



Verizon NEBS Compliance and Quality Assurance (NQA) Labeling Requirements for Light Emitting Products

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Change Control Record:

Version	Date	Action	Reason for Revision
1	November 21, 2005	New	
2	February 21, 2006	Revision	- Added reference to ANSI Z136 - Other minor editorial changes

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There are several sources for defining the labeling requirements for Light Emitting Products such as LASERs. The U.S. requirements are defined by the Food and Drug Administration (FDA) in their standard 21CFR1040.10. The European standard for labeling of LASERs is IEC60825. The Center for Devices and Radiological Health (CDRH), a department of the FDA, is the agency that sets the definition for LASER classification and labeling in the United States. The labeling requirements in North American were defined by the American National Standards Institute, in their documents ANSI Z136.1 and Z136.2. The European labeling standards are also based on the ANSI standards, and although there are some minor differences, the FDA has given notice that it will not object to the use of safety labels that use the IEC symbol. The word message for each LASER classification is identical under both the U.S. and IEC systems. UL60950 safety listing also verifies LASER labeling requirements against the IEC60825 requirements.

Class 1 LASERs are considered incapable of producing hazardous radiation levels during normal operation, and the FDA does not require labels to be placed on Class 1 LASER. The IEC does have a suggested label for a Class 1 LASER, but they also state that alternately, the label can be placed in the documentation to the user, e.g., the user manual, rather than on the product itself, and leaves this choice up to the manufacturer.

Under the IEC classification scheme for Class 2 or higher LASERs, there are three types of labels that could be on a LASER device, depending on its classification. For the FDA, the Warning symbol is incorporated into the label and need not be applied separately. Aperture labels are required for FDA for Class II or higher LASERs, and for the IEC for Class 3B or higher LASERs.

Warning Labels

This label is a symbol as shown in Figure 1. A warning label is required for all LASER products of Class 2 or higher. The colors are black and yellow for high visibility.

Explanatory Labels

This label is required for all LASERs of Class 1M or higher. The label should bear the wording as shown in Table 1 and Table 2 below. In addition, the explanatory label shall also describe the LASER in terms of the output radiation, the pulse duration (if appropriate), and the emitted wavelength. The name and publication date of the standard to which the LASER was classified shall also be included on the label, or elsewhere in close proximity on the product.

Aperture Labels

This is an additional label near the beam aperture to alert the user of the radiation source when that source is in excess of the AEL¹ for Class 1 or Class 2 LASER. The wording required by the FDA and the IEC is as described in Table 1 and Table 2 below.

Per the requirements set forth in Section 5 of IEC 60825, LASER warning labels shall be clearly visible through protective eyewear² specifically designed for the wavelengths of the emitted LASER radiation, and shall be located so that viewing the label does not require exposure to the

¹ Accessible Emission Limit

² Only Class 4 LASERs require protective eyewear.



radiation. Labels shall be permanently fixed, legible, and clearly visible during operation, maintenance or service. Text borders and symbols shall be black on a yellow background.

The tables below summarize the labeling requirements for different classifications of LASER products for both the FDA and the IEC. The classification for the IEC is different than for the FDA, but the FDA accepts the IEC classifications. Verizon recommends that vendors use the IEC classifications and labeling requirements. The name and publication date of the standard to which the LASER was classified shall determine the actual LASER power level for the product; the power level shall be indicated on the explanatory label, or elsewhere in close proximity on the product.

Vendors must also consult GR-449-CORE, Generic Requirements and Design Considerations for Fiber Distributing Frames for additional LASER labeling requirements.



