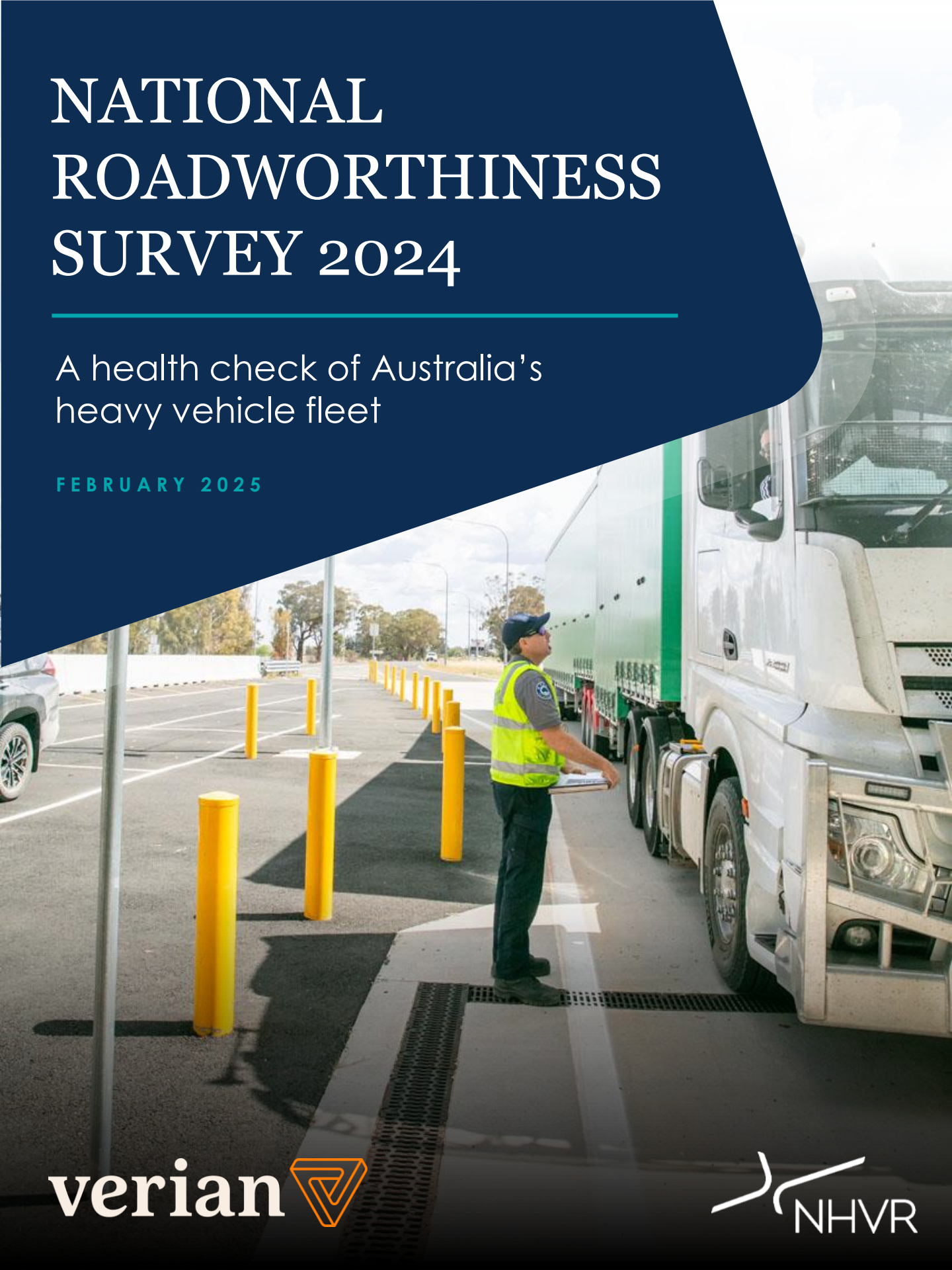
NATIONAL ROADWORTHINESS SURVEY 2024

A health check of Australia's heavy vehicle fleet

FEBRUARY 2025



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1.0

EXECUTIVE SUMMARY

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Executive summary

Overall outcomes

The National Roadworthiness Survey (NRS) was successfully conducted from 15 July to 11 October 2024 with 9,082 inspections conducted (7,130 in the 2016 baseline survey and 8,338 in 2021), encompassing a total of 14,362 overall units (powered and trailers).

The NHVR and jurisdictional partners, in collaboration with Verian, have developed improved systems and roadside data capture applications including the integration of registration data and co-ordinated inspection methodologies using a teams approach. Industry consultation was also undertaken in the planning phases which aided reduced average inspection times to 30 minutes in 2024 compared to 45 minutes in 2016.

Nationally, 75% of units passed inspection (i.e. the highest level of non-conformity was self-clearing). This was on par with the 2021 outcome (75%) and remained a strong improvement over the 2016 benchmark survey (55%). Most vehicles inspected were intercepted in the same jurisdiction to which they were registered. Conformity did not differ greatly between units inspected in the state of their registration compared to those vehicles inspected interstate.

The national median mileage was almost 345,000km. The average age of heavy vehicles on Australian roads is 10 years for powered units (vs. 10 years in 2021, 9 years in 2016) and 11 years for trailers (vs. 11 years in 2021, 9 years in 2016).

The percentage of national fleet over 12 years of age increased from 29% in 2016 to 38% in 2021, and remained stable at 38% in 2024. While this suggests the ageing of the national fleet has slowed, the previously established correlation between age and non-conformity across all componentry remains present.

Non-conformity

Non-conformity rates across all vehicle types in 2024 remain well below those of 2016. However, there was a small but statistically significant increase in non-conformity amongst powered units in comparison with 2021, notably amongst buses/coaches and plants/SPVs. Despite an increase in non-conformity, buses/coaches had the lowest level of non-conformity by powered unit type.

Executive summary

Non-conformity *(continued)*

Consistent with previous surveys the incidence of one or more non-conformities was higher amongst rigid truck powered units (39%) than all other powered units. This remains an improvement in comparison with the 2016 baseline survey (52%), though has not significantly improved from 2021 (37%).

The incidence of non-conformity was lower for semi-trailers (33%), B-doubles (26%), road trains (19%), bus/coach (11%) and plant vehicles (20%). As in past surveys, road trains were the combination with the lowest levels of non-conformity and, generally, non-conformity decreased as the size of the freight vehicle combination increased.

In the 2016 benchmark survey, 11% of powered units overall had a major non-conformity. In 2021, this rate decreased to 5%, and now in 2024 the incidence of major non-conformity has decreased further to 3%.

From 2021 to 2024 there were small but statistically significant increases in both minor (from 20% in 2021 to 22% in 2024) and self-clearing (from 7% in 2021 to 9% in 2024) non-conformities in powered units. However, in comparison to the 2016 benchmark, the incidence of minor non-conformance remains significantly lower (22% in 2024 compared to 34% in 2016). Self-clearing non-conformance is now higher than in 2016 (9% in 2024 compared to 5% in 2016).

Componentry

The incidence of non-conformity across different system categories is broadly consistent with the 2021 results but remain below that recorded in the 2016 benchmark survey.

Brake non-conformities and light/reflector non-conformities were the most common system non-conformity among freight hauling units. Amongst trailers a brake non-conformity was the most common system non-conformity. This was followed by structure and body non-conformities.

There has been a small but statistically significant decrease in the incidence of major non-conformities in brake systems amongst both freight hauling units (from 3% in 2021 to 2% in 2024) and trailers (from 6% in 2021 to 4% in 2024) since 2021.

Amongst freight hauling units there was also a decline in incidences of minor non-conformance for steering and suspension but a statistically significant increase in each of wheels; tyres and hubs; structure and body; seats and seat belts; windscreens and windows; and engine, driveline and exhaust.

Similarly, minor non-conformities declined for the category of steering and suspension amongst trailers but there was an increase in minor non-conformities for brake systems and wheels, tyres and hubs.

Executive summary

Powered units

Overall non-conformity in powered units decreased nationally from 48% in 2016 to 32% in 2021 and in 2024 sits at 34%, having increased by 2%. The increase in non-conformity was evident amongst bus/coach (from 8% in 2021 to 11% in 2024), and plant/SPV (from 13% in 2021 to 20% in 2024).

There has been a decrease in the overall proportion of powered units recording a major non-conformity (from 5% in 2021 to 3% in 2024). However, minor non-conformity increased in comparison with 2021 (from 20% in 2021 to 22% in 2024). There has also been a small but statistically significant increase in the proportion of powered units recording a self-clearing non-conformance (from 7% in 2021 to 9% in 2024). The incidence of major non-conformities decreased amongst rigid trucks, semi-trailers and road trains. Minor non-conformities increased amongst semi-trailers and plant/SPV, driving an overall increase.

Rigid trucks was the powered unit vehicle category most likely to have a non-conformance. Bus/coach were the least likely to have a non-conformance.

Trailers

Trailer non-conformity nationally has decreased slightly from 30% in 2021 to 29% in 2024. Trailer non-conformity has remained stable across vehicle types with the exception of road trains where it has decreased (from 21% in 2021 to 18% in 2024).

2.0

INTRODUCTION

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Background

The National Heavy Vehicle Regulator (NHVR) administers a set of laws for heavy vehicles (over 4.5 tonnes gross vehicle mass) under the Heavy Vehicle National Law (HVNL).

Since 2016 Verian has assisted NHVR to undertake the National Roadworthiness Survey (NRS). The NRS provides a health check of Australia's heavy vehicle fleet, letting the NHVR monitor the make up of the heavy vehicle fleet and understand how compliant it is. This information allows NHVR to determine where the NHVR and industry are making improvements in vehicle safety in addition to where more focus may be needed.

The National Heavy Vehicle Inspection Manual (NHVIM) is the foundation for a consistent approach to describing the non-conformities identified.

NRS 2024 is the third iteration of the survey. It is the broadest, most well-resourced and comprehensive assessment of the condition of the Australian heavy vehicle fleet undertaken.

NRS 2024 was conducted by heavy vehicle Authorised Officers completing inspections of relevant vehicles around Australia, entering data in tablets using a Computer Assisted Personal Interview CAPI program. The results enable NHVR to:

- identify high-risk vehicle components, vehicle systems, vehicle types, and industry sectors, and
- develop a framework for selection of vehicles to inspect the right vehicles, for the right reasons.

Background *(continued)*

NRS 2024 would again assist the NHVR and participating road managers with information to move toward selecting vehicles based on risk to more efficiently allocate inspection resources to improve the safety of the national heavy vehicle fleet and allows for the identification of safety initiative to be developed. In 2021, the survey also included WA for the first time (resourcing constraints in 2016 resulted in their inability to participate).

The NHVR set a number of specific objectives for the project:

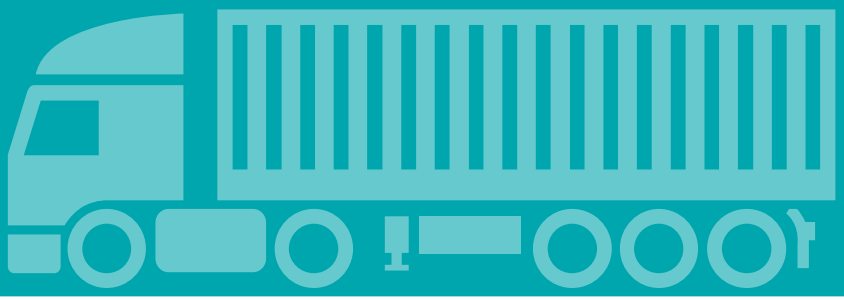
- assess the roadworthiness of the Australian heavy vehicle fleet through planning, coordinating and managing the conduct of a program of inspections on a recommended statistical basis;
- plan, coordinate and manage the conduct of sufficient inspections to establish the extent to which the heavy vehicle fleet meets heavy vehicle standards;
- collect, analyse and report on the findings, results and outcomes of the data collected;
- work with Authorised Officers in NHVR, WA and the NT to ensure sufficient inspections are conducted and performed to assess vehicle safety in a manner that allows comparison between vehicle types and location;
- ensure data is recorded and analysed during the survey in the agreed timeframe to monitor quality;
- work with Authorised Officers in NHVR, WA and the NT conduct a program of inspections of randomly selected vehicles using a standardised process, completing an approved inspection form, and reporting the findings from the data collected, as well as on the process itself;
- apply management process to the selection of vehicles and conduct of inspections to ensure the validity and reliability of the survey results for analysis and reporting on an Australia-wide comparison.

Please note, a glossary of terms used throughout the report is appended.

3.0

RESEARCH FINDINGS

3.1 Non-conformities



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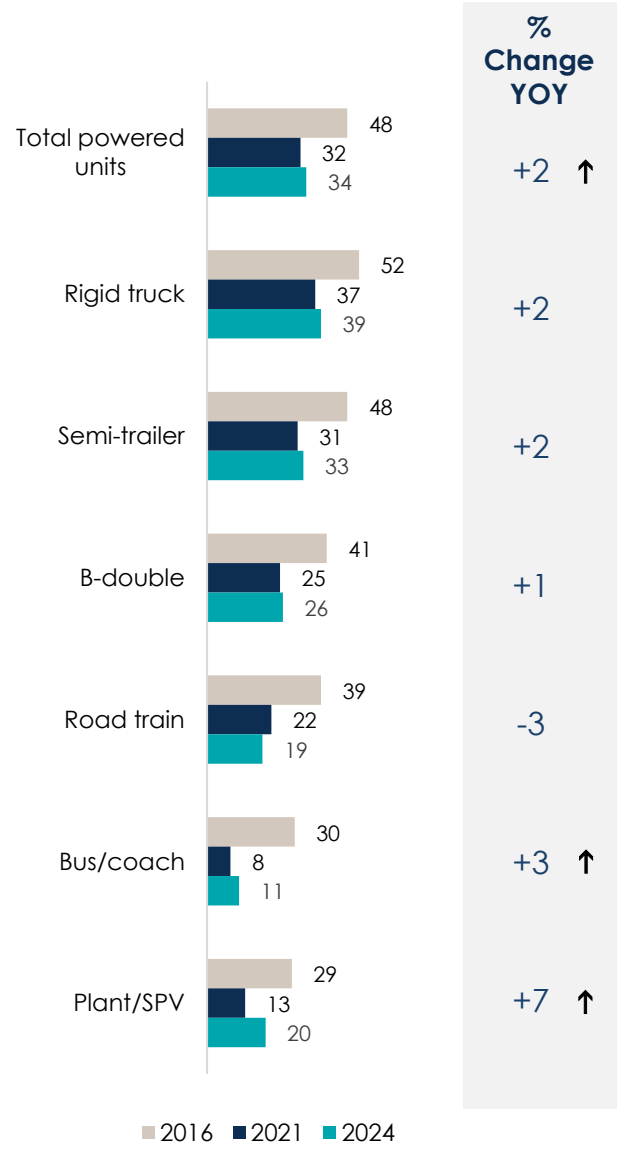
3.1.1 Non-conformities: Incidence amongst powered units

Incidence of non-conformity amongst powered units (%)



Overall there was a 2% increase in the incidence of non-conformities amongst powered units since 2021.

The increase in non-conformities since 2021 was statistically significant overall. However, it remained well below that recorded in the 2016 benchmark survey.

The increase in incidence of non-conformities was greatest amongst plant/SPV (from 13% in 2021 to 20% in 2024). However, the incidence of non-conformity in this category is also well below that recorded in the 2016 benchmark survey.

As in previous surveys, the incidence of one or more non-conformities was higher amongst rigid truck powered units (39%) than other powered units.

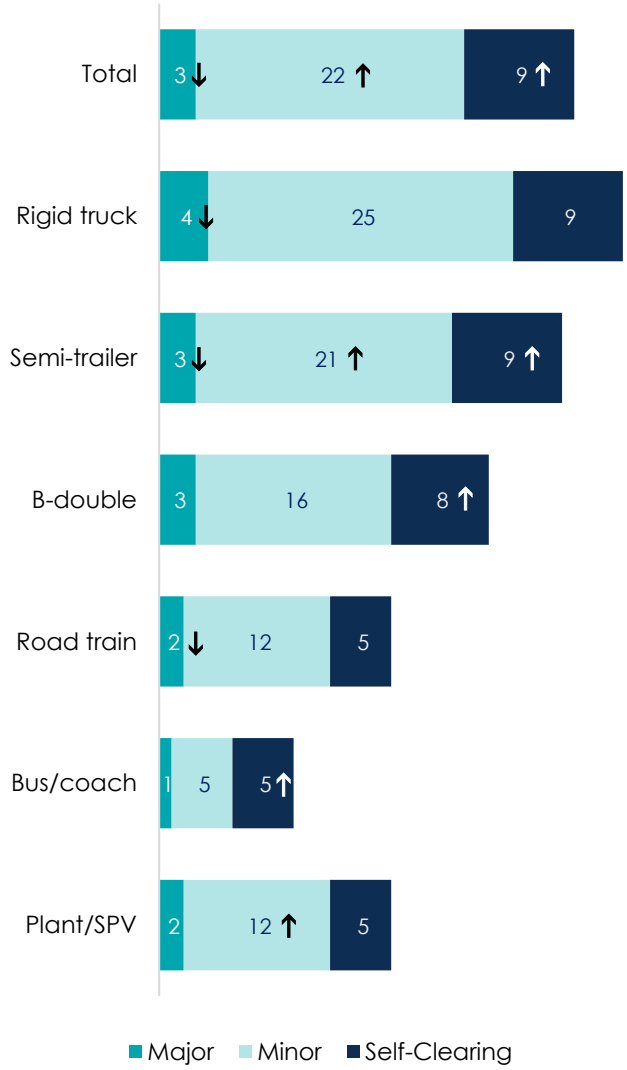
In comparison to rigid trucks the incidence of non-conformity was lower amongst semi-trailers (33%), B-doubles (26%), road trains (19%), bus/coach (11%) and plant/SPV vehicles (20%).

