

BROOKHAVEN NATIONAL LABORATORY PHYSICS DEPARTMENT	Number: 2.04	Revision:
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Subject: ATF Electrical Standards		
Prepared by:	Reviewed by:	Approved by:

ATF ELECTRICAL STANDARDS

1. Introduction

This document describes mandates, guidelines, and preferred methods of electrical distribution systems, control systems, communications equipment, and monitoring systems. It does not cover laboratory power distribution, telephone, fire, or fiber optic lines.

2. Guidelines

All 60 Hz power shall be delivered to ATF equipment at:

1. 115-volt single phase 3 wire, or
2. 208-volt 3 phase 5 wire

For certain systems the use of 208-volt single phase (3 wire with a ground conductor and 2 hot wires) is permitted. This system is not a preferred system but may be needed for certain commercial equipment. It should be noted that this is not the same as what is normally called a 220-volt system.

At the present time there is no need for using 480-volt systems for the ATF complex with their additional safety and cost considerations. This may have to be reconsidered at some later date.

Laboratory ES&H Standard (1.5.0 Electrical Safety) divides the classes of electrical hazards into four groups.

These groups can be summarized as follows:

- Class A: Ac and/or dc voltages less than or equal to 50 V;
Ac and/or dc voltages with less than 10 mA of available current, or limited to an instantaneous release of less than 10 J of energy.
- Class B: Ac voltages less than or equal to 250 Vac rms; or
Dc voltages less than or equal to 1000 Vdc; with greater than 10 mA of available current; or capable of an instantaneous release of greater than 10 J of energy.
- Class C: Ac voltages less than or equal to 600 Vac rms; or

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Dc voltages less than or equal to 6000 Vdc; with greater than 10 mA of available current; or capable of an instantaneous release of greater than 10 J of energy.

Class D: Ac voltages above 600 Vac rms; or
Dc voltages above 6000 Vdc; with greater than 10 mA of available current; or capable of an instantaneous release of greater than 10 J of energy.

The implications are as follows:

Class A: Systems may be serviced hot by anyone with minimal electrical training.

Class B: Systems should not normally be serviced hot. Written generic procedures, if necessary, and a generic permit must be used and working hot is allowed only by certain authorized personnel. Electrical Safety and Lockout Tagout training required.

Class C: Not permitted for ATF employees, guests, and visitors at this time.

Class D: Not permitted for ATF employees, guests, and visitors at this time.

3. Specifications

Use 115/208-volt systems for delivering power only. These voltages are not to be used for control or monitoring systems. There may be times when it is required to take exception to this but they should be kept to a minimum. These 115/208-volt systems must conform to the National Electric Code and OSHA, DOE, and BNL guidelines.

Use low voltage circuits for all control and monitoring functions. The use of DC is preferred but AC is allowed. DC voltages of +5, +12, and +24 are preferred. If you are ordering or building a device and want someone else to interface controls or monitoring with it, check with them for the standard being used.

Typical control protocols used are:

- RS-232 9600 baud
- IEEE-488 (GPIB/HPIB)
- NTSC RS-170 (U.S. standard television)
- Ethernet

Trigger and timing signals are available as +10v and at TTL levels (+5v).

Temporary systems. We will always have some prototype, temporary, or nonconforming systems around. Safety issues require us to keep these systems to a minimum. This does not mean that safety rules do not have to be followed in temporary circumstances, but that other restrictions may apply.

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The use of extension cords and temporary equipment configurations should not present safety hazards. If you need to run a temporary cable, place it where it will not be buried under permanent cables but not where it is a trip hazard or electrical hazard.

Official copies of these procedures are maintained at this website. Before using a printed copy, verify that it is the most current version by checking the document issue date on this website. Signed copies of these official procedures are maintained at the Training Office.

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