

# BRIEFING NOTE:

## ADR 42/05 – THE WAY FORWARD

### 1) Introduction

This briefing note follows on from HVIA's industry meetings and survey results regarding Australian Design Rule 42/05 pertaining to electrical connections. HVIA seeks industry feedback on the options presented in this paper, in the hope of firming up our advocacy on this issue to the Department of Infrastructure, Transport, Cities and Regional Development "the Department".

### 2) Background

On 1 July 2019, ADR 42/05 – General Safety Requirements came into force. This ADR covers several safety related areas with Clause 21, covering electrical connection between vehicles being the focus of this discussion.

The applicability of ADR 42/05 is for new vehicle models only. The Department has confirmed there are no current plans for this ADR to apply to all new vehicles sold at some point in the future. Existing vehicle models can continue to comply to ADR 42/04.

Prior to July 1 2019 (Refer Appendix A for ADR wording)

For heavy vehicle combinations, where the ATM of the trailer is above 3.5T ATM, ADR 42/04 required the use of a connector that complied with one of the following standards:

1. AS 2513-1982
2. ISO1185 – 1997
3. SAEJ560 - 1998

An unreferenced table was also included in clause 9, which covers one of the connector options within AS2513.

The poor wording of Clause 9.2.1 led to an interpretation that for vehicles over 3.5T GVM/ATM, ADR 42/04 does not require compliance to any connector standard.

HVIA has discussed this interpretation with the Department. They have indicated that this interpretation is not correct and will be issuing clarification in due course.

Post July 1 2019 (Refer Appendix B for ADR wording)

A revision of ADR 42 was introduced to facilitate the introduction of the International Whole of Vehicle Type Approval (IWVTA) administration process for light vehicles. This required removal of several Clauses in ADR 42/04 that then formed the basis of new ADR's.

The clauses covering connections between vehicles remained within ADR 42. However, wording of the clauses was changed to improve clarity and to update external references to Australian Standards.

Electrical connectors are now covered by Clause 21, and require combinations towing a trailer greater than 3.5T ATM to have connectors fitted that comply to one of these standards:

- AS 4177.5: 2004 (See note below)
- ISO1185:2003
- SAE J560: 2016
- AS4735:2003

Wording of comparable clause from ADR42/04 now makes it clear that where trailer ATM is greater than 3.5 T ATM, the electrical connector must now comply with one of the 4 standards.

Note:

AS4177.5 -2004 is the standard which superseded AS2513. AS2513 described 3 different connector options, the 12/7 pin flat connector, a small round 7 pin connector and a large 7 pin round connector. The latter being in common use within the heavy vehicle industry.

However, AS4177.5 now only describes the 12/7 pin flat connector.

### **3) Impact of the changes**

The key consequences of ADR 42/05 around electrical connectors (compared to ADR 42/04) are:

- The large 7 pin connector described under AS2513-1982 is no longer a permitted connector type;
- AS4735 is now a permitted option;
- Having the ADR only apply to new models has exacerbated interchangeability problems of the truck and trailer fleet;

### **4) Member Consultation and Industry Discussion**

At the request of members, HVIA undertook wider consultation both within the membership and other industry stakeholders.

The **National Heavy Vehicle Regulator** has indicated that they are taking a risk-based approach to enforcement in relation to lights on vehicles.

That is, roadside inspectors are only concerned that the vehicle lights are operating correctly in a combination and do not consider connector compliance.

They have indicated this enforcement approach will continue for the foreseeable future.

HVIA, Australian Trucking Association and the Truck Industry Council have jointly met with **the Department of Infrastructure, Regional Development and Cities**, with the following outcomes noted:

- The Department consider the so called “industry standard” connector is not compliant with ADR42/04 or ADR 42/05. As mentioned previously, DITCRD intend issuing an interpretation regarding Clause 9.2.1 of ADR 42/04.
- HVIA, TIC and ATA requested a roll back to ADR 42/04. They will consider this request, however, DITCRD indicated that there does not appear to be a compelling reason to do this as it would involve a roll back to include a standard that does not legally exist.