Table 1: IEC 60825 LASER Warning Label Requirements Summary

CLASS	WARNING LABEL	EXPLANATORY LABEL	APERTURE LABEL
1	Not Required	"CLASS 1 LASER PRODUCT" ³	Not Required
1M	Required	"LASER RADIATION – DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS" and "CLASS 1M LASER PRODUCT" ³	Not Required
2	Required	"LASER RADIATION – DO NOT STARE INTO BEAM" and "CLASS 2 LASER PRODUCT"	Not Required
2M	Required	"LASER RADIATION – DO NOT STARE INTO BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS" and "CLASS 2M LASER PRODUCT"	Not Required
3R	Required	"LASER RADIATION – AVOID DIRECT EYE EXPOSURE" and "CLASS 3R LASER PRODUCT"	"LASER APERTURE" or "AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE" ⁴
3B	Required	"LASER RADIATION – AVOID EXPOSURE TO BEAM" and "CLASS 3B LASER PRODUCT"	"LASER APERTURE" or "AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE" ⁵
4	Required	"LASER RADIATION – AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION" and "CLASS 4 LASER PRODUCT"	"LASER APERTURE" or "AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE" ⁵

³ Not Required but can be present on the product.

⁴ Aperture label is required when the Accessible Emissions Limit (AEL) of the LASER radiation is in excess of the limits for Class 1 or Class 2 LASER devices.

⁵ Aperture label is required when the Accessible Emissions Limit (AEL) of the LASER radiation is in excess of the limits for Class 1 or Class 2 LASER devices.



Table 2: FDA 21CFR 1040.10 LASER Warning Label Requirements Summary

CLASS	LABEL	REQUIRED WORDING	APERTURE LABEL
I	Not Required	Not Required	Not Required
IIA	Figure 3 or Figure 4 ⁶	"CLASS IIA LASER PRODUCT – AVOID LONG-TERM VIEWING OF DIRECT LASER RADIATION"	Not Required
II	Figure 3 or Figure 4 ⁶	[Position 1 on the logotype] "LASER RADIATION – DO NOT STARE INTO BEAM" and [Position 3 on the logotype] "CLASS II LASER PRODUCT"	"AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE" or "AVOID EXPOSURE – HAZARDOUS ELECTROMAGNETIC RADIATION IS EMITTED FROM THIS APERTURE" or "AVOID EXPOSURE – HAZARDOUS X-RAYS ARE EMITTED FROM THIS APERTURE"
IIIA	Figure 4	[Position 1 on the logotype] "LASER RADIATION – AVOID DIRECT EYE EXPOSURE" and [Position 3 on the logotype] "CLASS IIIa LASER PRODUCT"	"AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE" or "AVOID EXPOSURE – HAZARDOUS ELECTROMAGNETIC RADIATION IS EMITTED FROM THIS APERTURE" or "AVOID EXPOSURE – HAZARDOUS X-RAYS ARE EMITTED FROM THIS APERTURE"
IIIB	Figure 4	[Position 1 on the logotype] "LASER RADIATION – AVOID DIRECT EXPOSURE TO BEAM" and [Position 3 on the logotype] "CLASS IIIb LASER PRODUCT"	"AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE" or "AVOID EXPOSURE – HAZARDOUS ELECTROMAGNETIC RADIATION IS EMITTED FROM THIS APERTURE" or "AVOID EXPOSURE – HAZARDOUS X-RAYS ARE EMITTED FROM THIS APERTURE"
IV	Figure 4	[Position 1 on the logotype] "LASER RADIATION – AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION" and [Position 3 on the logotype] "CLASS IV LASER PRODUCT".	"AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE" or "AVOID EXPOSURE – HAZARDOUS ELECTROMAGNETIC RADIATION IS EMITTED FROM THIS APERTURE" or "AVOID EXPOSURE – HAZARDOUS X-RAYS ARE EMITTED FROM THIS APERTURE"

⁶ If irradiance greater than $2.5 \cdot 10^{-2}$ use Figure 4; otherwise use Figure 3.