Base 2024: Powered units: Total (n=9082), rigid truck (n=3975), semi-trailer (n=1577), B-double (n=845), road train (n=453), bus/coach (n=1282), plant/SPV (n=950).
Base 2021: Powered units: Total (n=8338), rigid truck (n=3835), semi-trailer (n=1443), B-double (n=842), road train (n=423), bus/coach (n=1036), plant/SPV (n=759).
Base 2016: Powered units: Total (n=7130), rigid Truck (n=3227), semi-trailer (n=1221), B-double (n=802), road train (n=221), bus/coach (n=1015), plant/SPV (n=644).

↑↓ **Statistically significant increase/decrease in comparison with 2021.**
Absence of arrow means no statistically significant difference.

3.1.2 Non-conformities: Level of non-conformity amongst powered units

Highest level of non-conformity amongst powered units (%)



In comparison with the 2021 survey there has been a statistically significant decrease in the incidence of major non-conformities (-2%).

In the 2016 benchmark survey, 11% of powered units overall had a major non-conformity. Now in 2024, this has decreased to 3%.

At the same time, the incidence of minor non-conformities increased by 2% in comparison with 2021 (from 20% in 2021 to 22% in 2024). This result remains well below the 2016 benchmark (34% minor non-conformance).

As in 2021, in 2024 there was also a small but statistically significant 2% increase in self-clearing non-conformity (from 5% in 2016, to 7% in 2021 to 9% in 2024).

There was a statistically significant decrease in the incidence of major non-conformities amongst rigid trucks (from 6% in 2021 to 4% in 2024), semi-trailers (from 7% in 2021 to 3% in 2024) and road trains (from 7% in 2021 to 2% in 2024).

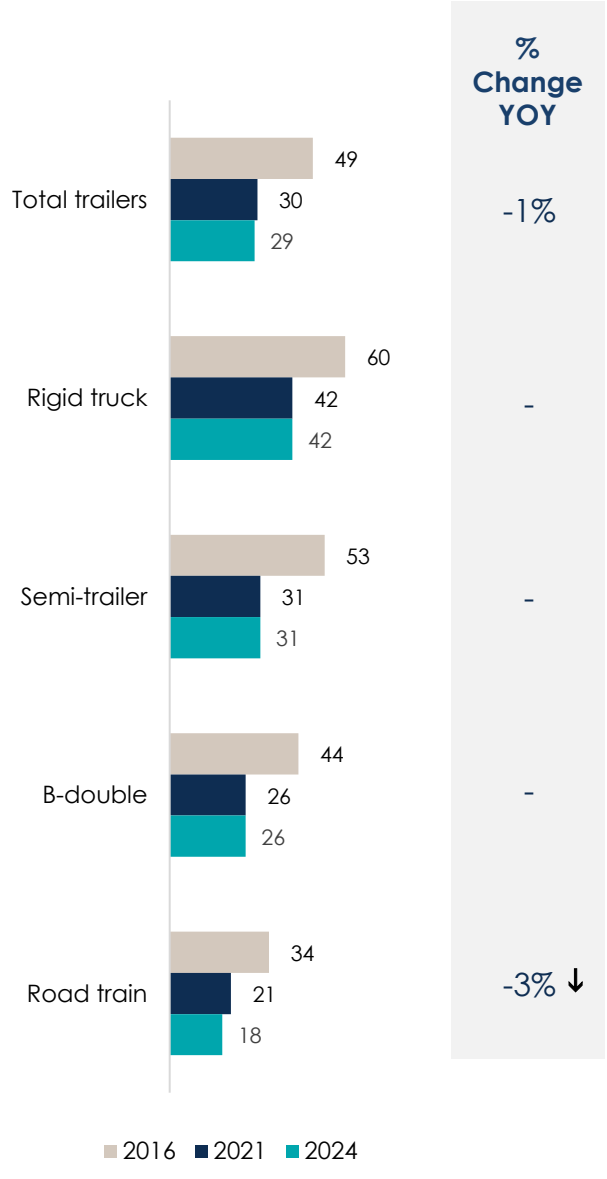
The most common category of non-conformity for all types of vehicles was a minor non-conformity. There has been a statistically significant increase in the incidence of minor non-conformance in semi-trailers (from 18% in 2021 to 21% in 2024) and plant/SPV (from 4% in 2021 to 12% in 2024).

Base 2024: Powered units: Total (n=9082), rigid truck (n=3975), semi-trailer (n=1577), B-double (n=845), road train (n=453), bus/coach (n=1282), plant/SPV (n=950).
Base 2021: Powered units: Total (n=8338), rigid truck (n=3835), semi-trailer (n=1443), B-double (n=842), road train (n=423), bus/coach (n=1036), plant/SPV (n=759).
Base 2016: Powered units: Total (n=7130), rigid truck (n=3227), semi-trailer (n=1221), B-double (n=802), road train (n=221), bus/coach (n=1015), plant/SPV (n=644).

↑↓ **Statistically significant increase/decrease in comparison with 2021.**
Absence of arrow means no statistically significant difference.

3.1.3 Non-conformities: Incidence amongst trailers

Incidence of non-conformity amongst trailers (%)



Overall, the incidence of non-conformity amongst trailers was consistent with 2021 (29% 2024, 30% 2021).

However, this result remains a significant improvement over the 2016 benchmark (49%).

There was a statistically significant decrease in the incidence of non-conformity amongst trailers hauled by road trains in comparison with 2021 (from 21% in 2021 to 18% in 2024). The incidence of non-conformity was lowest amongst trailers hauled by road trains.

The incidence of one or more non-conformity was higher for rigid trucks with trailers (42%) than other trailer combinations.

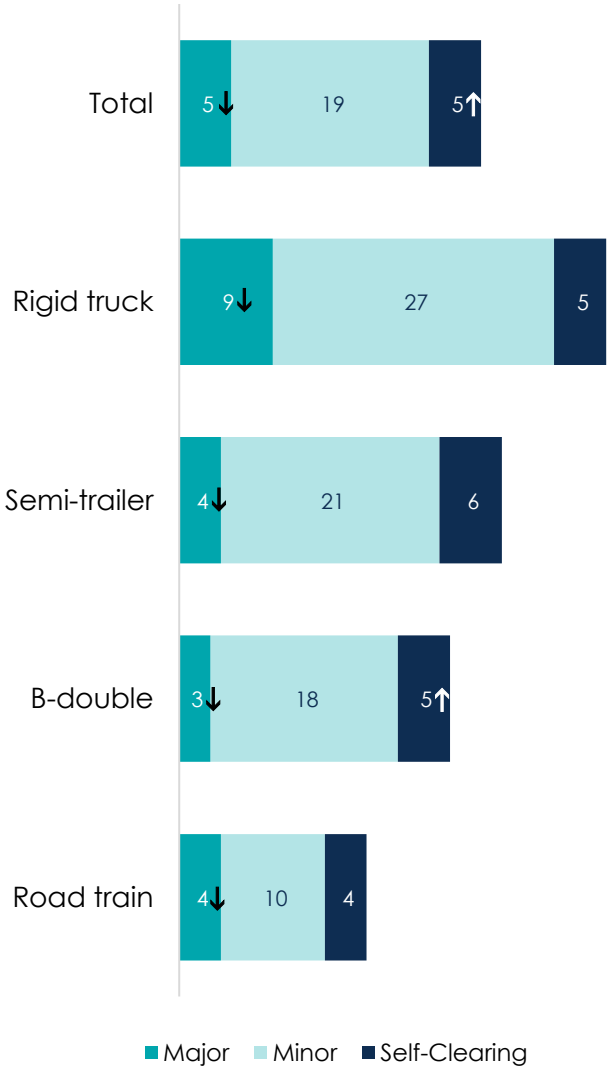
As in 2021, the incidence of any classification of non-conformity in trailers decreased with the size of the freight vehicle combination. 38% of trailers in 2-unit combinations had a non-conformity, while 22% of trailers in combinations of 3 or more units had a non-conformity. This has not shifted significantly since 2021 (from 36% and 23%, respectively).

Base 2024: Trailers: Total (n=5280), rigid truck (n=513), semi-trailer (n=1560), B-double (n=1694), road train (n=1494).
Base 2021: Trailers: Total (n=4987), rigid truck (n=435), semi-trailer (n=1461), B-double (n=1689), road train (n=1376).
Base 2016: Trailers: Total (n=3936), rigid truck (n=342), semi-trailer (n=1224), B-double (n=1604), road train (n=756).

↑↓ **Statistically significant increase/decrease in comparison with 2021. Absence of arrow means no statistically significant difference.**

3.1.4 Non-conformities: Level of non-conformity amongst trailers

Highest level of non-conformity amongst trailers (%)



There has been a decrease in the incidence of major non-conformities amongst trailers (8% in 2021 to 5% in 2024).

In 2016, 14% of trailers overall had a major non-conformity. This declined to 8% in 2021 and again to 5% in 2024. Each decline was statistically significant.

The overall incidence of minor non-conformity in 2024 (19%) was consistent with 2021(18%). However, it remains well below the incidence measured in the 2016 benchmark (33%).

There has been a slight but significant increase in the proportion of trailers with a self-clearing non-conformity (from 4% in 2021 to 5% in 2024).

There was a decrease in the incidence of major non-conformities amongst trailers attached to rigid trucks (from 14% in 2021, to 9% in 2024), semi-trailers (from 7% in 2021 to 4% in 2024), B-doubles (from 6% in 2021 to 3% 2024) and road trains (from 6% in 2021 to 4% 2024).

The most common category of non-conformity for all types of trailers, was a minor non-conformity.

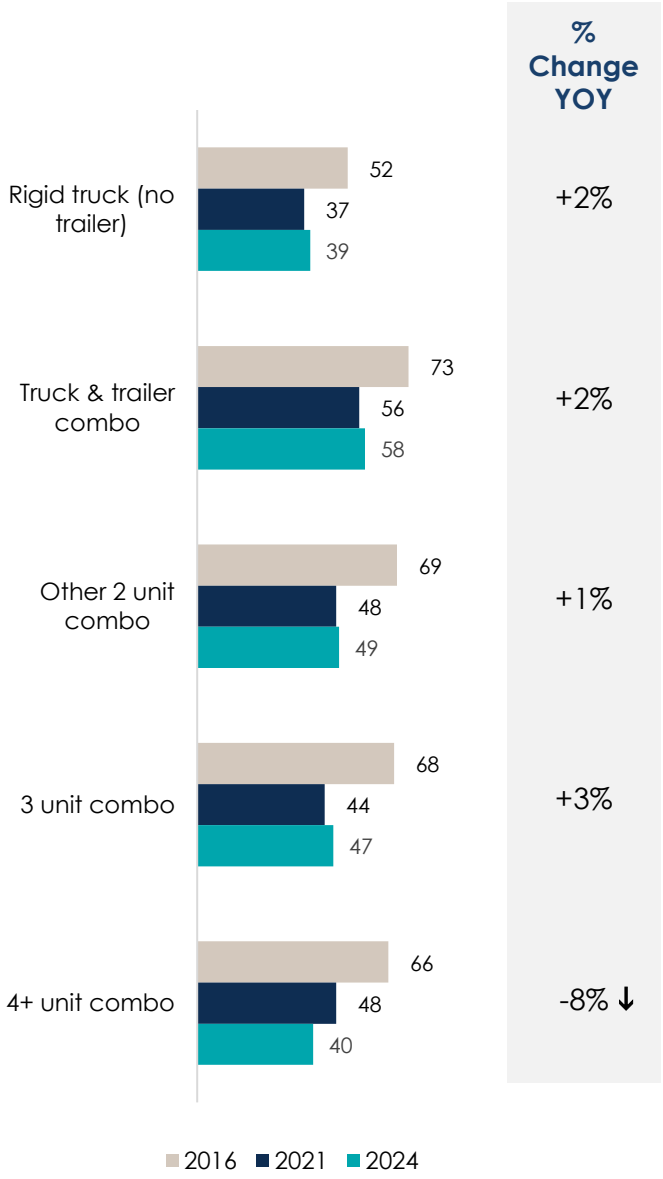
Trailers hauled by rigid trucks were most likely to have a minor non-conformity (27%). Trailers hauled by road trains were least likely to have a minor non-conformity (10%).

Base 2024: Trailers: Total (n=5280), rigid truck (n=513), semi-trailer (n=1560), B-double (n=1694), road train (n=1494).
Base 2021: Trailers: Total (n=4987), rigid truck (n=435), semi-trailer (n=1461), B-double (n=1689), road train (n=1376).
Base 2016: Trailers: Total (n=3936), rigid truck (n=342), semi-trailer (n=1224), B-double (n=1604), road train (n=756).

↑↓ **Statistically significant increase/decrease in comparison with 2021. Absence of arrow means no statistically significant difference.**

3.1.5 Non-conformities: Incidence amongst freight vehicle combinations

Incidence of non-conformities amongst freight vehicle combinations, by number of units (%)



The incidence of non-conformity in freight vehicle combinations has broadly remained consistent with 2021 results.

The exception is combinations of 4 or more units where there was a statistically significant decline in non-conformity (from 48% in 2021 to 40% 2024).

It should be noted that the incidence of non-conformity in freight vehicle combinations remains well below 2016 results.

As in past surveys, rigid truck combinations had a higher incidence of any classification of non-conformity (58%) than rigid trucks with no trailer (39%).

Consistently, with previous years, there was an overall variation in the average number of non-conforming units, such that larger freight vehicle combinations had a higher average number of non-conforming units. The average was highest for 4+ unit (0.84) compared to 2-unit (0.73) and 3-unit (0.76) freight vehicle combinations.

When assessing the rate of non-conformity, dividing the number of non-conforming units by the number of units in the combination, there was again an overall variation between the groups. The rate was higher for 2-unit combinations (0.41 for truck and trailer combinations, 0.33 for other 2-unit combinations) and lower for 3-unit combinations (0.25) and 4+ unit combinations (0.20).

Base 2024: Rigid truck (no trailer) (n=3478), truck & trailer combination (n=485), other 2-unit combination (n=1458), 3-unit combination (n=906), 4-unit combination (n=446).
Base 2021: Rigid truck (no trailer) (n=3405), truck & trailer combination (n=430), other 2-unit combination (n=1425), 3-unit combination (n=903), 4-unit combination (n=380).
Base 2016: Rigid truck (no trailer) (n=2885), truck & trailer combination (n=342), other 2-unit combination (n=1218), 3-unit combination (n=808), 4-unit combination (n=162).

↑↓ **Statistically significant increase/decrease in comparison with 2021.**
Absence of arrow means no statistically significant difference.

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RESEARCH FINDINGS

3.2 Profile of major grounded non-conformities

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3.2.0 Profile of major grounded non-conformities

A major grounded non-conformity is the highest level of non-conformity. It is defined as creating critical concern over the safety of a vehicle and the vehicle must not be used on a road while the non-conformity exists. In 2016, there was a total 146 vehicle units grounded, including 82 powered units and 64 trailers. The most common type of non-conformity causing the grounding of powered units was brakes, followed by steering and suspension. The most common non-conformity for trailers was also brakes, followed by couplings.

In 2021, there was a total of 148 vehicle units grounded, including 79 powered units and 69 trailers. The most common type of non-conformity causing the grounding of powered units was again brakes, followed by steering and suspension. The most common non-conformity for trailers was also brakes, followed by steering and suspension.

Now in 2024, there were 104 vehicle units grounded, including 51 powered units and 53 trailers. The most common type of non-conformity was brakes for both powered units and trailers. Lights & reflectors were next most common for powered units. Wheels, tyres, hubs was second most common amongst trailers.

