Verizon NEBS™ Compliance: Labeling Requirements for Light Emitting Equipment

Verizon Technical Purchasing Requirements

VZ.TPR.9204

Issue 1, October 2007

CHANGE CONTROL RECORD:

Version	Date	Action*	Reason for Revision
1	*10/23/2007*	Reissue	Document SIT.NEBS.TM.NPI.2005.030 reissued in new TPR format. Original document dated 10/21/2005
*** New, Add, Delete, Change, Reissue**			

PREPARED BY:

Name, Title, Organization	Date
Todd Talbot DMTS – NEBS Compliance and Quality Assurance Verizon Technology Organization Systems Integration and Testing 320 St. Paul Place, Floor 14 Baltimore, MD 21202 Phone: 410-736-5945; Fax: 410-736-5144 E-mail: todd.f.talbot@verizon.com	10/23/2007

APPROVED BY:

Name, Title, Organization	Date
Ludwig C. Graff Director, NEBS Compliance and Quality Assurance Verizon Technology Organization Systems Integration and Testing 320 St. Paul Place, Floor 14 Baltimore, MD 21202 Phone: 410-736-5904; Fax: 410-736-5144 E-mail: ludwig.c.graff@verizon.com	10/23/2007

Table of Contents

1.0 PURPOSE

The purpose of this Verizon Technical Purchasing Requirement document is to provide guidelines for labeling network products that emit light.

2.0 SCOPE

This Technical Purchasing Requirement document apply to all light-emitting products installed anywhere in the Verizon network, from the central office to the customer premises.

3.0 REFERENCES

ANSI Z136.1	Safe Use of Lasers
ANSI Z136.2	Safe Use of Optical Fiber Communications Systems Utilizing Laser Diode and LED Sources
IEC 60825	Safety of Laser Products
GR-449-CORE	Generic Requirements and Design Considerations for Fiber Distributing Frames
21 CFR 1040.10	Performance Standards for Light-Emitting Products

4.0 ACRONYMS

AEL	Accessible Emission Limit
CDRH	Center for Devices and Radiological Health
FDA	Food and Drug Administration
TPR	Technical Purchasing Requirement

5.0 LABELING REQUIREMENTS

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 AEL[1] 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 eyewear[2] 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 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.

[1] Accessible Emission Limit
[2] Only Class 4 LASERs require protective eyewear.

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 I 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 $2.5*10^{-2}$ use Figure 4; otherwise use Figure 3.

