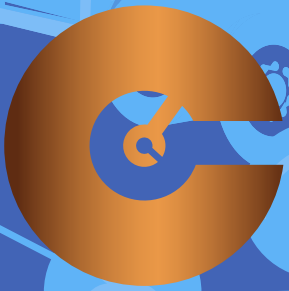
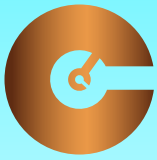


CLOCSA

Heavy Vehicle Tier Breakdown

Take care





Bronze Standard

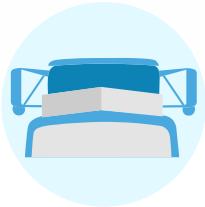
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Restrictions

External Cab

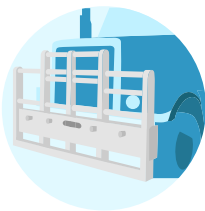
No items or equipment attached to outside of the truck cabin that adversely affect direct vision for the driver. The following items are not permitted on CLOCS-A accredited vehicles:



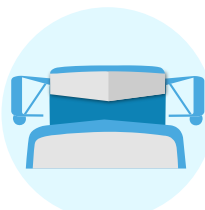
No bug deflectors on bonneted trucks – City and Urban Projects only



No external engine air intake hardware above bonnet level (on bonneted trucks) – City and Urban Projects only



No large inappropriate bullbars – City and Urban Projects only



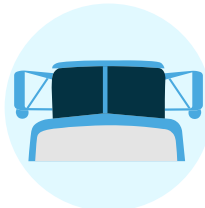
No inappropriate sunvisors

Internal Cab

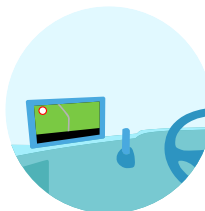
No fitment of inappropriate after-market cabin accessories or modifications that adversely affect direct vision for the driver. The following are not permitted on CLOCS-A accredited vehicles:



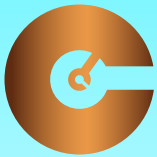
No overly large decals attached to the windscreens



No excessive windscreen or window tinting



No aftermarket accessories inappropriately mounted inside the cab that create blind spots or restrict the driver's field of view



Bronze Standard

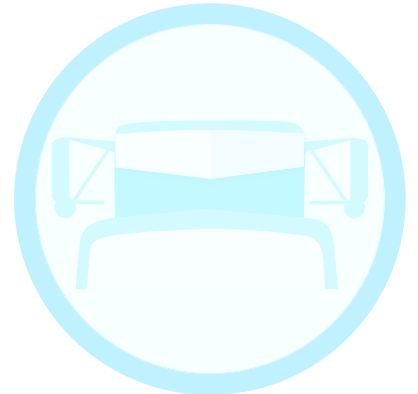
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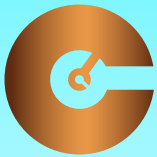
No Bug Deflectors on Bonneted Trucks – City and Urban Projects only

External Cab

No items or equipment attached to outside of the truck cabin that adversely affect direct vision for the driver.



Standard	No solid, clear or coloured bug deflectors mounted on bonneted trucks.
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by the elimination of items or equipment that adversely affect direct vision
Initial cost	Zero
Additional weight	Zero
Retro-fittable:	Yes
Reference Std:	ADR 93/00 - Forward Field of View 2018 (Clause 5.1) and the TIC – Code of Practice to ensure adequate field and clarity of view.
Notes:	Bug protectors can greatly impede direct forward vision on bonneted trucks and have contributed to serious accidents and fatalities. They serve no practical purpose in the city environment.
Advantages	Removing bug deflectors from the top of bonnets improves direct vision in front of the truck for the driver and could allow the driver to see a cyclist, motorcyclist or pedestrian that may otherwise be obscured.
Disadvantages	Disadvantages are minimal. Some drivers with vehicles that work both in the city and in regional or remote areas may want to refit the bug deflector as required.



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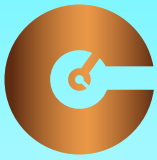
No Engine Air Intakes Above Bonnet Level – City and Urban Projects only

External Cab

No items or equipment attached to outside of the truck cabin that adversely affect direct vision for the driver.

Standard	No external engine air intakes above bonnet level (on bonneted trucks).
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by the elimination of things that serve to reduce direct vision.
Initial cost	Zero to \$200
Additional weight	Zero
Retro-fittable:	Yes
Reference Std:	ASDR 93/00 - Forward Field of Viw 2018 (Clause 5.1) and the TIC Code of Practice to ensure adequate field and clarity of view.
Notes:	Large vertical external air intake tubes on either side of bonneted trucks create blind spots on both sides of the windscreen. They serve no practical purpose in the city environment.
Advantages	Cutting down the height of external air intake tubes or removing them improves direct vision for the driver.
Disadvantages	Disadvantages are minimal. Some drivers with vehicles that also work on rural or outback dirt roads may want to refit the vertical tubes as required to raise the intake snorkels above dust levels.





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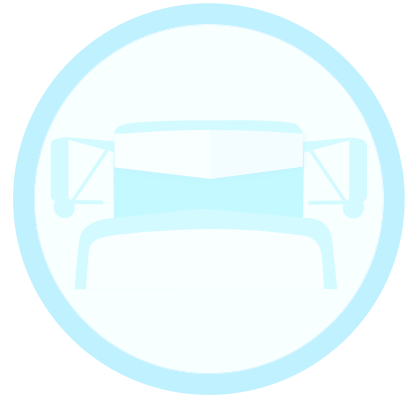
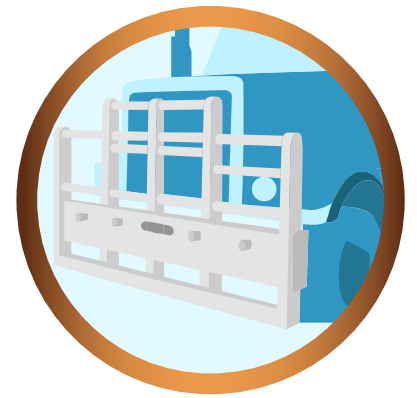


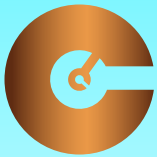
No Large Inappropriate Bullbars – City and Urban Projects only

External Cab

No items or equipment attached to outside of the truck cabin that adversely affect direct vision for the driver.

Standard	No large after-market bullbars that rise above the standard overall bumper height for the particular vehicle.
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by the elimination of items or equipment that adversely affect reduce direct vision.
Initial cost	Zero
Additional weight	Zero
Retro-fittable:	Yes
Reference Std:	ADR 93/00 - Forward Field of Vision 2018 (Clause 5.1) and the TIC Code of Practice to ensure adequate field and clarity of view
Notes:	Large and high bullbars serve to reduce direct vision for the driver in front of the truck and many restrict headlight projection. Aggressive bullbars risk the possibility of accidentally hooking or catching a cyclist. They serve no practical purpose in the city environment.
Advantages	Removing these very large bullbars improves direct vision for the driver in front of the truck.
Disadvantages	Disadvantages are minimal. Some drivers with vehicles that work both in the city and rural/outback roads may want to refit the bullbar as required.





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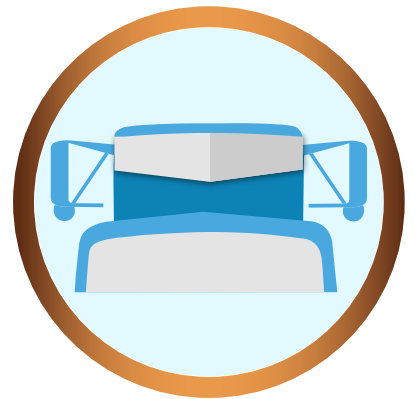


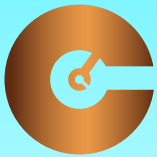
No Inappropriate Sunvisors

External Cab

No items or equipment attached to outside of the truck cabin that adversely affect direct vision for the driver.

Standard	No external sunvisors that protrude below the tinted band on the windscreen or the swept path of the wipers.
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by the elimination of items or equipment that adversely affect direct vision.
Initial cost	Zero to \$500 for a replacement sunvisor.
Additional weight	Zero
Retro-fittable:	Yes
Reference Std:	ADR 93/00 - Forward Field of View 2018 (Clause 5.1) and the TIC Code of Practice to ensure adequate field and clarity of view.
Notes:	Deep sunvisors that protrude below the tinted band on the windscreen or the swept path of the wipers serve to restrict the forward view for the driver.
Advantages	Swapping out inappropriate sunvisors for a conventional or standard sized visor improves direct vision for the driver.
Disadvantages	Disadvantages are minimal, however deep sunvisors can help if driving for extended periods facing directly into the rising or setting sun.





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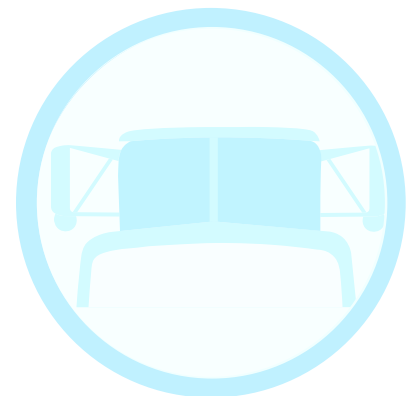


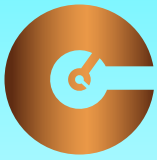
No Large Decals Attached to the Windscreen

Internal Cab

No fitment of inappropriate after-market cabin accessories or modifications that adversely affect direct vision for the driver.