Profile of major grounded units (unweighted)

Profile	Powered unit		Trailer	
	Sample n=		*Sample n=*	
Type of inspection	**2021**	**2024**	**2021**	**2024**
Interception	73	44	67	51
Present for inspection – invitation	1	1	2	0
Present for inspection – periodic	5	6	0	2
Type of vehicle	**2021**	**2024**	**2021**	**2024**
Rigid truck	44	24	11	9
Semi-trailer	19	14	15	14
B-double	7	4	13	8
Road train	7	6	30	22
Bus/Coach	0	2	0	0
Plant/SPV	2	1	0	0
Type of non-conformity*	**2021**	**2024**	**2021**	**2024**
Brakes	55	25	59	37
Couplings	1	3	6	4
Steering and suspension	15	14	10	5
Wheels, tyres and hubs	4	5	2	15
Structure and body	7	11	0	12
Seats and seatbelts	4	8	0	0
Lights and reflectors	5	19	3	8
Mirrors	0	1	0	0
Engine, driveline and exhaust	11	14	0	0

Profile	Powered unit		Trailer	
	Sample n=		*Sample n=*	
State of inspection	**2021**	**2024**	**2021**	**2024**
NSW	13	8	8	4
VIC	13	16	10	19
QLD	43	12	37	8
SA	1	3	6	4
WA	5	6	6	10
TAS	2	1	0	1
NT	1	4	2	6
ACT	1	1	0	1
State of registration	**2021**	**2024**	**2021**	**2024**
NSW	12	7	5	5
VIC	13	18	12	15
QLD	45	13	39	10
SA	0	3	6	7
WA	6	6	5	10
TAS	2	1	0	1
NT	1	3	1	5
ACT	0	0	1	0
Area	**2021**	**2024**	**2021**	**2024**
Metropolitan	31	28	12	23
Regional	48	23	57	30

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RESEARCH FINDINGS

3.3 Vehicle systems

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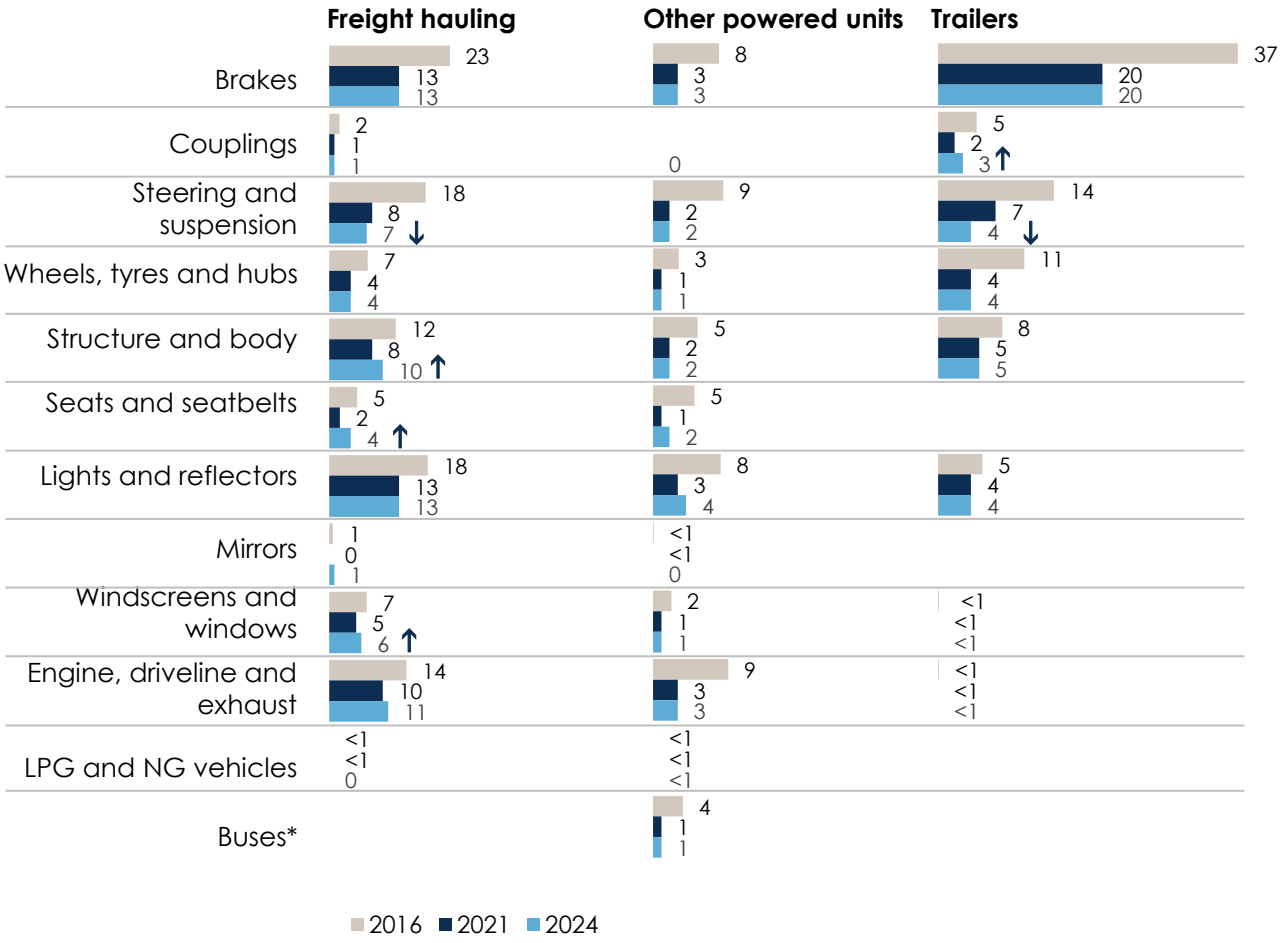
3.3.1 Vehicle systems: Incidence of non-conformity

The incidence of non-conformity across different system categories is broadly consistent with 2021 results and remain below that recorded in the 2016 benchmark survey. Brake non-conformities and light/reflector non-conformities were the most common system non-conformity among freight hauling units.

Amongst trailers a brake non-conformity was the most common system non-conformity. This was followed by structure and body non-conformities.

Incidence of non-conformity by category by unit type (%)



** Incidence based on bus/coach vehicles only*
Note: There may be cases of a system non-conformity recorded which is atypical for the type of unit
Note: All data changes statistically significant when comparing 2021 to 2016 data

Base 2024: Freight hauling units (n=6850), other powered units (n=2232), trailers (n=5280).
Base 2021: Freight hauling units (n=6543), other powered units (n=1795), trailers (n=4987).
Base 2016: Freight hauling units (n=5471), other powered units (n=1659), trailers (n=3936).

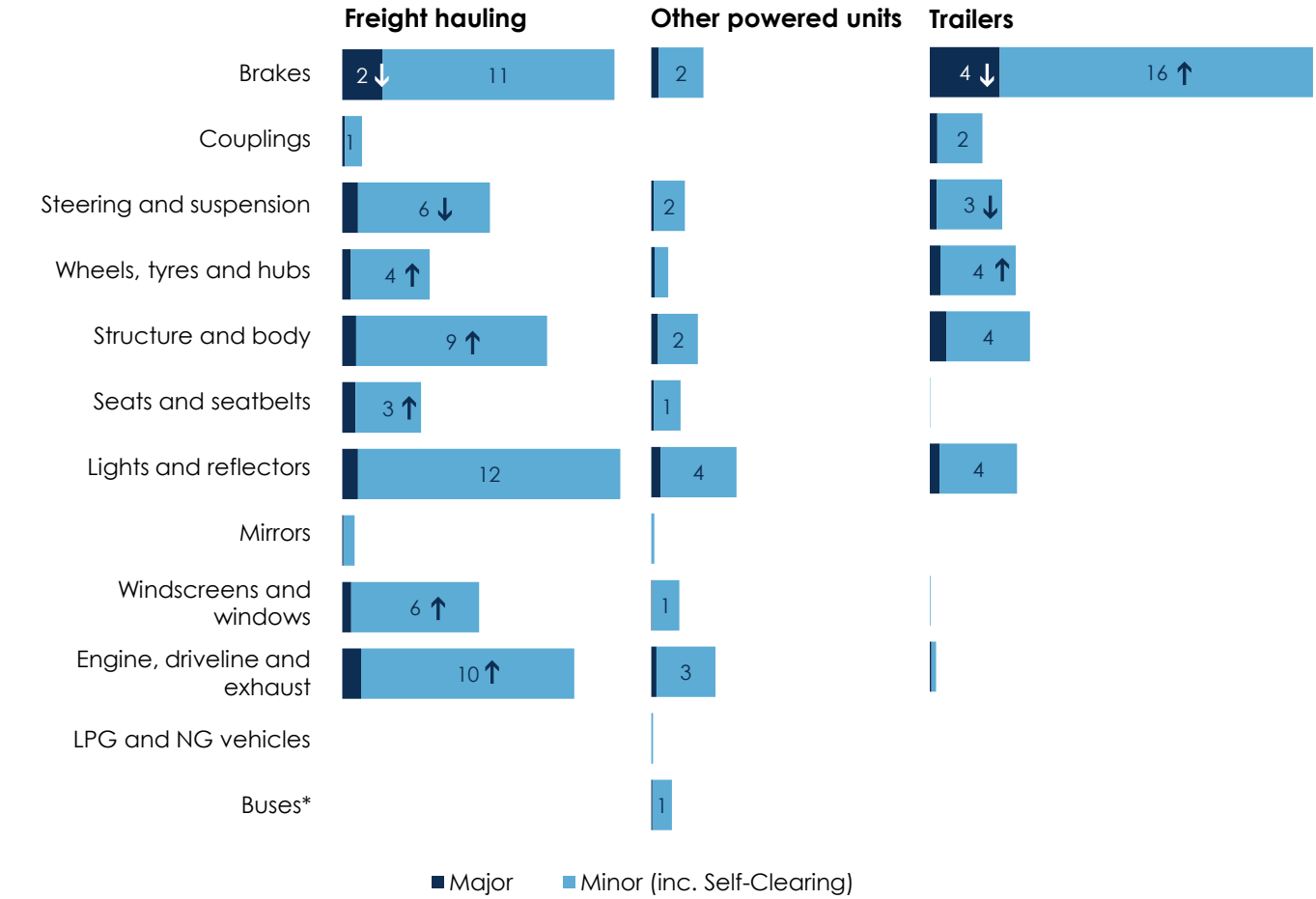
↑↓ **Statistically significant increase/decrease in comparison with 2021.**
Absence of arrow means no statistically significant difference.

3.3.2 Vehicle systems: Level of non-conformity amongst powered units and trailers

There has been a small but statistically significant decrease in the incidence of major non-conformities in brake systems amongst both freight hauling units (from 3% in 2021 to 2% in 2024) and trailers (from 6% in 2021 to 4% in 2024) since 2021.

Amongst freight hauling units there was also a decline in the incidence of minor non-conformance for steering and suspension but an increase in each of wheels; tyres and hubs; structure and body; seats and seat belts; windscreens and windows; and engine, driveline and exhaust. Minor brake non-conformance remained stable between 2021 and 2024 for freight hauling units. However, there was an increase in minor non-conformities for brake systems and wheels, tyres and hubs amongst trailers, while non-conformities declined in the category of steering and suspension.

Highest level of non-conformity in freight hauling units, other powered units and trailers by system (%)



** Incidence based on bus/coach vehicles only*
Note: There may be cases of a system non-conformity recorded which is atypical for the type of unit
Note: Labels less than 1% have been removed from charts for readability

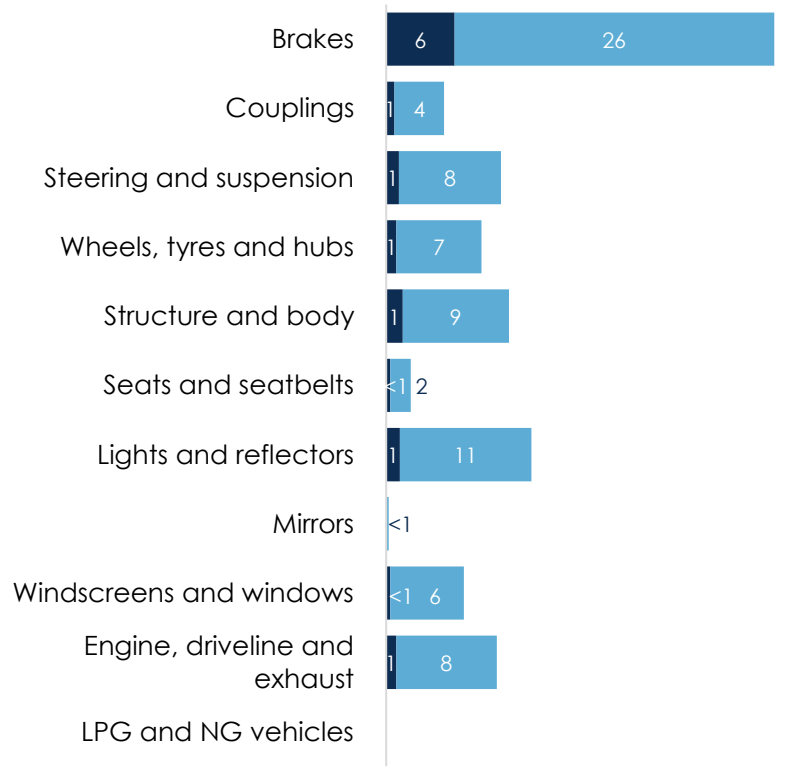
Base 2024: Freight hauling units (n=6850), other powered units (n=2232), trailers (n=5280).
Base 2021: Freight hauling units (n=6543), other powered units (n=1795), trailers (n=4987).
Base 2016: Freight hauling units (n=5471), other powered units (n=1659), trailers (n=3936).

↑↓ **Statistically significant increase/decrease in comparison with 2021.**
Absence of arrow means no statistically significant difference.

3.3.3 Vehicle systems: Level of non-conformity amongst freight vehicle combinations

In 2021 there was a statistically significant decrease in the incidence of non-conformity across categories (with the exception of LPG and NG vehicles) in comparison with the 2016 benchmark survey. In 2024, the incidence of non-conformity is consistent with 2021 in most categories, with the exception of steering and suspension (from 12% in 2021 to 10% in 2024), structure and body (from 8% in 2021 to 10% in 2024) and seats and seat belts (from 1% in 2021 to 2% in 2024).

Highest level of non-conformity in freight vehicle combinations (%)



	Non-conformity (%)			% Change YOY
	2016	2021	2024	
Brakes	53%	32%	32%	-
Couplings	9%	5%	5%	-
Steering and suspension	27%	12%	10%	-2% ↓
Wheels, tyres and hubs	17%	7%	8%	+1%
Structure and body	15%	8%	10%	+2% ↑
Seats and seatbelts	4%	1%	2%	+1% ↑
Lights and reflectors	19%	12%	12%	-
Mirrors	1%	<1%	<1%	-
Windscreens and windows	7%	6%	6%	-
Engine, driveline and exhaust	15%	9%	9%	-
LPG and NG vehicles	<1%	<1%	-	-

Note: Where sum of major and minor does not match total, this is due to rounding error. See Appendix A Research methodology for explanation.

Base 2024: All freight vehicle combinations (n=3288).
Base 2021: All freight vehicle combinations (n=3138).
Base 2016: All freight vehicle combinations (n=2586).

↑↓ **Statistically significant increase/decrease in comparison with 2021.**
Absence of arrow means no statistically significant difference.

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RESEARCH FINDINGS

3.4 Brake test outcomes

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3.4.1 Brake test outcomes: Roller brake tests

An important component of the NRS was the collection of data from roller brake tests (RBTs). RBTs were intended to be conducted on all axles of all units, unless it was unsafe to do so, or impeded by weather issues or practical issues such as the unit not being suitable for testing. In these instances, a visual inspection was conducted, another effective method of identifying defects in braking systems.

In 2024, RBTs were conducted in 59% of units inspected, or 60% of inspections (vs. 71% in 2021 and 95% in 2016). In cases where RBTs were not able to be conducted, authorised officers opted to conduct visual inspections. Reasons reported for not conducting RBTs varied and included weather conditions, equipment being unavailable and equipment failure.

The most likely vehicle types to have RBTs conducted were buses/coaches (68%), rigid trucks (65%) and B-doubles (65%), while road trains (40%) and plants/SPVs (30%) were less likely to have testing conducted, the latter possibly due to the location of testing and availability of testing equipment.

Examining the locations where RBTs were not conducted, the incidence was much higher in WA (85%), the ACT (78%) and VIC (55%), which is consistent with 2021. Additionally, it appears RBTs were significantly less likely to occur between 12pm and 6pm, with 46% of units inspected during this period not undergoing the test and having a visual inspection conducted instead. Interestingly, early morning inspections between 12am and 6am had the highest RBT completion rate (82%).

