

SAFE LOAD PROGRAMS

SPILLAGE HAZARDS (EXHAUST & ENGINE SHIELDING)

This document has been developed by Safe Load Program (SLP) to provide Authorised Inspection Locations (AIL's) and Dangerous Goods Transport Operators/Owners with SLP's interpretation of the Australian Standards 2809.1 and 2809.2 requirements for truck exhausts system and hot engine component shielding for Dangerous Goods vehicles that load or operate in participating SLP terminals depots and refineries.

We have separated the many requirements of the standard into their single components to better clarify each requirement.

AS2809.1

Section 2.1.13 Spillage hazards

Shields or diverters shall be provided where potential spillage or leakage could create a hazard. In addition to other considerations, specific attention shall be paid to the following:

- (a) The effect of corrosion or deterioration on important safety components, e.g. brake piping.

Note for AIL's:

Report all visual faults to the vehicle owner, e.g. where a spilt cargo may have caused deterioration wear or corrosion in vehicle safety critical components.

In general petroleum products are not highly corrosive so protection from corrosion is not normally an issue for the majority of SLP customers. Although spilt petroleum product on some rubber or synthetic components could seriously affect their performance or reduce their effective service life, so vehicle operators may need to consider shielding or protecting some safety critical equipment.

- (b) The possibility of a flammable liquid spillage contacting an ignition source, a hot engine or exhaust component, or the like.

Note for AIL's:

Ensure that potentially spilt product from the tank or vehicle ancillary equipment cannot contact the vehicle exhaust system or hot engine components.

Protective shielding must be fitted to all components that have the potential to cause product ignition or provide a source of heat that may in turn provide a source of product ignition.

- (c) The possibility that some hot engine or exhaust component may cause the warming of some cargo-carrying component to an undesirable degree.

Note for AIL's:

Ensure any exhaust or hot engine components are adequately shielded to ensure the tank or the tanks ancillary equipment cargo temperature cannot be raised by the exhaust or hot engine components.

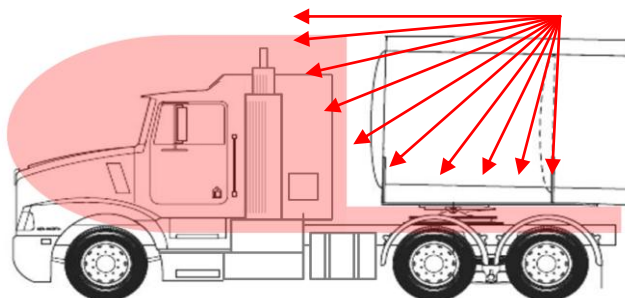
Vehicle exhaust and or hot engine components must be shielded to ensure they do not have the ability to heat product within the tank or the tanks ancillary equipment, e.g. piping, pump, etc.

- (d) The likely pattern of movement of any spillage, i.e. surges due to dynamic effects, tracking or flowing along vehicle components, spraying from spinning shafts, couplings or failed seals, etc.

Note for AIL's:

Determine if the design of the shielding will adequately ensure spilt product will not access the exhaust system and or, hot engine components and or, rotating components within the spill area. Rotating components (pump prop shaft, tail shaft) have the potential to spray spilt product in behind shielding on to exhaust or hot engine components. If rubber or other flexible boots or seals are being used as an element of heat shielding these components need to be watertight.

The direction spilt product takes needs to be considered in the design of the exhaust and hot engine component shielding. Product can travel in any direction from a tanker or its ancillary equipment. In this particular case we are protecting the vehicle exhaust and hot engine components from contact by product from the tanker. Any surface facing rearward of the truck cabin or with a surface facing in an upward direction has the potential to come in contact with spilled product. Any exhaust or hot engine component facing to the rear of the vehicle or upward requires shielding.



Typical area affected by a product spill from the tank or tanker
(Image -01)

AS2809.2

Section 1.7.1 Spillage hazards

The appropriate requirements of AS 2809.1 and the following requirements shall apply:

- a) Any portion of an engine or exhaust system which by reason of its location can be reached by spillage from above, whether the tanker is parked or moving, or which is within 1 m of a liquid-carrying component of the pumping system, shall be protected from such spillage by a metal shield.

