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# ADVISORY NOTICE

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## SEAT BELTS AND SEAT BELT WEBBING ON EARTHMOVING MACHINERY

CMEIG has recently received a number of inquiries from end-users regarding earthmoving machinery seat belts, and thus provides the following clarifications to industry.

While earthmoving machines may be supplied with 2”-wide or 3”-wide seat belts on a case-by-case basis, CMEIG is not aware of a strong technical argument to support the general use of 3”-wide (75mm) seat belt webbing today. Further, when dealing with 3, 4 and 5 point seat belt systems (see figure below), wider webbing may detract from operator comfort.

3”-wide belt webbing is not a common practice globally. The source of the Australian 3”-wide webbing requirement was *AS 2664:1983 - Earthmoving machinery - Seat belts and seat belt anchorages*. This standard is 35+ years old, and has been withdrawn i.e. this standard is considered technically out of date by Standards Australia. The understanding is the historical driver for wider belt webbing was due to concerns about belt material degradation (e.g. due to UV-damage or abrasion). Seat belt webbing technology has advanced since then and 2”-wide belt webbings are now widely proven in use. Also note the technical requirements for seat belts (e.g. breaking strength), as defined in the relevant international standards, apply irrespective of whether the belt has a 2” or 3” webbing. Anecdotally, most end users will be familiar with automotive and aircraft seat belts - 2”-wide belt webbing widths are commonplace in these applications also.

Another standard often referenced incorrectly is *AS/NZS 2596:2003 - Seat belt assemblies for motor vehicles.* This standard is a modified adoption of a UN Motor Vehicle regulation, applicable to seat belts and assemblies for adults, and larger children using child seats, in motor vehicles. It is not an appropriate standard for earthmoving machinery seat belts. CMEIG recommends seat belts that comply with one of the following international standards:

- *ISO 6683 - Earth-moving machinery - Seat belts and seat belt anchorages - Performance requirements and tests*
- *SAE J386 - Operator Restraint System for Off-Road Work Machines*
- *SAE J2292 - Combination Pelvic and Upper Torso Operator and Occupant Restraint Systems for Off-Road Work Machines*

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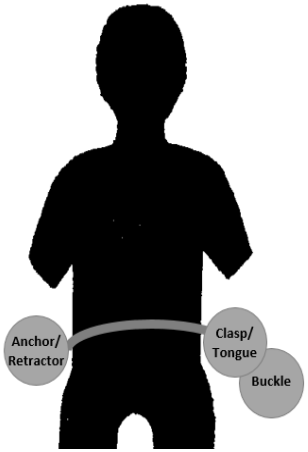
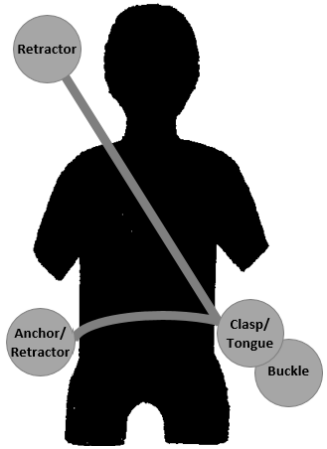
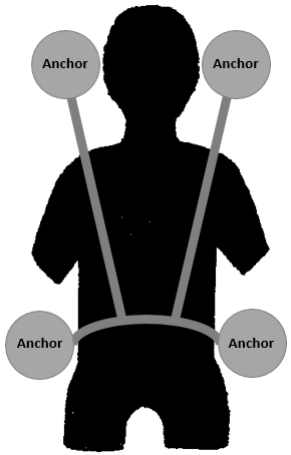
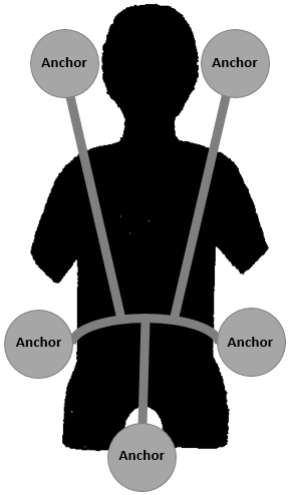
**Types of seat belts**

The table below is a summary of typical earthmoving machinery seatbelts. Note that where a machine is originally designed for a particular type of system, modifying the restraint system (e.g. changing from a two-point to a three-point seat belt) is often not a trivial matter, requiring re-evaluation of various aspects of machine design. For reasons including the above, CMEIG does not condone modifications to operator restraint systems.

