



NATIONAL CARAVAN  
COUNCIL LIMITED

# Code of Practice 501

Minimum Specification of Undergear

**for**

Caravan Holiday Homes

&

Residential Park Homes

Issue 3 – December 2006

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## **Foreword**

This code of practice has been drawn up by the National Caravan Council to provide a minimum standard of good manufacturing practice for the manufacture of chassis and undergear for caravan holiday-homes and residential park homes.

The National Caravan Council's Technical Committee, with the co-operation of chassis manufacturers, has produced this Code of Practice.

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## **Published by**

The National Caravan Council is the representative trade association for the U.K. Caravan Industry and was founded in 1939. Membership encompasses all sides of the industry, manufacturers, dealers, park owners and specialist suppliers of products and services.

The National Caravan Council founded and is now a key member of the European Caravan Federation, which promotes and strengthens the interests and influence of the industry within the European Community.

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## 1. SCOPE

This code of practice relates to Caravan Holiday Homes and Residential Park Homes and specifies the minimum requirements for the chassis, including wheels, tyres, bearings, corner steadies and jockey wheel. This document relates to production destined for both UK and Export customers.

## 2. NORMATIVE REFERENCES

This code of practice incorporates reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed within Annex C.

## 3. DEFINITIONS

For the purpose of this code the following definitions will apply:

Undergear	A chassis and all its component parts.
Chassis	The steel framework.
Drawbar	A projection of the chassis carrying a coupling which enables the Caravan Holiday Home or Residential Park Home to be towed.
Support point	A point identified for supporting the Caravan Holiday Home or Residential Park Home in conjunction with other support points.
Jacking point	A strengthened place on the chassis identified for the location of a jack during transportation and siting of the Caravan Holiday Home or Residential Park Home.
Jacking zone	A strengthened area on the chassis identified for the location of a jack during the transportation and siting of the Caravan Holiday Home or Residential Park Home.
Jockey wheel	A wheeled assembly, adjustable for height, designed to temporarily support the front end of a Caravan Holiday Home or Residential Park Home.
Holding Down Point	A point on the longitudinal main member of the chassis designed to be used for the holding down of the home once it is sited.
Corner steadies	Adjustable supports normally attached to the chassis at each corner of a Caravan Holiday Home or Residential Park Home.
Axle	A fabrication to support the wheel configuration.

## 4. WEIGHTS

It is the responsibility of the Caravan Holiday Home or Residential Park Home manufacturer to advise the chassis manufacturer at the point of order the anticipated weight of the home. Consideration should be given to the anticipated load of the Home when in use. i.e. number of occupants, personal effects, essential equipment.

If the weight of the Caravan Holiday Home or Residential Park Home is in excess of 5,500 kg the chassis manufacturer shall consult directly with the caravan manufacturer to determine the specific design requirements in relation to the number of axles and the wheel & tyre configurations.

It is the responsibility of the chassis manufacturer to design the chassis to ensure that its loading capacity is rated to, or above, the weight specified by the Caravan Holiday Home or Residential Park Home manufacturer.

The imposed weight of the home is to be clearly displayed on a metal plate attached to the chassis in the vicinity of the draw bar.

## 5. AXLE CONFIGURATION

The Caravan Holiday Home or Residential Park Home manufacturer must liaise with the chassis manufacturer to determine the required axle configuration and location.

It is recommended that for units with a mass in excess of Band F (over 5,500 kgs – see CoP 502), twin (or triple) axle configurations be employed.

Where twin or multiple axles are to be fitted, the chassis manufacturer should ensure that the axles are placed close together for safety and manoeuvrability reasons. A maximum distance of 2 x tyre outside diameter for each axle spacing is permitted. If a manufacturer wishes to exceed this maximum separation distance then the test detailed in Annex A shall be carried out, by formal inspection, to verify suitability.

It is recommended that the axle configuration be so arranged that the nose weight for a Caravan Holiday Home or Residential Park Home be no lighter than 25 kgs and no heavier than 100 kgs.

A permanent warning label shall be affixed to the drawbar stating:-

<p style="text-align: center;"><b>CAUTION</b> <b>Nose weight exceeds 25kg</b> Refer to Manual Handling Operations Regulations 1992</p>
--

Note – Black text on a yellow background

It is the responsibility of the caravan manufacturer to agree with the chassis manufacturer, the axle position.