All exhaust or hot engine components that can be reached by a product spill from above (Note: or behind) must be protected by a metal shield.

All exhaust or hot engine components within one (1) metre of a product carrying component e.g. the tank, pipework, pump, hose reel, hose, transfer hose, meter, vent, air eliminator, must be protected by a solid metal shield.

All metal shielding must be capable of protecting the exhaust or hot engine component from any spill caused while the vehicle is either stationary or moving; the direction of any product spill needs to be considered in the design of the shielding.

- b) The distance between the shield and any hot part of the engine or exhaust shall be not less than 50 mm.

A minimum 50 millimetres clearance is required between the exhaust and or hot component and the metal shielding.

- c) The distance between the shield and any cargo-carrying component shall be not less than 75 mm.

A minimum of 75 millimetres clearance is required between the metal shielding and any product component e.g. tank, pipework, pump, hose reel, hose, transfer hose, meter, vent, air eliminator.

- d) The shield for a vertical exhaust pipe shall extend as nearly as practicable to the full height of the pipe, but not lower than the top of the cabin, and shall be sealed to it liquid-tight at the top. Any openings or perforations for ventilation shall be located on the side remote from the tank.

The vertical exhaust metal shielding must be level with or higher than the top of the vehicle cabin.

The vertical exhaust metal shielding must extend as high as possible to the full height of the exhaust pipe.

The vertical exhaust metal shielding must be sealed liquid tight to the exhaust pipe on any surface that can be reached by a product spill.

Openings or ventilation holes must be located on the side furthest from the cargo tank and ancillary cargo carrying equipment.

Section 1.7.2 Propulsion engine exhaust

The engine exhaust system shall comply with the appropriate requirement of AS 2809.1 and the following requirements:

- a) The exhaust system shall not run beneath a tank unless shielded (see Clause 1.7.1).

All requirements of AS 2809.2 section 1.7.1 must be satisfied.

- b) The exhaust shall discharge behind the cabin and forward of the tank, at a level not lower than the top of the cabin and at least 1 m from any tank opening, or on the right-hand side of the vehicle, sideways and forward of the front wheels, or not more than 150 mm behind the front wheels.

Vertical exhaust discharge

All vertical exhaust outlets must discharge rear of the vehicle cabin but forward of the tank.

NOTE:

Some transport industry suppliers and manufactures in Australia have formed an opinion that this allows for vertical exhaust systems to be mounted to the rear of the main vehicle cabin while at the same time being mounted forward of the vehicle sleeper cabin, if a sleeper cabin is fitted.

SLP does not oppose this interpretation, as long as the ability to provide spill protection from the tanker or ancillary equipment to the rear or above the exhaust system is provided in full compliance with the Australian standards 2809.1 section 2.1.13 and 2809.2, section 1.7.1 and section 1.7.2.

All vertical exhaust metal shielding must be level with or higher than the top of the vehicle cabin.

The vertical exhaust must not discharge within one (1) metre of any tank opening, e.g. a tank hatch, vent or outlet.

Horizontal exhaust discharge

The horizontal vehicle exhaust pipe must discharge to the right hand side of the vehicle. (Drivers Side)

*The horizontal vehicle exhaust pipe must discharge forward of the front wheels or discharge within 150 millimetres to the rear of the front wheel. **Image 7***

UPDATE

NOTE: The ability to fit an exhaust system forward of the front wheel or within 150mm to the rear of the front wheel is contradicted by ADR 42/04 unless the following requirements are met ;

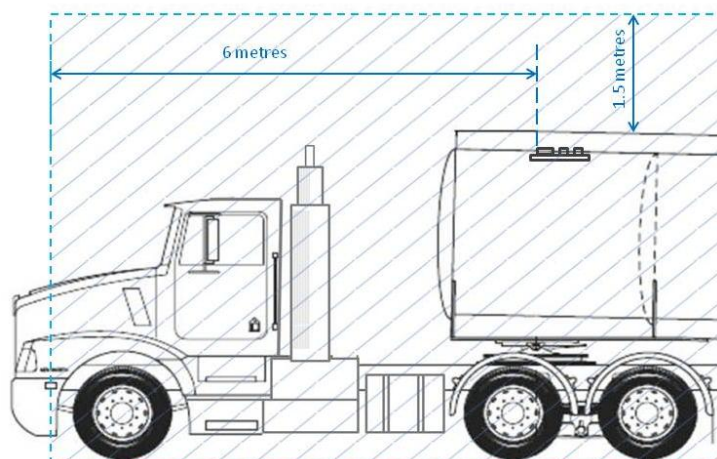
Section 10.3 N-Group Vehicles must meet the following requirements:

Section 10.3.1 The exhaust outlet must be behind the rearmost seating position and at least 40 mm beyond the furthest outboard or rearmost joint of the floor pan which is not continuously welded or permanently sealed, and must not extend beyond the general perimeter of the vehicle when viewed in plan. In the case of permanently enclosed vehicles not fitted with vertical exhaust systems the outlet must extend to the perimeter of the vehicle when viewed in plan;

*Required for Heavy goods category vehicles, category code (NC) manufactured on or after Jan 1st 2005.
Australian Design Rule 42/04 General Safety Requirements*

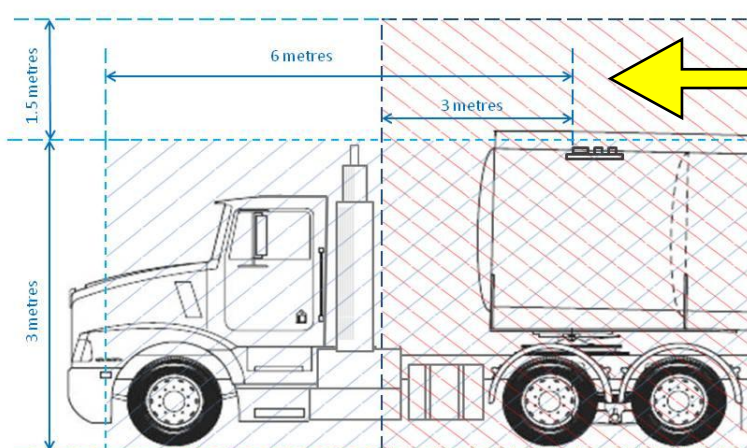
- (c) The exhaust shall not be discharged into a Zone 1 hazardous area.

Refer to AS 2430.3.3:2004 Classification of hazardous areas, the exhaust will need to be compliant with (part 4.6.2 Loading) and (part 4.6.3 Road or rail tanker, discharge with or without vapour recovery).



 Zone 2 Road Tanker Bottom Loading with Vapour Recovery

(Image -02)



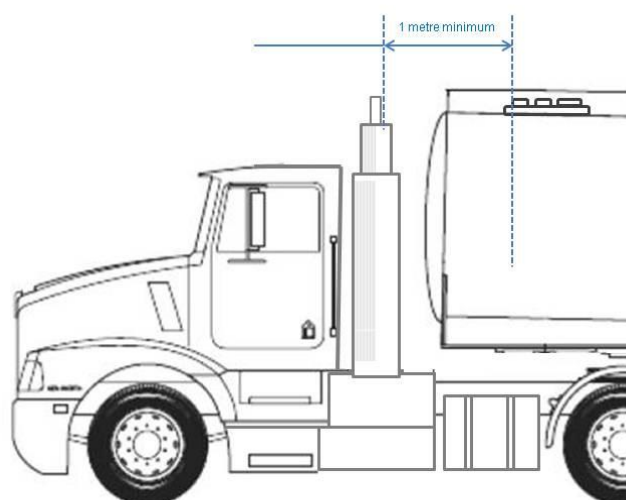
Zone 1 extends for three (3) metres laterally from the end of any wet hose, for hoses when disconnected from the tanker before loading and for a period of 5 minutes after loading.

 Zone 1 Road Tanker Loading without Vapour Recovery
 Zone 2

(Image -03)

In the above case the exhaust must not discharge into the Zone (1) atmosphere, this requirement must be in place for those tankers that are capable of top loading e.g. tankers fitted with fill tubes. The three (3) metre Zone one (1) atmosphere must be in place from the time the fill point connection is opened and for a period of five (5) minutes after loading is completed and the loading hose has been disconnected.