It is important to remember the primary purpose of a seat belt is to hold the operator in their seat, including in the event of a rollover or collision. Wearing the seat belt supplied with your earthmoving machine will enable better health and safety outcomes for the operator than not wearing it.

| **Type of Seat Belts** | **Two point Seat Belts** | **Three point Seat Belts** | **Four point Seat Belts** | **Five point Seat Belts** |
|---|---|---|---|---|
| **Description** | Typically a single belt across the lap (often referred to as a 'lap belt'), typically incorporating a retractor | Typically a lap restraint and a diagonal torso restraint (often referred to as a 'lap and sash belt') | Typically a lap restraint as well as a torso restraint across both shoulders | Similar to a four point operator restraint, but also incorporating an additional lower restraint |
| **Visual Representation (some common types shown, note that other variations exist)** |  |  |  |  |
| **Some Considerations** | • Simple to use<br>• Practical and most comfortable when application requires frequent torso movement (e.g. viewing ground or side/rear)<br>• Allows for quick removal, enabling rapid egress from the machine (e.g. in the event of a machine fire) | • Provides more torso restraint than a two point system<br>• Can limit movement of torso or cause operator discomfort where application requires frequent torso movement | • Provides more torso restraint than two and three point restraint<br>• Can limit movement of torso or cause operator discomfort where application requires frequent torso movement<br>• Bulky, harder to get in/out of | • Provides more upper and lower body restraint than other options discussed<br>• Can limit movement of torso or cause operator discomfort where application requires frequent torso movement<br>• Bulky, harder to get in/out of |

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**General Considerations when selecting seat belt systems**

A summary of some of the key considerations when selecting seat belt systems include:

- Ability to contain the operator in the event of a rollover or collision
- Consideration of machine applications requiring significant freedom of movement, especially torso movement.
- Consideration of machine operating profile, movement/vibration/ride characteristics
- Comfort, bulkiness, ergonomics
- Ability for the operator to quickly remove the restraint and exit the machine
- Suitability of surfaces and support structures to fit anchors/retractors (includes testing to appropriate standards)
- Trade-offs between the level of restraint, operator comfort and practicality – the wrong solution can result in discouraging use of the restraint system, negating any benefit of a seat belt system
- Any new risks introduced if replacing the factory-supplied seat belt system

**General guidance for maintaining seat belt systems**

Operator restraint systems, when used properly, hold the operator in the seat and help contain the operator inside the rollover protection structure (ROPS) in the event of a collision or tip-over. The seat assembly, which includes the seat belt and mounting hardware, should be inspected regularly. Inspection is recommended during the pre-shift walk around and as instructed in the manufacturer's operation & maintenance manual. Include the following items when inspecting and maintaining seat belts:

- Inspect the seat belt mounting hardware for wear or damage. Replace any mounting hardware that is worn or damaged
- Inspect mounting bolts. Tighten mounting bolts if the bolts are loose
- Inspect the buckle for wear or damage Replace the seat belt if the buckle is worn or damaged
- Inspect the tongue latch and ensure that it engages securely.
- Inspect the seat belt webbing for wear or damage. Wear or damage can include fluffing, fraying or broken strands. Replace the seat belt if webbing is worn or damaged –
- Inspect seat belt retractor(s) for proper function. Replace the seat belt if the seat belt retractor is not functioning
- Inspect shoulder loop web guide. Adjust shoulder loop hardware and/ or remove obstruction
- Inspect the seat belt height adjusters. Replace the seat belt if the height adjuster is not functioning
- Inspect the seat belt label for date of installation. The typical recommendation is to replace after three years of service life.
- Always perform inspections of the seat belt and mounting hardware before operating the machine - replace any damaged or worn parts
- Wear the seat belt at all times while operating the machine
- Sponge the webbing clean with mild soap and water. Do not use bleach, dye or industrial detergents unless specifically instructed or allowed to do so.

For more information, contact your product manufacturer, supplier or authorised agent.