## 6. CHASSIS

### 6.1 General

The structural integrity of the chassis shall have a minimum design life as specified by the Caravan Holiday Home or Residential Park Home manufacturer.

Track width of the axle is to be agreed between the chassis manufacturer and the home manufacturer. Consideration required as to the maximum track width capability of the selected haulier.

Sharp edges on steelwork should be minimized. Particular consideration should be paid to any steel at extreme edges of the chassis.

NOTE: Sufficient ground clearance (approach & departure angles) should be accommodated particularly in respect of when loading or unloading the Home. If a home manufacturer has specified a particular jack, then consideration should also be given to the specific clearances it requires.

## 6.2 Longitudinal Deflection

When the chassis is supplied to the caravan manufacturer, it shall be provided with the longitudinal members either un-deflected, or with an upwards deflection (set), as specified by the caravan manufacturer.

The chassis shall have stiffness, such that the completed home in its “free position” (supported only by the wheels and jockey wheel) shall not have a longitudinal deflection in excess of a ratio of 1:360.

Compliance with this requirement may be confirmed by placing the finished home on a flat level surface and measuring the height of the chassis from the floor at each end and at the centre. (See Annex B)

### NOTE:

To avoid damage to the Caravan Holiday Home or Residential Park Home, it is essential that it is stored, transported and sited in compliance with the requirements of the respective NCC Codes of Practice. Particular note should be taken of paragraph 10 of the Code of Practice for the Transportation, Siting and Commissioning of Caravan Holiday-Homes, and paragraph 2.4 of the Code of Practice for the Transportation, Siting and Commissioning of Residential Park Homes. (See Annex D).

## 6.3 Detail Design

All steel used for the chassis including drawbar, shall be to an appropriate recognised British Standard (BS) or international equivalent specification.

All materials used in the construction of the chassis must comply with the design specification agreed between the home manufacturer and the chassis manufacturer.

Tolerances for the sections will be to the tolerances quoted in the relevant British or European standards.

## 6.4 Drawbar

The coupling head shall be suitable for use with the coupling ball specified in BS AU 113c, or be a coupling eye to BS AU 29.

Drawbars may be designed to be either detachable or retractable. A drawbar may be fitted at either end of the home, in order to facilitate siting. Where two drawbars have been fitted the home manufacturer should advise the haulier and the siting team which drawbar has a negative noseweight.

## 6.5 Support Points

The chassis manufacturer shall provide support points in sufficient numbers and positions as agreed with the Caravan Holiday Home or Residential Park Home manufacturer in light of the weight distribution of the specific layout of a particular model. To achieve the required snow-loading grade, (Caravan Holiday Homes only) it is recommended that the support points be in the areas as specified by the detail design. (For example See Annex E).

**For homes up to 12.2 metres there should be a minimum of 4 support points on each longitudinal member (in addition to those either side of the axle support area).**

**For homes over 12.2 metres and up to the maximum legal length of 20.000 metres there should be a minimum of 6 support points on each longitudinal member (in addition to those either side of the axle support area).**

The chassis manufacturer shall identify these points by means of a yellow permanent label.

## 6.6 Jacking Points

Chassis manufacturer must declare the location of any jacking points or zones. A minimum of two points are to be provided on each side of the chassis. The jacking point or zone should be a strengthened position with a flat surface area and should have sufficient load capacity for the anticipated mass of the finished home.

The jacking points/zones should be identified by means of a red permanent label.

Where a home manufacturer specifies the use of a specific jack for siting purposes then provision may be made for particular locating pins or devices.

## 6.7 Holding Down Points

The chassis manufacturers shall provide suitable holding down points, each capable of resisting 10 KN. Holding down points shall be located within a zone of  $1000\text{mm} \pm 200\text{mm}$  of the end of the chassis longitudinal main member (see figure 1). If the holding down point is not located directly onto the main longitudinal members then the member used must also be capable of being sufficiently rigid to withstand the 10 KN being transferred.

