



## Heavy-duty tow trucks

1. Dual tyres on the rear axle groups.
2. Suitable spacer bars and safety chains needed to secure the towed vehicle.
3. A flashing amber light.
4. Work lamps that are used during hours of darkness to illuminate the towing point.
5. A suitable light bar that conforms to the lighting requirements in ADR 13/00.
6. Three portable warning devices.
7. Fire extinguisher (min 4.5 l).
8. Class to be marked on the right-hand side. The class is described in the Table.
9. A class 4 tow truck must have a power operated winch and air brake couplings at the rear for connection to have control of the towed vehicle brakes.
10. The crane (which is defined as a machine for raising and lowering heavy weights) shall be in accordance with the requirements of Australian Standard 1418 "Rules for Cranes", Part 1 ("1977-"General Requirements") and Part 5 (1980 - "Mobile Cranes") and be approved by the relevant authority supervising lifting appliances. This later point 10 obliges the manufacturer to consider the crane requirements in the Australian Standards series 1418. The definition of a crane is broad enough to include a wheel underlift and the winch system.

Tow truck classes in ADR 44/02, clause 44.4

Tow truck features on new vehicles can be approved under the identification plate (IPA) system (Road Vehicle Certification System - RVCS) that is governed by the Motor Vehicle Standards Act. If a new vehicle carries a valid Identification Plate and if the equipment was accurately described in the IPA application, then the state and territory road agencies should

accept the fitment of the equipment without further approval being necessary. The tow truck features will usually be added to a chassis-cab vehicle by a 'second stage manufacturer'.

Vehicle Standards Bulletin 6 (VSB 6):

Tow trucks will usually be constructed by a specialist body-installer rather than an OEM. The applicable vehicle modification code for a modified new (dealer-arranged) or in-service tow truck is VSB 6, Section T.

A summary of the requirements are:

1. The design of a tow truck must be certified by an authorised Accredited Vehicle Examiner (AVE). The modification plate should have a T1 Code (construction) and a T2 Code (design)
2. The design of the tow truck crane must be in accordance with the relevant parts in AS 1418.1, AS 1418.5, AS 1418.11 and AS 1418.20 (which has now been superseded by AS 5400). These standards specify factors of safety for the crane, underlift, winch, steel rope and jib / hook.
3. Stability under towing is also a factor that needs to be considered. Tow trucks should be designed so that the front axle is not unweighted to less than 60 per cent of the tare weight when a load is lifted at the back with no tray load. Note the heavy tow trucks operating under a type B permit can be eligible for a 7.0 tonne steer axle to assist with steering when towing.
4. There are no tow truck specific lighting requirements. Beacon lights and additional gantry lights are acceptable assuming they are ADR approved types.
5. Reinforcement of the chassis rails will be needed at the lifting cross-member.
6. Air brake couplings are required on a heavy-duty tow truck to control the brakes on the towed vehicle.

**T**his article is about heavy-duty tow trucks. It describes the design requirements that designers and operators need to comply with.

It also describes the access requirements that are likely to be applied to tow truck operators by state and territory authorities. There is no federal in-service regulation for tow trucks, so the design is regulated by the states and described in the various State road-safety regulations and guidelines. Furthermore, the NHVR has no specific powers or responsibilities relating to tow trucks. The design requirements arise from the Australian Design Rules and the modifications code Vehicles Standards Bulletin No 6.

ADR Design Requirements:

Along with other ADRs, new tow truck vehicles must conform to the relevant clauses in the Australian Design Rules (ADR 44/02, Clause 44.4 'Tow Trucks'). This rule identifies four tow-truck classes, which are shown in the Table. In summary ADR44 requires that tow trucks be equipped with the following:

| Class | Load capacity range | Minimum GCM | Minimum Safe Working Load (SWL) of Crane or Lifting Device | Maximum towed vehicle weight. |
|-------|---------------------|-------------|--|-------------------------------|
| 1     | 1.2 t – 2.99 t      | -           | 1.0 t  | 2.0 t                         |
| 2     | 3.0 t - 4.99 t      | -           | 2.5 t  | 5.0 t                         |
| 3     | 5.0 t – 11.99 t     | 18 t        | 5.0 t  | 12.0 t                        |
| 4     | > 12 t              | 25 t        | 5.0 t  | Not specified                 |

| Nominal rope diameter (mm) | Minimum breaking force (tonnes) |
|----------------------------|---------------------------------|
| 8                          | 4.2                             |
| 10                         | 6.4                             |
| 12                         | 9.2                             |
| 14                         | 12.6                            |
| 16                         | 16.4                            |
| 18                         | 20.7                            |
| 20                         | 25.7                            |

