INTELLIGENT ENGINEERING

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Wheel Nut Torque and Tyre Pressure Guide

Document Type: Customer Instruction Guide
Applies To: All chassis manufactured by Intelligent Engineering

1. Purpose

This document provides instructions for correctly tightening wheel nuts and setting tyre pressures to ensure safe operation, optimal performance, and the longevity of caravan components and tyres.

2. ⚠ Safety Information

- Always ensure the caravan is parked on a level surface and secured against rolling before performing any work.
- Use a calibrated torque wrench when tightening wheel nuts.
- Never use rattle guns for tightening.
- Re-check wheel nut torque and tyre pressure before each travel.
- Ensure tyre pressures are setup for the correct application and road surface.

3. Wheel Nut Torque Requirements

3.1 General Torque Procedure for ½" wheel studs

Wheel nuts must be tightened in two stages to ensure even clamping force:

Stage 1: 100 Nm.

Stage 2: 140 Nm.

3.2 General Torque procedure for M14 wheel studs

Wheel nuts must be tightened in two stages to ensure even clamping force:

Stage 1: 100 Nm.

Stage 2: 150 Nm.

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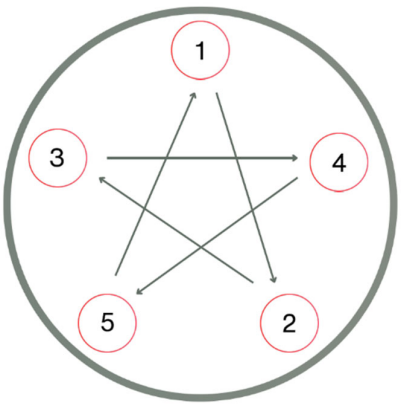
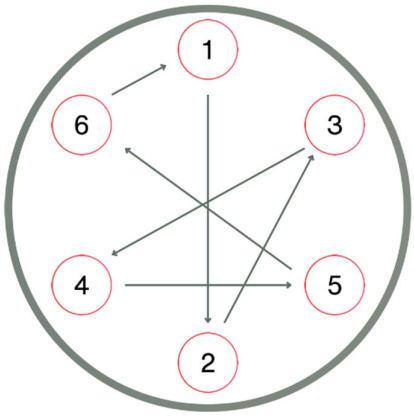
4. Torque Sequence

Wheel nuts must always be tightened in a star (criss-cross) pattern to ensure even load distribution and to prevent wheel distortion.





Key Points:

- **Do not** tighten nuts sequentially in a circular direction.
- Follow the star pattern for **both** torque stages.
- Apply torque gradually and evenly.

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5. Tyre Pressure Guidelines

Correct tyre pressure is critical for safety, tyre life, and load handling.

5.1 Determining Correct Pressure

Tyre pressure must be set based on:

1. **Tyre Manufacturer Specifications**
    - Refer to the markings on the tyre sidewall.
    - Observe maximum load rating and pressure limits.
2. **Caravan Weight**
    - Consider the **actual loaded weight** of the caravan.
    - Heavier loads require higher tyre pressure within the tyre's rated limits.

5.2 General Recommendations

- Inflate tyres when they are **cold** (before driving).
- Do not exceed the **maximum pressure** indicated on the tyre.
- Ensure all tyres are inflated to the correct pressure based on the load carried by each tyre.
- Check tyre pressure regularly, especially before long trips.

5.3 Calculating the correct tyre pressure for smooth bitumen cruising

Step 1. Determine the maximum tyre load and pressure

This information can be found on the sidewall of the tyre itself.
Note: Only use the 'SINGLE" specification for your caravan. The DUAL is only applicable to 2 tyres side-by-side and therefor not relevant to your caravan.

In the example below, we will calculate the correct pressure for a caravan weighing 2900 kg with a tandem axle setup.

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Using the information in the above picture, we can gather the following information:

Note: Only look at the SINGLE load rating

1400kg refers to the maximum load permitted on this tyre

80 PSI refers to the maximum pressure permitted to this tyre

Thus, If the tyre has a force of 1400 kg exerted on it, the pressure must be 80 PSI.

Let us now apply this guide to our 2900 kg tandem axle caravan by using some simple math calculations.

Caravan actual weight = 2900 kg (actual measurement)

Caravan ball weight = 290 kg (actual measurement) – this is the weight pushing down on the tow vehicle.

Total weight on all 4 wheels = 2900kg – 290kg = 2610 kg

Total weight on each wheel = 2610 kg / 4 (total wheels) = 652.5 kg

Consider that each wheel can carry a maximum of 1400kg, but is currently only carrying 652.5 kg

Therefore, each wheel is carrying (652.5kg / 1400kg % =) 46.6% of its maximum load.

We have determined before that a wheel with a load of 1400 kg must be at a pressure of 80 PSI, but,

Each wheel is carrying 46.6% of its maximum load so the pressure should also be set to 46.6% of its maximum pressure.

Each tyre pressure is 46.6% of 80 PSI is (80 X 46.6% =) **37.28 PSI**

As a rule of thumb, add 5 %: 37.28PSI + 5% = **39.1PSI** is required for smooth bitumen roads.

5.4 Calculating the correct tyre pressure for other road surfaces:

Corrugated dirt road: Reduce the calculated bitumen tyre pressure by 10 - 20%

Calculation = 39.1PSI – (10-20%) = 31.3 - 35.2PSI

IMPORTANT: Reduce your speed to a maximum of 60km/h to suite the road surface.

Note: To assist the suspension, the softer tyre will help absorb the corrugations and bumps.

Soft and loose sand: Reduce the bitumen tyre pressure by 40 - 50%

Calculation = 39.1PSI – 50% = 19.55 – 23.46PSI

IMPORTANT: Reduce your speed to a maximum of 40km/h to suite the road surface.

Note: This low tyre pressure will increase the tyre contact surface to reduce the chance of getting stuck in the sand.

Tyre pressures must be returned to the specified operating pressure immediately after leaving the sand road.

IMPORTANT:

1. The above-mentioned tyre pressures are calculated for a specific caravan setup and only the formulas apply to all setups and not the values used.
2. Always adjust the tyre pressures to suite the road surface.
3. Always adjust your speed to the road conditions and consider the safety risks.
4. Assess the road surface and condition prior to your travel.
5. To calculate a single axle setup tyre pressure, use 2 wheels for the calculation as each wheel will carry double the weight compared to a tandem setup.
6. Some caravan setups may have different weights from side to side, which should be considered when setting tyre pressures.

6. Maintenance Requirements

- Re-check wheel nut torque and pressure before and after every trip.
- Inspect your tyre for wear, uneven wear and damage after every trip.
- Consult a professional when in doubt.

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7. Summary

Correct wheel nut torque and tyre pressure are essential for a safe caravan towing experience. Always follow the specified two-stage torque process, use a star tightening pattern, and set the tyre pressures according to both tyre specifications and actual load conditions.