



Submission from the Pastoralists and Graziers Association (PGA)

Public consultation on AS 7531:2025 Rolling Stock Lighting and Visibility

Introduction

The Pastoralists and Graziers Association (PGA) welcomes the opportunity to comment on the draft AS 7531:2025 Rolling Stock Lighting and Visibility.

Our members operate heavy vehicles, including road trains and agricultural machinery, across regional and remote Western Australia and routinely use public roads that intersect rail corridors at level crossings. Rail–road interfaces are a major risk for our members, their employees, and the broader community, particularly where crossings are passive or in low-visibility conditions.

We acknowledge that this draft AS-7531 represents a substantial improvement over earlier versions, particularly through the inclusion of luminance-contrast concepts, visibility design principles and more detailed appendices.

However, the standard still falls short of the visibility and warning standards applied to heavy road vehicles in Australia, and therefore does not yet meet the Rail Safety National Law requirement that train operations be as safe “so far as is reasonably practicable” (SFAIRP) for road users.

Our comments focus on safety at level crossings and the experience of road users, especially heavy-vehicle operators.

Overall concern: Rail standards are significantly lower than standards required for heavy road vehicles

Heavy vehicles operating on public roads are subject to the Australian Design Rules (ADRs), which mandate minimum lighting and reflector performance, installation locations and geometric visibility, including for marker lamps, side lamps and warning lamps. National and state guidance reinforces that all compulsory lights and reflectors must remain operational.

In practice, **for road vehicles** this means:

- Trucks and trailers must have front and rear position lamps, side marker lamps and rear marker lamps that meet defined intensity, colour and field-of-view criteria (ADR 49/00).
- Lamps and reflectors must be installed and oriented so their effective operation is not impaired, including visibility from representative observation angles around the vehicle (ADR 13/00).

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- Oversize and special-purpose vehicles habitually use high-intensity flashing amber beacons, conspicuity markings and, where needed, escort vehicles to warn other road users.

By contrast, the draft **AS 7531 for rolling stock**:

- Treats forward-facing visibility beacons and side lights as optional (“should be fitted”) rather than mandatory, despite their clear role in making long trains detectable to road users.
- Limits reflective delineators to Class 1100 material and has removed a previous requirement for 180° visibility, even though the performance of Class 1100 at oblique angles is poor and many rural roads intersect tracks at acute angles.
- Permits relatively low minimum flash rates (40 flashes per minute) for visibility lights and beacons that may be inadequate as attention-getting devices in bright rural conditions.

It is inconsistent and unjustifiable that articulated trucks and slow-moving agricultural machinery are held to higher, more prescriptive visibility and hazard-warning standards than kilometre-long freight trains and passenger trains operating across public roads.

We therefore submit that **AS 7531 must be upgraded to at least the minimum visibility standard applied to heavy road transport to satisfy SFAIRP.**

It would be difficult to accept any claim by a major industry such as rail that these visibility requirements are beyond what is “reasonably practicable”. We consider that the Australian rail industry should be setting world-leading safety standards and striving for the highest practicable level of safety at all times.

Specific comments and recommendations by section

- **Section 2 – Visibility design principles**

We strongly support the increased emphasis on luminance contrast and environmental conditions in Sections 2.2–2.4 and Appendix H. However, Appendix H and associated thresholds depend heavily on an unpublished Monash Institute of Railway Technology report (Development of Contrast Standards for Visibility, 2025), without which users cannot fully understand or challenge the basis of the thresholds.

Recommendations:

1. Publish or make accessible the Monash MIRT report and reference it explicitly in the Bibliography so that road-safety and human-factors experts outside the rail industry can review the methods and conclusions.
2. Explicitly recognise any limitations or assumptions in the underlying research within Appendix H, including how contrast thresholds were chosen relative to real-world driver detection and reaction requirements at level crossings.