Standard	No overly large lettering or decals attached to any part of the windscreen.
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by the elimination of items or equipment that adversely affect direct vision.
Initial cost	Zero
Additional weight	Zero
Retro-fittable:	Yes
Reference Std:	ADR 93/00 - Forward Field of View 2018 (Clause 5.1) and the TIC Code of Practice to ensure adequate field and clarity of view.
Notes:	ADR 93/00 prescribes that all vehicles must have an “adequate” field of view when seated in the vehicle with the seat belt fastened. Fitting overly large lettering or decals to the windscreen can result in the driver having a reduced field of view, which could lead to an unsafe situation.
Advantages	Removing large decals attached to the windscreen will help to ensure the driver of the vehicle has an unhidden view of the road and traffic ahead.
Disadvantages	Disadvantages are minimal or none.





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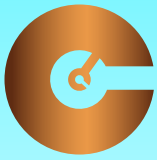
No Excessive Windscreen or Window Tinting

Internal Cab

No fitment of inappropriate after-market cabin accessories or modifications that adversely affect direct vision for the driver.

Standard	No excessive tinting of the windscreen or side windows that reduces light transmittance.
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by the elimination of items or equipment that adversely affect direct vision.
Initial cost	Zero
Additional weight	Zero
Retro-fittable:	Yes
Reference Std:	ADR 93/00 - Forward Field of View 2018 (Clause 5.1) and the TIC Code of Practice to ensure adequate field and clarity of view.
Notes:	Driving safely requires the driver to have the best possible vision of the road and other road users. Any reduction in the driver's vision, particularly in poor light conditions, such as twilight or wet weather conditions, will lead to a reduction in safety. Tinted windows can significantly reduce driver vision. Typically, the OEM will tint the windscreen and side windows to the maximum allowable under the ADR and therefore can't have any further tint applied.
Advantages	Windscreens and windows that are not tinted beyond legal limits will help to ensure the driver has the best possible the vision of the road and other road users.
Disadvantages	Disadvantages are minimal.





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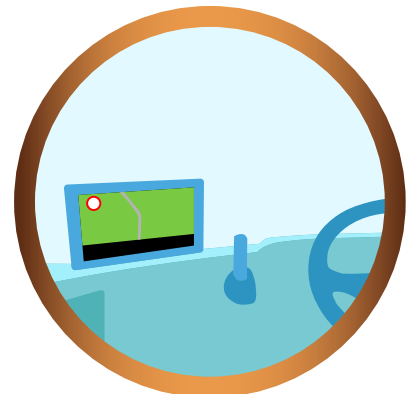


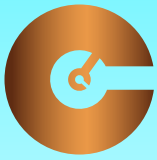
No Inappropriate Fitment of Aftermarket Accessories Inside the Cabin

Internal Cab

No fitment of inappropriate after-market cabin accessories or modifications that adversely affect direct vision for the driver.

Standard	No aftermarket accessories (such as screens or mobile phones) inappropriately mounted inside the cab that create blind spots and obscure the driver's field of view.
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by the elimination of things that serve to reduce direct vision.
Initial cost	Zero
Additional weight	Zero
Retro-fittable:	Yes
Reference Std:	ADR 93/00 - Forward Field of View 2018 (Clasuse 5.1) and the TIC Code of Practice to ensure adequate field and clarity of view.
Notes:	ADR 93/00 prescribes that all vehicles must have an "adequate" field of view when seated in the vehicle with the seat belt fastened. Inappropriately fitting aftermarket components such as screens and mobile phones above dashboard level can create blind spots and can adversely affect the driver's field of view. The driver of the vehicle should have an unhidden view of the road and traffic ahead.
Advantages	Appropriately relocating accessories that have been fitted within the normal field of view will help to ensure the driver has an unobstructed view of the road and traffic ahead.
Disadvantages	Some truck cabin and dashboard designs are such that there is little available space to readily and effectively mount aftermarket components such as screens and telephones.





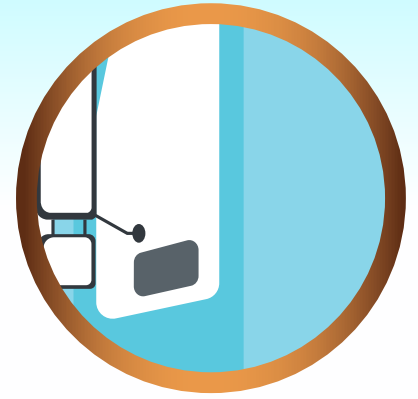
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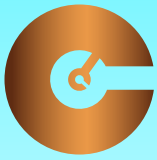
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Fresnel Lens

Standard	Fit a Fresnel lens to the passenger door window or peeper window.
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by implementing things that improve indirect vision.
Initial cost	\$20 to \$100
Additional weight	Zero
Retro-fittable:	Yes
Notes:	The Fresnel Lens is a clear, thin, flat plastic lens that is press fitted to a truck's passenger door window or peeper window. Its provides an extra downwards view for the truck driver so that at a glance he can see a vulnerable road user that might be hidden in the mirror's blind spot, alongside his passenger door.
Advantages	Fresnel lens are cheap, quick and easy to fit, with minimal ongoing maintenance. Unlike a mirror, it affords the driver a normal, (through the window) view of what's close to his cab, not a reversed or inverted mirror image. That means the driver will assimilate any danger faster and react more quickly.
Disadvantages	Disadvantages are minimal, although they can fall off, cannot be used if the passenger window is open or may even interfere with the window opening.





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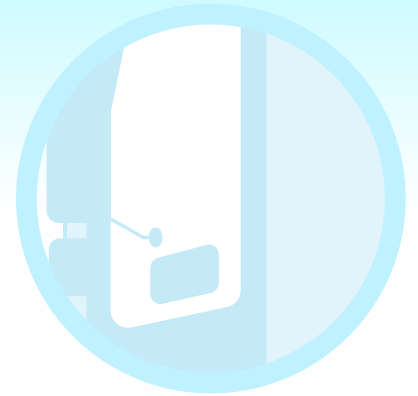
Amber Beacons

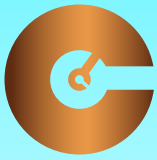
Standard	Fit a revolving or flashing amber beacon to the roof of the truck cabin that can be seen from both sides and in front of the vehicle.
Purpose & method	To enhance the awareness of trucks to Vulnerable Road Users by visual means.
Initial cost	\$200 to \$800
Additional weight	10kgs
Retro-fittable:	Yes

Notes: Flashing amber beacons fitted to the roof-top of truck cabs are a simple but effective means of attracting the attention of pedestrians, other road users and construction site employees. Once their attention is gained, then both parties are in better position to take action and keep out of each others way.

Advantages Flashing beacons are a relatively simple, low cost, low tech and reliable technology that has proven to be of universal benefit. Newer LED designs are brighter and more reliable than the older incandescent lights with a mechanical rotating system. The majority of construction vehicles operating in Australia will already have a version fitted to the cab as many civil construction companies mandate them on their job sites and in quarries.

Disadvantages These flashing beacons should be manually switched on and off each time the vehicle enters and exists the construction zone or workplace.





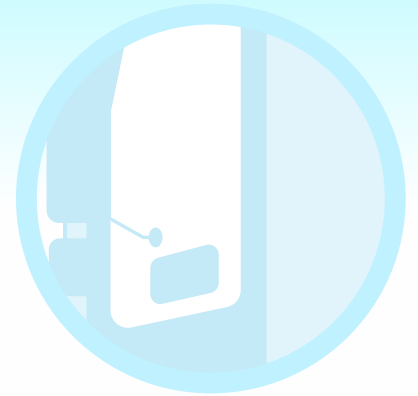
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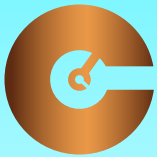
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Class V and VI Mirrors

Standard	Fit a Class V mirror above the passenger window and a Class VI mirror to the cabin (of COE trucks) or to the front left corner of the bonnet (on conventional trucks).
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by implementing things that improve indirect vision.
Initial cost	\$250 each
Additional weight	5kgs
Retro-fittable:	Yes
Reference Std:	ADR 14/02 – Rear Vision Mirrors 2006
Notes:	A class V mirror is typically a rectangular shaped convex mirror that is fitted outside and above the passenger-side window. This allows the driver to see down and into the blindspot adjacent to that side of the vehicle. A class VI mirror is a convex circular mirror that can be mounted on the front of both cab-over and bonneted trucks to provide a view of the blindspot across the front of the truck and adjacent to the left steer wheel. On bonneted trucks, this may be referred to a cross-over mirror.
Advantages	The direct view from the driver’s seat and indirect view via other mirrors can still leave blind spots close to the truck. Class V and VI mirror are an inexpensive and reliable way of providing a view into these area. Unlike cameras and screens in the cab, the driver does not have to take his eyes far from road or adjust his focal length to look into a mirror mounted on the outside of the cab.
Disadvantages	Disadvantages are minimal. On bonneted trucks, the mirror may create a small blind spot itself – forward and to the left of the vehicle