Note; before the fill point connection on the tanker is opened and following a five minute period after the loading hose has been disconnected and loading completed, the exhaust discharge requirements revert back to AS2809.2 Section 1.7.1 Spillage hazards in that the vertical exhaust must not discharge within one (1) metre of any tank opening, e.g. a tank hatch, vent or outlet.



AS2809.2 Section 1.7.1 Spillage hazards

NOTE: Other authorities may require special exhaust arrangements to suit their defined area of operation, such as airports.

(Image -04)

Special exhaust requirements will need to be reviewed by SLP on a case by case basis.

Common misunderstandings of Australian standards 2809.1 & 2809.2

Mistaken beliefs

- “If the exhaust system discharge (outlet) is more than (1) one metre away from any tank opening then it does not need to be shielded”*

This is not correct – the rule is there to ensure that no exhaust outlet or discharge is within one meter of any tank opening (e.g. a hatch, outlet, vent) this rule has nothing to do with minimum or maximum distances for the requirement for exhaust shielding.
- “If the exhaust stack is in front of the sleeper cabin then it does not require any shielding, because the sleeper cab acts as the shielding”*

This is not correct – while the sleeper cabin can at times act as shield blocking product directly from behind, it does not act as a shield from liquid falling from above. All exhausts in front of a sleeper cabin still require shielding to be fitted to the top of the factory fitted perforated screen.
- “If the exhaust stack is in front of the sleeper cabin and more than (1) one metre away from any tank opening it does not require any shielding”*

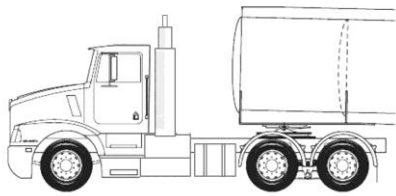
This is not correct – the location on the exhaust in front the sleeper cabin and its distance from any tank opening don’t exclude it from requiring shielding from behind and above.
- “The manufacturer that built my truck says it does not need to have shielding because it’s in front of the sleeper cabin”*

This is not correct – SLP and the participating terminal will decide if the truck complies with the Australian standard, if the truck does not comply it will not be permitted to enter an SLP participating terminal even if the manufacturer feels shielding is not required.
- “My exhaust system is covered or wrapped in an insulating blanket material that acts as a heat shield from any fuel splash”*

This is not correct – the standard specifically requires a metal shielding with minimum of 50 millimetres clearance between any hot engine or exhaust component and the metal shielding.
- “My exhaust system is covered with a number of small steel plates that act as a heat shield from any fuel splash”*

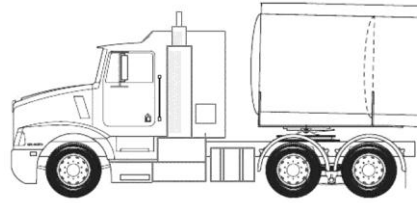
This is generally not correct – the standard specifically requests a minimum of 50 millimetres clearance between any hot engine or exhaust component and the metal shielding, plus the shielding needs to be continuous to ensure that fuel cannot run to the edge of the shielding and drip onto the hot engine or exhaust component.
- “An exhaust flap needs to be fitted to all exhaust stacks to ensure no fuel enters the exhaust pipe if a spill occurred during loading”*

This is not correct – it’s not a requirement for exhaust discharge flaps to be installed on exhausts, a straight cut exhaust pipe or an angle cut rear facing exhaust is permitted. NOTE: In many states it’s against environmental law to face the exhaust discharge to the left hand side of the vehicle.



Vertical exhaust standard cabin

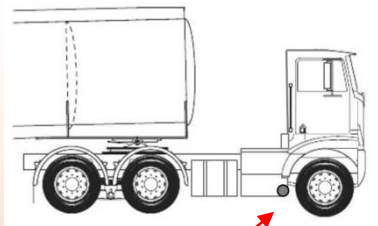
(Image -05)



Vertical exhaust with sleeper cabin

(Image -06)

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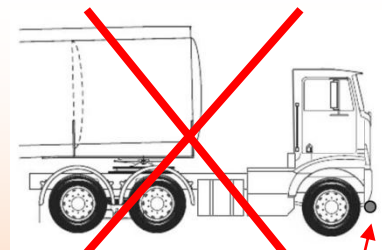