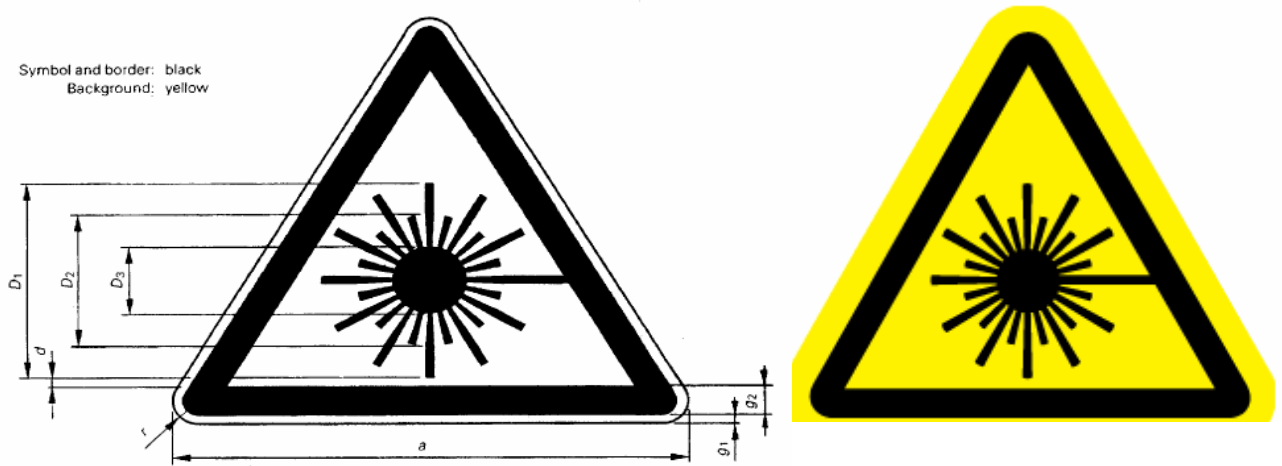


Figure 1: (IEC 60825 Figure 14) – Warning Label

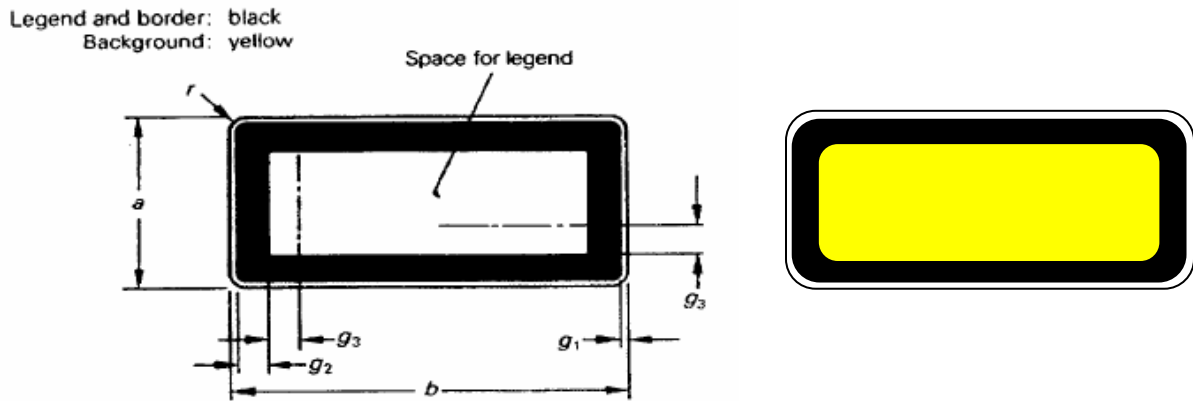


Figure 2: (IEC 60825 Figure 15) – Explanatory Label

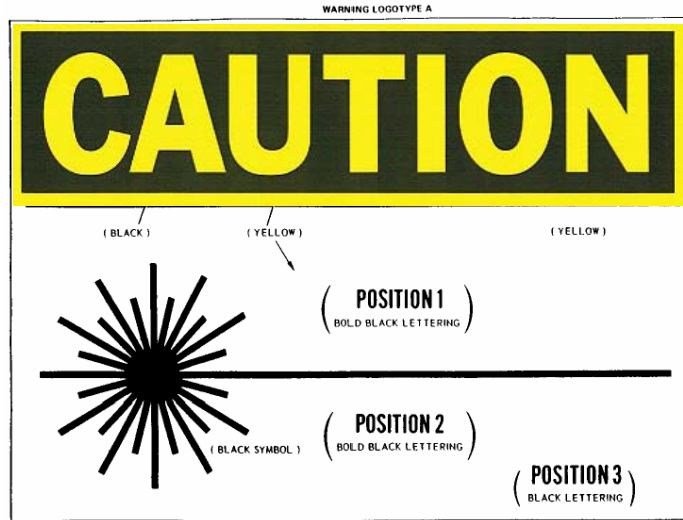


Figure 3: (FDA CFR 1040.10 Figure 1) – Explanatory Label

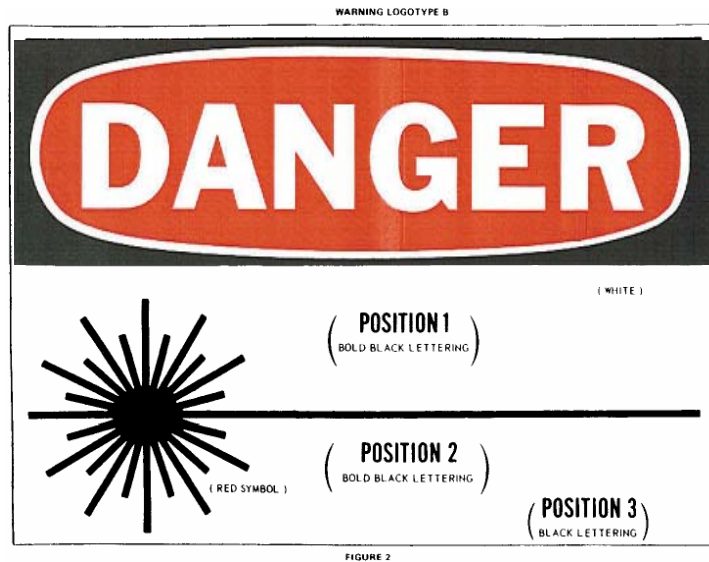


Figure 4: (FDA CFR 1040.10 Figure 2) – Explanatory Label