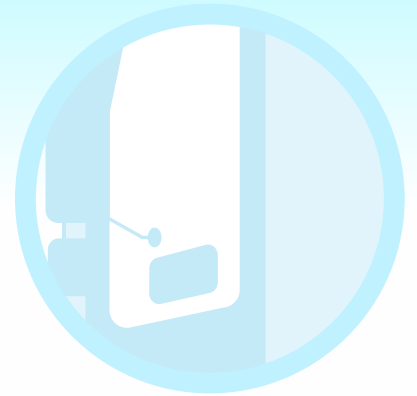
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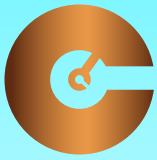
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Reversing Beeper

Standard	Fit a reversing beeper to the truck and/or trailer.
Purpose & method	To enhance the awareness of trucks to Vulnerable Road Users by audible means.
Initial cost	\$100 to \$300
Additional weight	2kgs
Retro-fittable:	Yes
Reference Std:	ADR 42/05 General Safety Requirements 2018
Notes:	Reversing alarms are a critical piece of technology designed to warn anyone in a vehicle's path that it is moving backwards. They are now fitted to most trucks, but few trailers. The original high-pitched electronic "beep - beep" sound has now fallen out of favour because of concerns for environmental impact and noise pollution. 'Quackers' are a much more environmentally friendly and safe alternative, as the sound dissipates at twice the rate of conventional alarms. They also make it easy to tell which vehicle is emitting the sound, using a unique white sound frequency. This sound is more detectable to people wearing hearing protection or earmuffs, and also to people with hearing loss.
Advantages	Reversing alarms are a cheap, reliable and effective method of warning site workers and Vulnerable Road Users that a nearby heavy vehicle is reversing and therefore to to be aware and move out of the way if necessary. The technology is also generally well-known amongst the public.
Disadvantages	All alarms create some noise pollution in urban areas.





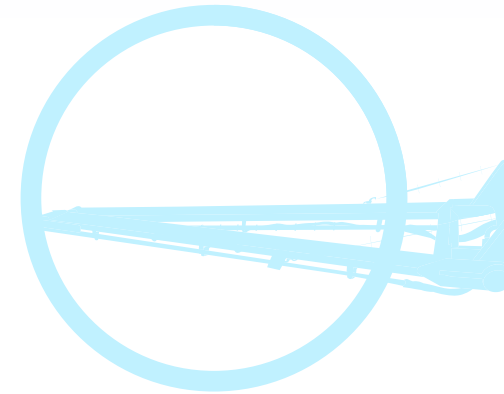
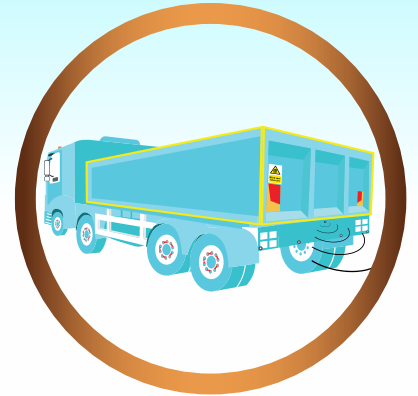
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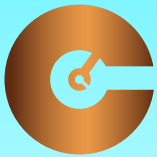
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Conspicuity Marking

Standard	Fit hi-vis retro-reflective conspicuity marking tape to the sides and rear of trucks and trailers.
Purpose & method	To enhance the awareness of trucks to Vulnerable Road Users by visual means
Initial cost	\$1,000 to \$1,500 for a 4-axle truck and dog combination
Additional weight	10kgs
Retro-fittable:	Yes
Reference Std:	ADR13/00 or UN ECE R104. Also refer to ATA Technical Advisory Procedure - Heavy Vehicle Visibility
Notes:	Awareness or “conspicuity” markings on heavy vehicles help to ensure they are more visible, particularly outside of daylight hours. This is best done with special purpose retro-reflective tape that acts similar to a conventional reflector when a light is shone on it. Although individual longitudinal stripes are effective, full contour marking is highly desirable. Colours should always be red on the rear, yellow on the sides and white on the front. See the ATA document noted above for detailed information.
Advantages	Retro-reflective markings improve conspicuity without the need for any kind of power because light from headlamps of approaching vehicles is simply reflected back to the driver. These markings can help prevent accidents on the road, protect pedestrians on site and present a professional company image.
Disadvantages	Disadvantage are minimal, but full contour marking for a large combination vehicle can be expensive.





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Brightly-Coloured Drawbars

Standard	Paint drawbars on dog trailers a very bright colour such as yellow to improve conspicuity of this danger zone.
Purpose & method	To enhance the awareness of trucks to Vulnerable Road Users by visual means
Initial cost	\$250
Additional weight	Zero
Retro-fittable:	Yes

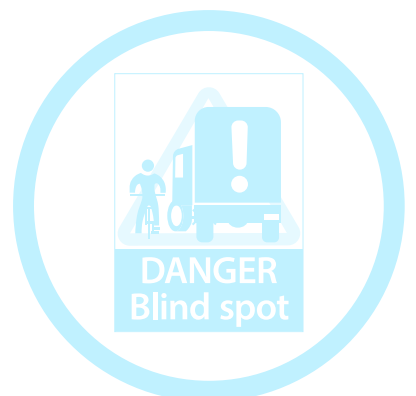
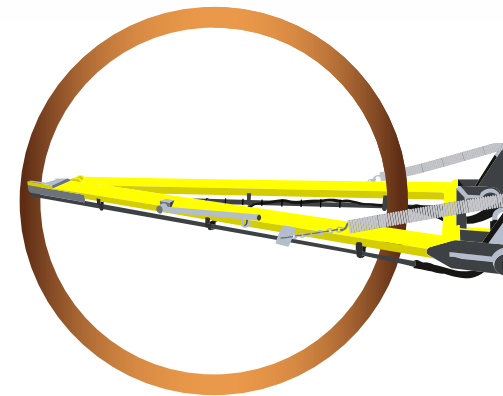
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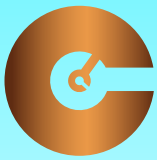
The gap between a truck and dog trailer is not possible to protect with any solid form of side underrun protection. This is a danger zone as some Vulnerable Road Users and other motorists do not always recognise that a trailer is following the truck and can accidentally enter this gap whilst the truck is still moving. The most effective form of defence is to make the drawbar as highly visible and conspicuous as possible. Many drawbars are painted dark colours such as black or grey and therefore difficult to see against the background. Painting drawbars very bright colours such as a bright yellow can dramatically improve conspicuity.

Advantages	Brightly painted drawbars can improve conspicuity without the need for any kind of power or technology. Costs are low and nothing to fall off or breakdown.
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Disadvantages

No disadvantages except the need to initially re-paint existing drawbars, and then re-paint from time to time as the paint wears at the front end of tipper drawbars.





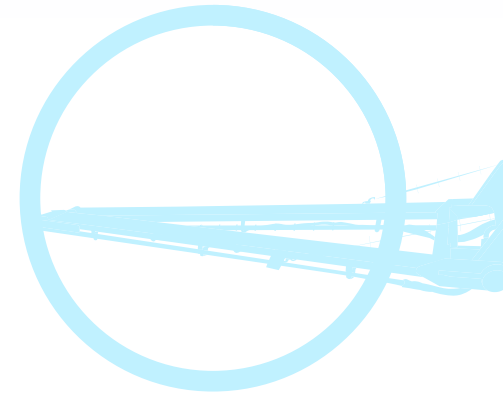
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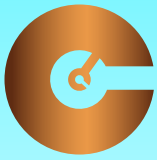
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Warning Signage

Standard	Fit warning signage to the left rear of trucks and trailers to highlight the potential dangers to Vulnerable Road Users. Minimum size of 300mm wide x 400mm high.
Purpose & method	To enhance the awareness of trucks to Vulnerable Road Users by visual means.
Initial cost	\$100
Additional weight	2kgs
Retro-fittable:	Yes
Notes:	These targetted signs are a warning to cyclists and motorcyclists of the potential danger of passing a truck in its blind spot on the left hand side – as it may be about to turn across their path. Signs should be very similar to that shown here to the right. The message is preferably displayed on a flat metal sign
Advantages	Signs are cheap, quick and easy to fit and replace as necessary.
Disadvantages	A cyclist may not be able to see the sign if it is not prominently displayed, cleaned regularly or is surrounded by other signs that cause confusion or distraction. Signs may be less impactful than say audible warnings.





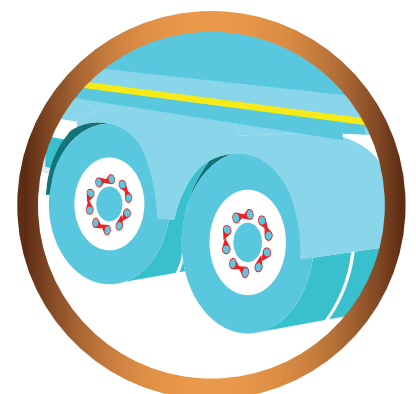
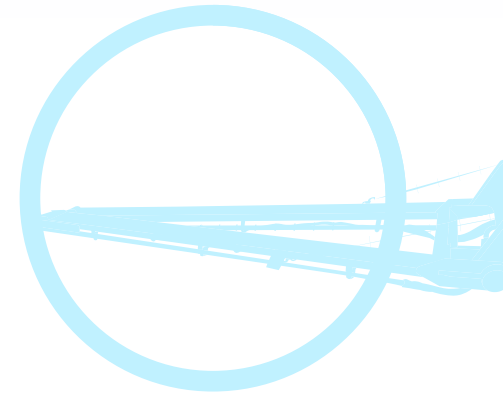
Bronze Standard

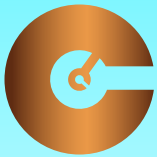
The Minimum Mandatory Standard for all heavy vehicles complying with CLOCS-A technical requirements. Measures and technologies that are relatively low cost and easy to implement.