There were several issues observed with the RBTs when conducted. There were issues with faulty tests, influenced by factors associated with vehicles as well as the brake test unit, drivers failed to follow the instructions correctly, and some operator error in recording each axle sequentially and accurately. In some cases, axles were missed, or re-tested and sufficient information was not always available by which to interpret which results were relevant. Where these types of issues were identified, the unit was not included in the analysis. Outlier analysis was also conducted on the brake test data such that values outside of reasonable bounds were excluded.

Incidence of roller brake tests not being conducted by state of inspection (%)

State of Inspection	Powered units			Trailers		
	2016	2021	2024	2016	2021	2024
NSW	<1%	15%	24%	<1%	14%	32%
VIC	1%	42%	57%	1%	52%	52%
QLD	<1%	13%	20%	<1%	11%	32%
SA	2%	22%	25%	<1%	21%	11%
WA	-	69%	81%	-	81%	89%
TAS	<1%	2%	7%	<1%	0%	2%
NT	6%	22%	18%	6%	12%	7%
ACT	2%	7%	74%	2%	7%	92%

Base 2024: Total (n=14362), rigid truck (n=3975), semi-trailer (n=1577), B-double (n=845), road train (n=453), bus/coach (n=1282), plant/SPV (n=950), trailer (n=5280).
Base 2021: Total (n=13325), rigid truck (n=3835), semi-trailer (n=1443), B-double (n=842), road train (n=423), bus/coach (n=1036), plant/SPV (n=759), trailer (n=4987).
Base 2016: Total (n=11066), rigid truck (n=3227), semi-trailer (n=1221), B-double (n=802), road train (n=221), bus/coach (n=1015), plant/SPV (n=644), trailer (n=3936).

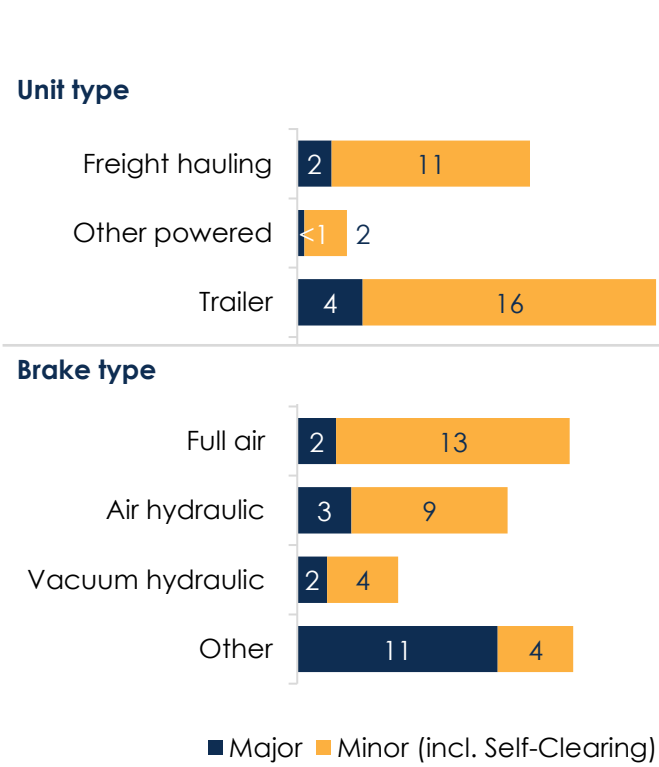
3.4.2 Brake test outcomes: Type of brake systems

Following the significant decrease seen between 2016 and 2021, the number of brake non-conformities has remained stable in 2024 across all unit types. The most common brake type, full air brakes, are again the most likely to experience issues of non-conformity among the three main types (listed below), while the incidence of non-conformity among vacuum hydraulic brakes has decreased significantly (12% in 2021 to 6% in 2024).

Examining the age of the fleet, there continues to be a correlation between unit age and the likelihood of a braking non-conformities, such that older units are more likely to be non-conformant. Units less than 6 years old are significantly less likely to experience any braking defect (from 8% in 2021 to 6% in 2024), whereas units manufactured over 12 years ago defects increase to 22% (21% in 2021). The incidence of a major defect also increases with age of unit (<6 years 1%, 6-<12 years 2%, 12+ years 4%).

The most common additional brake types (aside from the main three) was hydraulic followed by electric, disc and hydrostatic.

Incidence of highest level of brake non-conformities in units and by type of brake system (%)



Unit type	Total brake faults (%) 2016	2021	2024	% Change
Freight hauling	23%	13%	13%	-
Other powered	8%	3%	3%	-
Trailer	37%	20%	20%	-
Brake type				
Full air	26%	15%	15%	-
Air hydraulic	17%	10%	12%	+2%
Vacuum hydraulic	17%	12%	6%	-6% ↓
Other	55%	27%	15%	-12% ↓

Base 2024: Freight hauling (n=6850), other powered (n=2232), trailer (n=5280), full air (n=12628), air hydraulic (n=1265), vacuum hydraulic (n=354), other (n=115).
Base 2021: Freight hauling (n=6543), other powered (n=1759), trailer (n=4987), full air (n=11442), air hydraulic (n=1443), vacuum hydraulic (n=333), other (n=107).
Base 2016: Freight hauling (n=5471), other powered (n=1659), trailer (n=3932), full air (n=9571), air hydraulic (n=1109), vacuum hydraulic (n=353), other (n=29).

↑↓ **Statistically significant increase/decrease in comparison with 2021. Absence of arrow means no statistically significant difference.**

3.4.3 Brake test outcomes: Brake efficiency (1)

During the National Roadworthiness Baseline Survey (NRBS) 2016, the NHVR requirement for measuring brake efficiency for a vehicle when measured in the RBT was kilonewtons per tonne (kN/T) force generated by the brakes. Vehicles were required to meet a minimum level of 4.5 kN/T. For 2021, NHVR updated their NHVIM to the measure the deceleration to measure braking efficiency. The measure of deceleration is expressed in m/s/s. The minimum required deceleration is 4.4 m/s/s as expressed in the NHVIM.

In 2024, both measures of force were captured to compare against previous years, with kN/T to compare with 2016 and 2021, and m/s/s to compare with 2021.

The percentages of units meeting the standard of 4.5 kN/tonne has significantly decreased for rigid trucks and articulated hauling units, though this remains above 2016 levels.

The percentages of units meeting the standard of 4.4 m/s/s has significantly increased for rigid trucks, articulated hauling units and trailers, while buses/coaches have remained level with 2021. Trailers have shown the most significant increase (from 62% in 2021 to 84% in 2024).

Force – Brake efficiency

Measure	Rigid truck			Articulated hauling unit			Trailer			Bus/Coach		
	2016	2021	2024	2016	2021	2024	2016	2021	2024	2016	2021	2024
≥ 4.5 kN/T (%)	85%	89%	86%↓	77%	86%	81%↓	37%	51%	50%	90%	92%	93%
Mean (kN/T)	5.58	5.73	5.98	5.34	5.68	5.83	4.27	4.74	4.72	5.87	6.13	6.37
STD DEV. (kN/T)	1.21	1.24	1.47	1.22	1.36	1.60	1.36	1.52	1.71	1.55	1.32	1.45
Sample	2,709	2,893	6,527	2,191	1,776	4,680	3,489	2,925	7,351	931	644	1,521

Deceleration – Brake efficiency

Measure	Rigid truck		Articulated hauling unit		Trailer		Bus/Coach	
	2021	2024	2021	2024	2021	2024	2021	2024
≥ 4.4 m/s/s (%)	90%	93%↑	84%	88%↑	62%	84%↑	97%	97%
Mean (m/s/s)	5.95	6.37	5.85	6.17	5.14	6.38	6.60	6.59
STD DEV. (m/s/s)	1.35	1.42	1.60	1.61	1.83	1.96	1.20	1.26
Sample	4,235	6,759	2,441	4793	4,223	7,227	822	1,489

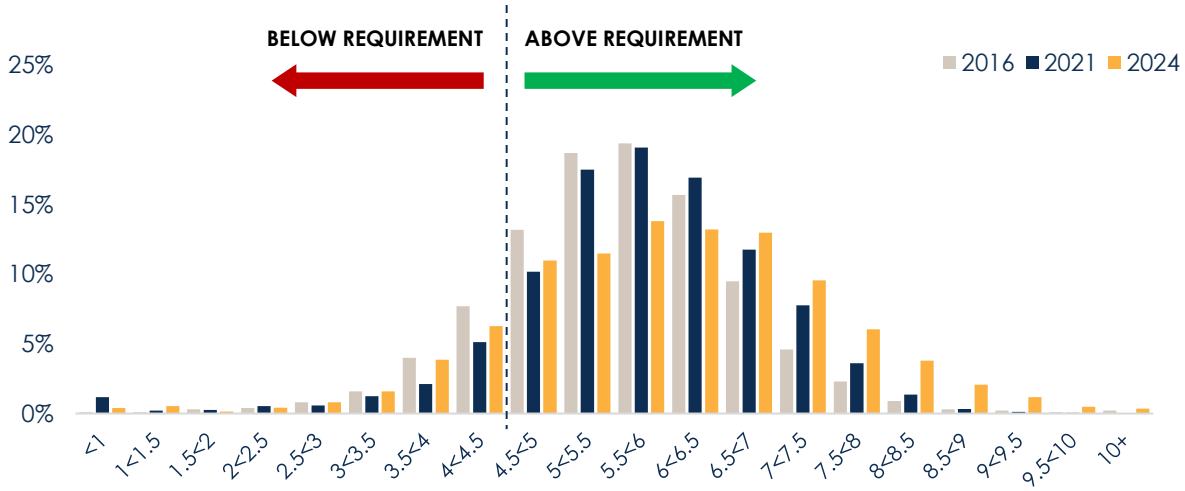
Base 2024: All units that had completed roller brake test output available and outliers removed – Force n=7650; Dynamic Deceleration n=7843.

↑↓ **Statistically significant increase/decrease in comparison with 2021. Absence of arrow means no statistically significant difference.**

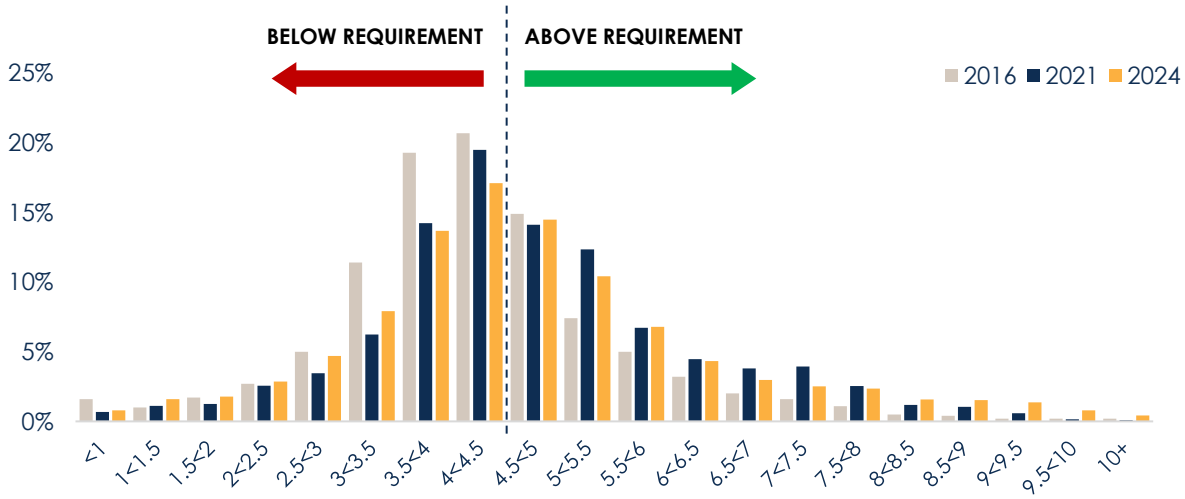
3.4.3 Brake test outcomes: Brake efficiency (2)

The charts below show the 2016, 2021 and 2024 distributions of brake efficiency (kN/T) for the different vehicle types. The distribution of braking efficiency for rigid trucks has spread out, with more in 2024 falling slightly below the standard (3-5<4.5) and well above (6.5+). Trailers have remained relatively stable against 2021 results.

Brake efficiency (kN/T) rigid trucks



Brake efficiency (kN/T) trailers



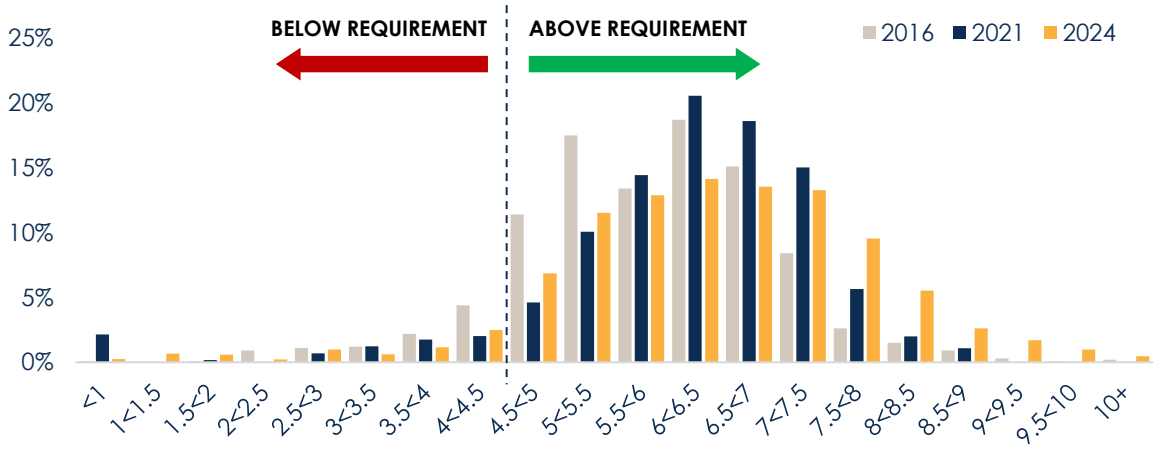
Base 2024: Units that had brake testing completed excluding outliers rigid trucks (n=2435), trailer (n=2579).
Base 2021: All units that had completed roller brake test output available.
Base 2016: Rigid trucks (n=2709), trailer (n=3489).

3.4.3 Brake test outcomes: Brake efficiency (3)

The charts below show the 2016, 2021 and 2024 distributions of brake efficiency (kN/T) for the different vehicle types. The distribution of braking efficiency for articulated hauling units has somewhat shifted back towards the left, though more are well exceeding the standard (6.5+). In 2024, more buses/coaches have greater braking efficiency (>7.5) compared to previous years.

Brake efficiency (kN/T) articulated hauling units

Brake efficiency (kN/T) bus/coach

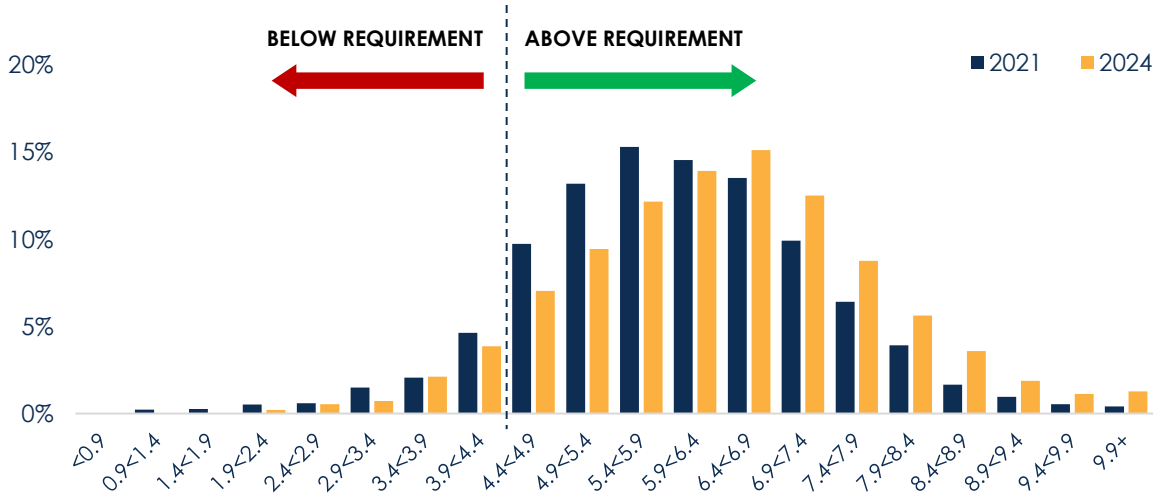


Base 2024: Units that had brake testing completed excluding outliers articulated hauling units (n=1575), bus/coach (n=721).
Base 2021: All units that had completed roller brake test output available.
Base 2016: Articulated hauling units (n=2191), Bus/Coach (n=931).