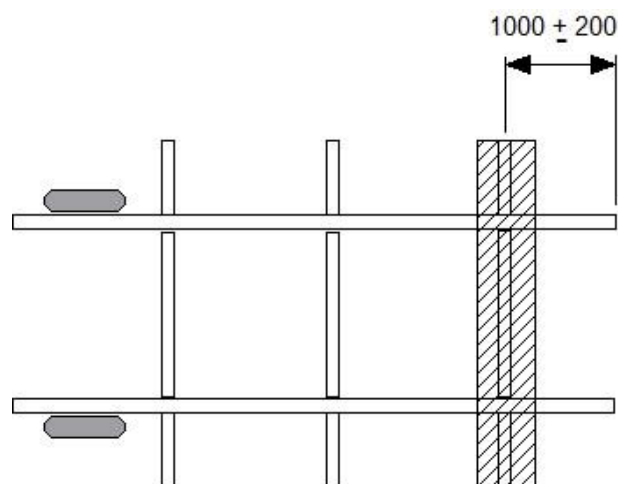


Figure 1

The holding down points shall be clearly identified by a permanent label affixed in close proximity to the point provided.

The holding down points must comply with the detail design as specified by the Caravan Holiday Home or Residential Park Home manufacturer.

#### 6.8 Craning Points

The Caravan Holiday Home or Residential Park Home manufacturer must liaise with the chassis manufacturer to ensure that the chassis lifting points are positioned correctly and are suitable for lifting a completed unit into position.

The home manufacturer should provide a method statement for undertaking the craning procedure. This should be based on a physical test carried out by the Home manufacturer and witnessed by the chassis manufacturer.

#### 6.9 Corrosion Protection

All chassis and external ferrous components to be protected in accordance with:- ISO 12944

Paint and varnish - Corrosion protection of steel structures by protective paint systems.

Duration:	Medium (M) 5 to 15 years
Corrosive category:	C3 Medium (for skirted park homes) C4 High (for non-skirted park homes and all caravan holiday homes)

To prevent premature deterioration caused by certain environmental conditions e.g. abrasion and mechanical damage on coastal parks, the paint system shall be agreed between the Caravan Holiday Home or Residential Park Home manufacturer and the Chassis manufacturer.

Protection of the chassis shall be in accordance with Annex F.

#### 6.10 Welding

All welding work must be carried out by competent persons. To prove competency all welders should be tested as required in Annex G.

The NCC may audit the persons carrying out the work on an occasional basis, to ensure they are suitably competent.

### 7. WHEELS, TYRES AND BEARINGS

The configuration of wheels, tyres and bearings used on a particular chassis shall have a manufacturers stated load capacity equivalent to, or more than, the designed maximum loading capacity of the chassis. The Wheels and Tyres must comply with the requirements of Code of Practice 502 Minimum Specification for Wheel and Tyre Configurations for Caravan Holiday Homes and Residential Park Homes

NOTE:

1. Pneumatic tyres shall not be inflated beyond their maximum designed pressure.
2. If split rims fitted with pneumatic tyres are used they must be designed and fitted in such a way that they cannot be taken apart from outboard of the axle.

8. CORNER STEADIES AND SUPPORT (AXLE) STANDS

- 8.1 Corner steadies are designed to only provide temporary means of support. These should not be used for levelling purposes or as a permanent means of support.
- 8.2 Support (Axle) stands may be used as a permanent means of support. The supports should be sufficient in number and be capable of withstanding the load of the finished home and all anticipated imposed loads. The home must be supported in accordance with clause 6.5 of this code.

9. JOCKEY WHEEL

Every Caravan Holiday Home and Residential Park Home shall be fitted with an adjustable jockey wheel. The jockey wheel and its clamping mechanism shall be capable of sustaining a minimum load of 100 kg. The jockey wheel should never be used as a permanent means of support.

10. CHASSIS AND WHEEL MARKING

The designed maximum loading capacity of the chassis shall be marked on the chassis manufacturers identification plate.

The recommended inflation pressure of pneumatic tyres must be visibly marked on all wheel hubs.

Split rims fitted with pneumatic tyres must have the following statement visibly marked on all wheel hubs. "DO NOT DISMANTLE WITH TYRE INFLATED"

11. INFORMATION TO BE PROVIDED TO CARAVAN HOLIDAY HOME AND RESIDENTIAL PARK HOME MANUFACTURERS

The chassis manufacturer shall supply information to the Caravan Holiday Home and Residential Park Home manufacturers covering items (a - i) below: -

- a) The weight band of the chassis or the designed maximum loading capacity of the chassis.
- b) The maximum vertical static load of the coupling head.
- c) The position of supporting points.
- d) The maximum safe working load of the support stands provided, if applicable.
- e) The position of holding down points.
- f) The maximum load that can be applied to the jockey wheel.
- g) The recommended inflation pressure for pneumatic tyres fitted. Given that most caravan holiday home tyres require an inflation pressure greater than 40psi. Advice should be given which advises that a risk assessment should be undertaken before tyres are inflated. A statement should be included which recommends when a caravan tyre is to be inflated, the use of a safety cage or other suitable restraining device is strongly recommended.

