Safety Guidelines for Lightwave Transmission Systems

Verizon Safety Management
John F. Quinlan CIE, CUSA
National Manager / LASER Safety Officer
LASER

Light Amplification by Stimulated Emission of Radiation

verizon
LASER Types

Argon fluoride (UV)
Krypton fluoride (UV)
Nitrogen (UV)
Argon (blue)
Argon (green)
Helium neon (green)
Helium neon (red)
Rhodamine 6G dye (tunable)
Ruby (CrAlO3) (red)
Nd:Yag (NIR)
Carbon dioxide (FIR)
Diode Tel-Com
Semi-Conductor LASER
Gas LASERS
Excimer LASERs
Dye LASERs
Characteristics of a LASER
LASER Classifications

LASER Classification (American National Standards Institute – ANSI)

- LASERs are classified into four broad areas depending on the potential for causing injury (tissue burns). When you see a LASER, it should be labeled with one of these four class designations:
  
  - Class 1 (Closed System)
  - Class 1A
  - Class 2 (low power)
  - Class 3A and 3B- (Medium Power)
  - Class 4- (High Power)
3 Characteristics of a LASER

Whitelight Ar/Kr Ion Laser Spectral Lines
OPTICAL FIBER (LIGHT WAVE) COMMUNICATION SYSTEMS (OFCS)
OPTICAL FIBER
(LIGHT WAVE)
COMMUNICATION SYSTEMS (OFCS)
Spectrum
LASER Safety and the Eye

WARNING!!!!!! NEVER LOOK DIRECTLY INTO A FIBER END, A LASER SOURCE OR POINT A LASER IN YOUR EYES OR AT OTHERS!
Verizon’s Fiber to the Premises
FIOS
Non-Beam Hazards of LASERs

Glass Particles

Fusion Splicing

Chemical/Solvents
## Safe Practices

<table>
<thead>
<tr>
<th>ANSI Standards</th>
<th>Class 1 (SG1)</th>
<th>Class 2 (SG2)</th>
<th>Class 3A (SG3a)</th>
<th>Class 3B (SG3b)</th>
<th>Class 4 (SG4)</th>
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<tbody>
<tr>
<td>Z136.1/Z136.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Power Level mW</td>
<td>Cannot emit LASER Radiation</td>
<td>&lt;= 1mW</td>
<td>1-5 mW</td>
<td>5 -500 mW</td>
<td>&gt; 500 mW</td>
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<tr>
<td>Power Level dBm</td>
<td>Cannot emit LASER Radiation</td>
<td>&lt;= 0.00 dBm</td>
<td>0.01 - 7 dBm</td>
<td>7 - 27 dBm</td>
<td>&gt; 27dBm</td>
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<tr>
<td>Eye Exam Req.</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>LASER Eyewear</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Should</td>
<td>Shall</td>
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</table>

Class 1 (SG1) system for transmission during normal operations.

When being serviced it becomes a Class 3a or 3b depending on power level.
Multimode Fiber Optics

Downstream Video
Downstream Voice and Data
Upstream Voice and Data
Safety Considerations

Class 3a

Class 3b
SYSTEMS THAT ARE NOT ENCLOSED AND ENERGIZED ARE CLASSIFIED AS A 3A OR 3B LASER.
THE FOLLOWING SAFETY CONSIDERATIONS THEN APPLY:

**Only authorized-trained employees may:**

- Install
- Service
- Maintain fiber-optic systems that are Not enclosed.
LASER Eye Protection

Diode Tel-Com
804-1755nm
Optical Density 3
Visible Light Transmission 30%
Lens Color - Green
Medical Surveillance
– Baseline Eye Exam
Medical Surveillance

SM assists Market Area Directors and Hourly Staffing representatives to identify technician groups who require the Baseline Medical Eye Examinations.

Only authorized employees assigned to work on energized equipment and cable between Central Office Equipment and the Fiber Distribution Hub are required to have the Baseline Medical Eye Examination: Employees working on this section of the FTTP system shall receive a one-time Baseline Medical Eye Examination.

Employees who meet the requirement and have already received the FTTP training and those who are planning to attend FTTP Training shall be scheduled for the Baseline Medical Eye Exam.

HR Staffing will schedule Baseline Medical Eye Exam for new hires and upgrade/transfer employees by contacting Health Resources.

Local Manager will schedule Baseline Medical Eye Exam for their employee's by contacting Health Resources.

Please have the Name, SS# and BA ID of your employees available when you call Health Resources for an exam. Appointments should be scheduled for the last day of FTTP training when possible.

Health Resources contacts employee's Manager or HR Staffing by Lotus Notes to confirm that the employee has completed the Baseline Medical Eye Examination. Note: Medical test results are considered confidential.

Health Resources reviews and files Baseline Medical Eye Examination results in Employee's medical record file.

Employee completes Baseline Medical Eye Examination and returns to work or training class.

A follow-up medical eye exam shall be conducted as soon as practicable after an incident report of hazardous exposure or specific eye complaints.
## FIOS Training Available

<table>
<thead>
<tr>
<th>Title</th>
<th>Course Code</th>
<th>Classroom Enrollment Available</th>
<th>Other Delivery Options</th>
<th>Course Hours</th>
<th>Course Status</th>
<th>Development Site</th>
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<tbody>
<tr>
<td>FTTP: FIBER OPTIC FOR I&amp;R TECHNICIANS</td>
<td>TT10332T</td>
<td>No</td>
<td>None</td>
<td>104.00</td>
<td>Active</td>
<td>Verizon (excluding 272's)</td>
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<td>In Dev.</td>
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Questions?
Additional Contact Information

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