Wheel-Nut Position Indicators

Standard	Fit wheel-nut position indicators or wheel-nut retainers to all wheels on both trucks and trailers.
Purpose & method	To reduce the likelihood of heavy vehicles being involved in incidents by facilitating regular safety checks.
Initial cost	\$60 to \$200
Additional weight	2kgs
Retro-fittable:	Yes
Notes:	The loss of wheels from trucks or trailers when driving is an extremely hazardous event – particularly in congested environments. Following strict procedures when re-fitting wheels to heavy vehicles and then conducting daily checks of the wheel-nuts is an important safety discipline. Position indicators help to facilitate frequent checks by drivers and retainers help to stop nuts coming off.
Advantages	These plastic devices are cheap, reliable and very effective at identifying a wheel-nut that is coming loose. They will also melt or deform if subject to high temperatures such as those caused by a wheel bearing failure.
Disadvantages	Disadvantages are minimal. They may fall off or the colour may fade over time. It is important not to confuse indicators with retainers. The retainers will not necessarily guarantee that wheel-nuts are prevented from becoming loose.





Bronze Standard

The Minimum Mandatory Standard for all heavy vehicles complying with CLOCS-A technical requirements. Measures and technologies that are relatively low cost and easy to implement.



Rear View Cameras

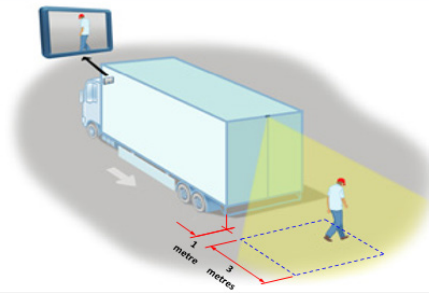
Standard	Fit an in-cab screen and rear-facing camera to the rearmost HV unit (i.e. either the truck or the trailer if a trailer is in use) to monitor the situation behind the vehicle when reversing and/or tipping off.
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Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by implementing things that improve indirect vision.
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Initial cost	\$600 to \$1,000
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Additional weight	5kgs
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Retro-fittable:	Yes
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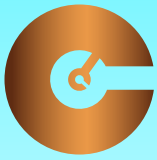
Reference Std:	A minimum visible ground coverage area as indicated in the diagram.
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Notes:	Reversing a heavy vehicle on an active construction site or in any congested environment can be a hazardous activity. Past accidents have resulted in serious injuries and deaths. Cameras designed specifically to provide the driver with a real time image of the area directly behind their vehicle are now considered an indispensable aid in assisting drivers to safely reverse their vehicle or tip off their trailers.
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Advantages	Modern camera systems offer many advantages. The screens are now large, bright and very clear. They can provide the driver with considerable confidence and safety when reversing large vehicles on a building site or in urban environments that may include Vulnerable Road Users near to the vehicle. Considerable damage repair costs can also be avoided as the camera can help eliminate reversing into objects.
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Disadvantages	Initial cost. Ongoing reliability and maintenance costs in a harsh operating environment (like tippers or concrete agitator trucks) are also a factor. Camera-only systems do not actually provide the driver with a warning, but rely on the driver to monitor the screen, interpret the image and respond accordingly.
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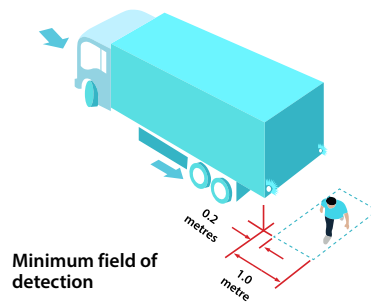
Bronze Standard

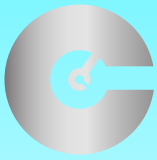
The Minimum Mandatory Standard for all heavy vehicles complying with CLOCS-A technical requirements. Measures and technologies that are relatively low cost and easy to implement.



Reversing Sensors

Standard	Fit a reversing sensor system to the rearmost HV unit (i.e. either the truck or the trailer if a trailer is in use) to monitor the situation behind the vehicle when reversing and/or tipping off.
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by implementing things that improve indirect vision.
Initial cost	\$500 to \$1,500
Additional weight	5kgs
Retro-fittable:	Yes
Reference Std:	A minimum visible ground coverage area as indicated in the diagram.
Notes:	Reversing a heavy vehicle on an active construction site or in any congested environment can be a hazardous activity. Past accidents have resulted in serious injuries and deaths. Sensors systems detect the presence of a person or an object close to the rear of vehicle and alert the driver with an audio-visual alarm.
Advantages	Reverse sensor systems can provide a heavy vehicle driver with considerable confidence and additional safety when reversing large vehicles on a building site or in urban environments that may include Vulnerable Road Users near to the vehicle. Considerable damage repair costs can also be avoided as the system can help to prevent reversing into objects. Unlike cameras, sensors do not rely on the driver monitoring a screen and correctly interpreting an image as the system will provide an alarm.
Disadvantages	Initial cost. Ongoing reliability and maintenance costs in a harsh operating environment (like tippers or concrete agitator trucks) are also a factor. It is important that drivers should not become over-reliant on such systems and remain vigilant in the event that the system fails for some reason.





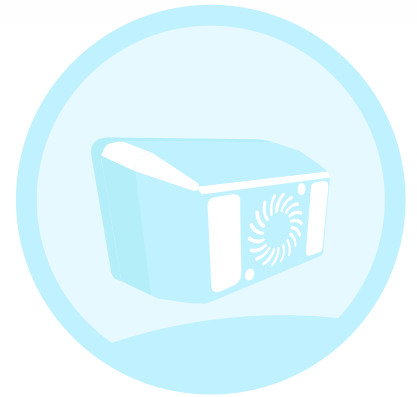
Silver Standard

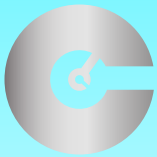
A higher standard of equipment that is preferred for heavy vehicles complying with CLOCS-A technical requirements. Similar to UK CLOCS and broadly aligned to current NSW/Vic govt. major projects.



Daytime Running Lamps

Standard	Have 2 LED daytime running lamps fitted to the front of the truck.
Purpose & method	To enhance the awareness of trucks to Vulnerable Road Users by visual means.
Initial cost	\$350 to \$750
Additional weight	2kgs
Retro-fittable:	Yes
Reference Std:	ADR76/00 Daytime Running Lamps
Notes:	Daytime running lamps are forward facing white lamps, fitted to the front of vehicles. They make the vehicle more conspicuous against its background at times when headlamps are not typically switched on. These white lights on the front of a truck must be fitted in accordance ADR76/00.
Advantages	A reasonably low cost, low tech but reliable and effective means of increasing road safety as they substantially raise the visibility of motor vehicles to other road users.
Disadvantages	The combined cost of parts and fitting may be significant at the higher end.





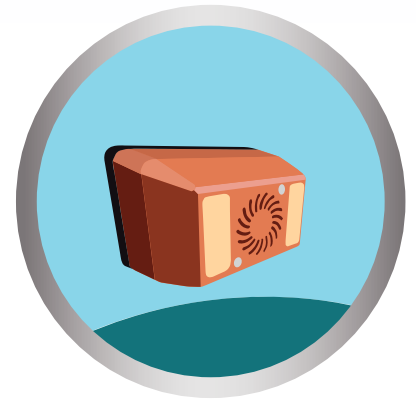
Silver Standard

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Left Turn Audible Warning

Standard	Fit a speed-sensitive left turn indicator that incorporates a recorded (spoken) audible warning message able to be heard by cyclists and pedestrians near the to left side of the vehicle.
Purpose & method	To enhance the awareness of trucks to Vulnerable Road Users by audible means.
Initial cost	\$500
Additional weight	5kgs
Retro-fittable:	Yes



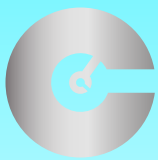
Notes: A left turn audible warning alarm can alert cyclists and pedestrians that a truck is turning left by way of a recorded message or alarm. The message is usually triggered when the vehicle is travelling at below a predetermined speed and the left turn indicator is selected. Some alarms allow the message to be tailored by the owner. In contrast to most form of alarms, this device warns the cyclist and pedestrian rather than the driver.



Advantages This system is unique in that it provides a bespoke audible warning to vulnerable road users, in contrast to other more typical visual measures that may not be picked up if the cyclist or pedestrian is not well-positioned relative to the truck or not paying attention.



Disadvantages May not be able to be heard by motorcyclists wearing a crash helmet. May cause some noise pollution offence in the city if there are a large number of vehicles equipped with these devices.