- h) The category of exposure and the duration for which the corrosion protection has been specified.
- i) If corner steadies are attached, a warning that the steadies are intended to only provide a temporary means of support and should not be used for levelling of a Caravan Holiday Home or Residential Park Home or be part of the permanent support of a sited unit. The maximum loading capacity per steady shall be stated.
- j) Details of specific jacks to be used, where required.
- k) Details of all other maintenance requirements.

## ANNEX A

### Axle Configuration Test

#### Procedure:

The following test must be carried out if the axle spacing is greater than 2-x tyre outside diameter.

Using calibrated weighing equipment, weigh the completed Caravan Holiday Home/Residential Park Home to ascertain the individual axle weights and the nose weight prior to moving to a clean (swept), dry, level tarmac or concrete surface with sufficient space for manoeuvrability.

Adjust the jockey wheel to ensure that the axles are equally loaded.

Check the tyre pressures in accordance with the label attached to the wheel and tyre assembly to ensure that they are not over or under inflated and the pressures read the same.

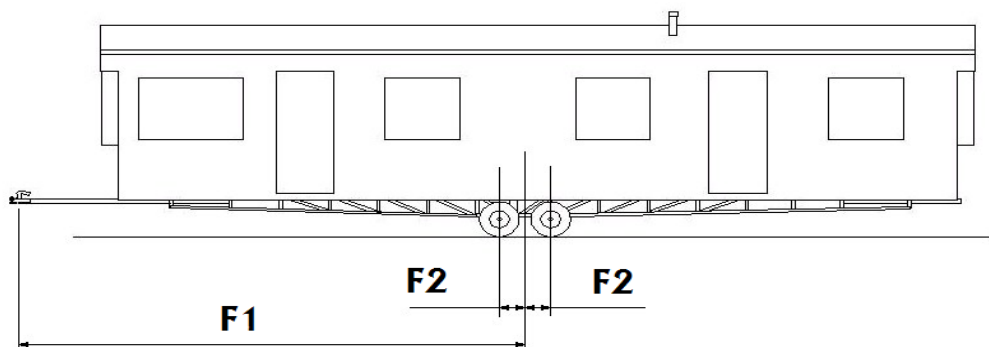
Using a suitable vehicle as an anchor i.e. tractor or forklift positioned at 90° to the Caravan Holiday Home/Residential Park Home longitudinal members of the chassis, attach to the towing coupling of the home and the towing point of the support vehicle, a calibrated load cell (1000 kgs) in line with a hand winch using suitable slings and shackles.

Remove any unnecessary slack from the load cell, hand winch, sling and shackle assembly.

Using the hand winch, apply a steady load in a smooth manner, recording the maximum load applied up to the point where the tyres begin to turn. Remove the applied load so that the unit can centralise itself on its tyres before repeating the procedure in the opposite direction.

#### Calculated forces:

The unit rotates about the centre point of the two axles. The couple of the applied load, is resisted by the forces at the axles, one in the direction of the applied force, the other in the opposite direction.



F1 = measurement between tow hitch and pivot point.

F2 = measurement between axle and pivot point.

The applied couple = F1 x force applied x 9.81 (converter kg/N) = -----kN.

This is balanced by the two F2 couples = 2 x F2 x 0.51 x 9.81 (converter kg/N).

F2 = -----kN = ---- kg or --- kg on each wheel.

This calculation equates to a direct sideways force to each bearing, retaining washer and bolt of ----kg ( kN).

Example:

F1 = measurement between tow hitch and pivot point = 8.25 m.

F2 = measurement between axle and pivot point = 0.51 m.

The applied couple =  $8.25 \times 230 \times 9.81 = 18.6 \text{ kN}$ .

This is balanced by the two F2 couples =  $2 \times 0.51 \times 0.51 \times 9.81$ .

F2 = 18.25 kN = 1860 kg or 930 kg on each wheel.

This calculation equates to a direct sideways force to each bearing, retaining washer and bolt of 930 kg (9.1 kN).

Test Failures:

The test will be considered a failure if any of the following occur:

Burst or Deflated Tyre.

Deformed Wheel.

Bent or Fractured Stub Axle.

Collapsed Bearings.