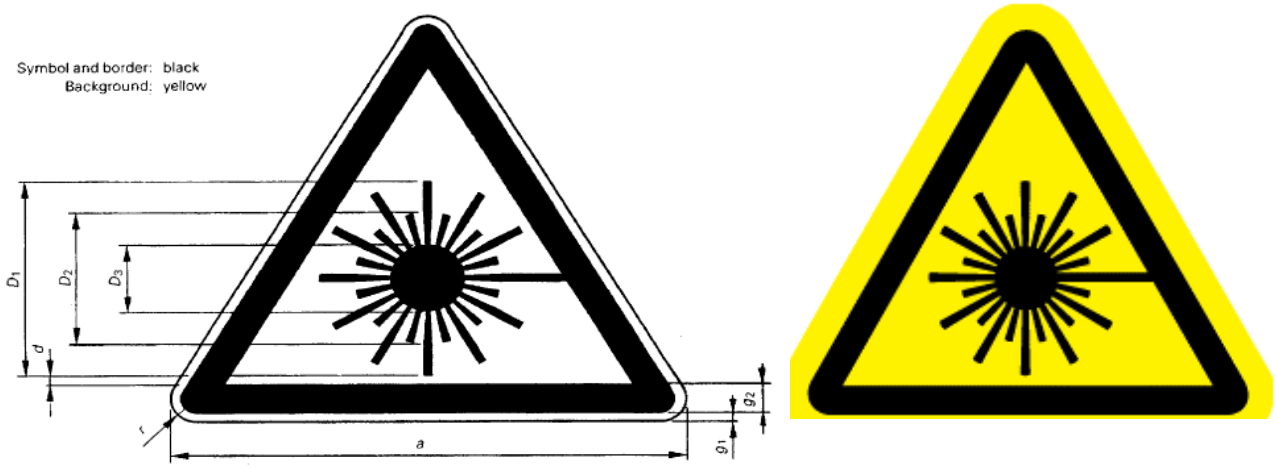

Figure 1: (IEC 60825 Figure 14) – Warning Label

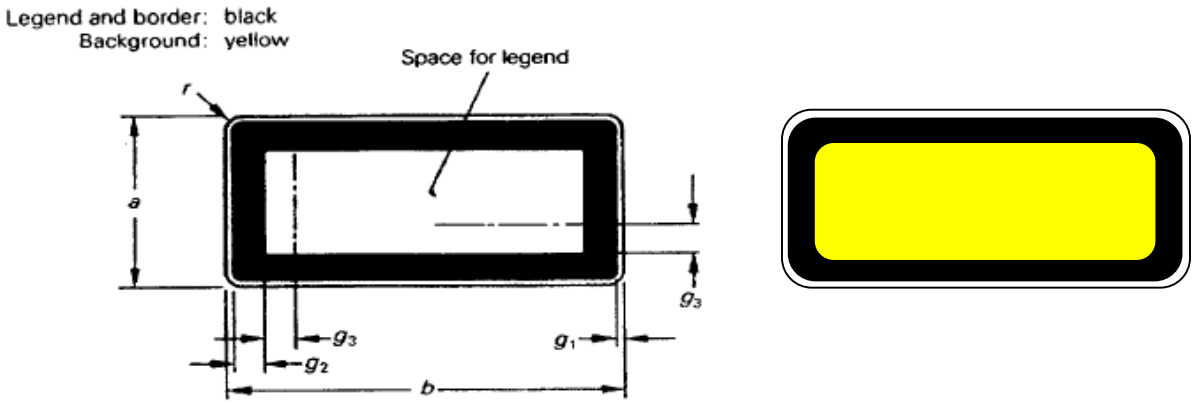

Figure 2: (IEC 60825 Figure 15) – Explanatory Label

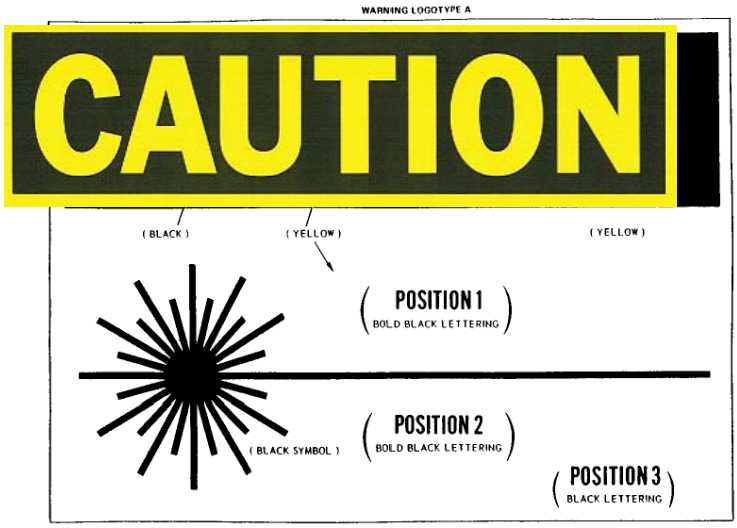

Figure 3: (FDA CFR 1040.10 Figure 1) – Explanatory Label

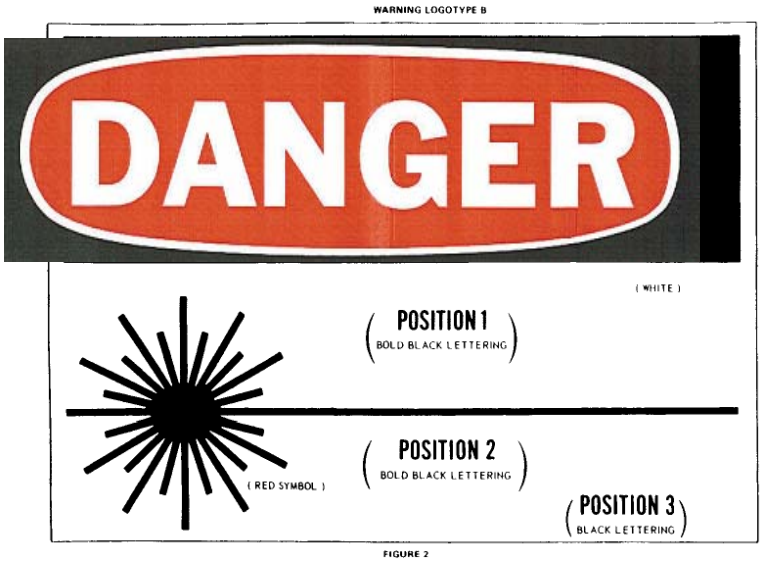

Figure 4: (FDA CFR 1040.10 Figure 2) – Explanatory Label

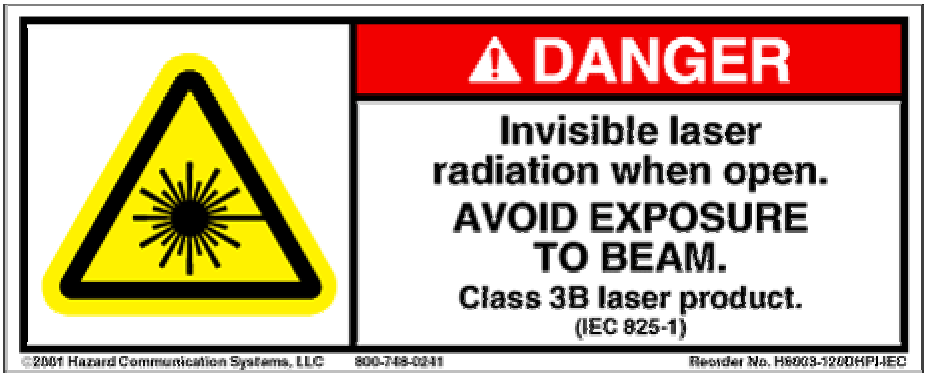

Figure 5: Examples of Harmonized LASER Safety Labels[7]

[7] Source: http://www.ce-mag.com/archive/02/03/peckham.html

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