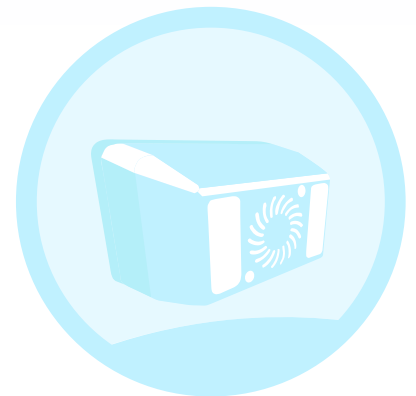
Silver Standard

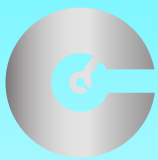
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Front Underrun Protection

Standard	Have trucks over 12 tonne GVM fitted with a conforming Front Underrun Protection Device – FUPD
Purpose & method	To help to reduce the severity of incidents by the fitment of protection devices.
Initial cost	\$2,500 to \$3,000
Additional weight	150kgs
Retro-fittable:	Yes
Reference Std:	ADR 84/00 - Front Underrun Impact Protection 2009
Notes:	ADR 84 requires that a continuous barrier be provided at the front of trucks that can withstand certain minimum crash forces. These are called a Front Underrun Protection Device (FUPD). They have been mandatory on all new trucks (over 12 tonne) in Australia since the 1st Jan 2011 for new models and since 1st Jan 2012 for all models. Maximum height off the ground is 400mm.
Advantages	<p>Conforming FUPDs fitted to trucks:</p> <ul style="list-style-type: none"> • ensure that crash forces are evenly distributed across the front of the truck • can help to minimise injuries by preventing smaller vehicles from going underneath the front of trucks in the event of an accident, and • prevent the car damaging the truck’s steering - allowing the truck to be brought to a controlled stop.
Disadvantages	Disadvantages relate to additional tare weight and cost and a slight reduction in ground clearance at the front of the truck.





Silver Standard

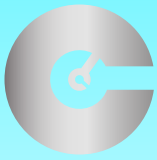
A higher standard of equipment that is preferred for heavy vehicles complying with CLOCS-A technical requirements. Similar to UK CLOCS and broadly aligned to current NSW/Vic govt. major projects.



Side Underrun Protection Device – Trucks

Standard	Have trucks fitted with Side Underrun Protection Devices – SUPD
Purpose & method	To help to reduce the severity of incidents by the fitment of protection devices.
Initial cost	\$1,500 to \$2,200
Additional weight	Up to 100kgs
Retro-fittable:	Yes
Reference Std:	ATA Technical Advisory Procedure – Side Underrun Protection, and UN-ECE-R73
Notes:	Side Underrun Protection Devices (SUPD) or Lateral Protection Devices (LPD) are either solid panels or horizontal bars that occupy larger spaces between axle groups on a heavy vehicle.
Advantages	Side Underrun Protection Devices (SUPDs) reduce the likelihood of pedestrians, cyclists and motorcyclists from falling under the sides of a heavy vehicle and being run over by the rear wheels. The devices also provide surface area for the fitment of conspicuity marking.
Disadvantages	Disadvantages relate to additional tare weight and cost, and reduced accessibility to some equipment that may be directly behind the device. It is important that the devices do not interfere with the vehicle’s functionality when installed.





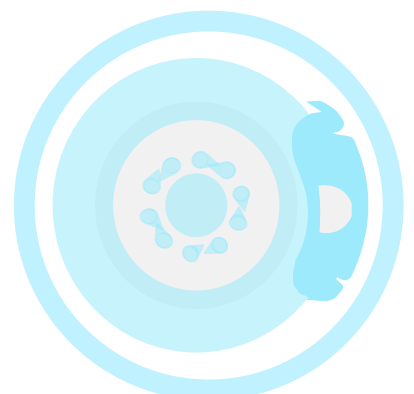
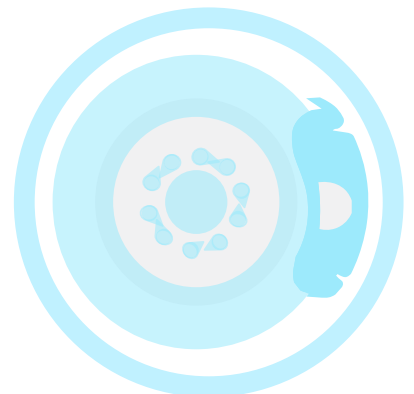
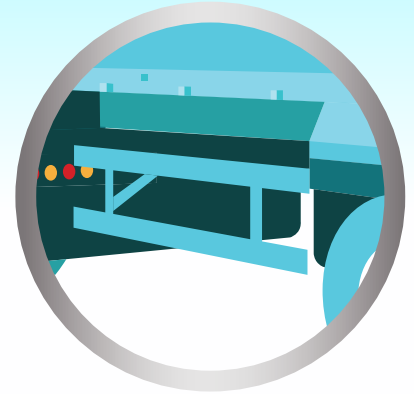
Silver Standard

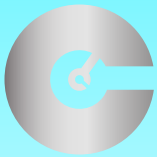
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Side Underrun Protection Device – Trailers

Standard	Where a trailer is included in a heavy vehicle combination, have the trailer fitted with Side Underrun Protection Devices – SUPD.
Purpose & method	To help to reduce the severity of incidents by the fitment of protection devices.
Initial cost	\$2,500 to \$3,500
Additional weight	Up to 150kgs
Retro-fittable:	Yes
Reference Std:	ATA Technical Advisory Procedure – Side Underrun Protection, and UN-ECE-R73
Notes:	Side Underrun Protection Devices (SUPD) or Lateral Protection Devices (LPD) are either solid panels or horizontal bars that occupy larger spaces between axle groups on a heavy vehicle. They may have high-vis markings fitted for additional conspicuity and/or warning signage intended for Vulnerable Road Users.
Advantages	Side Underrun Protection Devices (SUPDs) reduce the likelihood of pedestrians, cyclists and motorcyclists from falling under the side of a vehicle and being caught under the wheels. The devices provide surface area for the fitment of conspicuity marking. Well-designed solid panel versions can also offer improvements in aerodynamics and fuel consumption.
Disadvantages	Disadvantages relate to additional tare weight and cost, and reduced accessibility to some equipment that may be directly behind the device. Can be quite long for semi-trailers. It is important that the devices do not interfere with the trailer’s operation and functionality when installed.





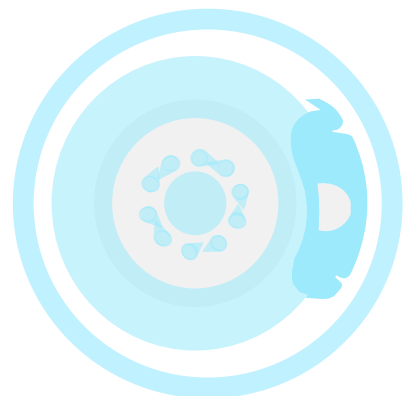
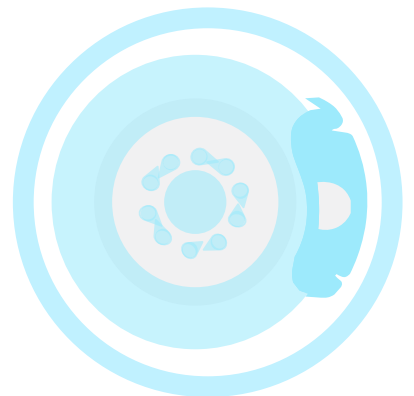
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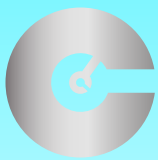
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Rear Underrun Protection

Standard	Have the rearmost HV unit (i.e. either the truck or the trailer if a trailer is in use) fitted with a compliant Rear Underrun Protection Device – RUPD.
Purpose & method	To help to reduce the severity of incidents by the fitment of protection devices.
Initial cost	\$1,000
Additional weight	Up to 100kgs
Retro-fittable:	Yes
Reference Std:	ADR 91/00 - Rear Underrun Impact Protection 2018. This ADR only applies to all Medium (TC) and Heavy (TD) semi-trailers manufactured on or after 1st July 2019.
Notes:	Rear Underrun Protection Devices (RUPD) are continuous rear bumpers on heavy vehicles that conform with prescribed dimension and strength requirements set out in the ADR . Note that Clause 5.1 (c) of the Standard states that “where the rearmost point of the tyres is within 600mm of the rear end of the vehicle, the tyres will be considered as meeting the requirements over their width”.
Advantages	RUPDs help to minimise the risk of injury in the event of smaller vehicles underrunning heavy vehicles in rear end crashes. If the barrier has energy absorbing properties then the crash deceleration forces may be significantly reduced.
Disadvantages	Disadvantages relate to additional tare weight and cost, however these devices have been mandatory on trailers now for a very long time.





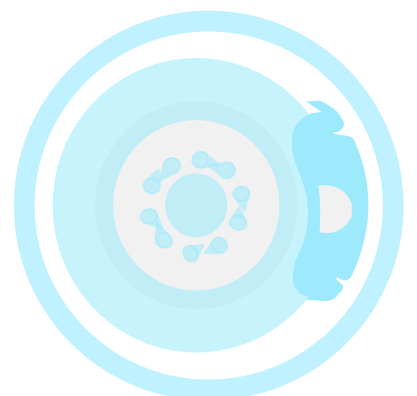
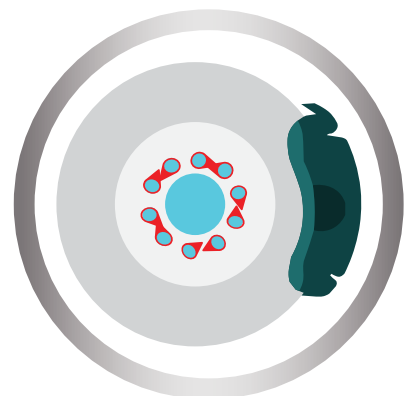
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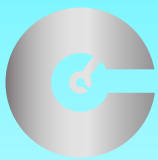
A higher standard of equipment that is preferred for heavy vehicles complying with CLOCS-A technical requirements. Similar to UK CLOCS and broadly aligned to current NSW/Vic govt. major projects.