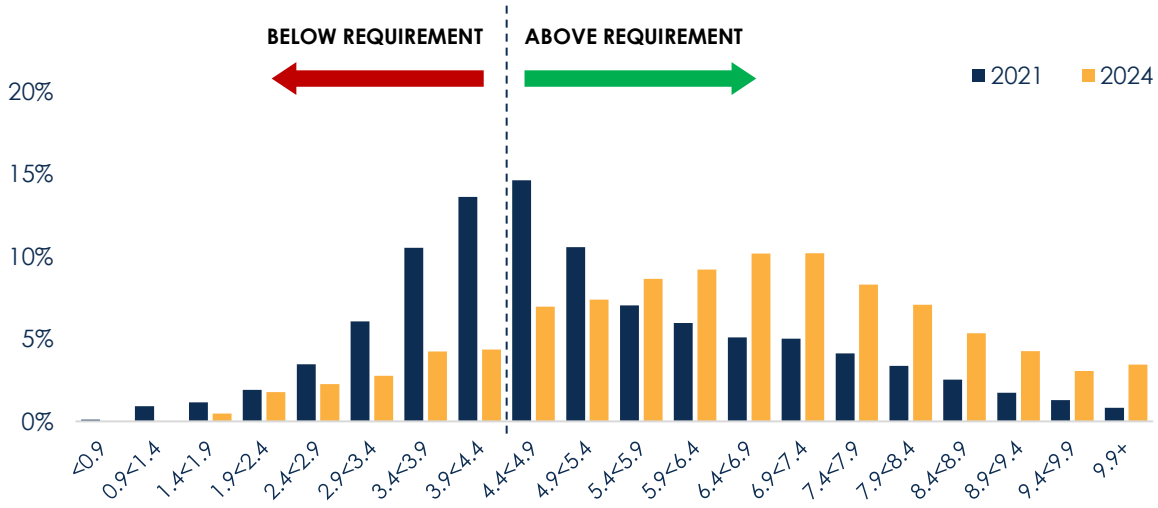
3.4.3 Brake test outcomes: Brake efficiency (4)

The charts below show 2021 and 2024 distributions of brake efficiency (m/s/s) for the different vehicle types. Rigid trucks and trailers have skewed further to the right of the braking standard. Trailers in particular were previously left-skewing and have significantly improved.

Dynamic deceleration (m/s/s) rigid trucks



Dynamic deceleration (m/s/s) trailers



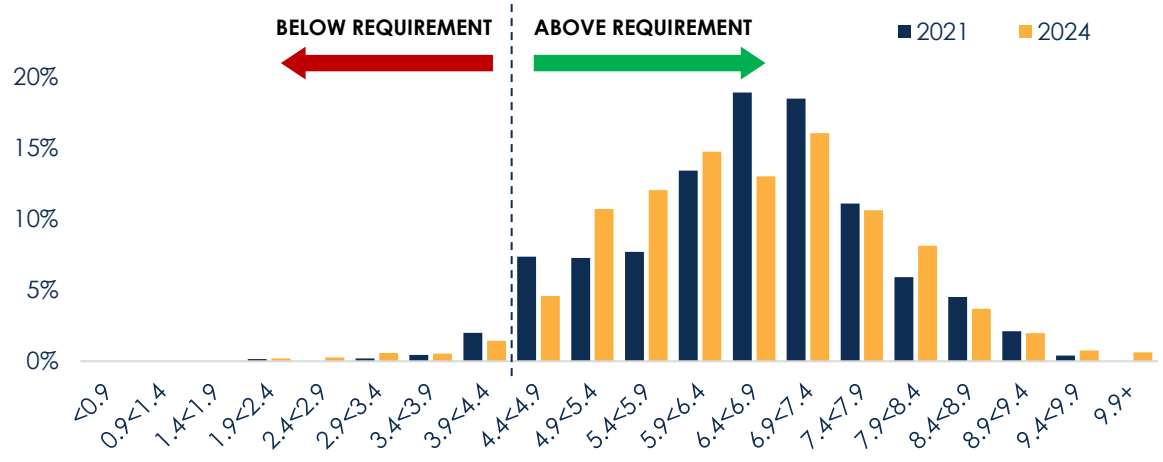
Base 2024: Units that had brake testing completed excluding outliers rigid trucks (n=2546), trailer (n=2599).
Base 2021: All units that had completed roller brake test output available.

3.4.3 Brake test outcomes: Brake efficiency (5)

The charts below show 2021 and 2024 distributions of brake efficiency (m/s/s) for the different vehicle types. Articulated hauling units are skewing slightly more to the right of the standard, while buses/coaches distribution retains its strong positive skew.

Dynamic deceleration (m/s/s) articulated hauling units

Dynamic deceleration (m/s/s) bus/coach



Base 2024: Units that had brake testing completed excluding outliers articulated hauling units (n=1623), bus/coach (n=706).
Base: 2021 All units that had completed roller brake test output available.

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RESEARCH FINDINGS

3.5 Compliance schemes

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3.5.1 Compliance schemes: Participation in compliance schemes

The unit types with the greatest level of participation in compliance schemes were B-doubles (75%) and road trains (71%). Rigid trucks (7%) and bus/coaches (3%) were least likely to participate in any of the programs measured.

In comparison with 2021, there was an increase in program participation amongst:

- Articulated vehicles (from 51% in 2021 to 56% in 2024);
- Semi-trailers (from 36% in 2021 to 42% in 2024);
- B-doubles (from 64% in 2021 to 75% in 2024);
- Road trains (from 61% in 2021 to 71% in 2024); and
- Trailers (from 42% in 2021 to 56% in 2024).

Participation of drivers' powered units in alternative compliance schemes (%)

NHVAS scheme	Freight	Articulated	Rigid truck	Semi-trailer	B-double	Road train	Bus/ Coach	Plant/ SPV	Trailers
Fatigue	5	19	1	12	23	40	1	3	21
Maintenance	13	40	5	26	54	58	3	4	43
Mass management	15	49	5	35	67	62	-	5	49
Loading and dimension	2	6	1	4	1	22	-	4	8

Units participation in compliance schemes (%)

Measure	NHVAS Maintenance			Trucksafe Maintenance			NHVAS Mass Management			Participation in any program		
	2016	2021	2024	2016	2021	2024	2016	2021	2024	2016	2021	2024
Freight	13	12	11	<1	<1	<1	12	13	13	20	20	19
Articulated	38	33	34	1	<1	<1	45	28	42	58	51	56
Rigid truck	6	8	4	<1	<1	-	4	6	5	10	11	7
Semi-trailer	27	22	23	1	<1	<1	33	23	31	46	36	42
B-double	54	47	53	1	<1	<1	64	41	66	78	64	75
Road train	61	33	33	<1	<1	-	57	16	34	78	61	71
Bus/Coach	<1	<1	3	<1	-	-	<1	<1	0	4	2	3
Plant/SPV	2	<1	1	<1	-	<1	<1	<1	1	27	30	30
Trailers	34	29	34	<1	<1	<1	24	18	40	47	42	56

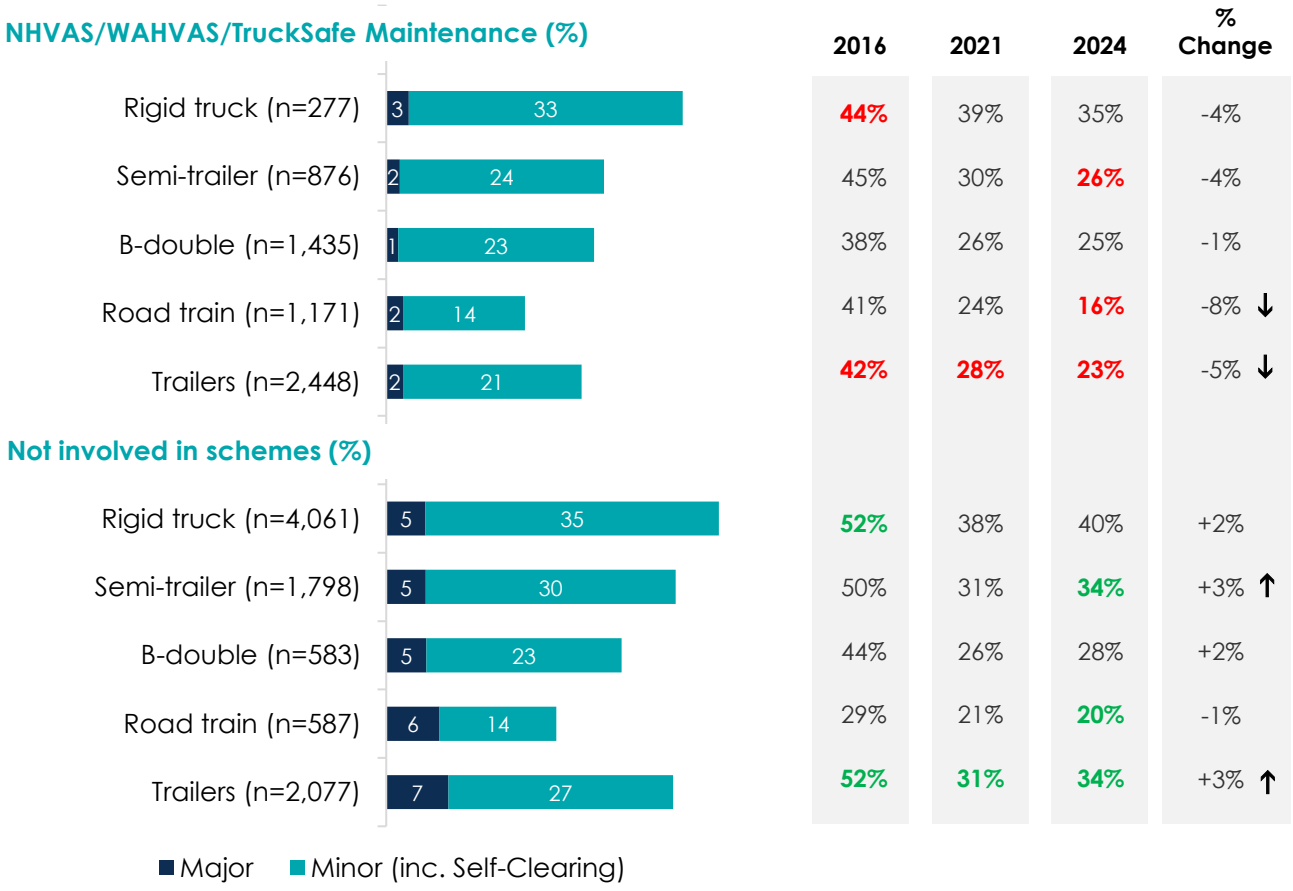
Base 2024: Freight hauling (n=6850), articulated (n=2875), rigid truck (n=3975), semi-trailer (n=1577), B-double (n=845), road train (n=453), bus/coach (n=1282) plant/SPV (n=950), trailers (n=5280).

3.5.2 Compliance schemes: Impact of NHVAS / WAHVAS / Trucksafe maintenance schemes

In 2024 road trains, semi-trailers and trailers overall participating in a maintenance scheme were significantly less likely to have a non-conformance than those vehicles not participating in a scheme. This compares to both previous waves where participating in a scheme was not a predicator of non-conformity.

Road trains were the least likely to have a non-conformity regardless of scheme participation.

Road trains (from 24% in 2021 to 16% in 2024) and trailers overall (from 28% in 2021 to 23% in 2024) participating in a maintenance scheme were less likely to have a non-conformance in 2024 than they were in 2021. Meanwhile, semi-trailers (from 31% in 2021 to 34% in 2024) and trailers (from 31% in 2021 to 34% in 2024) that were not involved in a scheme were more likely to have a non-conformance than they were in 2021.



	Total non-conformity (%)			
	2016	2021	2024	% Change
Rigid truck (n=277)	**44%**	39%	35%	-4%
Semi-trailer (n=876)	45%	30%	**26%**	-4%
B-double (n=1,435)	38%	26%	25%	-1%
Road train (n=1,171)	41%	24%	**16%**	-8% ↓
Trailers (n=2,448)	**42%**	**28%**	**23%**	-5% ↓
Not involved in schemes (%)				
Rigid truck (n=4,061)	**52%**	38%	40%	+2%
Semi-trailer (n=1,798)	50%	31%	**34%**	+3% ↑
B-double (n=583)	44%	26%	28%	+2%
Road train (n=587)	29%	21%	**20%**	-1%
Trailers (n=2,077)	**52%**	**31%**	**34%**	+3% ↑

Note: Colours represent significant differences between those in a scheme and not in a scheme within the same category; red is significantly lower, green is significantly higher.

Note: Where sum of major and minor does not match total, this is due to rounding error. See Appendix A Research methodology for explanation..

Base 2024: Freight (n=6850), articulated (n=2875), rigid truck (n=3975), semi-trailer (n=1577), B-double (n=845), road train (n=453), bus/coach (n=1282) plant/SPV (n=950) trailers (n=4748).
Base 2021: Freight (n=6543), articulated (n=4961), rigid truck (n=3835), semi-trailer (n=1443), B-double (n=842), road train (n=423), bus/coach (n=1036) plant/SPV (n=759) trailers (n=4987).
Base 2016: Freight (n=5571), articulated (n=2244), rigid truck (n=3227), semi-trailer (n=1221), B-double (n=802), road train (n=221), bus/coach (n=1015) plant/SPV (n=644) trailers (n=3936).

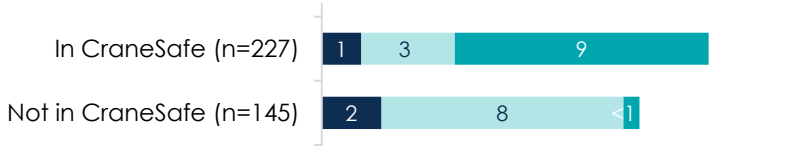
↑↓ **Statistically significant increase/decrease in comparison with 2021.**
Absence of arrow means no statistically significant difference.

3.5.3 Compliance schemes: CraneSafe

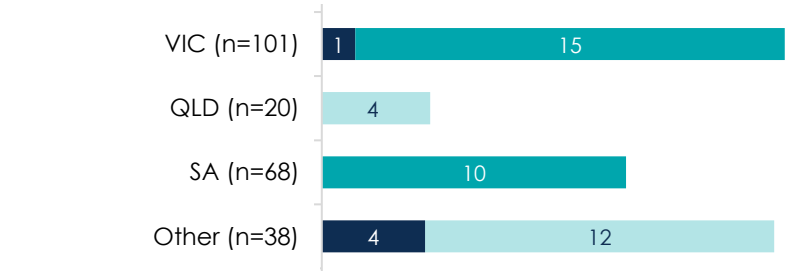
Participation in the CraneSafe scheme and the incidence of non-conformity among cranes was again examined in 2024. CraneSafe is a national, industry-initiated voluntary crane assessment program, with the aim of supplementing existing safety standards with annual assessments. Among the n=372 cranes inspected in the survey, six in ten (61%) were participating in the CraneSafe program.

The incidence of minor or major non-conformities was not significantly different for participating (13%) and non-participating (11%) cranes in 2024. However, the incidence of any non-conformity increased significantly compared to 2021 amongst those participating in the CraneSafe scheme. This was after a statistically significant decline between the 2016 benchmark and 2021 (23% in 2016 compared to 6% in 2021).

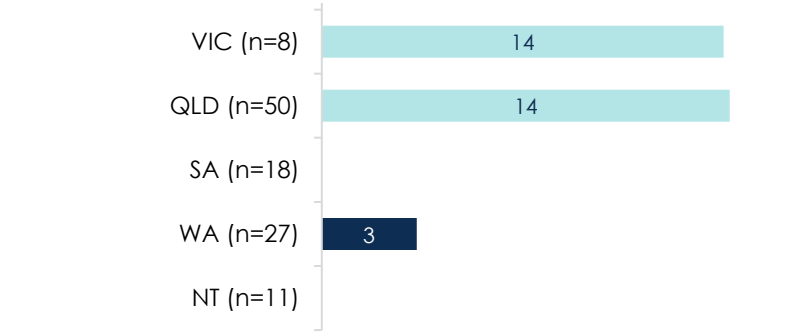
Incidence Of non-conformity & CraneSafe (%)



Involved in CraneSafe by state



Not involved in CraneSafe by state (%)



	Total non-conformity (%)			
	2016	2021	2024	% Change
In CraneSafe (n=227)	23%	6%	13%	+7% ↑
Not in CraneSafe (n=145)	36%	9%	11%	+2%
VIC (n=101)	43%	5%	16%	+11% ↑
QLD (n=20)	27%	10%	4%	-6%
SA (n=68)	-	3%	10%	+7%
Other (n=38)	0%	10%	15%	+5%
VIC (n=8)	18%	2%	14%	+12%
QLD (n=50)	23%	13%	14%	+1%
SA (n=18)	9%	19%	-	-19%
WA (n=27)	-	6%	3%	-3%
NT (n=11)	-	7%	-	-7%

Base 2024: In CraneSafe (n=227), Not in CraneSafe (n=145), Involved in CraneSafe by state: VIC (n=101), QLD (n=20), SA (n=68), Other (n=38), Not involved in CraneSafe by state: VIC (n=8), QLD (n=50), SA (n=18), WA (n=27), NT (n=11).
Base 2021: In CraneSafe (n=183), Not in CraneSafe (n=139), Involved in CraneSafe by state: VIC (n=75), QLD (n=62), SA (n=30), Other (n=16), Not involved in CraneSafe by state: VIC (n=18), QLD (n=52), SA (n=11), WA (n=25), NT (n=15).
Base 2016: In CraneSafe (n=146), Not in CraneSafe (n=168), Involved in CraneSafe by state: VIC (n=114), QLD (n=30), ACT (n=16), Other (n=8), Not involved in CraneSafe by state: VIC (n=17), QLD (n=47), SA (n=35), NSW (n=43).