Twisted Chassis and/or Draw Bar.

Twisting Body Structure causing Doors and Windows to become jammed.

Any visible external panel damage or separation,

Note:

A failure will not be recorded if deformation does occur, but returns to its natural state once the load has been released and the unit returned to its centralised state.

ANNEX B

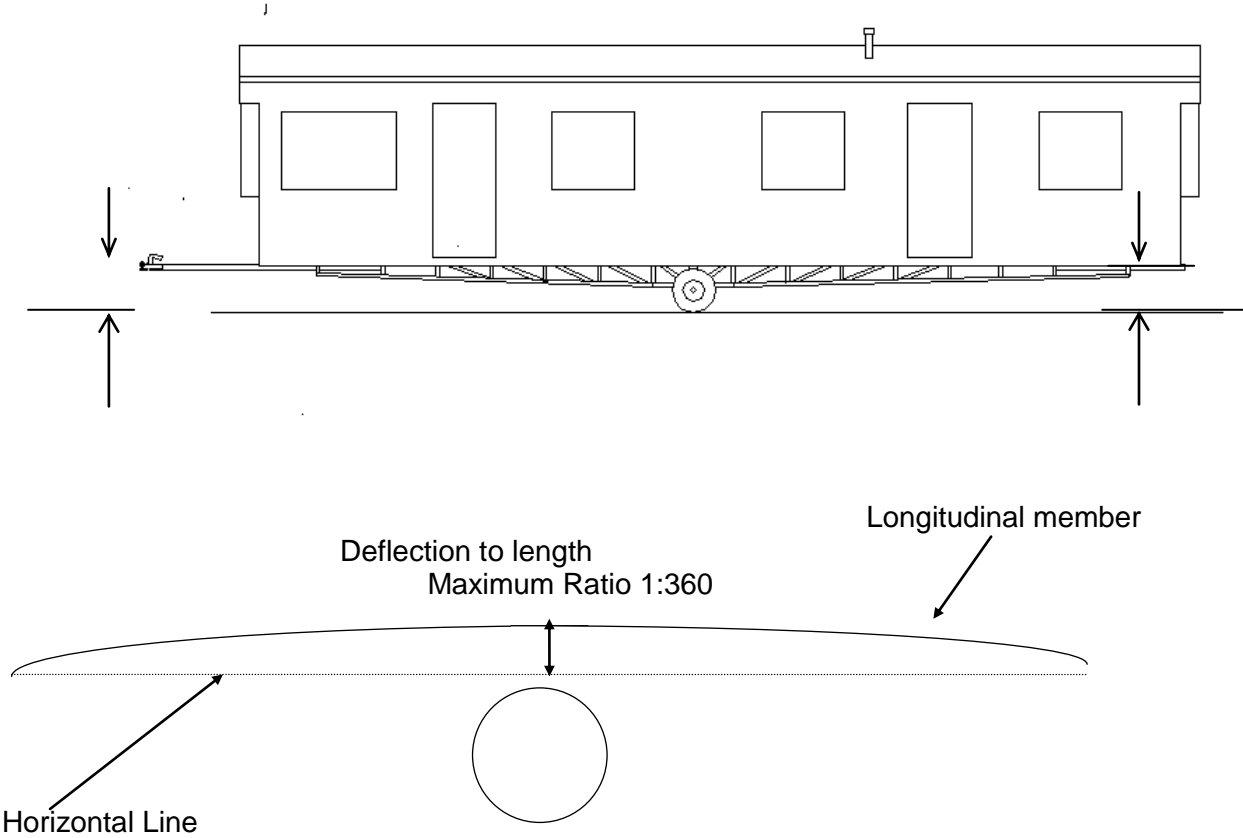


Fig. 1. Measurement of longitudinal deflection

## ANNEX C

### Normative References

BS.3632: 1995	Specification for Residential Park Homes
BS.5493: 1977	Code of practice for protective coating of iron and steel structures against corrosion.
BS AU 113 C: 1978	Specification for dimensional characteristics of coupling ball for caravans and light trailers.
BS AU 29: 1964	Drawbar eyes and fore carriage pins for connection between trailers of 5 – 35 tons gross weight and towing vehicle.
BS EN ISO 12944	Parts 1-8: Paints and Varnishes. Corrosion protection of steel structures by protective paint systems.
Code of Practice	CoP 502 – Specification for Wheel and Tyre Configurations for Caravan Holiday Homes and Residential Park Homes
Code of Practice	Transportation, Siting, Commissioning and Maintenance of Park Homes
Code of Practice	Transportation, Siting and Commissioning of Caravan Holiday Homes

## ANNEX D

Extract from Code of Practice for the Transportation, Siting and Commissioning of Caravan Holiday Homes.