Anti-lock Braking System – Trucks

Standard	Have trucks fitted with an Anti-lock Braking System – ABS
Purpose & method	To reduce the likelihood of heavy vehicles being involved in incidents via advanced electronic driving aids.
Initial cost	\$2,500 to \$3,000
Additional weight	10kgs
Retro-fittable:	No
Reference Std:	ADR 35/ 06 - Commercial Vehicle Brake Systems 2018
Notes:	Antilock Braking Systems (ABS) emerged more than 20 years ago and were designed to prevent wheel lock up during braking thus assist the driver to maintain directional control of the vehicle, particularly on wet or slippery roads surfaces.
Advantages	In emergency stops, ABS has proven to be highly effective and is widely accepted as an invaluable safety feature. It has been mandatory on all new trucks in Australia since 1 July 2015, but has been fitted to most new trucks by default since 2008 in conjunction with the ADR 80/02 (Euro IV) emission control package.
Disadvantages	ABS was not designed to reduce stopping distances and under some circumstances may increase it. The laws of physics still apply and ABS cannot necessarily maintain control in all circumstances. The driver must drive to the prevailing conditions and not simply rely on enhanced safety systems to manage inappropriate speed.





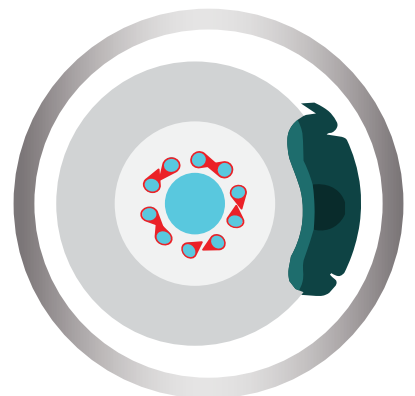
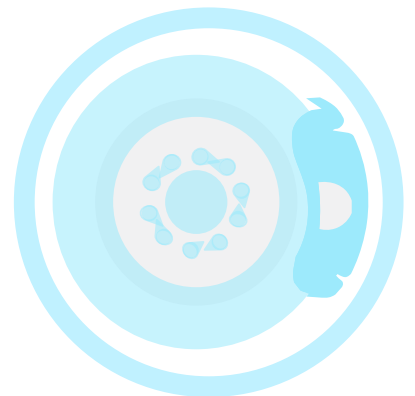
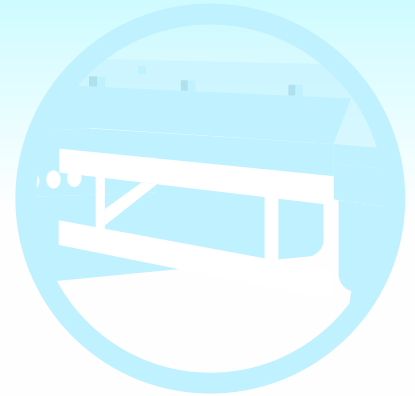
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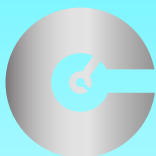
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Anti-lock Braking System – For Trailers

Standard	Where a trailer is included in a heavy vehicle combination, have the trailer fitted with an Anti-lock Braking System – ABS.
Purpose & method	To reduce the likelihood of heavy vehicles being involved in incidents via advanced electronic driving aids.
Initial cost	\$5,000 to \$7,000
Additional weight	10kgs
Retro-fittable:	Yes
Reference Std:	ADR 38/05 - Trailer Brake Systems 2018
Notes:	Anti-lock Braking Systems (ABS) emerged more than 20 years ago and were designed to prevent wheel lock up during braking thus assist the driver to maintain directional control of the vehicle, particularly on wet or slippery roads surfaces.
Advantages	In emergency stops, ABS has proven to be highly effective and is widely accepted as an invaluable safety feature. By eliminating trailer wheel lock-up the system helps to reduce the occurrence of trailer swing and jack-knifing. It has been mandatory on all new trailers in Australia since November 2019.
Disadvantages	Relatively expensive compared to other measures. ABS was not designed to reduce stopping distances and under some circumstances may increase it. The laws of physics still apply and ABS cannot necessarily maintain control in all circumstances. The driver must drive to the prevailing conditions and not simply rely on enhanced safety systems to manage inappropriate speed.





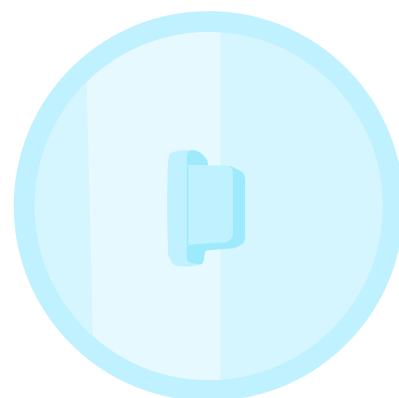
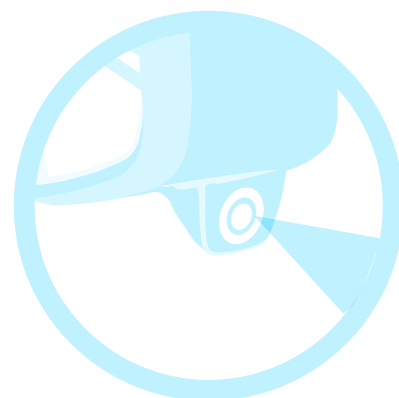
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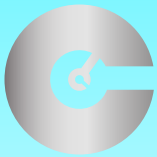
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ADR 80/03 Emission Standards (EuroV)

Standard	The use of post-2010 model trucks with engines that comply with ADR 80/03 emission standards.
Purpose & method	To reduce the impact of heavy vehicle exhaust emissions on the Australian public by the adoption of vehicles that comply with more stringent regulations.
Initial cost	All new trucks sold in Australia must be at least ADR 80/03 compliant.
Additional weight	50kgs to 100kgs
Retro-fittable:	No
Reference Std:	ADR 80/03 - Emission Control for Heavy Vehicles 2006
Notes:	Noxious emissions from road vehicles reduce urban air quality, leading to illness and premature deaths among Australians. The current emission standards for all new heavy vehicles sold in Australia are set out in ADR 80/03. This was mandated for new trucks in 2010/11. The standard lists alternate or technically equivalent Japanese MLIT, UN or US EPA regulations.
Advantages	Replacing older trucks with post-2010 vehicles that comply with ADR 80/03 emission standards will contribute to a reduced incident of disease and premature deaths attributable to air pollution compared with older vehicles that only conform to lower standards.
Disadvantages	Vehicles that meet ADR 80/03 standards have additional technology that adds weight, takes space and may use more fuel. Disadvantages may include additional capital costs, productivity losses (due to higher tare weight), fuel costs, diesel exhaust fluid costs, and greenhouse gas emissions.





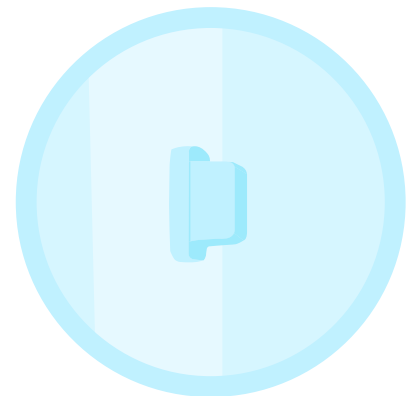
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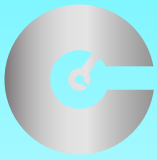
Left-Side Blind Spot Camera

Standard	Fit a camera system and in-cab screen to the vehicle to monitor the presence of left-side blind spot objects
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by implementing things that improve indirect vision.
Initial cost	\$600 to \$3,000
Additional weight	10kgs
Retro-fittable:	Yes
Notes:	Blind spot cameras provide images of areas close to a truck or trailer which are usually hidden from the driver. Drivers can observe the monitor and take evasive action as necessary. Sophisticated systems can now have multiple cameras and split screens on the monitor. Footage can be recorded and held and even relayed back to the depot in real time.
Advantages	Cameras now offer many advantages. The screens are now large, bright and clear. They can provide the driver with considerable confidence when driving large trucks in urban environments that may include Vulnerable Road Users near to the vehicle. Recorded footage (from several cameras) can have time, location and speed stamping, and may used to determine responsibility in an accident.



Disadvantages

As a result of increasing sophistication and capability, cameras systems can become expensive at the high end. Ongoing reliability and maintenance costs are also a factor. The presence of the in-cab monitor may be a source of driver distraction.