↑↓ **Statistically significant increase/decrease in comparison with 2021.**
Absence of arrow means no statistically significant difference.

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RESEARCH FINDINGS

3.6 Inspection time

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3.6.0 Inspection time: Day time versus night time inspections

During the NRBS 2016 there was a potential relationship noted between the time of the inspection and the likelihood of a vehicle/combination to record a non-conformity. In 2021, there was no clear relationship between the time of inspection and the likelihood of a non-conformity to be observed. However, it was noted that inspections that occurred after 2:00pm were significantly more likely to observe non-conformities.

Now in 2024, there is no clear evidence of a relationship between the time of the inspection and the likelihood of a vehicle/combination to record a defect / non-conformity.

Incidence of non-conformity by inspection time (%)

Time of Inspection	TOTAL	12:00am - 2:59am	3:00am - 5:59am	6:00am - 8:59am	9:00am - 11:59am	12:00pm - 2:59pm	3:00pm - 5:59pm	6:00pm - 8:59pm	9:00pm – 11:59pm
Self-Clearing	8	5	8	7	7	8	**12**	8	10
Minor	21	18	26	**26**	20	20	21	23	21
Major	3	5	5	3	4	3	2	2	0
Major (Grounded)	<1	1	1	<1	<1	1	1	0	0
NET: Minor *	29	24	34	**32**	**27**	28	33	31	31
NET: Major	4	6	6	4	4	4	3	2	0
NET: Any non-conformity recorded	33	29	40	**36**	31	32	35	33	31
Sample	14362	262	140	2625	5772	3860	1104	480	119

Note: Colours represent significant differences between specific inspection time periods for a category against the total; red is significantly lower than the total, green is significantly higher than the total.

*Note: The 'NET Minor' combines Self-Clearing and Minor categories together.

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RESEARCH FINDINGS

3.7 Metro versus regional

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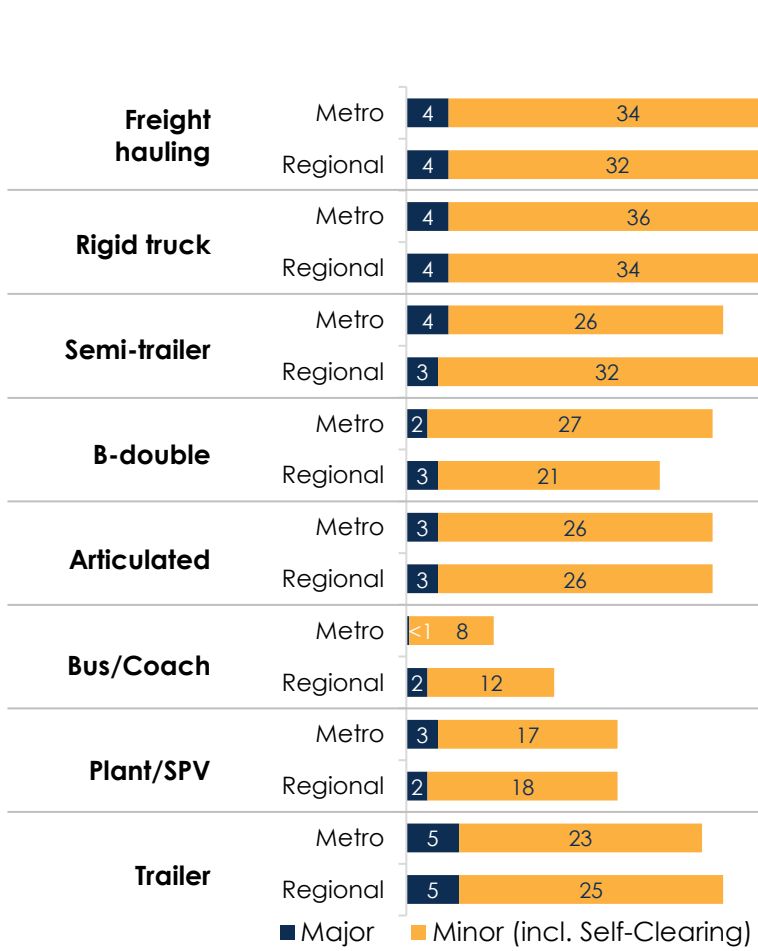
3.7.0 Incidence of non-conformity: Metro versus regional

In line with the approach taken in previous waves of the study, the NT, TAS and the ACT were excluded from the following analysis as they were categorised as only one type of area. That means, the incidences of non-conformities for powered units and trailers are shown for inspections in NSW, VIC, QLD, WA* and SA comparing metropolitan and regional areas.

Overall, freight hauling units in a metropolitan area (38%) were more likely to have a non-conformity than those inspected in a regional area (35%). Conversely, bus/coaches inspected in regional areas (14%) were more likely to have a non-conformance than those inspected in metropolitan areas (8%).

In comparison with 2021, the only statistically significant difference by powered unit type was a 7% increase in the overall incidence of non-compliance amongst plant/SPV in both metro (from 13% in 2021 to 20% in 2024) and regional (from 13% in 2021 to 20% in 2024) areas.

Highest level of non-conformity by vehicle type and metro/regional location (%)



		Total non-conformity (%)			Change (%)
		2016	2021	2024	
Freight hauling	Metro	53%	37%	38%	+1%
	Regional	49%	34%	35%	+1%
Rigid truck	Metro	55%	39%	40%	+1%
	Regional	50%	35%	38%	+3%
Semi-trailer	Metro	51%	29%	30%	+1%
	Regional	47%	33%	34%	+1%
B-double	Metro	39%	25%	29%	+4%
	Regional	43%	27%	25%	-2%
Articulated	Metro	46%	27%	29%	+2%
	Regional	46%	30%	29%	-1%
Bus/Coach	Metro	33%	6%	8%	+2%
	Regional	27%	12%	14%	+2%
Plant/SPV	Metro	28%	13%	20%	+7% ↑
	Regional	31%	13%	20%	+7% ↑
Trailer	Metro	21%	30%	28%	-2%
	Regional	50%	29%	29%	-

Note: Colours represent significant differences between metro and regional areas within the same category; red is significantly lower, green is significantly higher.
Note: Where sum of major and minor does not match total, this is due to rounding error. See Appendix A Research methodology for explanation.

** Please note: WA was not included in the 2016 study*

Base 2024: Freight hauling metro (n=3276), freight hauling regional (n=3574), rigid truck metro (n=2172), rigid truck regional (n=1803), semi-trailer metro (n=682), semi-trailer regional (n=895), B-double metro (n=338), B-double regional (n=507), articulated metro (n=1104), articulated regional (n=1771), bus/coach metro (n=847), bus/coach regional (n=435), plant/SPV metro (n=516), plant/SPV regional (n=434), trailer metro (n=1815), trailer regional (n=3465)

↑↓ **Statistically significant increase/decrease in comparison with 2021. Absence of arrow means no statistically significant difference.**

3.0

RESEARCH FINDINGS

3.8 Vehicle profile

verian

NHVR

3.8.1 Vehicle profile

10

vs. **10** years in 2021
vs. **9** years in 2016

Average age (years) powered units

11

vs. **11** years in 2021
vs. **10** years in 2016

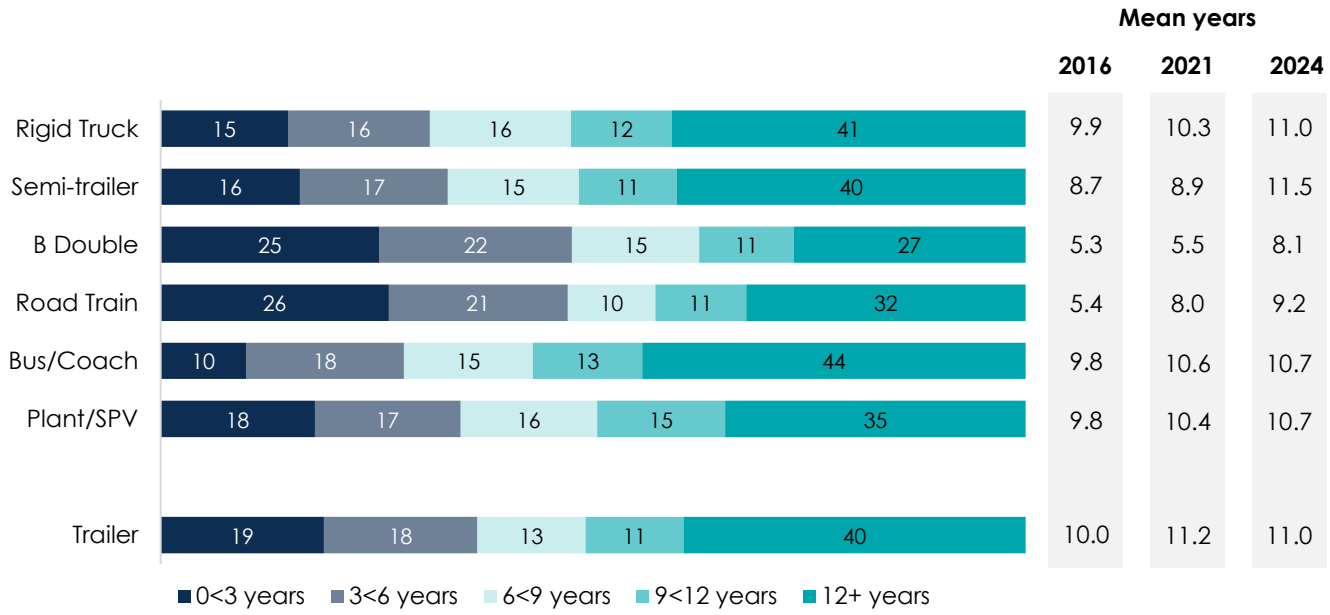
Average age (years) trailers

Vehicle age had been found in NRBS 2016 to be strongly associated with the incidence of non-conformities. A profile of age of vehicle units was assessed to provide context to the roadworthiness results.

The age of each unit was calculated based on the date of manufacture, referenced to the survey year for the unit. Overall, 38% of total units were assessed to be 12 years and older, and 50% of total units were assessed to be 9 years and older. The same proportions were found in the 2021 study.

B-double powered units were the newest, with an average of 8.1 years. Rigid trucks, semi-trailers, buses/coaches, plant/SPV and trailers were again the oldest, with an average exceeding 10 years.

2024 age of vehicle units by vehicle type (%)



Base 2024: Units with year of manufacture available: Rigid truck (n=4128), semi-trailer (n=2987), B-double (n=2464), road train (n=1800), bus/coach (n=1219), plant/SPV (n=844), trailer (n=4933).
Base 2021: Rigid truck (n=3835), semi-trailer (n=1443), B-double (n=842), road train (n=423), bus/coach (n=1036), plant/SPV (n=759), trailer (n=4987).
Base 2016: Rigid truck (n=3164), semi-trailer (n=1197), B-double (n=789), road train (n=208), bus/coach (n=1012), plant/SPV (n=616), trailer (n=3774).

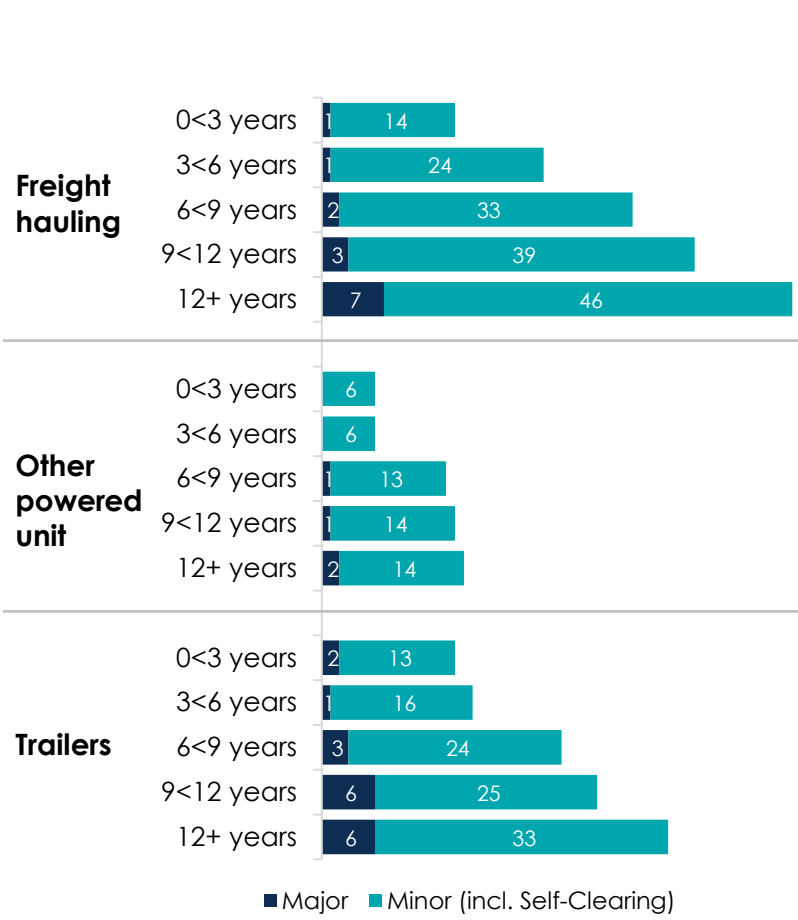
3.8.2 Vehicle profile: Relationship between vehicle age and non-conformity (1)

The relationship between age and non-conformity was assessed for freight hauling units, other powered units and trailers across the five age groups.

As in 2021 and 2016 there continues to be a direct relationship between the age of a unit and the incidence of non-conformity. The findings demonstrated that the incidence of non-conformity increased with age. Freight hauling units showed the greatest increase with age (from 15% for 0<3 years up to 53% for 12+ years age).

Whereas in 2021 there was a decrease in the level of non-conformity across each age group, there were some increases in 2024, as well as some decreases.

Highest level of non-conformity by unit type and age (%)



		Non-conformity (%)			% Change
		2016	2021	2024	
Freight hauling	0<3 years	21%	14%	15%	+1%
	3<6 years	39%	24%	25%	+1%
	6<9 years	48%	33%	34%	+1%
	9<12 years	61%	39%	42%	+3% ↓
	12+ years	74%	53%	53%	-
Other powered unit	0<3 years	10%	2%	6%	+4% ↑
	3<6 years	19%	8%	6%	-2% ↓
	6<9 years	28%	7%	13%	+6% ↑
	9<12 years	33%	15%	15%	-
	12+ years	46%	14%	16%	+2%
Trailers	0<3 years	26%	11%	15%	+4% ↑
	3<6 years	46%	24%	17%	-7% ↓
	6<9 years	50%	27%	28%	+1%
	9<12 years	57%	37%	32%	-5% ↓
	12+ years	61%	39%	39%	-

Base 2024: Units where age is recorded – Freight hauling (n=6458), other powered unit (n=2051), trailers (n=4933).
Base 2021: Units where age is recorded – Freight hauling (n=5815), other powered unit (n=1732), trailers (n=4783).
Base 2016: Units where age is recorded – Freight hauling (n=5354), other powered unit (n=1628), trailers (n=3774).

