

ADR Compliance Services

CONSULTING ENGINEERS

A division of Chamonix (Aust) Pty Ltd * TEST FACILITY ID T9648

Test Report Number 2012T16 Vintage Auto Parts / Helix Suspension Beam Axle Maximum Safe Working Load

Prepared for The Hoffman Group

Background

The Hoffman group manufacture front beam axle assemblies for use in road vehicles under the Vintage Auto Parts and Helix Suspension Brands.

The design is reminiscent of axles fitted to many vehicles in the 1920's to 1940's and Ford products in particular. They feature a 102mm vertical offset compared with original items, this effectively lowers the vehicle by 102mm.

The assembly consists of a Beam axle made from a normalised and hardened ductile cast iron of known grade. The grade of the material used here is not declared for commercial reasons. It will be made available to regulatory authorities on request, subject to satisfactory confidentiality arrangements.

A transverse leaf spring is mounted on a pair of spring perches on top of the axle providing the suspension elasticity. Longitudinal location is then either provided by four parallel leading links, two each side of the chassis or a pair of "Hairpins". Transverse location is via panhard rod. Stub axles are of similar design to Ford units used from 1927 to 1948 excepting that they are larger in cross section and manufactured from heat treated alloy steel of known grade.

All suspension location links are manufactured from ASTM 1045 cold drawn seamless tube. Welding is undertaken by internationally certified tradespeople using a defined welding procedure, not declared here for commercial reasons.

All fasteners are grade 8 high tensile and nuts are nyloc.

ADR Compliance Services has been requested to determine the maximum permissible axle load for the assembly.

Standard

Both the National Code of Practice for Light Vehicle Modification and the NSW Code of Practice for Light Vehicle modification set standard load criteria that modified suspension components should meet. Viz:

- bump loads: 4g vertical;
 - rut loads: 1g vertical combined with 0.6g lateral; and
 - skid loads: 2g vertical combined with 1.2g skid (longitudinal);
- Overturning loads: 2g vertical combined with 2.5g overturning are also considered; where g is the static load at the tyre contact patch when the vehicle is stationary.

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Assessment and Testing

An assessment of the required load criteria and stress analysis was conducted on the Beam Axle Assembly. This showed that in the normal usage criteria identified above the 4g bump load caused the highest stress levels in the Beam. A physical test was therefore undertaken to confirm that under this target axle load at 4 g no plastic deformation of any portion of the assembly would be encountered.

A known press load simulating a 800kg axle load at 4g resulted in no deformation of any component of the assembly. The axle is available in two lengths both with and without lightening holes. The longest axle (drilled) was tested ensuring a worst case analysis has been undertaken.



Beam Axle Proof load test

By analysis it has determined that no plastic deformation would result from any of the specified load criteria that result from an 800Kg axle load. This analysis and rating is relevant for Helix/Vintage Beam Axle assemblies manufactured by the Hoffman group and consisting of an entire kit of components supplied for a vehicle. Kit contents and part numbers are listed below.

Relevant Part numbers

Beam Axle

HEXAX3 - 46" Solid

HEXAX1 - 46" Drilled

HEXAX4 - 47 3/4" Solid

HEXAX2 - 47 3/4" Drilled

Beam Axle Four Bar - Part # HEXBARL260

Panhard Bar - Part # HEXBARL260

Beam Axle Hair Pins - Part # HEXHP27 Alternative to Four Bar

Spindle (Stub Axle) - Part # HEXSPIN7

Steering Arms - Part # HEXSTARM3

Batwings - Part # HEXBRK003

Results

Important Note: All testing and assessment was conducted using an assumption that a wheel rim of zero offset is used. Caution must be exercised if rims with negative offsets are to be used where axle load is approaching the 800Kg design level. Wheel bearing loads should also be checked.

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This analysis and rating is relevant for Vintage Auto Parts and/or Helix Beam Axle assemblies manufactured by the Hoffman group and consisting of an entire kit of components supplied for a vehicle. Kit contents and part numbers are listed above.

The Beam Axle Assemblies are satisfactory for vehicles with a static front Axle load of 800Kg.



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