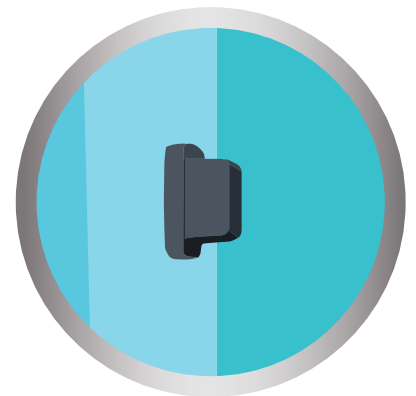
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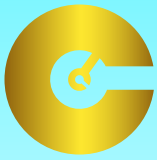


Left-Side Proximity Sensors

Standard	Fit a proximity sensor and alarm system to the vehicle to monitor the presence of left-side blind spot objects.
Purpose & method	To enhance the visibility and awareness of Vulnerable Road Users to the driver by implementing things that improve indirect vision.
Initial cost	up to \$2,000
Additional weight	5kgs
Retro-fittable:	Yes
Notes:	Proximity sensors can be mounted to the side of a truck, and detect when an object has entered the driver's blind spot. These systems will provide an audible and/or visual alert to the driver. The visual alert may be a "traffic light" system where a green, amber or red light is displayed dependent on how close an object is to the sensor. An audible alarm may sound if the object is very close to the sensor.
Advantages	Compared to a blind spot camera system, proximity sensors offer the advantage of not requiring the driver to continually monitor a screen. They are only activated when an object comes into range. Some systems mount the warning lights on the left hand A-pillar, which pairs them up with the left door rear view mirror. This improves the overall quality of information. Proximity sensors are typically less expensive than camera systems.



Disadvantages Proximity sensors do not inform the driver if the object is a car, truck, cyclist, motorcyclist or pedestrian. In traffic, proximity sensors can be triggering continually. They provide no evidence in the event of an accident.



Gold Standard

The highest standard of equipment that is being sought for heavy vehicles complying with CLOCS-A technical requirements. Encourages leading safety technologies & to future-proof vehicles.

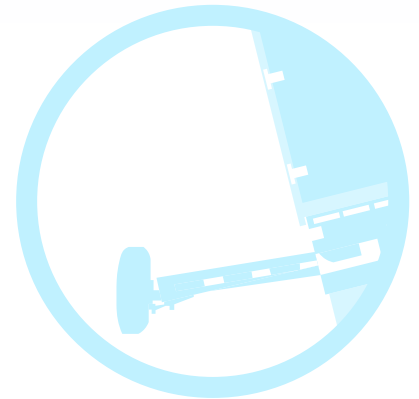


Telematics

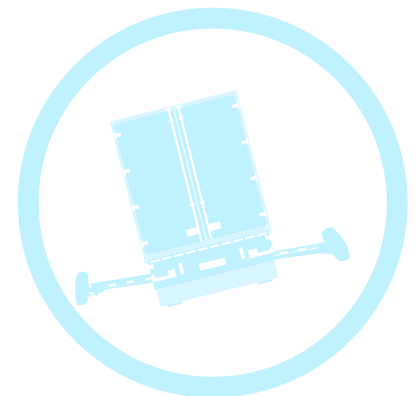
Standard	Fit a telematics system to the truck with position monitoring, driver behaviour monitoring and fatigue management.
Purpose & method	To reduce the likelihood of heavy vehicles being involved in incidents via advanced electronic driving aids.
Initial cost	
Additional weight	2kgs
Retro-fittable:	Yes



Notes: Telematics relates to the exchange of data and information to and from a vehicle. It is now a powerful technology that provides businesses with an opportunity to remotely supervise drivers and provide a wide range of real-time information including – location, speed and direction of travel, driver behaviour such as harsh cornering and braking, loaded or unloaded status, automatic calculation of driving time and the upcoming need for rest breaks for fatigue management purposes.

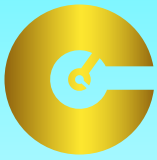


Advantages Telematics can provide very distinct advantages in the areas of tracking, communications, scheduling, route optimisation, maintenance planning, fatigue management and driver safety via behaviour monitoring and coaching. Similar to the benefits offered by modern automated transmissions in trucks, telematics can allow drivers to concentrate more on the driving and less on the distractions.



Disadvantages Telematics can have some significant initial and on-going (monthly) costs. Systems will always require maintenance and upgrades. Management needs to allocate time to monitor and manage the flow of information to extract the benefits. Requires IT capabilities within the business.





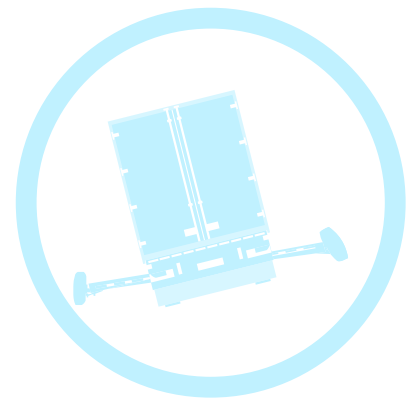
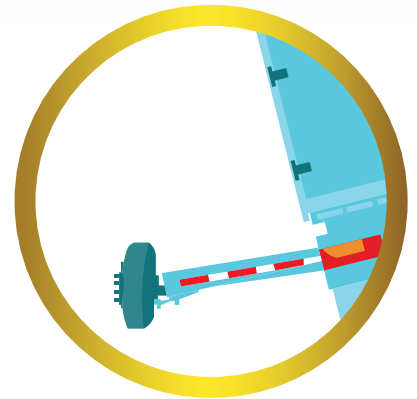
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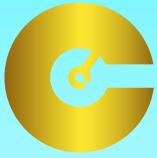
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Electronic Stability Control – Trucks

Standard	Have trucks fitted with an Electronic Stability Control system – ESC.
Purpose & method	To reduce the likelihood of heavy vehicles being involved in incidents via advanced electronic driving aids.
Initial cost	\$3,000
Additional weight	10kgs
Retro-fittable:	No
Reference Std.	ADR 35/06 - Commercial Vehicle Brake Systems 2018
Notes:	Electronic Stability Control (ESC) is an active vehicle safety system that continuously monitors the speed and lateral acceleration of the vehicle and compares it to the critical threshold at which point rollover may occur. When this threshold is approached the roll stability function intervenes to slow the vehicle by reducing engine torque, engaging the engine retarder and automatically applying the braking systems. Frequently, system activation takes place before the driver is even aware of the need.
Advantages	If a driver enters a corner too fast for the conditions, an ESC system will automatically intervene and help to prevent a rollover or at least reduce the severity of the incident. ESC also has YAW correction function, which can correct an oversteer or understeer situation, where the vehicle path deviates from the drivers desired path. As of Jan 1 2022, this is now a mandatory ADR requirement on all new 2 and 3 axle heavy vehicles sold in Australia.
Disadvantages	ESC cannot prevent all rollover crashes. The driver must drive to the prevailing conditions and not simply rely on enhanced safety systems to manage inappropriate speed. The fitment of “smart braking systems” to heavy vehicles is a complex area, particularly in relation to truck – trailer compatibility. Refer to the Technical Advisory Procedure produced by the Australian Trucking Association for “RSC and ESC systems for trucks and trailers” for information and guidance.



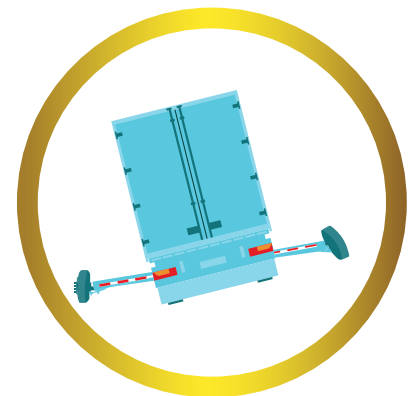
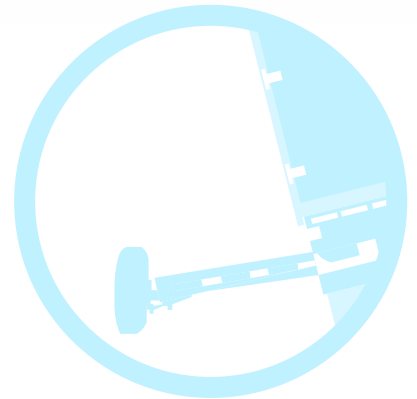


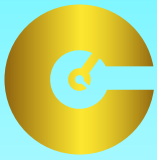
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Roll Stability Control – Trailers

Standard	Where a trailer is included in a heavy vehicle combination, have the trailer equipped with a Roll Stability Control system – RSC.
Purpose & method	To reduce the likelihood of heavy vehicles being involved in incidents via advanced electronic driving aids.
Initial cost	\$3,000 when fitted from new
Additional weight	10kgs
Retro-fittable:	Yes, but with qualifications
Reference Std.	ADR 38/00 - Trailer Brake Systems 2006
Notes:	Roll Stability Control (RSC) is an active vehicle safety system that continuously monitors the speed and lateral acceleration of the vehicle and compares it to the critical threshold at which point rollover may occur. When the critical threshold is approached, the roll stability function intervenes to slow the vehicle by automatically applying the braking system.
Advantages	If a driver enters a corner too fast for the conditions, a Roll Stability Control system will automatically intervene and help to prevent a rollover or at least reduce the severity of the incident. RSC has been mandatory on all new large trailers sold in Australia since Nov 2019.
Disadvantages	Relatively expensive compared to other measures. The laws of physics still apply and a Roll Stability Control system cannot prevent all rollover crashes. The driver must drive to the prevailing conditions and not simply rely on enhanced safety systems to manage inappropriate speed. Refer to the Technical Advisory Procedure produced by the Australian Trucking Association for “RSC and ESC systems for trucks and trailers” for information and guidance.