↑↓ **Statistically significant increase/decrease in comparison with 2021. Absence of arrow means no statistically significant difference.**

3.8.2 Vehicle profile: Relationship between vehicle age and non-conformity (2)

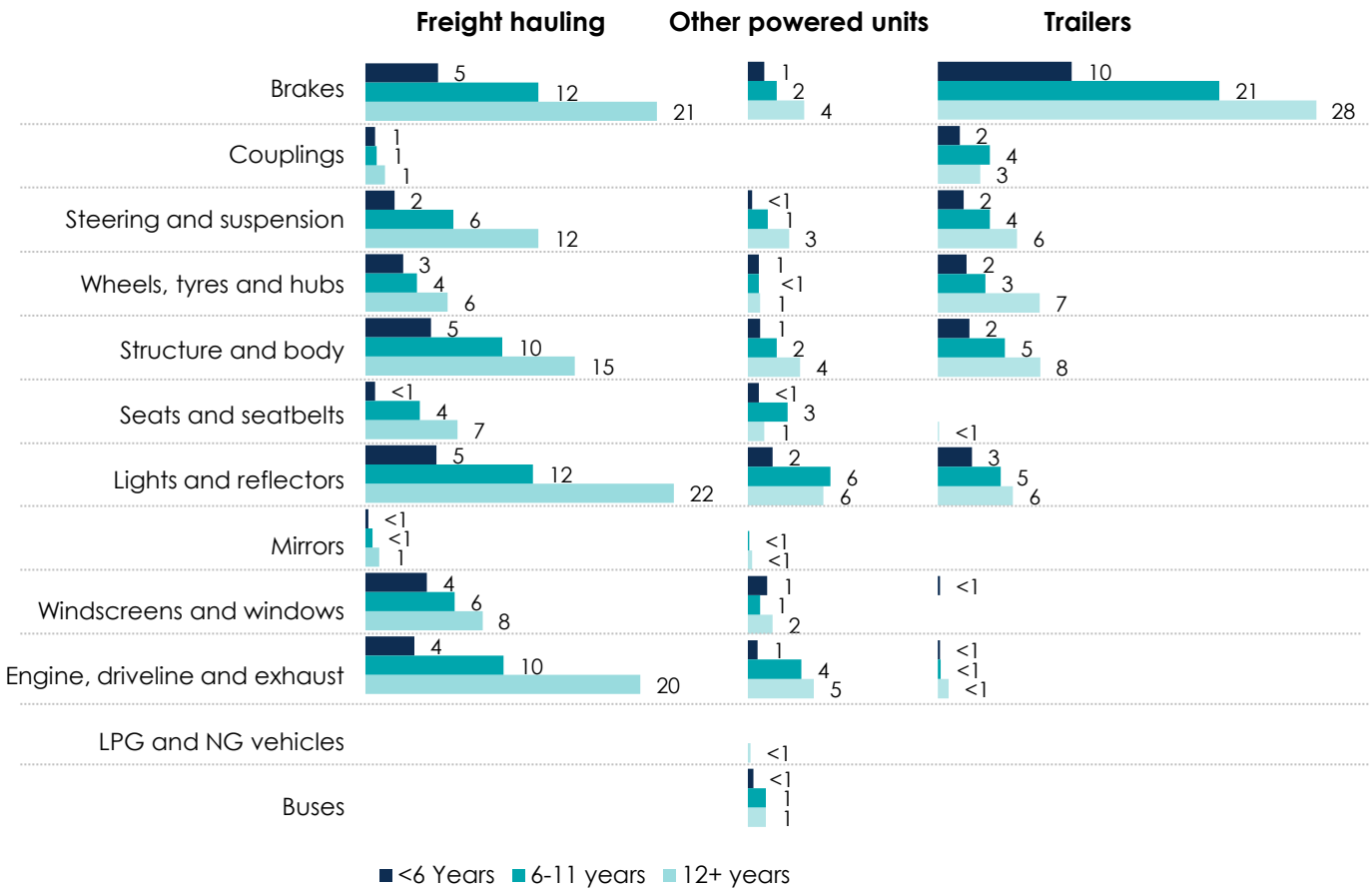
Non-conformities were assessed for 12 main vehicle systems covered in the NHVIM, to have a consistent way of reporting the non-conformities identified.

The increase in incidence of a non-conformity based on unit age occurred consistently for the 12 main vehicle system non-conformities covered in the survey, including brakes, and steering and suspension. The incidence was greatest for brake non-conformities for freight hauling units and trailers aged 12 years and over.

The three systems with the highest incidences of non-conformity for units aged 12 years and over were:

- Brakes: trailers (28%) and freight hauling units (21%);
- Lights and reflectors: freight hauling units (22%); and
- Engine, driveline and exhaust: freight hauling units (20%).

Highest level of non-conformity by unit type and age, by category (%)



Base 2024: Units where age is recorded – Freight hauling (n=6458), other powered units (n=2051), trailers (n=4933).
Base 2021: Units where age is recorded – Freight hauling (n=5815), other powered units (n=1732), trailers (n=4783).

↑↓ **Statistically significant increase/decrease in comparison with 2021.**
Absence of arrow means no statistically significant difference.

4.0 Appendix A

RESEARCH METHODOLOGY

verian

NHVR

Consultation and management

The NHVR consulted extensively with jurisdictions nationally and with industry to explain the rationale and objectives of the survey, along with details of implementation, to demonstrate the value of the survey and address any concerns about the impact of its implementation. NHVR undertook a pre-survey media and industry engagement campaign to inform industry about the survey, what to expect, etc; therefore there is risk that industry manipulated fleet, particularly for present for inspection (PFIs) vehicles.

The overall management approach involved three key stakeholders:

- Authorised Officers*: to manage the inspection logistics, perform inspections and record the survey data.
- Verian: as the survey partner, to set up the survey method, address issues with data collection through the survey period, provide daily reports on progress, and analyse and report on the results.
- NHVR: to coordinate the survey implementation and liaise with the jurisdictions to address any logistical issues.

Inspection modes

Three main modes of selection of vehicles for inspection were implemented in the survey:

- roadside intercept, principally for rigid trucks, truck and trailer combinations and articulated vehicle combinations, as well as plant vehicles, where relevant;
- scheduled inspection – observe annual and/or periodic inspections conducted by third parties where roadside intercepts and PFIs were unavailable;
- present for inspection – principally for plant/SPV and bus/coach vehicles.

Final survey numbers by state of inspection

Sample size

Total	NSW	VIC
14362	3324	2862

QLD	SA	WA
2672	1626	2646

TAS	NT	ACT
461	534	237

*Authorised Officers from NHVR, Main Roads WA and Department of Logistics and Infrastructure NT.

Vehicle systems

Non-conformities have been reported for the vehicle systems covered in the National Heavy Vehicle Inspection Manual (NHVIM) to provide a consistent way of reporting. Categories of non-conformity included brakes; couplings; steering and suspensions; wheels, tyres and hubs; structure and body; seats and seatbelts; lights and reflectors; mirrors; windscreens and windows; engine, driveline and exhaust. Liquid petroleum Gas (LPG) and natural gas (NG) vehicles, as well as buses and motorhomes* were also included within vehicle systems.

Method and presentation of results

For the 2016 baseline study NHVR engaged a statistical consultant, to recommend a sample size and sampling method to ensure the data collected was valid and reliable. The same approach was used in 2021 and 2024. This approach included over-sampling jurisdictions and vehicle groups with a smaller share of the vehicle fleet. Weighting involved applying a multiplier to individual sub-groups in the survey so that the resulting distribution matched that of the target heavy vehicle population. In general, the weighted results are presented in this report.

Vehicle selection

The most effective method for achieving a representative sample of vehicles would involve random selection. Fixed and mobile inspection stations along or close to main and secondary travel routes were utilised. With facility to use mobile interception on roads up to several kilometres away, these provided a very good basis for achieving a representative sample, particularly of freight vehicles. While certain freight vehicles would be less likely to be on such a route, or even active over the time period of the survey, the ability to access such vehicles was limited.

Within this sampling regime, access to plant/SPV and buses/coaches was also limited. In the case of plant/SPV there was limited travel on the relevant routes, and in the case of bus/coach there was a need to minimise disruption to services and passengers; in addition, it was not seen as appropriate or safe to attempt an inspection of a bus or coach loaded with passengers.

As a result of these sampling issues, it was accepted that the majority of the plant/SPV and bus/coach quotas would be inspected via special arrangement. Many of the plants/SPVs were therefore inspected at depots, or arrangements made for the vehicles to be brought to an inspection station. In addition, the large majority of inspections of buses/coaches were also made at depots or through special arrangement.

Where jurisdictions had periodic inspections of vehicles, such vehicles were also allowed to be included in the survey, based on the full inspection required for the survey being implemented.

*Although motorhomes were included as a category of non-conformity, the number of motorhomes inspected was too low to provide meaningful analysis.

Survey instrument

The survey instrument was based on that used in NRBS 2016. The survey had four broad categories of content:

- details of the inspection time and location;
- details about the vehicle combination, and then for each unit;
- details of non-conformity, completed separately for each unit; and
- capturing roller brake test.

Data collection

The primary data collection method was through Computer Assisted Personal Interview (CAPI), using tablets or laptops. The survey was programmed with the survey authoring software Confirmit, and implemented on the tablet/phone with the Sawtooth application.

Online connectivity was required to upload data. Use of the tablets/phones and data input was managed by Authorised Officers. While paper forms were provided as a back-up for where use of the tablets was not possible, they were not needed to achieve sample targets.

Electronic data collection provided benefits of:

- the program managing the sequence of data entry, reducing the risk of missing information;
- uploading data, reducing the need to handle paper forms.

Time efficiencies were achieved through auto-population of data and improved navigation in Confirmit and 3-4 person inspection teams with dedicated roles.

Monitoring of the fieldwork

The survey was monitored daily during fieldwork, and updates on the number of inspections completed were provided to NHVR and each jurisdiction Operations Managers.

Rounding of figures

All figures in this report are rounded to the nearest whole number. However, any summed or netted values are calculated using the precise, unrounded figures. As a result, the total derived from the rounded figures in the charts may vary by ±1% from the actual summed value due to rounding error.

Where values do not total to 100%, this is either due to rounding or multiple responses being allowed for the question.

Tests of statistical significance

Tests of statistical significance were conducted (at 95% confidence interval) to assess whether differences in the incidences of non-conformity between groups of vehicles in the survey (e.g., comparing results for different jurisdictions, or comparing results for different vehicle categories) should be considered as real differences or just occurring by chance. Where a difference is confirmed, it is described as statistically significant.

Reporting non-conformity

The incidence of non-conformity in a unit or vehicle combination has been reported in three ways:

- the incidence of any classification of non-conformity for a unit or vehicle combination;
- the incidence of the highest level of non-conformity for a vehicle system for three categories: self-clearing, minor and major/major grounded combined, along with the total incidence; and
- the incidence of the highest level of non-conformity for a vehicle system for two categories: self-clearing/minor combined and major/major grounded combined, along with the total incidence.

It was possible for situations where the highest non-conformity identified was minor, however a major non-conformity notice was issued due to the number of minor non-conformities identified.

Where a unit has multiple non-conformities of different levels of severity, it is categorised as the most severe for reporting purposes (i.e. highest level of non-conformity).

Terminology

All jurisdictions inspected for non-conformities listed as reasons for rejection under the NHVIM and followed NHVR mechanical inspection procedures to ensure consistency across jurisdictions. Categorisation does not reflect the condition of the vehicle, it simply reflects the risk the non-conformity presented with the use of the vehicle.

The classifications, in order of increasing severity, are described below:

- A self-clearing non-conformity may be issued when a reasonable belief exists that the use of the vehicle on road does not pose a safety risk or the number plate is obscured, defaced or illegible.
- A minor non-conformity creates a concern over the safety of a vehicle, and subject to conditions, does not prevent the vehicle from being used on the road.
- A major non-conformity creates a significant concern over the safety of a vehicle, and subject to conditions and restrictions of use, does not prevent the vehicle from being used on the road.
- A major (grounded) non-conformity creates critical concern over the safety of a vehicle and the vehicle must not be used on a road while the non-conformity exists.

Terminology *(continued)*

As this survey is a research activity designed to take a snapshot of the mechanical condition of Australia's heavy vehicle fleet, the categorisation identified on a corresponding defect notice may not reflect the data captured for the purpose of the survey.

Each non-conformity was classified in isolation, rather than being classified as the safety risk of the aggregate impact of all non-conformity identified on the vehicle combination.

The report analyses three vehicle categories:

1. Powered unit: the motorised unit of the heavy vehicle (which may or may not be towing a trailer), including:
   - Rigid truck with no trailer (also includes a prime mover running bob-tail),
   - Prime mover,
   - Bus/coach, and
   - Plant/SPV.
2. Trailer: the non-motorised unit attached to the powered unit.
3. Freight vehicle combination: where the powered unit is towing a trailer, including:
   - Rigid truck and trailer,
   - Semi-trailer: prime mover with one trailer,
   - B-double: prime mover with two trailers, and
   - Road train: prime mover with three or more trailers.

Powered units were further divided into:

- Freight hauling unit: rigid truck, semi-trailer, B-double, road train.
- Other powered unit: the other vehicle categories – bus/coach, plant/SPV.
- Articulated hauling unit: semi-trailer, B-double or road train.

Sample sizes for vehicle categories by state of inspection

The tables below record the number of vehicles intercepted, of differing types, inspected in each jurisdiction in 2016, 2021 and 2024.

2024	STATE OF INSPECTION							
VEHICLE TYPE	**NSW**	**VIC**	**QLD**	**SA**	**TAS**	**NT**	**ACT**	**WA**
	n=	**n=**	**n=**	**n=**	**n=**	**n=**	**n=**	**n=**
Powered units								
Rigid truck	921	808	776	388	152	119	86	725
Semi-trailer	439	321	299	165	60	32	25	236
B-double	225	255	199	87	40	3	10	26
Road train	28	29	65	63	0	50	0	218
Articulated	692	605	563	315	100	85	35	480
Bus/coach	465	204	233	126	30	33	40	151
Plant/SPV	161	203	149	228	15	30	26	138
Total vehicle units	**2239**	**1820**	**1721**	**1057**	**297**	**267**	**187**	**1494**
Trailers	**1085**	**1042**	**951**	**569**	**164**	**267**	**50**	**1152**
TOTAL UNITS	**3324**	**2862**	**2672**	**1626**	**461**	**534**	**237**	**2646**

2021	STATE OF INSPECTION							
VEHICLE TYPE	**NSW**	**VIC**	**QLD**	**SA**	**TAS**	**NT**	**ACT**	**WA**
	n=	**n=**	**n=**	**n=**	**n=**	**n=**	**n=**	**n=**
Powered units								
Rigid truck	937	813	731	501	159	108	75	511
Semi-trailer	426	313	250	165	62	40	20	167
B-double	264	266	117	116	39	8	9	23
Road train	46	20	132	35	0	54	1	135
Articulated	*736*	*599*	*499*	*316*	*101*	*102*	*30*	*325*
Bus/coach	279	182	222	117	24	33	52	127
Plant/SPV	154	200	141	120	12	20	27	85
Total vehicle units	**2106**	**1794**	**1593**	**1054**	**296**	**263**	**184**	**1048**
Trailers	**1221**	**972**	**1003**	**572**	**158**	**293**	**42**	**726**
TOTAL UNITS	**3327**	**2766**	**2596**	**1626**	**454**	**556**	**226**	**1774**

2016	STATE OF INSPECTION							
VEHICLE TYPE	**NSW**	**VIC**	**QLD**	**SA**	**TAS**	**NT**	**ACT**	**WA**
	n=	**n=**	**n=**	**n=**	**n=**	**n=**	**n=**	**n=**
Powered units								
Rigid truck	854	792	756	419	175	110	121	NA
Semi-trailer	286	362	279	178	65	30	21	NA
B-double	159	284	195	122	29	4	9	NA
Road train	60	8	59	51	0	43	0	NA
Articulated	*505*	*654*	*533*	*351*	*94*	*77*	*30*	NA
Bus/coach	247	242	265	136	34	51	40	NA
Plant/SPV	155	229	142	77	13	3	25	NA
Total vehicle units	**1761**	**1917**	**1696**	**983**	**316**	**241**	**216**	NA
Trailers	**876**	**1043**	**972**	**622**	**140**	**233**	**50**	NA
TOTAL UNITS	**2637**	**2960**	**2668**	**1605**	**456**	**474**	**266**	**NA**

Grey highlighting small sample sizes <30 – results for these cells have not been reported in the detailed results

Sample sizes for vehicle categories by state of registration

The tables below records the number of vehicles intercepted, of differing types, registered in each jurisdiction in 2016, 2021 and 2024.

