This bulletin is intended to heighten operator **SAFETY** and **AWARENESS** by giving them a basic understanding of the purpose and benefits of having a certified Rollover Protective Structures (ROPS) on an earthmoving machine.

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**CATERPILLAR SAFETY SERVICES**

Caterpillar Safety Services strives to promote the safety of anyone in, on or around Cat products. This includes the people operating and servicing the equipment, as well as the people, products and processes that impact safety at the surrounding jobsite.

We provide general industry, jobsite and product specific safety training materials, education and consulting services. Our solutions and services can help reduce injury, improve efficiencies and promote a culture of safety within our customers. Keeping people safe at work and getting them home safely every day is our focus.

Our website, SAFETY.CAT.COM™ provides you with detailed safety information in a variety of formats, including: toolbox talks, training materials, interactive presentations, checklists, videos, product bulletins, newsletters and more—all organized by industry, topics and machines.

**FOR MORE INFORMATION PLEASE VISIT:** SAFETY.CAT.COM™

This pamphlet is not intended to be a comprehensive analysis of all hazards related to Cat® products or to your specific application and does not supersede any state, federal or local statutes or regulations. More complete information regarding Cat products is provided in the Operation & Maintenance Manual (OMM) for specific models. Caterpillar recommends you and your employees read and understand the OMM before operating or working on any machine.
WHAT IS A ROLLOVER PROTECTIVE STRUCTURE (ROPS)?
It is defined as a system that includes a ROPS structure (or cab with an integrated ROPS), which is mounted to the machine frame via a mounting system to provide crush protection for the operator. The requirements are defined in appropriate ISO standards and other standards required by a country’s regulations. It is one of the most important safety structures on an earthmoving machine and may be required by regulations (e.g. US, EU, etc.). See picture below for a description of a system that includes a ROPS structure:

WHAT IS THE PURPOSE FOR HAVING A ROPS?
This structure’s main purpose is to provide operator protection in the event of a machine rollover. The ROPS also absorbs energy during a rollover similar to the energy absorbed by crumple zones in automobiles.

CRITERIA FOR A CERTIFIED ROPS?
ISO 3471 is the most prevalent standard for most types of earthmoving machinery. It specifies the structural performance requirements for a ROPS system. ISO 3471 requires a push test to certify a ROPS system. The requirements are force resistance in the lateral, vertical and longitudinal directions, and energy absorption in the lateral direction. There are limitations on deflections under the loading so the ROPS does not infringe the area occupied by the operator, referred to as the DLV (Deflection Limiting Volume). Again, the ROPS is a system that consists of the ROPS structure (or cab with an integrated ROPS), mounting system and frame. The test is conducted using these components. Loading is applied sequentially: 1) Lateral, 2) Vertical, and then 3) Longitudinal.

Per ISO 3471, the intent is that all ROPS manufactured be capable of meeting or exceeding the stated levels of performance, which includes allowance for design, process and material property tolerances.