#### **5) Industry Consultation**

HVIA conducted 3 meetings to canvass industry opinions, struggle points and possible solutions. The summary of the meetings is available upon request.

The key take away from these sessions, is that there is an appetite from all sections of the industry to standardise on a single plug if possible.

#### **6) Connector Survey**

An action item from the 3 sessions was that HVIA would undertake an industry survey to better understand the situation in the field.

Appendix C shows key results, from which the following broad statements can be made.

- The connector type most fitted by trailer manufactures is the AS2513 connector (47%) with the Industry convention following with (27%).
- Truck OEMs have fit rates for AS2513 and the Industry Convention connector of 28% and 25%, with significant fit rates of between 12-15% each of the AS4735, AS4177.5 and ISO 1185 connectors.

Taking this together with the Trailer Manufacturer responses, it implies that a significant number of trucks have their connectors changed after delivery.

From the Department’s perspective, there is significant incidence of non-compliance.

#### **7) Truck Industry Council and Australian Trucking Association**

TIC has recently issued a technical guide which recommends the use of the AS 4735 connector.

While ATA has not issued an official position with respect to ADR 42/05, their current Technical Advisory Procedure (Sep 2015) on electrical wiring recommends the use of the AS4735 connector. ATA has not indicated that they would be moving away from the current TAP recommendation.

#### **8) HVIA Recommended Option**

In light of the industry sessions, consultation with Regulators and other industry groups and the survey results, HVIA seeks industry’s view on advocating to the Department the following proposal:

- 1) Having the ADR changed to a performance-based standard that does not specify a connector type but requires the core lighting functions to be operational in the short term;
- 2) Create an Industry code of practice that would suggest Transitioning to AS4735:2003 standard connector for the core lighting functions from 1 January 2022 for all new heavy vehicles (not models), and the mechanics of how this could be implemented;
- 3) Additional connectors can be used for other electrical functions as required; and
- 4) Developing Industry Guidelines in conjunction with TIC and the ATA to communicate best practice around electrical connections.

In developing this proposal, HVIA has considered the following:

- The priority is to ensure that the core lighting functions are supported, considering that the fleet has a mixture of 24V and 12V lighting systems.
- While standards with more than 7 pins exist, these are intended for 24V systems and would not have the current carrying capacity to accommodate a 12V lighting system.
- Following on from the previous point, AS4735 and SAEJ560 are the two standards whose connectors accommodate the higher current draw of a 12V system.
- The “Industry Convention” will not be accepted by the Department as it is not a recognised standard.
- On-Road enforcement is only concerned with the performance of lighting not the connection.
- Allows for status quo, ensuring on going compliance, whilst working towards a solution.
- AS4735 was prepared by a working group consisting of HVIA (as CVIAA), TIC, ARTSA, DoTARS (now DITCRD), SAE, AAAA and AustRoads amongst other industry and government groups. The need for redundancy for clearance light was considered important by the working group, rather than a dedicated auxiliary power pin. Since writing of the standard, longer combinations are now permitted adding to the need to consider redundancy. (both for safety and electrical draw reasons especially on combinations with older trailers using incandescent lighting)
- While currently a reversing light is not required on a trailer, several stakeholders have indicated that an increasing demand for devices protecting vulnerable road users. This type of equipment requires a reverse signal. For example, reversing alarms, reversing cameras and so on. Therefore, going forward there will be less capacity to use the pin reserved for a reverse signal as a source of constant electrical power. There is also some risk that in the future the ADR may be changed to further align with UN vehicle lighting regulations, which mandate a reversing light on trailers.
- The Department has recently come under significant pressure to evaluate references within the ADR’s to third-party standards where those standards must be purchased i.e. Australian Standards. If the Department does find it necessary to remove Australian Standards from the ADRs, it might require industry to develop a more flexible and consistent set of guidelines around electrical connection between vehicles, perhaps under the umbrella of a Code of Practice. Such a Code of practice could cover not only the core lighting function but

recommendations on best practice for powering and control wiring needs for other accessories.

