Industry Technical Council
Advisory Procedure

Side Under Run Protection
About the Advisory Procedure:

This Advisory Procedure is published by the Australian Trucking Association Ltd (ATA) to assist the road transport industry improve the technical understanding of Side Under Run protection Systems and the application of Side Under Run protection heavy trailers. The Advisory Procedure has been drafted to apply to a generalized range of trailers and provides guidance for “deemed” compliance in accordance with the requirements as set-out in UN-ECE regulation R73. It is not, nor is it intended to be, complete or without exceptions.

The Advisory Procedure is a guide only, and its use is entirely voluntary. Recommendations or procedures may not be suitable for or applicable to all operators. Operators should consider their own circumstances, practices and procedures when using this Advisory Procedure.

Operators must comply with the Australian Design Rules (ADRs), the Australian Vehicle Standards Regulations, the Roadworthiness Guidelines and any specific information and instructions provided by manufacturers in relation to vehicles, wheel systems, and other parts. No endorsement of products or services is made, or intended. Brand names, where used in the Advisory Procedure, are for illustrative purposes only.

Suggestions or comments about this Advisory Procedure are welcome. Please write to the Industry Technical Council, Australian Trucking Association, Minter Ellison Building, 25 National Circuit, Forrest ACT 2603.

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Advisory Procedure
SIDE UNDER RUN PROTECTION

This Technical Advisory Procedure (TAP) has been developed by the ATA-ITC (and endorsed by the Australian Trucking Association General Council) to provide trailer builders and operators with general construction guidelines for a lateral protection device that would be deemed to comply with the requirements of UN-ECE R73.

These devices aid the safety of vulnerable road users such as pedestrians and cyclists by removing many opportunities for accidental access into the wheel space of trucks and trailers, and can also provide aerodynamic benefits.

The UN ECE regulations are commonly referred to the international standards for motor vehicles and represent an increasing base in the Australian regulatory framework for vehicle design.

Introduction:

In order to promote the increased fitting of Side Under Run Protection devices this TAP provides trailer and truck body builders with off the shelf designs that do not need individual engineering assessment of the primary devices.

The designs provided cover three materials, traditional steel, aluminium, and a fibre composite panel material. The fibre composite panel material design is low weight and may be designed to improve dynamic airflows around trailers offering potential to achieve safety and efficiency gains.

Interpretations of vehicle Categories:

European vehicle categories O3 and O4 are considered equivalent to Trailer Categories TC & TD respectively in the Australian Design Rules system.

Glossary:

A Lateral Protection Device (LPD) is a construction consisting of longitudinal member(s) and link(s) (fixing elements) to the chassis side members or other structural parts of the vehicle that is designed to offer effective protection to unprotected road users against the risk of falling under the sides of the vehicle and being caught under the wheels. Parts of the vehicle can be considered an LPD when designed appropriately.

Compliant Side Under Run Protection:

By installing Side Under Run Protection to semi-trailers in accordance with this Technical Advisory Procedure, the installation would be “deemed to comply” with requirements in UN-ECE R73.

The area of intended protection is primarily the side area of a vehicle where intrusion by a pedestrian and/or a cyclist could result in their personal injury.

The longitudinal section to be protected is typically:
   a) that area rear ward of the landing legs and in front of the axle group; and,
   b) that area rearward of the axle group:
Vertically, the section of protection is:
   a) Not less than 550mm above ground level; and,
   b) Goes to the top of the tyre or 950mm above the ground, whichever is higher.
      Note: Specialist trailer types such as double drop decks will require further
      interpretation by your trailer manufacturer/supplier.

In plan the LPD must not be more than 150mm in-board of the outer edge of the tyres, except
that immediately forward of the tyres the LPD must not be more than 30mm in-board of the
outer edge of the tyres.

Notes:
1. Equipment such as tool boxes provided within the dimensional scope of “Side Under-
   Run Protection” is accepted as complying.

Technical Specifications for Lateral Protective Devices:

The following specifications are drawn from UN ECE regulation 73:

7.1. The lateral protective device shall not increase the overall width of the vehicle
   and the main part of its outer surface shall not be more than 120 mm inboard
   from the outermost plane (maximum width) of the vehicle. Its forward end may
   be turned inwards on some vehicles in accordance with paragraphs 7.4.3 and
   7.4.4. Its rearward end shall not be more than 30 mm inboard from the
   outermost edge of the rear tyres (excluding any bulging of the tyres close to the
   ground) over at least the rearmost 250 mm.

7.2. The outer surface of the device shall be smooth, and so far as possible
   continuous from front to rear; adjacent parts may however overlap provided that
   the overlapping edge faces rearwards or downwards, or a gap of not more than
   25 mm measured longitudinally may be left, provided that the rearward part
   does not protrude outboard of the forward part; domed heads of bolts or rivets
   may protrude beyond the surface to a distance not exceeding 10 mm and other
   parts may protrude to the same extent provided that they are smooth and
   similarly rounded; all external edges and corners shall be rounded with a radius
   not less than 2.5 mm.

