Rollover Protective Systems (ROPS) requirements in SA

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There are standards

- **ISO 3471**
  - Earth-moving machinery – Roll-over protective structures – Laboratory tests and performance requirements
  - DLV: Deflection Limiting Volume
    - Defined in ISO 3164
    - Volume occupied by person, that may not be penetrated during a test
- **ISO 5700** for tractors have different DLV (termed zone of clearance)
  - Tractors for agriculture and forestry – Roll-over protective structures (ROPS) – Static test method and acceptance conditions
- **SANS 1563**
  - Strength of large passenger vehicle superstructures (roll-over protection)
  - Have different DLV for busses
• Details requirements for rollover and falling object protective structures for trackless vehicles in surface & underground operations

• **DOES NOT** specify whether or not protective structures shall be required for specific vehicles
  • Shall be established by the company through risk assessments, directives in guidelines, OR company policy

• **Goal:**
  • Assure operators & passengers of trackless vehicles’ reasonable protection during rollover accidents

• **Seatbelts:** Shall be fitted in all vehicles with ROPS:
  • ISO 6683 for earth moving machinery
  • SAE J140 for light vehicles
Design certification
- Testing of a prototype
- Design verification by Pr.Eng.

Production certification
- Manufacturing Drawings
- Quality Assurance Plan
- Material specifications
- Welding inspection
- Apply Anglo American STD 100
Anglo American DLV slightly different

Height in AA 900 mm
In 3471 it is 1020 mm
Is ISO 3471 applicable to Light Commercial Vehicles and LDV’s?

- ISO 3471 does not apply to above
- ROPS Types:
  - External
  - Internal
    - Attached at vehicle cab floor AND at least at front seat belt anchor bolts
- Tiers of ROPS
  - Standard-duty
    - Risk assessment → >1 rollover of vehicle unlikely in event of accident
    - Use ISO 3471 Table 1 Section 4
      - Tractor portion of tractor scraper to determine loads (lateral energy requirement not required to be met)
  - Heavy-duty
    - Risk assessment → > 1 rollover of vehicle likely in event of accident
    - Multiply performance requirements for Standard-duty ROPS x 2.25

<table>
<thead>
<tr>
<th>Machine mass m</th>
<th>Lateral load force F</th>
<th>Lateral load energy U</th>
<th>Vertical load force F</th>
<th>Longitudinal load force F</th>
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</thead>
<tbody>
<tr>
<td>700 &lt; m ≤ 1010</td>
<td>6m</td>
<td>20 000 (m/10 000)¹,²</td>
<td>19,61 m</td>
<td>4,8m</td>
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<tr>
<td>1010 &lt; m ≤ 32 160</td>
<td>95 000 (m/10 000)¹,²</td>
<td>20 000 (m/10 000)¹,²</td>
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<tr>
<td>m &gt; 32 160</td>
<td>12m</td>
<td>2,68m</td>
<td>9,6m</td>
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</table>
1 ton pick-up truck **load box canopy**

**ROPS design**

- ROPS canopies shall be provided where 1 ton pick-up trucks are **used to transport passengers** in the load box
  - Passengers shall only be transported in this way where a risk assessment indicates that more than one roll-over of the vehicle is unlikely in event of accident
  - Side facing seats not allowed
- Comply with Standard-duty ROPS requirements
- Reconstruct mountings in tests/analyses
  - ROPS may be OK, but mounting fail