## **9) Conclusion**

The recommended option allows for truck and trailer manufacturers to be compliant with the ADR, which is currently not the case for many. This alleviates a current compliance risk whilst also allowing for an orderly transition to a single connection type for the core lighting functions. When this proposal is implemented it will allow for consistency within the fleet for all new builds but still allows for additional connections to ensure flexibility with the existing fleet.

HVIA acknowledges this will mean a transition for many of our members and as such we seek your views.

**APPENDIX A - ADR 42/04 – CLAUSE 9**

**9. ELECTRICAL WIRING, CONNECTIONS & INSTALLATIONS**

- 9.1. The wiring of electrical equipment other than the high tension ignition wiring must:
- 9.1.1. be supported at intervals of not more than 600 mm, except that this requirement must not apply in the case of any '*Pole-type Trailer*' which is so constructed that the length of the pole forward of the trailer frame can be adjusted;
  - 9.1.2. be insulated at joints;
  - 9.1.3. be located in such a position that it cannot become overheated, cannot contact moving parts, nor constitute a fire hazard owing to its proximity to the fuel system; and
  - 9.1.4. be protected from chafing. The edge of all holes in metal through which the wiring passes must be rolled or bushed with a grommet of rubber or other equivalent insulating material.
- 9.2. Electrical Connections
- 9.2.1. Except for motor vehicles over 3.5 tonnes '*GVM*' and trailers over 3.5 tonnes '*ATM*', the electrical connectors between motor vehicles and trailers, for the purpose of operating the prescribed vehicle lighting and signalling must comply with Australian Standard 2513 – 1982 "Electrical Connections for Trailer Vehicles". Motor vehicles over 3.5 tonnes '*GVM*' and trailers over 3.5 tonnes '*ATM*' may use electrical connectors complying with International Standards Organisation ISO 1185 – 1997 or Society of Automotive Engineers SAE J 560 – 1998 standards for electrical connectors between towing vehicles and trailers as alternative standards.

**TABLE 1.1 CIRCUITS AND IDENTIFICATION**

14-pin connector	7-pin connector	Contact No.	Circuit	Circuit conductor colour
		1	Left-hand turn	Yellow
		2	Reversing signal	Black
		3	Earth return	White
		4	Right-hand turn	Green
		5	Service Brakes	Blue
		6	Stop lamps	Red
		7	Rear lamps, clearance and side marker lamps	Brown
		8	Battery charger/electric winch	Orange
		9	Auxiliaries, etc/battery feed	Pink
		10	Earth return	White
		11	Rear fog lamp	Grey
		12	Spare	Violet

Note: Where service brakes are not fitted, contact No. 5 may be used for auxiliaries

9.2.2. Every trailer must be equipped with an electrical conductor independent of the trailer '*Coupling*', providing a return path between the electrical circuits of the trailer and that of the drawing vehicle.

9.3. Electrical installations intended for connection to a power system other than that of the drawing vehicle must be required to comply with Australian Standard 3001-1981 "Electrical Installations in Caravans and Caravan Parks".