7.3. The device may consist of a continuous flat surface, or of one or more horizontal
   rails, or a combination of surface and rails; when rails are used they shall be not
   more than 300 mm apart and not less than:
      50 mm high in the case of N₂ and O₃;
      100 mm high and essentially flat in the case of N₃ and O₄
   Combinations of surfaces and rails shall form a practically continuous side
   guard subject, however, to the provisions of 7.2.

7.4. The forward edge of the side guard shall be constructed as follows:

7.4.1. Its position shall be:

7.4.1.1. on a motor vehicle: not more than 300 mm to the rear of the vertical plane
         perpendicular to the longitudinal plane of the vehicle and tangential to the outer
         surface of the tyre on the wheel immediately forward of the guard;

7.4.1.2. on a drawbar trailer: not more than 500 mm to the rear of the plane defined in
         paragraph 7.4.1.1;
7.4.1.3. on a semi-trailer: not more than 250 mm to the rear of the transverse median plane of the support legs, if support legs are fitted, but in any case the distance from the front edge to the transverse plane passing through the centre of the kingpin in its rearmost position may not exceed 2.7 m.

7.4.2. Where the forward edge lies in an otherwise open space, the edge shall consist of a continuous vertical member extending the whole height of the guard; the outer and forward faces of this member shall measure at least 50 mm rearwards and be turned 100 mm inwards in the case of N2 and O3 and at least 100 mm rearwards and be turned 100 mm inwards in the case of N3 and O4.

7.4.3. On a motor vehicle where the 300 mm dimension referred to in paragraph 7.4.1.1. falls within the cab, the guard shall be so constructed that the gap between its forward edge and the cab panels does not exceed 100 mm and, if necessary, shall be turned in through an angle not exceeding 45º. In this case, the provisions of paragraph 7.4.2 are not applicable.

7.4.4. On a motor vehicle where the 300 mm dimension referred to in paragraph 7.4.1.1 falls behind the cab and the side guard is extended forward to within 100 mm of the cab, as an option to the manufacturer, then the provisions of paragraph 7.4.3 must be met.

7.5. The rearward edge of the side guard shall not be more than 300 mm forward of the vertical plane perpendicular to the longitudinal plane of the vehicle and tangential to the outer surface of the tyre on the wheel immediately to the rear; a continuous vertical member is not required on the rear edge.

7.6. The lower edge of the side guard shall at no point be more than 550 mm above the ground.

7.7. The upper edge of the guard shall not be more than 350 mm below that part of the structure of the vehicle, cut or contacted by a vertical plane tangential to the outer surface of the tyres, excluding any bulging close to the ground, except in the following cases:

7.7.1. Where the plane in paragraph 7.7 does not cut the structure of the vehicle, then the upper edge shall be level with the surface of the load-carrying platform, or 950 mm from the ground, whichever is the less;

7.7.2. Where the plane in paragraph 7.7 cuts the structure of the vehicle at a level more than 1.3 m above the ground, then the upper edge of the side guard shall not be less than 950 mm above the ground;

7.7.3. On a vehicle specially designed and constructed, and not merely adapted, for the carriage of a container or demountable body, the upper edge of the guard may be determined in accordance with paragraphs 7.7.1. and 7.7.2 above, the container or body being considered as part of the vehicle.

7.8. Side guards shall be essentially rigid, securely mounted (they shall not be liable to loosening due to vibration in normal use of the vehicle) and, except as regards the parts listed in paragraph 7.9, made of metal or any other suitable material. The side guard shall be considered suitable if it is capable of withstanding a horizontal static force of 1 kN applied perpendicularly to any part of its external surface by the centre of a ram the face of which is circular and flat, with a diameter of 220 mm ± 10 mm, and if the deflection of the guard under load is then not more than:
30 mm over the rearmost 250 mm of the guard, and
150 mm over the remainder of the guard.
Compliance with this requirement can be verified by calculation.

7.9. Components permanently fixed to the vehicle, e.g. spare wheels, battery box, air tanks, fuel tanks, lamps, reflectors and tool boxes may be incorporated in the side guard, provided that they meet the dimensional requirements of this Regulation. The requirements of paragraph 7.2 shall generally apply as regards gaps between protective devices and permanently fixed components.

7.10. The guard may not be used for the attachment of brake, air or hydraulic pipes.

**Material Selection:**

Materials used in LPDs must be able to withstand the relatively low design load of 1kN (102 kgf) applied over a 220mm diameter.

The options considered in this TAP are:
- Steel Purlins
- Aluminium Channel
- Monopan 30 Composite Panel

Basic calculations for stress and bending have been completed for readily available steel and aluminium structural sections, including C-section steel purlin and Aluminium Channel.

Selected sections - C10015 & C15012 steel purlin and UA2464 (100x50) & UA5058 (125x50) aluminium channel sections are nominally 2.6 to 3.9 kg/metre, with support requirements ranging from 1900mm thru 3000mm.

