

## COMPONENT SELECTION GUIDE

Legislation requires that trailers are to be manufactured to comply with all applicable Australian Design Rules (ADRs). Trailers with an Aggregate Trailer Mass (ATM) greater than 4.5 tonne must be fitted with a compliance plate (silver) prior to registration. The Federal Department of Transport issues compliance plates following approval of submissions of documented evidence relating to applicable ADRs. A major consideration with any trailer design is to have a suitable braking system.

Requirements for trailer brake systems are covered by ADR38

A trailer brake system assembly comprises three major sub-assemblies:

**FOUNDATION BRAKES-** the brakes and associated mechanical parts including the brake shoes, linings & brake drum. Brakes may be of the mechanical, hydraulic or electric type.

**SUSPENSION SYSTEM-** comprises the associated springing elements (springs/air bags), bracketry and axle attachment (U-bolts etc.).

**CONTROL SYSTEM** which is the process by which the foundation brakes are activated, and may be provided by the overrun of the trailer (override) or via electric, vacuum or air control signals.

ADR38 requires that trailers up to 4.5t ATM must have an efficient brake system utilising any of the above control systems (override control systems are limited to maximum 2.0t ATM). Trailers exceeding 4.5t ATM must use approved brake systems. The strict requirements outlined in ADR38 have resulted in approved brake systems to date being limited to air over mechanical disc or S cam type.

Evidence of compliance for the brake system fitted to a particular model trailer required for submission to gain compliance plate approval, may be derived from physical brake testing of the completed trailer, or by calculation process using test data of approved sub assembly components (if fitted), the latter method being most common & cost effective.

While it is generally understood how foundation brakes & control system choices affect trailer brake efficiency, less is understood regarding the role of the suspension system. Suspension systems may be deemed as brake reactive or non-brake reactive, i.e. how the suspension reacts under trailer braking conditions.

It must be remembered that if the brakes lock-up and skid when applied, the trailer is not decelerating as intended and may result in a jackknife situation. If suspensions are brake reactive, load transfers from one axle to another within an axle group. When load transfers from one axle to another, that axle suddenly has to be provided with enough braking force to suit the increased load, and the other has to ensure there is not too much braking force to cause the wheels to skid when the load is transferred.

Data provided by component testing (from approved sub-assemblies) allows determination of the brake system skidding limits by calculation processes.

Trailers may be classed as pig trailers, semi-trailers or dog trailers. Ratings for **TOTAL TRAILER BRAKE SYSTEMS** are based on pig trailer configuration.

**Pig trailers** are trailers with one axle group which is on or about the centre of the load space. Hence the axle load (Gross Trailer Mass GTM) and total trailer load (ATM) is much the same.

**Semi-trailers** are trailers with one axle group towards the rear of the load space. Some manufacturers fit the axle group on drawbar type trailers midway between the centre of load space and rear of the trailer and designate the trailer as a tag trailer to take advantage of axle load limits greater than those allowed for pig trailers. These trailer configurations are treated as semi-trailers for brake calculation purposes.

Since semi-trailers have considerable load proportioned to the towing vehicle the brake system components must be chosen to ensure that the trailer is not over braked at the axle group while having sufficient performance to cater for emergency & parking of the total trailer mass (ATM).

**Dog trailers** are those which have an axle group at the front of the trailer - steerable (by turntable mostly) and an axle group at the rear. These types of trailers require unique brake performance considerations. Wheelbase & height of loaded trailer centre of gravity determine the amount of load transfer from rear to front under trailer braking. Short, high dog trailers are difficult to configure brake system components to reduce jackknife effects. Components are best chosen after brake performance calculations to ensure compliance.

Trailer brake system configurations may be varied following calculations via power chamber, spring brake & tyre sizes together with choice of slack adjuster position to verify compliance.

To some, such calculation processes may seem complex. Rogers Willex, through its association with consultants, Trailer Design Services Pty. Ltd., can provide brake performance calculations, preparation & lodgement of evidence of compliance documentation on a consultative basis to the Vehicle Standards section of the Federal Department of Transport. Guessing trailer brake equipment to suit a particular application may cause problems and delays with the trailer certification processes and/or costly rework.

Consult with Rogers Willex technical staff during your trailer design phase. Assistance may be provided with most applications.

Information required when requesting Trailer Design Services assistance with trailer compliance application:

- Manufacturers full name & address (if company ACN/ABN)
- Vehicle Identification No. (VIN) for the applicable trailer; available from your local Transport Dept.
- Trailer type (pig, semi or dog)
- Trailer Make & Model
- Axle group loads kg.
- Aggregate Trailer Mass kg.
- Tyre size, load rating & qty per axle
- Make, model no. & ADR approval no. of axle/brake assemblies. \*
- Make, model no. & ADR approval no. of the suspension assemblies. \*
- Make, model no. & ADR approval no. of air control system. \*
- Make, model no. & ADR approval no. of coupling/kingpin. \*
- Make, model no. & qty of the following lights:
  - Direction indicator lamps
  - Side marker lamps
  - Side reflectors
  - Front end outline marker lamps
  - Front position lamps
  - Rear end outline marker lamps
  - Front reflectors
  - Stop lamps
  - Rear position lamps
  - Registration plate lamp/s
  - Rear reflector

\* If not manufactured by Rogers Willex

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