Steel rope breaking force (AS 3469 Grade 1770 steel rope)

As a guide the wheel underlift on a 10 tonne tilt-tray tow truck should not lift more than 1.8 – 2t. This is determined by point 3 above. A design factor of safety of 3 is appropriate so the underlift mechanism should be capable of lifting six tonnes in this example. AS1418 and AS 5400 requirements: Some heavy-duty recovery vehicles have a crane that is used to recover and reposition the casualty truck. The work health and safety regulations state that mobile cranes with a SWL over 10t need to be design registered, and in some states be registered as plant equipment. However, tow trucks are exempt from the design and plant registration requirements. The design and construction of tow trucks with mobile cranes attached can still be considered as 'plant' and designers or installers of cranes and other equipment on tow trucks need to consider the following:

1. Emergency stops must be fitted at all control stations.
2. The capacity of the under or crane must not exceed the GVM or GCM of the towing vehicle. Any component that has the capacity to lift a load that can exceed these ratings needs to be marked

down accordingly with a notice placed in a prominent position.

3. Adequate safety factors must be applied (e.g. 4x for hydraulic hoses, 2.5x for other hydraulic equipment. Factors of Safety related to structures, cables and hoists should be a minimum of 3 as a general rule. See the table below showing how safety factors can be determined).
4. Hydraulic equipment and controls shall comply with the relevant requirements in AS1418.
5. Hydraulic controls are to have operational illustrations.
6. Pneumatic equipment and controls shall comply with the relevant requirements in AS1418.
7. The recovery winch shall comply with EN14492-1 or SAE J706 and the information marked on recovery winches must be in SI units.
8. Chains, ropes, webbing, hooks, and shackles to comply with nominated technical standards and to be marked accordingly (see the Table).

The force needed to pull each tonne of car weight up a 25o ramp assuming a factor of safety of six is  $6 \times 0.43 = 2.6t$ .

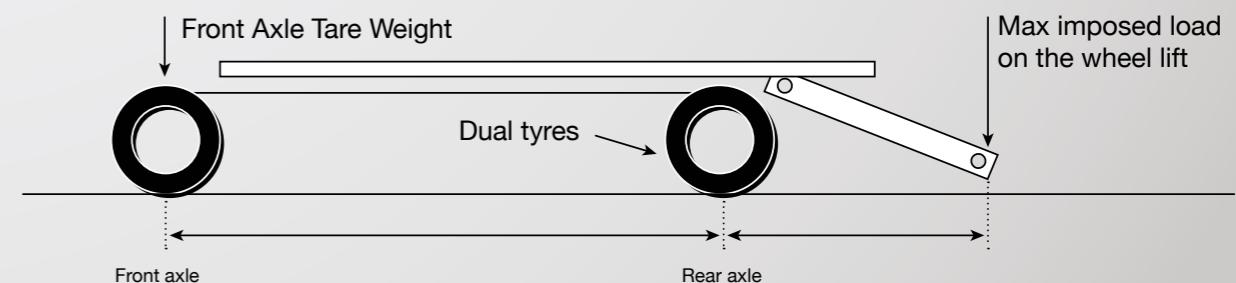
Operational requirements

The following general operational requirements are applicable to heavy-duty tow trucks. Note that there are some requirements that are state and territory specific.

1. As per state road rules, a vehicle cannot be towed unless the driver can control the movement of the towed vehicle.
2. If the towed vehicle's laden mass is greater the 3.5 x the towing vehicle's tare mass. The towing, vehicle must be able to control the towed vehicle's brake system.
3. Tow truck operators must carry equipment such as a broom, shovel or bucket for the removal of debris and glass.
4. Flat towing or partial lift towing should be conducted when safe to do so in order to minimise axle loadings and resulting stress on bridges. A light-board must be fitted and if towing at night time or low visibility the side marker lamps must be on. If these cannot be switched on, portable side marker lights must be fitted.
5. Only one vehicle can be towed unless authorised by a police officer or a specific permit.

In addition to both ADR 44/02 and VSB 6, some road agencies specify equipment requirements on heavy vehicle tow-trucks because of their heavy-duty nature. For example, in Victoria heavy duty tow trucks operating under a type B permit and towing accident damaged or incapacitated vehicles must have an on-board weighing device that measures the load on the rear axles and constantly displays the recording.

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$$\text{Max Imposed Load} = 0.6 \times \text{Tare} \times \text{Wheelbase/Overhang}$$