, a safe mode.

Fail-safe or redundant interlocks shall be provided for any portion of the protective housing that, by design, can be removed or displaced during operation and maintenance, and thereby allow access to Class 3B or Class 4 laser radiation.

4.4.2.1.3 Interlocks on Removable Protective Housings (All Classes with Embedded Class 3B or Class 4). Protective housings that enclose Class 3B or Class 4 lasers or laser systems shall be provided with an interlock system that is activated when the protective housing is opened or removed during operation and maintenance. The interlock or interlock system shall be designed to prevent access to laser radiation above the applicable MPE. The interlock may, for example, be electrically or mechanically interfaced to a shutter that

interrupts the beam when the protective housing is opened or removed (see 7.2.1 for electrical hazards).

a) **Non-defeatable (non-override) Area or Entryway Safety Controls.** Nondefeatable safety latches, entryway or area interlocks (e.g., electrical switches, pressure sensitive floor mats, infrared, or sonic detectors) shall be used to deactivate the laser or reduce the output to levels at or below the applicable MPE in the event of unexpected entry into the laser controlled area (see Figure 2a).

2. Class 4 Warning Placards. These are affixed to the side wall of the LightSAFE and conform to the ANSI 136.1 Safe Use of Lasers

Additionally, all areas where unattended Class 3B or Class 4 lasers or laser systems operate shall be marked with laser safety area warning signs containing the “Warning” signal word and appropriate instructions regarding the hazards of entry into the laser controlled area.

3. Laser On Light – Illuminates when the LightWELD is fired. The laser on light goes in the panel next to the door and provides a visible means of confirming laser operation inside of the LightSAFE laser controlled area.

4.4.2.8.1 Visible Warning Device. A visible warning device is any device, mechanical or electrical, that indicates when the laser is operating. Examples include a single lamp or a laser warning sign that is lighted or flashes when the laser is operating. The warning device shall be visible through laser eye protection. This light or lighted sign can be electrically interfaced and controlled by the laser power supply so that the light is on (or flashing) only when the laser is operating.

If used, the emission indicator should be clearly noticeable under all anticipated lighting conditions, be conspicuously different from general lighting, and have a specific meaning within the operational area where it is used.

4.4.2.8 Area Warning Device (Class 3B or Class 4). A Class 3B laser controlled area should and a Class 4 laser controlled area shall have an area warning device that is visible prior to entering the area.

4. Laser Windows with OD 8 + Filtration – There is a laser window in the door as standard on the LightSAFE. All windows include a certification label for the wavelength of light that the LightWELD emits with a filtration level equal to or greater than the filtration specified by IPG Photonics of OD 6 +.

4.4.2.3 Viewing Windows and Diffuse Display Screens (All Classes). All viewing windows and diffuse (reflective or transmitted) display screens included as an integral part of a laser or laser system shall incorporate a suitable means (such as interlocks, filters, attenuators) to maintain the laser radiation at the viewing position at or below the applicable MPE as determined by the LSO (see 4.4.4.2.3.2).

4.4.2.8.2 Audible Warning Device. This device may be used to warn individuals in a greater space than the immediate laser area about startup or activation of the laser(s). **The LightWELD unit itself is equipped with a buzzer that can be set up to be continuously on while the laser is welding or set up to give a 2 second warning prior to the beam being energized. This is set up thru the LightWELD system.**

5. Sliding Doors on the LightSAFE^R. In order to supply easy and rapid egress by laser people the LightSAFE^R incorporates a sliding door system with overlapping panels – this is an unlocked system, with dual interlocks (section 1) and conforms to the below requirement.

4.4.2.10.1 Access. All Class 4 area or entryway safety controls shall be designed to allow both rapid egress by laser personnel at all times and admittance to the laser controlled area under emergency conditions.

The **LightSAFE^R** was designed to provide a laser controlled area for operation of the LightWELD hand held laser welder and or with a co robot laser assist. Proper personnel instruction on safe use of lasers is a requirement and final certification of any class 4 laser operation is the responsibility of the Laser Safety Officer of the company using such a barrier. It has not been designed to use with other laser products or as a general laser welding barrier system. Depending on the installation a ceiling may or may not be required but generally is not needed if no 2nd story operations are present – and there is no exposed reflective materials such as copper or aluminum metals above the welding area and in the reflection zone off the weld itself.