Actual testing has been completed for Monopan 30 Composite Panel to determine bending resistance and crush resistance.

The Monopan 30 Composite panel (30mm thickness) is provided in sheet form. A minimum section width of 225mm is required in the material for LPD construction. At a section width of 225mm, the material needs to be supported at not less than 950mm centres; as the section width is increased so do the minimum support centres. At 450mm width the supports may be increased to 1900mm.

<table>
<thead>
<tr>
<th>Section</th>
<th>Maximum Span - Supported</th>
<th>Maximum Overhang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel - C10015</td>
<td>2400</td>
<td>600</td>
</tr>
<tr>
<td>Steel - C15012</td>
<td>3000</td>
<td>700</td>
</tr>
<tr>
<td>Aluminium - UA2464</td>
<td>1900</td>
<td>400</td>
</tr>
<tr>
<td>Aluminium - UA5058</td>
<td>2150</td>
<td>450</td>
</tr>
<tr>
<td>Monopan 30 – 225mm</td>
<td>950</td>
<td>300</td>
</tr>
<tr>
<td>Monopan 30 – 450mm</td>
<td>1900</td>
<td>450</td>
</tr>
</tbody>
</table>

Your trailer manufacturer/supplier will be able to calculate alternatives for material options and installation.

**Installation:**

Drawings are attached below to assist in interpretations for installation.
References:

At the time of printing, the UNECE Vehicle Regulations can be located at: [http://live.unece.org/trans/main/wp29/wp29regs61-80.html](http://live.unece.org/trans/main/wp29/wp29regs61-80.html)

Type Tyre Dimensions – check with your tyre supplier:

<table>
<thead>
<tr>
<th>Tyre Size</th>
<th>265/70R1 9.5</th>
<th>275/80R2 2.5</th>
<th>11R22.5</th>
<th>295/80R2 2.5</th>
<th>445/50R2 2.5</th>
<th>385/65R2 2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical free Radius</td>
<td>440</td>
<td>515</td>
<td>532</td>
<td>531</td>
<td>504</td>
<td>546</td>
</tr>
<tr>
<td>Typical Laden Radius</td>
<td>400</td>
<td>482</td>
<td>492</td>
<td>492</td>
<td>464</td>
<td>496</td>
</tr>
<tr>
<td>Tyre Height (typical)</td>
<td>840</td>
<td>997</td>
<td>1024</td>
<td>1023</td>
<td>968</td>
<td>1042</td>
</tr>
</tbody>
</table>

Vehicle Category  | ADR Category Code | UNECE Category Code |
------------------|-------------------|---------------------|
Medium Goods Vehicle Over 3.5 tonnes up to 4.5 tonnes GVM | NB | N2 |
Over 4.5 tonnes up to 12 tonnes GVM | NB1 | |
| Heavy Goods Vehicle | NC | N3 |
| Medium Trailer | TC | O3 |
| Heavy Trailer | TD | O4 |

Exceptions or Alterations:

Vehicles of the following types need comply only as indicated in each case.

The paragraphs referred to below are from UN-ECE R73, which at the time of publication can be accessed at [http://www.unece.org/fileadmin/DAM/trans/main/wp29/wp29regs/R073r1e.pdf](http://www.unece.org/fileadmin/DAM/trans/main/wp29/wp29regs/R073r1e.pdf).

a) An extendable trailer shall comply with all the requirements of paragraph 12. When closed to its minimum length; when the trailer is extended, however, the LPD need only comply with paragraphs 12.8., 12.9., and 12.10., and with either paragraph 12.4. or 12.5., but not necessarily both; extension of the trailer shall not produce gaps along the length of the LPD;

b) A tank vehicle, that is a vehicle designed solely for the carriage of a fluid substance in a closed tank permanently fitted to the vehicle and provided with hose or pipe connections for loading or unloading, shall be fitted with LPD that comply so far as is practicable with all the requirements of paragraph 12.; strict compliance may be waived only where operational requirements make this necessary;

c) On a vehicle fitted with extendable legs to provide additional stability during loading, unloading or other operations for which the vehicle is
designed, LPD may be arranged with additional gaps where these are necessary to permit extension of the legs;

d) On a vehicle equipped with lashing and securing points in accordance with ISO 9367-1:1989 or ISO 9367-2:1994 for water borne transportation on Ro/Ro vessels, gaps shall be permitted within LPD to accept the attachment of restraint devices.

e) On a vehicle fitted with a crane for loading, unloading or other operations for which the vehicle is designed, making it impracticable to comply with all the requirements of paragraph 12, the LPD may be arranged with additional gaps where these are necessary to permit the movement or stowage of the crane.

f) If the sides of the vehicle are so designed and/or equipped that by their shape and characteristics the component parts together meet the requirements of paragraph 12, they may be regarded as replacing the LPD. (This provision includes tool boxes – but must meet the lateral positioning requirements).