150mm behind front wheel, AS 2809.1 ✓

40 mm to the rear of the vehicle cabin ADR 42/04 ✓

Manufactured on or after Jan 1st 2005

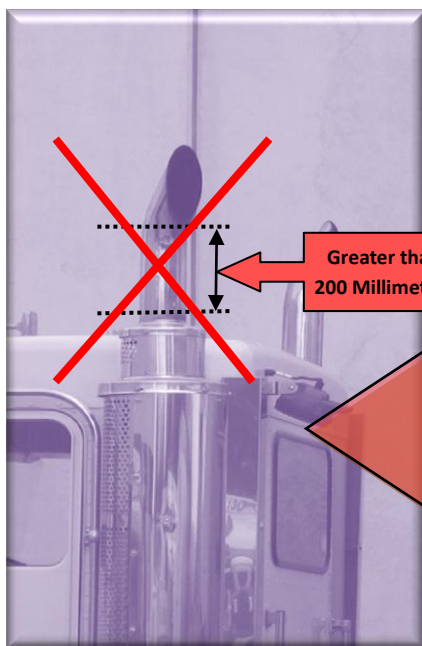
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AS 2809.1 exhaust forward of front wheel ✓

Forward of the rear of the vehicle cabin ADR 42/04 ✗

(Image -08)



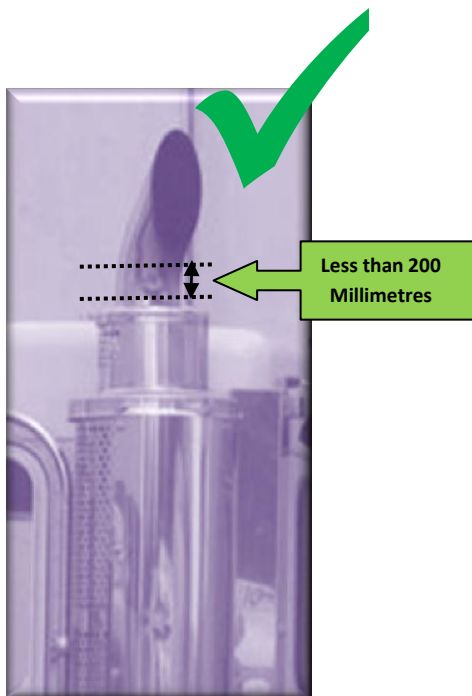
(Image -09)

This picture shows vertical exhaust shielding compliant with the requirement to be higher than or level with the top of the vehicle cabin.

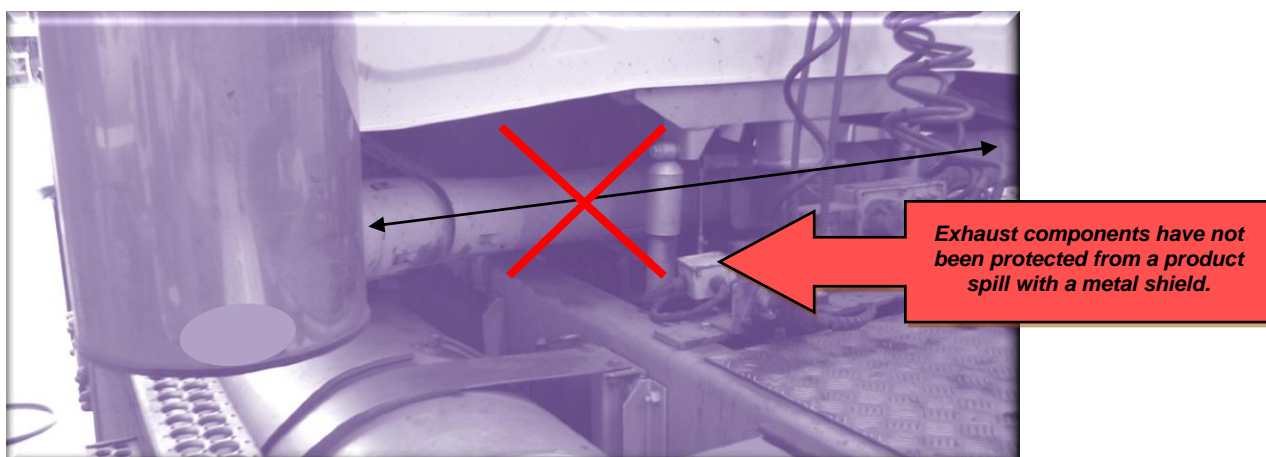
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The exhaust shielding does not extend as high as is practicably possible to the full height of the exhaust pipe; in this case the exhaust shielding could have extended a further 250 millimetres to the point where the exhaust pipe starts to curve into the angled outlet. Another option would be to reduce the length of the exhaust pipe to as short as is practicably possible.