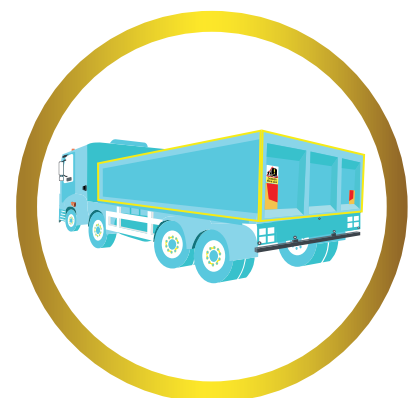
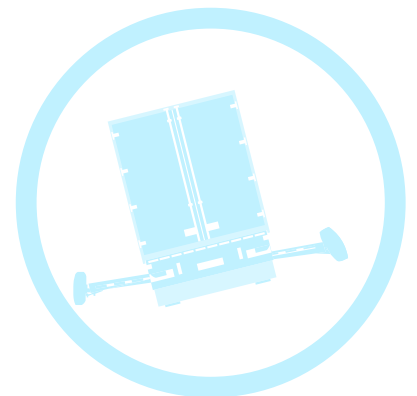
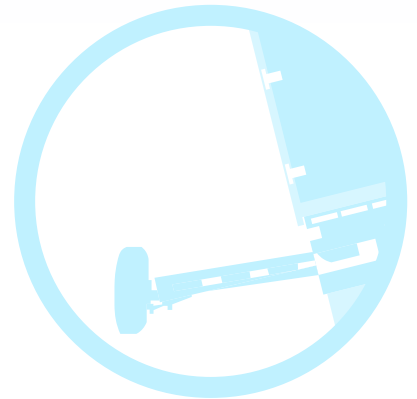
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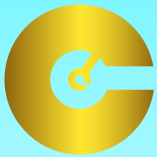
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Advanced Emergency Braking

Standard	Have trucks fitted with an Advanced Emergency Braking System – AEBS.
Purpose & method	To reduce the likelihood of heavy vehicles being involved in incidents via advanced electronic driving aids.
Initial cost	\$3,000
Additional weight	10kgs
Retro-fittable:	No
Reference Std.	ADR97/00 - Advanced Emergency Braking for Omnibuses and Medium and Heavy Goods Vehicles 2022
Notes:	A significant amount of accidents involving heavy vehicles are rear-end collisions. AEBS uses radar and camera imaging to identify a frontal hazard. If the system detects a likely collision ahead, it gives the vehicle's driver a warning. If the driver does not respond, the brakes are automatically applied in an attempt to bring the truck to rest before impacting the object. Some advanced systems are also capable of detecting and protecting vulnerable road users such as pedestrians and cyclists.
Advantages	Helps to avoid rear-end collisions and mitigates accident damage. Research suggests that AEBS fitted to heavy vehicles may prevent around 25 per cent of fatal heavy vehicle crashes. 84 percent of rear-end crashes occur in urban areas - so particularly relevant to CLOCS-A. When applied as part of an Adaptive Cruise Control (ACC) system it will help drivers to maintain safe following distances on highways.
Disadvantages	Disadvantages are minimal. The system cannot be retro-fitted. It adds some expense to the initial cost of a new truck and often comes as part of a wider package of electronic aids such LDWS.





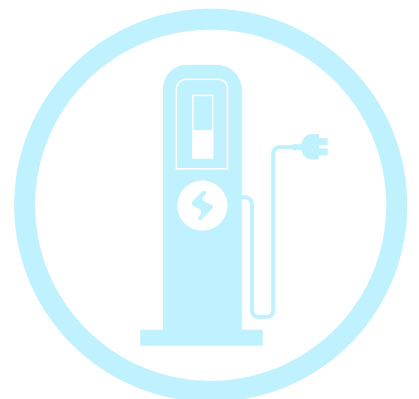
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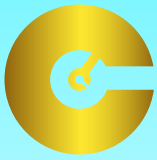
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Autonomous Reverse Braking

Standard	Have vehicles fitted with an Autonomous Reverse Braking system – ARB.
Purpose & method	To reduce the likelihood of heavy vehicles being involved in incidents via advanced electronic driving aids.
Initial cost	\$4,500 to \$5,500
Additional weight	10kgs
Retro-fittable:	Yes
Reference Std.	UN Regulation No. 158 - Devices for means of rear visibility or detection
Notes:	Collisions involving a reversing vehicle and site worker, pedestrian or another vulnerable road user (such as a cyclist or motorcyclist) result in significant trauma and associated costs. An Autonomous Reverse Braking System can use technology to provide a level of protection by autonomously applying the brakes if an object (including a person) or crash threat is detected. After several seconds the brakes are released again so the final distance to a dock or similar can be achieved.
Advantages	ARB helps to prevent reversing collisions with VRUs or objects. Systems can operate in light or darkness, provide an initial audible warning to the driver, recognize fixed or moving objects, and apply the brakes autonomously. After the vehicle has been brought to a stop, the driver can then decide if a check behind the vehicle is necessary before continuing. Systems can be retrofitted and can be applied to both rigid vehicles and combinations.
Disadvantages	Initial cost of the system is significant. To retrofit an ARB system, trailers will require TEBS, but trucks can be ABS or EBS, 12 volt or 24 volt. It is important that drivers should not become over-reliant on such systems and remain vigilant in the event that the system fails for some reason.





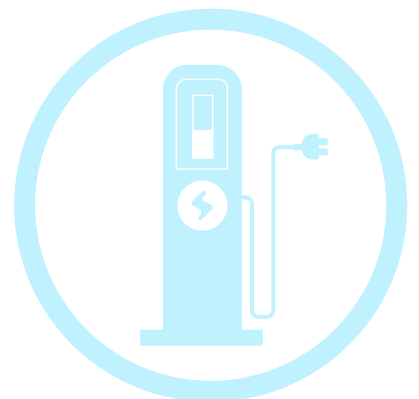
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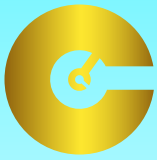
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ADR 80/04 Emission Standards (Euro VI)

Standard	The use of trucks with engines that comply with ADR 80/04 emission standards.
Purpose & method	To reduce the impact of heavy vehicle exhaust emissions on the Australian public by the adoption of vehicles that comply with more stringent regulations.
Initial cost	\$10K to \$15K above a Euro V-spec vehicle.
Additional weight	100kgs to 150kgs
Retro-fittable:	No
Reference Std.	“Draft” ADR80/04 - Emission Control for Heavy Vehicles 2023
Notes:	Noxious emissions from road vehicles reduce urban air quality, leading to illness and premature deaths among Australians. Current noxious emission standards in Australia are set out in ADR 80/03. The more stringent ADR 80/04 standards for heavy vehicles have been approved by Parliament and posted on the Federal Register of Legislation. This will require new models to comply with the standard from 1st Nov 2024 and all new vehicles sold from 1st Nov 2025. The new standard lists alternate or technically equivalent Japanes MLIT, UN or US EPA regulations.
Advantages	Purchasing and using new vehicles complying with ADR 80/04 emission standards will contribute to a reduced incident of disease and premature deaths attributable to air pollution. The majority of health benefits will accrue in major cities where 71% of the population resides and average level of exposure to noxious emissions from road vehicles is greater. This will also have an indirect benefit to governments by reducing pressure on the public health system.
Disadvantages	Vehicles that meet ADR 80/04 standards have additional technology that adds to the purchase price, complexity and tare weight of a new truck and takes up some extra chassis space. Not all truck suppliers and brands can offer an ADSR 80/04 option in Australia yet.





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Zero Emission Vehicles

Standard	The use of trucks with a zero emission drive train.
Purpose & method	To reduce the impact of heavy vehicle exhaust emissions on the Australian public by the adoption of vehicles that comply with more stringent regulations.
Initial cost	Significant, but highly variable.
Additional weight	Significant, but highly variable
Retro-fittable:	No

Reference Std:	ADR 109/00 - Electric Power Train Safety Requirements 2023 ADR 110/00 - Hydrogen Fuelled Vehicle Safety Related Performance 2023 UN Regulation No. 138/01 - Acoustic Vehicle Aert Systems
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Notes:	<p>Noxious emissions from road vehicles reduce urban air quality, leading to illness and premature deaths among Australians. Greenhouse gases from road vehicles are also a major contributor to global warming and climate change. The potential benefits offered by zero emission vehicles represent a huge step forward.</p> <p>Current viable drivetrain options for this technology are either battery electric or hydrogen fuel cells.</p> <p>Relevant to the objectives of CLOCS-A is the fact that it is harder to hear electric vehicles travelling at lower speeds. This represents a danger for Vulnerable Road Users. In response, Acoustic Vehicle Alerting Systems (AVAS) have been developed to provide an artificial vehicle noise at lower speeds. AVAS will be mandatory for CLOCS-A heavy vehicles fitted with a zero emission drive train.</p>
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Advantages	<p>Advantages offered by zero emission vehicles include:</p> <ul style="list-style-type: none"> • Better air quality by the elimination of both toxic emissions and greenhouse gases • Reduced noise pollution for both the driver and the public • The ability to deliver into the city and residential areas at night due to the silent engines • The ability to safely go inside buildings without the fear of toxic fumes • Enhanced energy security for the country via not having to rely on imported fossil fuels
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