Guidelines for Safe Handling of Airbags and Pyrotechnic Seatbelt Devices

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1. Introduction

This document is provided by the Automotive Safety Council to promote the safe handling of pyrotechnic restraint system devices. It is intended for persons that may need to handle these devices outside of their vehicle installation as part of their daily job function. These devices include airbag modules and certain seatbelt components that are energy producing devices. Because these devices contain energetic materials in order to perform their intended purpose as a safety restraint item, they must be treated with extreme caution when handling them outside of their properly installed vehicle environment. When improperly handled, these devices are capable of causing severe injuries.

These instructions are guidelines and general in nature. The guidelines cover a wide range of pyrotechnic devices but, are not intended to provide specific instruction for each and every device that may be encountered. The guidelines cannot address every imaginable hazard. There are many devices from many manufactures and new technology and devices are being introduced every year. Always refer to specific instructions from the vehicle manufacturer and always apply general safety precautions and good common sense when handling these devices. Pyrotechnic safety restraint devices usually contain printed warning and caution labels. You should read these labels and adhere to the information on them. These guidelines should also be considered as a supplement and not a replacement for any specific work site safety rules that may exist.

The Automotive Safety Council makes no claim that this information is 100% complete and accurate and each person handling a live pyrotechnic safety restraint device does so at his/her own risk.

This document does not address the procedures for removal and installation of a live pyrotechnic safety restraint device from a vehicle. Please refer to

the vehicle manufacturers instructions for removal and installation information.

2. Definitions

Cover – The decorative deployment door portion of the module that is visible when installed in the vehicle. The cushion will inflate through the cover.

Cushion – The fabric bag which is folded inside the module and fills with the gas produced from the inflator when activated

Deployment – The activation or firing of an inflator, pre-tensioner, or module assembly.

Dual stage inflator – An inflator that has two separate ignitors and sources of energetic materials that may be inflated in a variety of manors depending on the specific vehicle system design.

Gas Generant – The energetic material(s) inside the inflator that produces the gas to fill the cushion. This may be a solid pyrotechnic material, compressed gas, or both.

Housing – The outer container of an airbag module. It is generally made from metal or plastic. The inflator, cushion, and cover are attached to the housing.

Ignitor – The activation device contained in an inflator or micro gas generator that converts the electrical signal to start the chain reaction of gas generation process.

Inflator – The device in the airbag module that produces the rapid release of inert gas which fills the cushion.

Live Device – A pyrotechnic device, or module, that still contains all or some of the energetic materials within it.

Micro Gas Generator – This device is effectively a miniature inflator that produces a small amount of gas and is typically used in a pre-tensioning seatbelt device.

Module – An automotive inflatable restraint system device that usually contains an inflator, cushion, housing, and cover. The module, or airbag assembly, is generally the form that the device is packaged and shipped as.

Pre-tensioner – A seatbelt device that is pyrotechnically activated to retract webbing in a crash to tension the seatbelt around the occupant.

Pyrotechnic – A process of a chemical reaction used to convert the stored energetic materials in an inflator or micro gas generator into a rapidly expanding inert gas. In this context, we refer to all airbag modules and pre-tensioning seatbelts as being pyrotechnic devices.

Spent Device – An inflator, airbag module, or pre-tensioner that no longer contains any energetic materials and is commonly referred to as inert.

3. General Information

This document discusses the safe handling of pyrotechnic safety restraint devices. The two major classes of these devices are inflatable cushions, or airbag modules, and pre-tensioning seatbelt devices.

Airbag modules are continuing to evolve and proliferate. Most of these devices are similar in that they take an electrical signal from the vehicles crash sensing system, activate, or ignite, an inflator to rapidly produce an inert gas, use that gas to fill a cushion, which then provides energy absorption to the vehicle occupant(s). The general types of airbag modules include:

- Driver airbag modules, located in the center of the steering wheel.
- Passenger airbag modules, located within the instrument panel on the passenger side of the vehicle.
- Side impact modules, typically located in the side of the seat, facing the door.
- Head protection modules, located under the headlining of the vehicle above the side doors. These are often referred to as curtain airbags or roll over protection modules.
- Lower leg modules or knee airbags, located near the bottom of the instrument panel to protect front seat passengers from lower leg injuries.
- Inflatable seatbelts, an inflatable portion of the seatbelt webbing.

Most airbag modules consist of:

- An inflator
- A housing that may be made from various materials
- A folded cushion
- A cover, generally plastic, that the cushion breaks through when it inflates

Pre-tensioning seatbelt devices are designed to take an electrical signal from the vehicles crash sensing system, activate a micro gas generator (which is a miniature inflator) to rapidly produce an inert gas, which then produces a mechanical motion to provide seatbelt tensioning of the webbing around the occupant(s). The mechanical motion is normally done in a piston tube where the micro gas generator drives a piston like device down the length of the tube. The tube may be straight or curved.

These devices may include:

- Pre-tensioning retractor assemblies.
- Pre-tensioning buckle assemblies.

4. Handling Do’s

- Always consider a live device to be dangerous.
- If it is not certain if a device is live or spent, it must be treated as if it was live.
- Always refer to the vehicle manufactures information about live devices.
- Wear chemical resistant gloves and safety glasses when handling any live device.
- Read any caution and warning labels on the device and abide by their instructions.
- When carrying a live airbag module, hold it with the cover pointed away from your body.
- When placing a live airbag module on a bench or other surface, always place it with the cover pointed up.
- When holding a pre-tensioning seatbelt buckle assembly, hold it by the round piston tube with the end of the tube farthest from the buckle pointed away from yourself and any other person.
- When holding a pre-tensioning seatbelt retractor assembly, hold it by the protruding piston tube on the side of the retractor, or by gripping the two sides together and point the end of the tube away from yourself and any other person.

5. Handling Don’ts

- Never tamper with any live device. Do not attempt to disassemble or diagnose any problems. Do not hammer, drill, cut, or weld on any live device.
- Do not cut any wires or remove electrical connectors.
- Never apply electrical current to the device in any fashion
- Do not use a Volt Ohm Meter (VOM) on any live device. This can only be done by trained personnel with specialized test equipment.
- Never subject a live module to extreme heat or any open flames.
- Never carry a live device by the electrical wires.
- Do no drop or throw any live device.
- Do not immerse in water.
- Never place any object on top of an airbag module cover.
- Never set an airbag module down on its cover, the cover must be pointed up.
- Do not point the exit of the piston tube of a pre-tensioning seatbelt assembly towards anyone.
- Do no insert any objects into the piston tube of a pre-tensioning seatbelt assembly.

6. Storage

Always store a live module in its approved shipping container when available. Store live modules in a cool, dry, secure area away from all corrosives, oxidizers, ignition sources, or high heat sources. Curtain type airbags should be stored lying as flat as possible and unfolded. Always store airbag modules with the cover facing up not down.

Storage must always be done in accordance with any federal, state, and local regulations. Local regulations must include local building and fire codes.

7. Shipping

Pyrotechnic devices are considered hazardous materials for shipping by the U.S. Department of Transportation (DOT). Shipping must be done with approved packaging with correct hazardous material identification and documents. This must follow federal, state, and local regulations and must be done by persons certified to handle hazardous materials.

8. End of life and Recycling

Please refer to the vehicle manufacturer and/or USCAR for proper procedures concerning how to handle live devices for end of life vehicles and recycling. Some states allow live devices to be recycled, while others require them to be managed as hazardous waste. Disposal/Recycle should be performed according to state and local regulations.