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- **Sections 3 and Appendix F – Headlights**

Appendix F appropriately explains that train headlights are primarily aimed to assist train crew in seeing the track, signalling and obstructions, rather than to act as the primary warning device to road users. This is consistent with the photometric focus of §3.2, but it highlights the need for separate, dedicated conspicuity devices for the benefit of road users—just as ADRs distinguish between dipped-beam headlamps for road seeing and DRLs or marker lamps for conspicuity.

Recommendations:

1. Clarify in Appendix F that headlights are not to be considered sufficient on their own to provide adequate conspicuity of trains to road users at level crossings, and that they must be complemented by visibility lights, beacons, side lights and high-performance reflectors.
2. Add a cross-reference from §3 to §4.7 (visibility beacons) and §4.8 (side lights) indicating that overall conspicuity at level crossings must be demonstrated using the luminance-contrast framework, not just headlight candela values.

- **Section 4.6 – Forward visibility lights - flashing**

The 2025 draft relaxes a previous requirement that visibility lights flash when the horn is sounded, instead stating that flashing will occur only “where visibility lights are arranged to flash when the horn is sounded”. This weakens an important warning mechanism.

The current permitted flash-rate range (40–180 flashes per minute) allows for very low rates that may not draw drivers’ attention quickly enough at higher approach speeds, especially in bright daylight. In other industries and on road vehicles, warning beacons commonly use flash rates around 1.5–2 Hz to maximise attention while avoiding flicker discomfort.

Recommendations:

1. Reinstate and strengthen the requirement so that forward visibility lights shall flash in a wigwag pattern when the horn is sounded, regardless of whether they are otherwise on or off, except where explicitly prohibited by local road-traffic regulations.
2. Increase the minimum allowable flash rate to at least 120 flashes per minute (≈ 2 Hz) for visibility lights used as warning devices at level crossings, with 180 flashes per minute retained as an upper bound.
3. Require that flash rates for all warning lights on a consist (visibility lights, beacons, EoTM/EoTD) be chosen and synchronised with the explicit objective of maximising detectability for road users while avoiding glare to train crews and road traffic.

- **Section 4.7 – Forward-facing visibility beacons**

The introduction of forward-facing visibility beacons is a major positive step, supported by operational practice on sugar-cane trains and by recent research showing improved detection of trains with additional beacon lighting, particularly at obtuse crossings and close ranges. However,

treating beacons as optional (“should be fitted”) is inconsistent with the risk profile and with heavy-vehicle practice where oversize trucks routinely use mandatory amber warning beacons.

Recommendations:

1. Change §4.7 so that forward-facing visibility beacons must be fitted to the lead vehicles of trains operating over public level crossings and must operate whenever the train is approaching or occupying a level crossing, unless specifically prevented by local environmental constraints (e.g. light-pollution regulations).
2. Set a minimum flash rate of 120 flashes per minute for beacon operation when used as a warning device at crossings, with upper bounds retained to manage glare and discomfort.
3. Expand Commentary C4.7-1 to refer to “poor light conditions such as foggy weather, dawn and dusk, dusty conditions, and rain”, in line with the environmental conditions already recognised in §2.1 and C2.4.
4. Require that beacons’ photometric performance be validated not just in nominal candela terms but against the luminance-contrast thresholds for relevant viewing angles defined in Appendix H.
5. Add a new informative appendix (Appendix “I”) describing the purpose, target user groups, operational scenarios, and examples of beacon configurations, similar to Appendices F and G for headlights and visibility lights.

- **Section 4.8 – Side lights**

The addition of side lights is welcome and clearly aligned with how side marker lamps are used on heavy vehicles to define vehicle length and position. However, leaving side lights as a mere recommendation (“should be fitted”) under-recognises their critical role in enabling road users to detect trains from the side at night and in low visibility.

Heavy vehicles must have side marker lamps and reflectors spaced to outline the vehicle; trains, which are much longer and can block crossings for longer periods, should not have a weaker standard.