SLP will accept a maximum of 200 millimetres of exposed exhaust pipe above a vertically mounted exhaust shrouding.

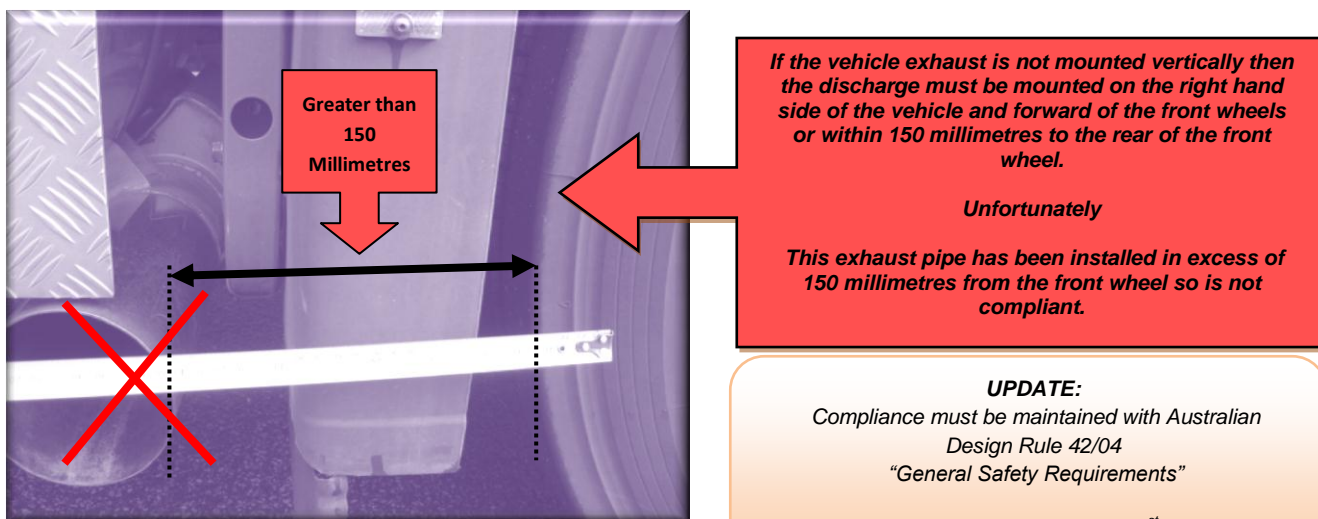


(Image -10)



(Image -11)

Note: Compliance must be maintained with Australian Design Rule 42/04 "General Safety Requirements"



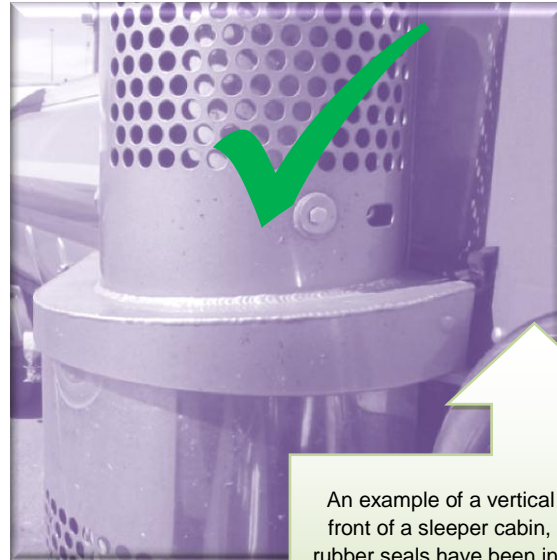
(Image -11)

UPDATE:
Compliance must be maintained with Australian Design Rule 42/04 "General Safety Requirements"
Manufactured on or after Jan 1st 2005



(Image -12)

Note; the rear of this shrouding has also been sealed liquid tight to the sleeper cabin ensuring no product can reach the exhaust pipe or muffler box from the rear.