2024	STATE OF REGISTRATION							
VEHICLE TYPE	**NSW**	**VIC**	**QLD**	**SA**	**TAS**	**NT**	**ACT**	**WA**
	n=	n=	n=	n=	n=	n=	n=	n=
Powered units								
Rigid truck	941	851	815	375	152	85	32	724
Semi-trailer	414	412	317	100	65	23	8	238
B-double	167	272	238	96	39	0	5	28
Road train	34	33	71	62	0	35	0	218
Articulated	615	717	626	258	104	58	13	484
Bus/coach	470	207	240	124	30	31	29	151
Plant/SPV	163	185	194	229	14	23	11	131
Total vehicle units	**2189**	**1960**	**1875**	**986**	**300**	**197**	**85**	**1490**
Trailers	**1001**	**1172**	**1178**	**485**	**167**	**127**	**13**	**1137**
TOTAL UNITS	**3190**	**3132**	**3053**	**1471**	**467**	**324**	**98**	**2627**

2021	STATE OF REGISTRATION							
VEHICLE TYPE	**NSW**	**VIC**	**QLD**	**SA**	**TAS**	**NT**	**ACT**	**WA**
	n=	n=	n=	n=	n=	n=	n=	n=
Powered units								
Rigid truck	886	936	812	422	157	75	34	513
Semi-trailer	373	414	293	102	64	20	7	170
B-double	159	341	188	79	41	1	2	31
Road train	19	37	165	38	0	33	2	129
Articulated	*551*	*792*	*646*	*219*	*105*	*54*	11	*330*
Bus/coach	268	186	234	113	23	32	52	128
Plant/SPV	131	172	192	121	11	20	24	88
Total vehicle units	**1836**	**2086**	**1884**	**875**	**296**	**181**	**121**	**1059**
Trailers	**818**	**1343**	**1407**	**428**	**147**	**124**	**11**	**699**
TOTAL UNITS	**2654**	**3429**	**3291**	**1303**	**443**	**305**	**132**	**1758**

2016	STATE OF REGISTRATION							
VEHICLE TYPE	**NSW**	**VIC**	**QLD**	**SA**	**TAS**	**NT**	**ACT**	**WA**
	n=	n=	n=	n=	n=	n=	n=	n=
Powered units								
Rigid truck	830	874	802	387	169	84	65	16
Semi-trailer	242	412	301	155	70	29	7	5
B-double	135	334	198	100	29	4	0	2
Road train	15	13	104	54	0	24	1	10
Articulated	*392*	*759*	*603*	*309*	99	*57*	*8*	*17*
Bus/coach	243	245	271	135	34	45	39	3
Plant/SPV	144	204	179	71	15	3	22	6
Total vehicle units	**1609**	**2082**	**1855**	**902**	**317**	**189**	**134**	**42**
Trailers	**567**	**1274**	**1241**	**528**	**133**	**120**	**11**	**62**
TOTAL UNITS	**2176**	**3356**	**3096**	**1430**	**450**	**309**	**145**	**104**

Grey highlighting small sample sizes <30 – results for these cells have not been reported in the detailed results

Glossary

TECHNICAL

Authorised officer
A person employed by NHVR, Main Roads WA or Department of Logistics and Infrastructure NT who as part of their duties is authorised to examine heavy vehicles to identify non-conformities which would render the vehicle unsafe.

Axle
One or more shafts positioned in a line across a vehicle, on which one or more wheels intended to support the vehicle turn.

Axle group
A single axle group, tandem axle group, twin steer axle group, tri-axle group or quad-axle group.

B-double
A combination consisting of a prime mover towing two semi-trailers, with the first semi-trailer being attached directly to the prime mover by a fifth wheel coupling and the second semi-trailer being mounted on the rear of the first semi-trailer by a fifth wheel coupling on the first semi-trailer.

Combination
A group of vehicles consisting of a motor vehicle such as a prime mover or rigid truck towing one or more other vehicle units such as semi-trailer or trailer.

Coupling
A device used to couple a vehicle in a combination to the vehicle in front of it.

Defect notice
Issued to the operator of a heavy vehicle by an authorised officer who after conducting an inspection, reasonably believes that the vehicle is a non-conforming heavy vehicle and the use of the vehicle on a road poses a safety risk. A defect notice categorisation does not reflect the condition of the vehicle, it simply reflects the risk the non-conformity presents with continued use of the vehicle.

Dog trailer
A trailer (including a trailer consisting of a semi-trailer and converter dolly) that has:
- one axle group or a single axle at the front that is being steered by connection to a towing vehicle by a drawbar; and
- one axle group or a single axle at the rear.

Heavy vehicles
Vehicles that have a gross vehicle mass (GVM) or aggregate trailer mass (ATM) greater than 4.5 tonnes.

Inspection
An inspection is an assessment of a vehicle against the reasons for rejection listed in the National Heavy Vehicle Inspection Manual (NHVIM).

Inspection form
The data collection survey form aligned to the NHVIM which is designed to record the outcome of an inspection for the purpose of the NRS 2024.

Glossary

TECHNICAL

Jurisdictions
Australian State and Territory Road Authorities.

National Heavy Vehicle Accreditation Scheme (NHVAS)
NHVAS is voluntary and open to operators who can demonstrate a record of compliance with heavy vehicle regulation and standards. Operators can apply for accreditation under several NHVAS modules.

Non-conformity
Systems and components on a heavy vehicle that contravenes the Heavy Vehicle Safety Standards, or part that does not perform its intended function, or has deteriorated to such an extent that it cannot be reasonably relied upon to perform its intended function.

Powered unit
The motorised unit of a heavy vehicle.

Rigid truck
A rigid motor vehicle built mainly as a load carrying vehicle.

Road train
A B-triple; or a combination, other than a B-double, consisting of a motor vehicle towing at least two trailers, excluding any converter dolly supporting a semi-trailer.

Semi-trailer
A trailer that has:
- one axle group or a single axle towards the rear; and
- a means of attachment to a prime mover that results in some of the mass of the trailer's load being imposed on the prime mover.

Special purpose vehicle (SPV)
A motor vehicle or trailer, other than an agricultural vehicle or a tow truck, built for a purpose other than carrying goods; or a concrete pump or fire-engine.

Survey partner
The contracted party, Verian, engaged to assist the NHVR and the Jurisdictions to deliver the NRS.

Trailer
A vehicle that is built to be towed, or is towed, by a motor vehicle, but does not include a motor vehicle being towed.

Glossary

SURVEY

Computer assisted personal interviewing (CAPI)
Where the survey data is entered using a computer. Inspectors entered the survey into a tablet during the inspection.

Quota
The required number of sample items (i.e., vehicles), for the overall survey and for specific sub-groups.

Random sampling
Selection of units where each unit has equal probability of being selected.

Standard deviation
A measure of variation in the distribution of results, as a distance from the mean; it is determined by taking the square root of the average of the squared deviations of a distribution of scores or results.

Statistical significance
A pre-determined probability level. A significance level of .01 or less has been applied generally—meaning that there is a 95% probability that the differences are real.

Statistical test
To assess the probability, or likelihood, that differences in results for sub-groups are great enough that it is unlikely to be due to chance.

Unweighted data
Results from the survey without any manipulation, or weighting, of the representation of the vehicle units.

Weighting
Applying a multiplier to individual sub-groups in the survey so that the resulting distribution matches that of the target population.

Weighted data
Results from the survey after weighting has been applied, to represent the target population.

4.1 Appendix B

DATA TABLES

Incidence of vehicle system non-conformity: By vehicle categories (1)

Incidence of highest level of categories of non-conformity in freight hauling units (%)

TYPE OF NON-CONFORMITY	Rigid truck					Semi-trailer				
	Major	Minor/ Warn.	2024 Total	2021 Total	2016 Total	Major	Minor/ Warn.	2024 Total	2021 Total	2016 Total
	%	%	%	%	%	%	%	%	%	%
Brakes	2	11	13	13	22	2	13	15	16	28
Couplings	<1	1	1	1	2	-	1	1	1	4
Steering and suspension	1	7	8	9	19	<1	4	5	5	16
Wheels, tyres and hubs	<1	4	5	4	8	<1	2	2	2	7
Structure and body	1	11	11	10	14	1	4	4	3	7
Seats and seatbelts	1	4	4	3	6	<1	2	2	2	3
Lights and reflectors	1	14	15	14	20	<1	6	7	7	17
Mirrors	<1	1	1	1	1	-	<1	<1	<1	<1
Windscreens and windows	<1	6	6	6	7	<1	6	6	6	7
Engine, driveline and exhaust	1	11	12	10	14	1	9	9	9	16
LPG and NG vehicles	-	-	-	-	-	-	-	-	-	-

TYPE OF NON-CONFORMITY	B-double					Road train				
	Major	Minor/ Warn.	2024 Total	2021 Total	2016 Total	Major	Minor/ Warn.	2024 Total	2021 Total	2016 Total
	%	%	%	%	%	%	%	%	%	%
Brakes	2	11	13	11	23	2	8	10	12	27
Couplings	<1	1	2	1	3	-	1	1	2	2
Steering and suspension	<1	2	2	5	11	-	2	2	4	8
Wheels, tyres and hubs	<1	1	2	1	4	<1	<1	1	<1	1
Structure and body	<1	3	3	1	5	<1	2	2	1	2
Seats and seatbelts	<1	1	2	<1	2	<1	-	<1	<1	2
Lights and reflectors	<1	5	5	5	9	<1	2	2	4	11
Mirrors	-	<1	<1	<1	<1	-	<1	<1	<1	<1
Windscreens and windows	<1	7	8	5	7	1	4	4	5	8
Engine, driveline and exhaust	1	6	6	8	11	<1	2	2	5	14
LPG and NG vehicles	-	-	-	-	-	-	-	-	-	-

Base 2024: Rigid truck (n=3975), semi-trailer (n=1577), B-double (n=845), road train (n=453).
Base 2021: Rigid truck (n=3835), semi-trailer (n=1443), B-double (n=842), road train (n=423).
Base 2016: Rigid truck (n=3227), semi-trailer (n=1221), B-double (n=802), road train (n=221).

Incidence of vehicle system non-conformity: By vehicle categories (2)

Incidence of highest level of categories of non-conformity in other powered units (%)

TYPE OF NON-CONFORMITY	Bus / Coach					Plant / SPV				
	Major	Minor/ Warn.	2024 Total	2021 Total	2016 Total	Major	Minor/ Warn.	2024 Total	2021 Total	2016 Total
	%	%	%	%	%	%	%	%	%	%
Brakes	<1	2	2	2	9	1	4	5	4	7
Couplings	-	-	-	<1	<1	-	-	-	<1	<1
Steering and suspension	-	1	1	2	8	1	3	4	2	9
Wheels, tyres and hubs	<1	<1	1	<1	1	<1	2	2	1	6
Structure and body	<1	1	1	1	4	1	5	6	3	8
Seats and seatbelts	<1	1	2	2	6	<1	1	1	1	4
Lights and reflectors	<1	3	3	1	7	1	9	10	5	11
Mirrors	-	-	-	<1	<1	-	1	1	<1	<1
Windscreens and windows	<1	1	1	1	3	-	2	2	1	2
Engine, driveline and exhaust	<1	2	2	2	11	1	7	7	3	6
LPG and NG vehicles	-	<1	<1	-	-	-	-	-	-	-
Buses*	<1	1	1	2	4	-	-	-	<1	-

**** Incidence based on bus/coach vehicles only***
Note: There may be cases of a system non-conformity recorded which is atypical for the type of unit

Incidence of vehicle system non-conformity: By freight vehicle combinations

Incidence of highest level of categories of non-conformity in freight vehicle combinations (%)

TYPE OF NON-CONFORMITY	Rigid truck					Semi-trailer				
	Major	Minor/ Warn.	2024 Total	2021 Total	2016 Total	Major	Minor/ Warn.	2024 Total	2021 Total	2016 Total
	%	%	%	%	%	%	%	%	%	%
Brakes	8	27	36	37	57	4	26	30	31	51
Couplings	1	9	10	11	19	-	1	1	1	5
Steering and suspension	2	10	12	11	28	1	9	9	13	29
Wheels, tyres and hubs	1	8	9	9	17	1	7	7	6	18
Structure and body	2	11	12	9	16	1	9	10	7	15
Seats and seatbelts	<1	2	3	1	6	<1	2	2	2	3
Lights and reflectors	2	16	18	16	20	1	10	11	11	20
Mirrors	-	<1	<1	<1	1	-	<1	<1	<1	<1
Windscreens and windows	<1	6	7	7	8	<1	6	6	5	7
Engine, driveline and exhaust	1	11	12	10	15	1	9	10	9	16
LPG and NG vehicles	-	-	-	<1	<1	-	-	-	<1	<1

TYPE OF NON-CONFORMITY	B-double					Road train				
	Major	Minor/ Warn.	2024 Total	2021 Total	2016 Total	Major	Minor/ Warn.	2024 Total	2021 Total	2016 Total
	%	%	%	%	%	%	%	%	%	%
Brakes	4	30	34	33	52	7	18	25	24	56
Couplings	<1	2	2	2	5	1	5	7	6	10
Steering and suspension	1	7	8	13	25	1	5	7	13	24
Wheels, tyres and hubs	<1	8	8	7	17	1	6	7	5	11
Structure and body	1	8	9	9	15	1	4	5	7	8
Seats and seatbelts	<1	1	2	<1	2	<1	-	<1	<1	2
Lights and reflectors	1	8	9	9	14	1	7	7	10	17
Mirrors	-	<1	<1	<1	<1	-	<1	<1	<1	<1
Windscreens and windows	<1	7	8	5	7	1	4	4	5	8
Engine, driveline and exhaust	1	6	7	8	11	<1	3	3	5	15
LPG and NG vehicles	-	-	-	<1	<1	-	-	-	<1	<1

Base 2024: Rigid truck & trailer (n=497), semi-trailer (n=1494), B-double (n=844), road train (n=453).
Base 2021: Rigid truck & trailer (n=865), semi-trailer (n=1443), B-double (n=842), road train (n=423).
Base 2016: Rigid truck & trailer (n=342), semi-trailer (n=1221), B-double (n=802), road train (n=221).

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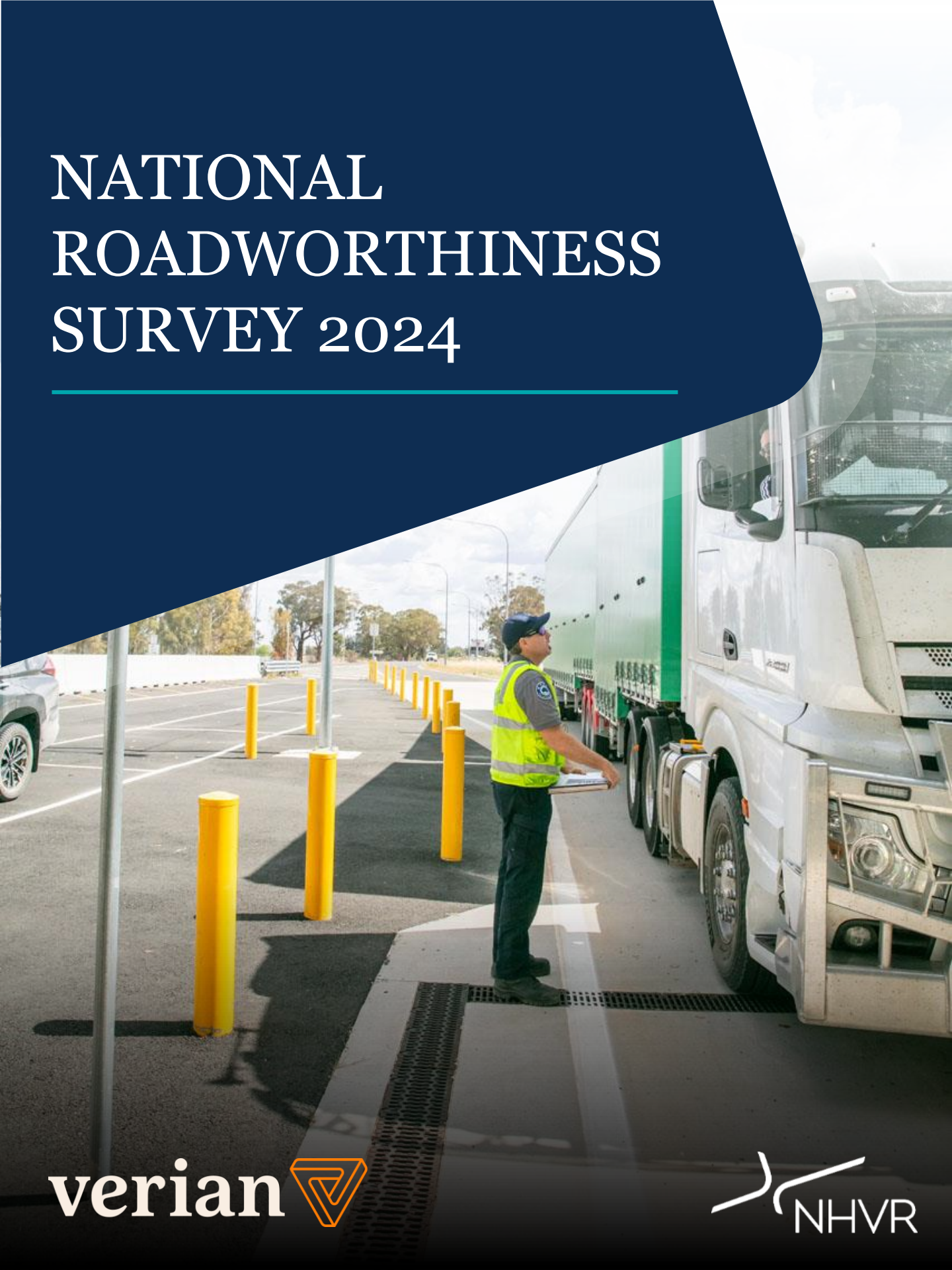

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