## Appendix B – ADR 42/05 Clause 21

### **21. ELECTRICAL WIRING, CONNECTIONS & INSTALLATIONS**

- 21.1. The wiring of electrical equipment other than the high tension ignition wiring must:
- (a) be insulated at joints;
  - (b) be located in such a position that it cannot become overheated, cannot contact moving parts, nor constitute a fire hazard owing to its proximity to the fuel system;
  - (c) be protected from chafing; and
  - (d) except in the case of any 'Pole-type Trailer' which is so constructed that the length of the pole forward of the trailer frame can be adjusted; be supported at intervals of not more than 600 mm.
- 21.1.1. The edge of all holes in metal through which the wiring passes, must be rolled or bushed with a grommet of rubber or other equivalent insulating material.
- 21.2. In the case of an M-Group or N-Group vehicle fitted with a 'Coupling' designed to tow a trailer with an 'ATM' not exceeding 3.5 tonnes, the electrical connector(s) for the purpose of operating prescribed trailer lighting and light signalling devices, must comply with AS 4177.5 – 2004 (Caravan and light trailer towing components, Part 5: Electrical connectors).
- 21.3. In the case of an M-Group or N-Group vehicle fitted with a 'Coupling' designed to tow a trailer with an 'ATM' exceeding 3.5 tonnes, the electrical connector(s) for the purpose of operating prescribed trailer lighting and light signalling devices, must comply with:
- (a) ISO 1185:2003 (Road vehicles -- Connectors for the electrical connection of towing and towed vehicles -- 7-pole connector type 24 N (normal) for vehicles with 24 V nominal supply voltage); or
  - (b) SAE J560 – 2016-04-01 version (Primary and Auxiliary Seven Conductor Electrical Connector for Truck-Trailer Jumper Cable); or
  - (c) AS 4735 – 2003 (Heavy road vehicles - Electrical connectors for articulated vehicles); or
  - (d) AS 4177.5 – 2004 (Caravan and light trailer towing components, Part 5: Electrical connectors).
- 21.4. In the case of a trailer with an 'ATM' not exceeding 3.5 tonnes, the electrical connector(s) for the purpose of operating the prescribed trailer lighting and light signalling devices, must comply with AS 4177.5 – 2004 (Caravan and light trailer towing components, Part 5: Electrical connectors).
- 21.5. In the case of a trailer with an 'ATM' exceeding 3.5 tonnes, the electrical connector(s) for the purpose of operating the prescribed trailer lighting and light signalling devices, must comply with:
- (a) ISO 1185:2003 (Road vehicles -- Connectors for the electrical connection of towing and towed vehicles -- 7-pole connector type 24 N (normal) for vehicles with 24 V nominal supply voltage); or



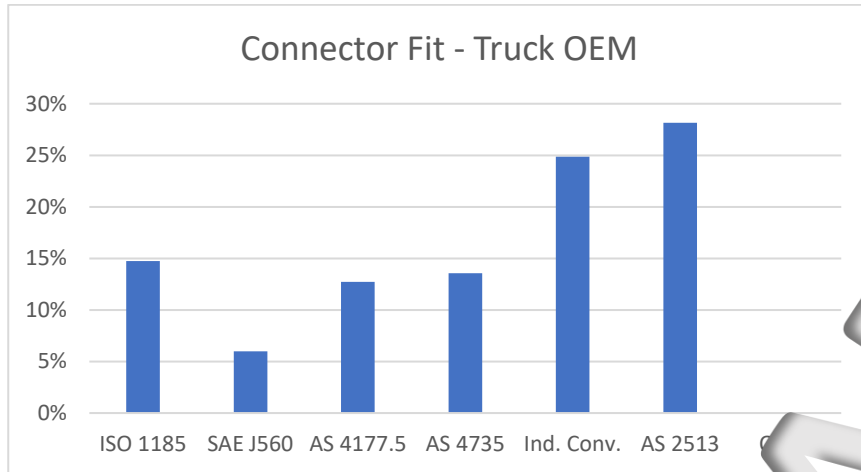
- (b) SAE J560 – 2016-04-01 version (Primary and Auxiliary Seven Conductor Electrical Connector for Truck-Trailer Jumper Cable); or
- (c) AS 4735 – 2003 (Heavy road vehicles - Electrical connectors for articulated vehicles); or
- (d) AS 4177.5 – 2004 (Caravan and light trailer towing components, Part 5: Electrical connectors).

21.6. Every trailer must be equipped with an electrical conductor independent of the trailer '*Coupling*', providing a return path between the electrical circuits of the trailer and that of the drawing vehicle.

21.7. Electrical installations intended for connection to a power system other than that of the drawing vehicle must comply with AS/NZS 3001:2008 (Electrical installations – Transportable structures and vehicles including their site supplies).