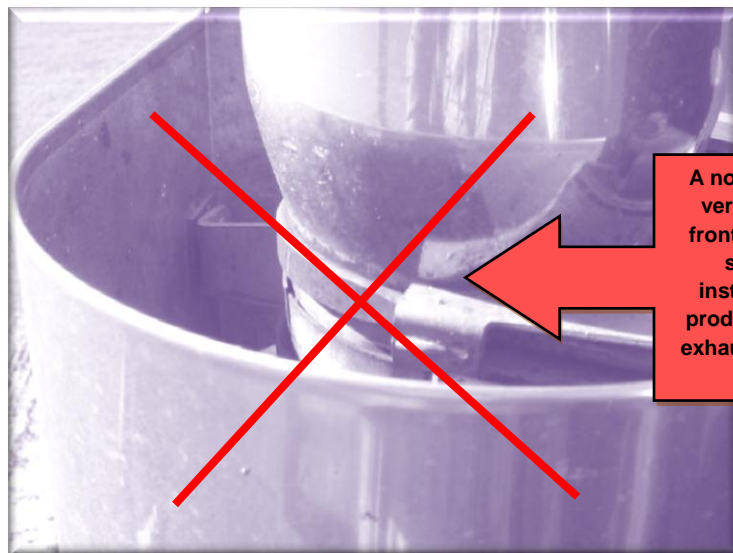
(Image -13)

An example of a vertical exhaust installed in front of a sleeper cabin, metal shielding and rubber seals have been installed to ensure that any spilt product cannot access the hot exhaust pipe from the rear or above.

Note; is there 50 millimetres clearance from the exhaust pipe to the metal shielding.

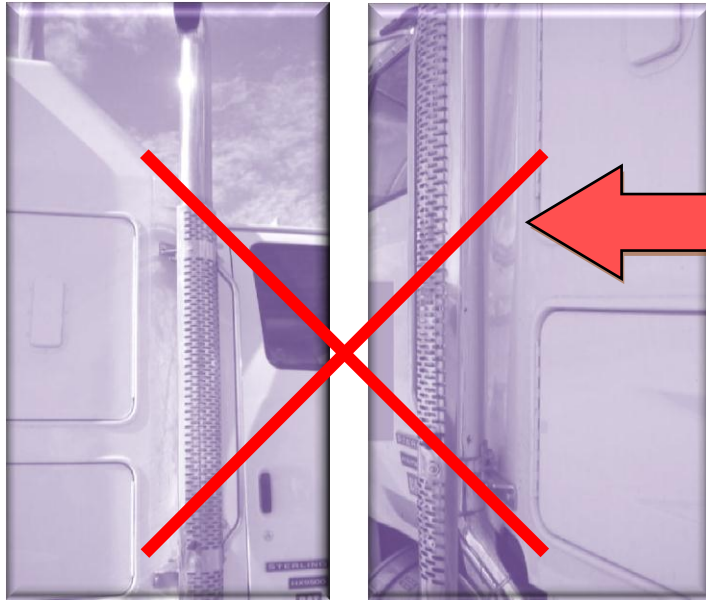


(Image -14)



(Image -15)

A non compliant example of a vertical exhaust installed in front of a sleeper cabin, metal shielding has not been installed to ensure that spilt product cannot access the hot exhaust from the rear or above.



A non compliant example of a vertical exhaust installed in front of a sleeper cabin, metal shielding has not been installed to ensure that spilt product cannot access the hot exhaust from the rear or

(Image -16)

(Image -17)

The vertical exhaust metal shielding must be sealed liquid tight to the exhaust pipe on any surface that can be reached by a product spill.

All vertical exhaust metal shielding must be level with or higher than the top of the vehicle cabin.

The vertical exhaust metal shielding must extend as high as possible to the full height of the exhaust pipe.

Openings or ventilation holes must be located on the side furthest from the cargo tank and ancillary cargo carrying equipment.



(Image -18)