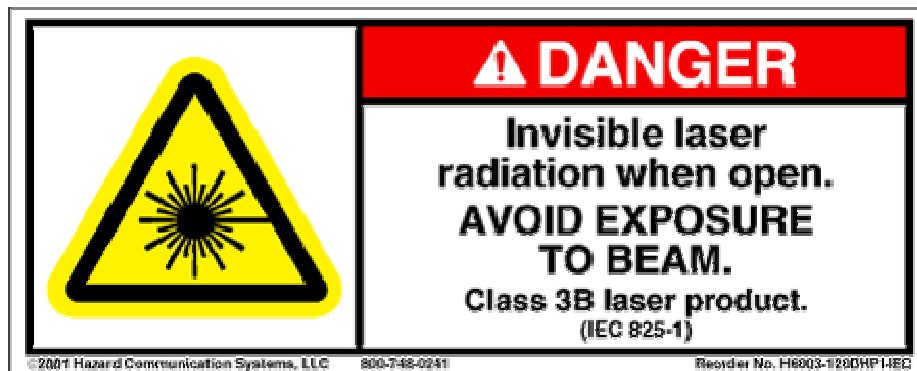


Figure 5: Examples of Harmonized LASER Safety Labels⁷

⁷ Source: <http://www.ce-mag.com/archive/02/03/peckham.html>
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Class 4 LASER label



Class 1 LASER with label



Class 1 LASERs without labels



Figure 6: Some Examples of LASER Labels Found in the Verizon Network