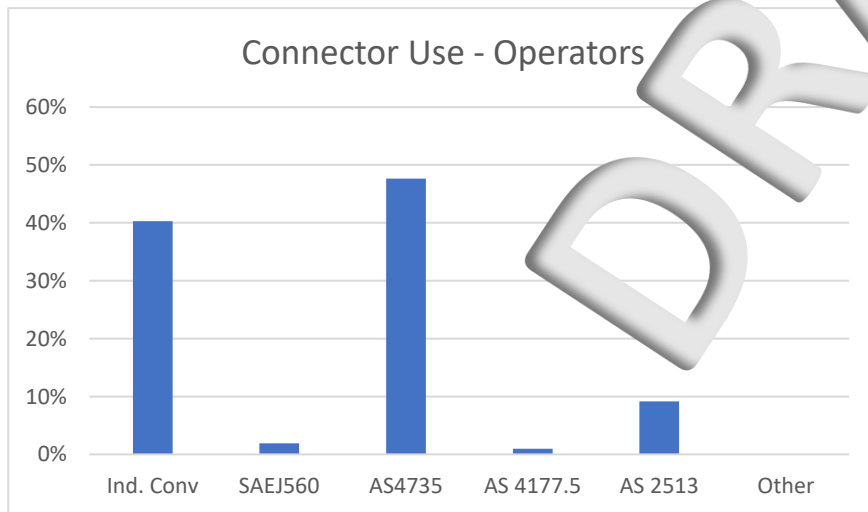
### **Appendix C - Survey Results – Trailer connector Survey.**

Survey was distributed to HV industry sectors – Trailer Manufacturers, Operators and Component suppliers. Note that there were insufficient Component supplier responses of sufficient detail for analysis (only one response with data)



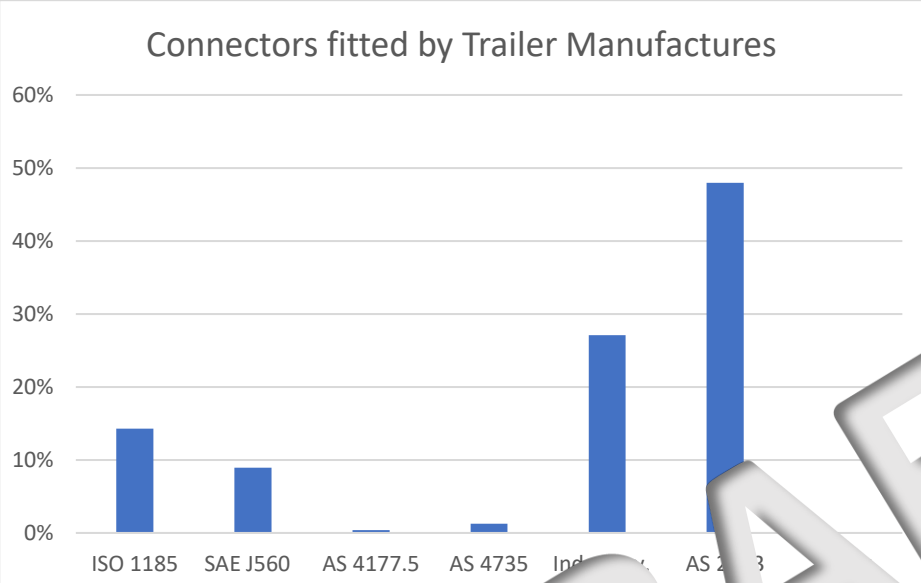
**Notes:**

- Based on 13 responses covering around 11,000 sales for 2018 that the OEM supplied ex-factory with connectors fitted. While only 13 responded, nearly all major manufactures responded to the survey.



**Notes:**

10 responses covering around 2000 trailers. Result inconclusive due to low No. trailers covered.



- Notes:**
- 40 responses covering around 14,500 sales for 2018.
  - 66% fit 1 connector only, 33% fit 2 connectors (i.e. road train/b-double)
  - Several responses indicate that 2 different connectors are fitted:
    - Ind. Convention + AS2513 (approx. 10% total responses)
    - however due to wording of survey questions it is likely this figure is higher and likely other combinations are also being offered to customers.

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### How Power is derived for Accessories - Trailer Manufacturers

