

# TEMPORARY CHANGE REQUEST

TCR NO. **TCR-5008, Sec 2, Chap 8, R6-001**

(e.g., TCR-ENG-021,R0-001)

The Temporary Change Request (TCR) Form is to be used to process urgent or minor changes for PPPL Policies, Organization/Mission Statements and Procedures. The TCR should be used when changes are:

- 1) urgent, and can not wait the 2-4 week period for Department Head review/comment, or
- 2) minor, and do not warrant Department Head review.

Person Requesting Change: Glenn Anderson\_\_\_\_\_

Phone Ext: 3740\_\_\_\_\_

Department Name: ESH&S\_\_\_\_\_

Document Number: 5008,Sec2,Chapt8\_\_\_\_\_

Revision No.: 6\_\_\_\_\_

Document Title: Enclosures for Electrical Equipment

**Reason for change:** Add title  
Remove class designations

**Change description:** (Summarize and attach changed pages, with changes clearly indicated)  
Add "ELECTRICAL SAFETY PROGRAM" in title block  
Delete class designations no longer used.

1. Does this TCR significantly alter the intent or scope of the document? YES: \_\_\_\_\_ NO: x\_\_\_\_\_

2. Does this TCR significantly impact **ES&H**? YES: \_\_\_\_\_ NO: x\_\_\_\_\_

If 1 or 2 is **YES**, Explain why the changes should not be routed for Department Head review:

Bill Slavin

\_\_\_\_\_  
**Department/Division Head Approval**

12/3/2014

\_\_\_\_\_  
**Date**

John DeLooper

\_\_\_\_\_  
**Head, Best Practices and Outreach/designee**

12/8/2014

\_\_\_\_\_  
**Date**

Release/Effective date of this TCR: 12/8/2014

Incorporate this TCR into next revision of this document?

YES: x\_\_\_\_\_NO: \_\_\_\_\_

	PRINCETON PLASMA PHYSICS LABORATORY ES&H DIRECTIVES		
	ES&HD 5008 SECTION 2, CHAPTER 8		
	ELECTRICAL SAFETY PROGRAM <b>Enclosures for Electrical Equipment</b>		
Approved	Date: 07/07/05	Revision 6	Page 1 of 3

TCR ESHD 5008 Section 2, Chapter 8, R6-001

## CHAPTER 8 ENCLOSURES FOR ELECTRICAL EQUIPMENT

### 8.1 DESCRIPTION

This section shall apply to:

- A. Type-tested devices or components operating above 600 V (see Chapter 4, paragraph 4.5).  
Exception: Enclosures for commercial electrical apparatus when fabricated, tested, and installed in accordance with ANSI C37 series standards and manufacturer's recommendations.
- B. Non type-tested devices or components operating over 50 V.
- C. Radio-frequency (rf) and microwave equipment.
- D. Energy-storage equipment having stored energy above 50 J.

### 8.2 TYPES OF HAZARDS

- A. Electrical shock hazard from ungrounded or poorly grounded enclosures.
- B. Burns resulting from rf, eddy-current, or microwave heating.
- C. Burns to skin and eyes from electrical arcing and molten metal.
- D. Faults occurring inside the enclosure that may rupture the enclosure and injure personnel or damage adjacent equipment.
- E. Failure of personnel-safety-interlocks, permitting personnel to come in contact with energized equipment within an enclosure.
- F. Crowded working conditions within enclosures, resulting in personnel-safety hazards.

### 8.3 DESIGN AND CONSTRUCTION CRITERIA

Design and construction of enclosures shall:

- A. Prevent objects outside enclosures from making contact with live electrical parts.
- B. Provide adequate interior working space (ref. NEC Article 312, "Cabinets, Cutout Boxes, and Meter Socket Enclosures")

C. Provide electrical PSIs on all doors and hinged access panels on high-voltage enclosures arranged to prevent normal access without interrupting the interlock circuit. Provide door locks to limit access to authorized personnel.

D. Install suitable barriers between any two or more of the following circuits where they exist in one enclosure:

1. High-voltage circuits (above 600 volts), TCR ESHD 5008 Section 2, Chapter 8,R6-001
2. Circuits (240 & 480 volts), TCR ESHD 5008 Section 2, Chapter 8,R6-001
2. Low-voltage (below 240 volts), TCR ESHD 5008 Section 2, Chapter 8,R6-001
3. Instrumentation and control circuits (below 50 volts), TCR ESHD 5008 Section 2, Chapter 8,R6-001
4. Computer I/O and millivolt or milliamp signal circuits.  
See Chapter 3, paragraph 3.3 for Class definitions. See Chapter 4 for barrier descriptions. Communication circuits shall be run through dedicated enclosures and raceways.

E. Barrier or isolate all Computer I/O and millivolt or milliamp signal circuits that extend outside enclosures from any higher-voltage circuits within the enclosure. Use grounded metal barriers, 1:1 transformers having suitable withstand rating, fiber-optic isolators, or other approved means.

F. Provide suitable covers over any exposed parts when they exist in an enclosure. Existing equipment is subject to inspection within the guidelines of paragraph 3.1.2 in Chapter 3. TCR ESHD 5008 Section 2, Chapter 8,R6-001

G. Provide properly shielded and grounded enclosures for RF and microwave equipment and give particular attention to all openings, such as doors, access ports, and viewing windows, to prevent radiation leakage (see Section 4.0 of ES&HD- 5008). TCR ESHD 5008 Section 2, Chapter 8,R6-001

H. Provide enclosures structurally adequate for their intended use and environment. Use wire glass or its equivalent material in viewing windows.

I. Provide adequately sized grounding of the enclosure and its appurtenances. See NEC article 250 for grounding requirements. Diagnostic and Electronic rack wiring requirements are specified in PPPL Engineering Standard ES-ELEC-001.

J. Design the wiring and equipment furnished inside control enclosures operated below 600 volts to comply with the provisions of NFPA 79, "Electrical Standard for Industrial Machinery."

#### 8.4 OPERATING CRITERIA

A. All personnel shall be cleared from an enclosure where hazardous conditions exist before energizing the equipment.

B. Safety signs and/or warning lights shall be provided to indicate equipment hazards. Energy and Safety Barriers shall be installed in accordance with Chapter 4, Isolation of Hazards.

C. When a temporary enclosure is necessary, it should be electrically interlocked and should meet the same requirements as a permanent enclosure, where practicable.

D. All electrical equipment must be de-energized prior to working on or near the components. An "Energized Work Permit is required to work on energized equipment, except for testing and troubleshooting (see Chapter 3 for detailed requirements.