This is particularly critical for freight and grain trains, which can extend to around one kilometre in length, meaning the locomotive headlight ceases to provide any useful warning once it has passed the crossing and only high-visibility, high-contrast side lighting allows road users to detect the continuing presence of the train.

Recommendations:

1. Change §4.8 so that side lights must be fitted along both sides of all locomotives, passenger vehicles and freight wagons operating across public level crossings and must operate whenever the train is moving or occupying a crossing.
2. Consider increasing the minimum number of side lights per vehicle beyond three for very long wagons, or tie spacing requirements to vehicle length akin to ADR 13’s spacing of side marker lamps.

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3. Add a new informative appendix describing the purpose of side lights, target groups (road users, track workers), interaction with reflective delineators, and recommended operational practices, similar to Appendices F and G.

- **Section 11 – Livery and Section 12 – Reflective delineators**

We support the stronger emphasis on high-visibility livery with explicit contrast requirements and the discouragement of camouflaging colours. However, the reflective delineator specification in §12 remains weaker than heavy-vehicle practice, particularly in its reliance on Class 1100 material and removal of the earlier 180° viewing-arc requirement.

Given that heavy trailers are expected to be highly visible from oblique angles using ADR-compliant reflectors and marker plates, it is inconsistent for trains to accept lower-performing material and less stringent geometric visibility.

Recommendations:

1. Increase the minimum performance requirement for reflective delineators on rolling stock to match or exceed the retroreflective standards commonly used for heavy trailers (e.g. specify higher-performance classes where needed and ensure performance at realistic observation and entrance angles).
2. Reinstate a requirement that delineators be positioned and selected to provide effective visibility across a wide range of approach angles (e.g. approximating a 180° viewing arc in the horizontal plane at road-user eye height), consistent with the functional intent of ADR 13/00.
3. Explicitly link reflector performance to the luminance-contrast framework in Appendix H, requiring demonstration that reflective treatments contribute meaningfully to the contrast thresholds for representative level-crossing geometries.

- **Appendices and stakeholder process**

Finally, several aspects of the development and accessibility of AS 7531 raise concerns about transparency and inclusiveness:

- Key research (MIRT contrast report) is not publicly available or referenced.
- Consultations have been primarily rail-industry-centric, with limited involvement of road-user groups, road-safety experts or heavy-vehicle associations, despite the standard's direct impact on road safety.
- Requiring comments only in PDF format risks excluding some members of the public, including those with limited digital access or visual impairments.

Recommendations:

1. Include road-user groups (e.g. heavy-vehicle, agricultural and motoring organisations) and human-factors experts in the ongoing development and review of AS 7531 to ensure a balanced understanding of risk at level crossings.
2. Make supporting research and data publicly available and reference it in the Bibliography.

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3. Provide multiple accessible channels for public comment (e.g. web forms, text submissions) in addition to annotated PDFs and clearly advertise consultations beyond the rail industry.

Conclusion

AS 7531:2025 is an important step forward for rolling-stock visibility and lighting, but as drafted it still assigns trains a lower standard of conspicuity than that required for heavy road vehicles operating on public roads. In our view, this is incompatible with the Rail Safety National Law requirement to manage risk to the public so far as is reasonably practicable, particularly given the continuing toll of level-crossing collisions and near misses.

We therefore urge ARiSO to:

- **Make forward-facing visibility beacons and side lights mandatory and always-operational in relevant contexts.**
- **Tighten reflector performance and geometric visibility requirements.**
- **Increase minimum flash rates for warning lights used at crossings.**
- **Align overall conspicuity expectations with, at minimum, the standards applied to heavy road transport under the ADR framework.**

The PGA would welcome further engagement with ARiSO and the Standing Committee, alongside road-safety and heavy-vehicle stakeholders, to assist in refining AS 7531 so that it genuinely reflects best practice and protects all users of shared road-rail environments.