

Safety Plan

ECE 492 - Spring 2015

Abstract

This document outlines the safety plans for maintenance and operation of LFEV systems. The appropriate section of this document must be present and read before work begins on any component listed in this document.

Revision 1.4.1
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Table of Contents

1. General Requirements	2
1.1. Participants	2
1.2. Documentation	2
1.3. Changes	3
2. Design Requirements	3
2.1. References	3
3. Equipment Guidelines	3
3.1. TSV Pack	3
3.2. Tractive System Interface	3
3.3. Dynamometer	3
4. Operating Procedure	4
4.1. Opening the TSV Pack	4
4.2. Operating the TSV Pack	5
4.3. Running the Dynamometer	5

General Requirements

Participants

The guidelines laid out in this document apply to all students involved with the Lafayette Formula Electric Vehicle (LFEV) project. All students must agree to and comply with all restrictions described in this document. Students may not grant access to any system listed in this document to any person not directly involved in the LFEV project.

Documentation

This safety plan and all included test procedures will be archived on the course website. The hardcopy found with the documents in AEC room 400 shall be the definitive revision of the document. This copy of the document must be read and understood by all participating students.

Changes

All students involved in the LFEV project will be notified of any and all revisions to the safety plan before the revised plan goes into effect. The definitive copy of this document in AEC room 400 must be replaced with every new revision, and any participant in the safety plan must review and agree to comply with all alterations to the document.

Design Requirements

References

All systems designed for the LFEV project must adhere to the safety guidelines in GPR005 of the 2015 LFEV Statement of Work and the referenced 2015 SAE Formula Hybrid Rules. All designs must be peer-reviewed and specifically verified to follow the safety guidelines established in these documents.

Equipment Guidelines

TSV Pack

The TSV pack must be kept in the designated high voltage area while energized with more than one cell. All work on an energized TSV pack must be done within this area, following the operating procedures laid out in this document.

Tractive System Interface

The TSI may only be operated in the designated high voltage area when energized above 30 volts, or directly connected to one or more packs. All work on an energized TSI must be done within this area, following the operating TSV Pack procedures laid out in this document.

Dynamometer

The Dynamometer may only be operated in AEC room 401, following the operating procedures laid out in this document. Maintenance may be performed on any component as long as the system is not energized.

Operating Procedures

Any work involving the components listed in this section must follow the procedures listed below. If any component not listed has components that exceed 30 volts but has no procedure listed below, a safety plan must be developed and listed before any work can be done on the system.

Opening the TSV Pack

Process Restrictions

Restricted Spaces

- Only people working directly with the pack may be within the HV area
- No nonessential objects on the same surface within 1 meter of the TSV Pack
- No more than 3 people may work on the TSV Pack at any given time

Safety Manager

- A safety manager must be appointed to ensure safety practices are followed
- They must remain outside the HV area, with a direct view of the work
- They must wear safety glasses at all times, and must carry a cell phone

Equipment

- All tools used inside the TSV Pack must be insulated
- Only cotton or wool clothing may be worn when working in the HV area
- Safety glasses must be worn at all times while working in the HV area
- No metal finger rings or loose metal jewellery are allowed in the HV area while work is being performed

Process

Opening The Pack

1. Approve plan of action with qualified instructor
2. Appoint safety manager
3. Clear high voltage area of non-participating personnel
4. Clear TSV Pack work area
5. Proceed with approved plan of action

WARNINGS

- Do not connect the TSV Pack to anything outside of the high voltage area
- Only one loose cell may be outside of the HV area or room 401 at any time
- There must be an emergency stop reachable from outside of the HV area

Operating the TSV Pack

Process restrictions

Restricted Spaces

Only one person, working directly with the pack, may be within the HV area

Safety Manager

A safety manager must be appointed to ensure safety practices are followed

They must remain outside the HV area, with a direct view of the work

They must wear safety glasses at all times, and must carry a cell phone

Equipment

Only cotton or wool clothing may be worn when working in the HV area

Safety glasses must be worn at all times while working in the HV area

Process

Charge*/Discharge

1. Approve the plan of action with a qualified instructor
 2. Appoint safety manager
 3. Clear the HV area of people not involved in the operation
 4. Connect pack to power supply or load
 5. Activate power supply or load
 6. Monitor charge*/discharge
 7. Deactivate power supply or load
 8. Disconnect pack from power supply or load
- * During charge, when the SOC is <90% and the HV area is marked as charging, the safety manager may leave for up to 30 minutes
 - * During charge, the safety manager may give the position to another person. This person must acknowledge the responsibilities before taking the role

WARNINGS

Do not connect the TSV Pack to anything outside of the high voltage area

There must be an emergency stop reachable from outside of the HV area

Running the Dynamometer

Process restrictions

Restricted Spaces

No one may be in room 401 while the dynamometer is being operated

Safety Manager

A safety manager must be appointed to ensure safety practices are followed

They must have a direct view of room 401

They must wear safety glasses at all times, and must carry a cell phone

Process

Startup

1. Have a qualified instructor untag and unlock the power supply switch
2. Turn on power supply (but do not activate)
3. Clear dynamometer of loose tools or other obstructions
4. Clear everyone from the room
5. Set warning tape across the room 401 door
6. Begin running tests from remote computer interface

Shutdown

1. Shut down power supply output remotely
2. Remove room 401 warning tape
3. Turn off power supply
4. Have qualified instructor retag and relock power supply switch

WARNINGS

Only a qualified instructor may untag and unlock the power supply switch

Ensure the power supply switch is tagged out before performing any work

The motor should never be operated with an individual in the same room

There must be an emergency stop located outside of the danger zone