10. Prior to loading at the manufacturers premises, the haulier, in conjunction with the manufacturers representative, shall assure himself that the unit(s) are in satisfactory condition and undamaged. Once loaded at the factory the unit should be jacked up, blocked and supported on the appropriate jacking points through its length (where braced chassis is used this should be under the vertical braced points). The axles or chassis should be blocked to ensure that no weight is taken by the wheels. Supports should extend as far to the front and rear as possible. It is recommended that the overhang of any unit beyond the last point of support on the trailer should not exceed 3.05m (Approx. 10 ft).

### NOTE:

Under The Road Vehicles Construction and Use Regulations the maximum permitted length of rearward projection (the distance from the rear of the transportation vehicle to rear of the load) is 3.05m (Approx. 10 ft).

It is the responsibility of the transporter driver to ensure his load is adequately secured.

The chassis should be anchored down by the chains at points where the chassis is supported so as not to distort any of the structure, i.e. chains should be located over the chassis at pre-blocked positions and/or axle areas.

The haulier should be aware of the implications of signing the manufacturer's release note and of the need for the park owner's/dealer's signature of acceptance on the delivery note.

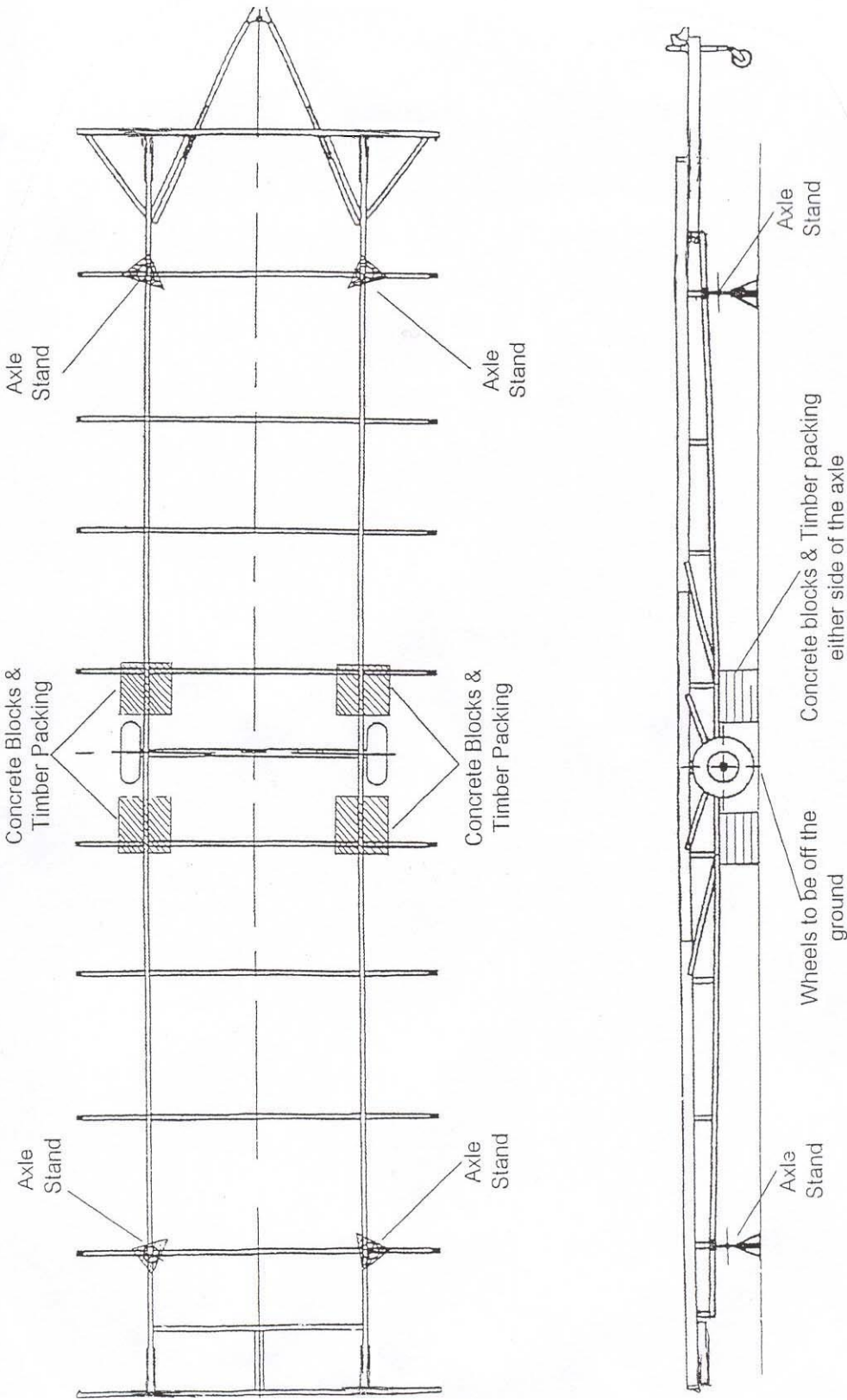
### NOTE:

For Park Homes, see Para.2.4 of Code of practice for the Transportation, Siting, Commissioning and Maintenance of Park Homes.

While the wording is similar, it is not identical to the Code of Practice for the Transportation, Siting and Commissioning of Caravan Holiday Homes however the general context is the same in both documents.

ANNEX E

Example of a supported chassis.



## ANNEX F

### Chassis painting and corrosion protection

- 1 National Caravan Council Minimum Requirement  
This specification defines the minimum requirements for the selection, application, inspection and testing for coatings used to protect chassis to meet the standard.

Duration	:	Medium (m) 5 to 15 Years
Corrosivity Category	:	C3 Medium (for skirted park homes) C4 High (for non-skirted park homes and all caravan holiday homes)
- 2 Demonstration of compliance
  - 2.1 Codes and Standards - The NCC requires written assurance from both the paint supplier and the chassis manufacturer that the painting and corrosion protection is in accordance with the current edition of the following codes and standards.
    - International Standard ISO 12944  
Paint and Varnish – Corrosion protection of steel structures by protection paint systems
    - BS3900 : F4 1991
  - 2.2 Environment and Durability – The NCC requires written assurance from both the paint supplier and the chassis manufacturer detailing the following:-

Durability	:	Medium (M) 5 tp 15 years or better
Corrosive Category	:	C3 or C4
  - 2.3 Performance Data - The NCC requires the following details from both the paint supplier and the chassis manufacturer:-  
  
Substrate Preparation - (e.g. degreased)  
Paint specification  
Exposure - e.g. Environments, Salt Spray (BS3900 : F4 1991)  
QUVa hour rating ;Good condition
- 3 General  

The Chassis manufacturer shall develop painting and corrosion protection procedures to meet the standard. The procedures shall cover all inspection checks. A copy of the relevant procedures will be submitted to the NCC

  - 3.1 Surface Preparation - The procedures shall advise on surface preparation e.g. steel is to be free from oil, grease, water and other contaminants etc.
  - 3.2 Coating Application - The procedures shall advise on the Paint application.
  - 3.3 Drying - The procedures shall advise on the drying process.
  - 3.4 Mechanical Damage - The procedures should advise how to protect damaged areas.
  - 3.5 Warranty - The procedures should detail the terms of warranty between the paint manufacturer (supplier) and the chassis manufacturer.

## ANNEX G

To ensure that consistent quality of work is produced by welders the processes set out below should be employed:

- Welders are required to be tested against the appropriate sections of BS4872:Part 1:1982 (Specification for approval testing of welders when welding procedure approval is not required. Fusion welding of steel)
- The welder is required to undergo weld tests according to the joint configuration(s) that is most representative of the type of work on which he/she is employed. This also requires the welder to use the thickness and type of material, welding process and consumables that he/she would encounter in his day to day duties.
- Rules for the tests are detailed in BS4872
- A statement of the test results is made for each welder by the testing body. These results are then held by the employer as records of the employees' performance.
- Re-approval of welders should take place if any of the following apply
  - The welder is to be employed on work outside the extent of his current approval(s)
  - The welder changes his employer without the transfer of his approval test certificate
  - Six months or more have elapsed since the welder undertook any welding (the welders record should be signed every 6 months to indicate that he/she has regularly performed welding duties- this is to be undertaken by the welder's Line Manager)
  - There is any specific reason to question the welders' ability.
- Welders should be re-approved every 2 years (as recommended in BS4872).