



**4X4 ACCESSORIES**



**DATE:**

May 2014

**DESCRIPTION:**

Old Man Emu Suspension System

**APPLICATION:**

Jeep Grand Cherokee WK2 2011 on

**PART NO. & PRICE:**

Refer Application Sheet Page 7

**PRODUCT GROUP & BARCODE:**

Refer Table page 6

**FITTING:**

4 Hours

**AVAILABILITY DATE:**

August 2014



# PRODUCT SPECIFICATION

## OME SUSPENSION SYSTEMS:

Aftermarket 4WD suspension is extremely complex. Determining the right solution for your vehicle and your requirements demands special attention to many factors. Unlike numerous aftermarket suspension systems, which are only available in a single configuration targeting lift height, OME now offers a range of tuned and matched integrated suspension systems engineered specifically for the Jeep Grand Cherokee WK2. This ensures the right suspension is available to suit how the vehicle is outfitted and the conditions it will encounter.

## DESIGN & DEVELOPMENT:

The objective of OME Engineers was to develop an integrated suspension system for the Jeep Grand Cherokee WK2. The WK2 runs an independent front and independent rear suspension set up and is available in a number of engine variants. In some markets there is a tow pack option which comes with a Nivomat (self-levelling) rear shock absorber. Air bag suspension models are available with the Jeep WK2 and the OME suspension does NOT replace the airbag system.

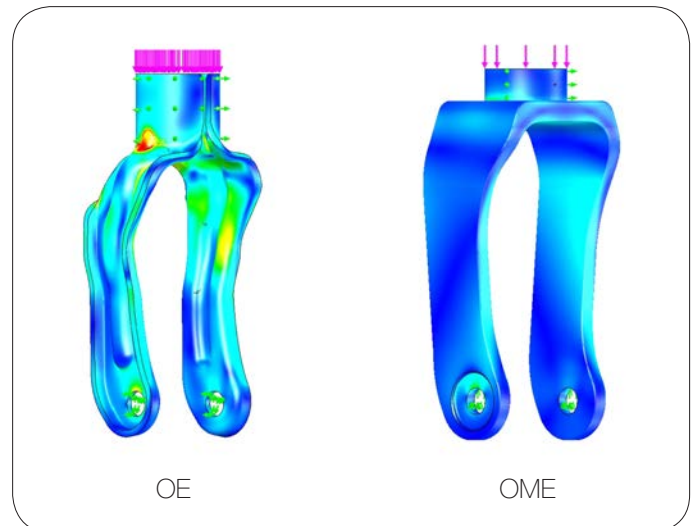
The key areas that were considered were lift, load carrying and comfort. With the WK2 being a mid-sized SUV, the original suspension provided a soft, comfort orientated ride which had a tendency to top out and have frequent bump stop contact, especially on rougher surfaces and over speed humps. The WK2's geometry allowed for a 40 to 50mm lift which improved bump stop travel and off road capability. Longer travel shocks/struts were developed for improved down travel and were tuned to match the new spring specifications. Complex front strut design resulted in a lengthy task when valve tuning and ride work was conducted as removing and refitting the strut involves the removal of numerous components. Comprehensive fitting instructions have been created to assist in the fitment of the WK2 suspension system.

## TESTING:

As there was known failures of WK2 front struts, extensive testing was conducted and included the following standard OME test procedures.

## FEA:

Finite Element analysis was conducted on the front clevis design to optimise strength and durability



## TEMPERATURE:

Re-closable front shock absorber bodies manufactured with suitable lower end mount for thermal transfer testing of internal cartridges on high speed test machine. Cartridges manufactured with ARB Hilux Heavy Front valve code & tested vs. Hilux Heavy production units as benchmark. 6 units were tested simultaneously with no air cooling, then repeated with air cooling. 2 units had an air gap between the cartridge & body, 2 units had grease filling the internal space between cartridge & body, & the last 2 units were standard Nitrocharger level production units. Samples containing grease did not reach internal temperatures as high as those with air gap during cycling. Internal temperatures also decreased more rapidly for samples with grease than air gap. As such, the use of grease as a heat transfer medium would provide best thermal transfer. However, the extreme length of the Jeep front body provides capacity for greater oil volume & surface area for heat transfer than Hilux production units tested as the benchmark. Samples with air gap did not build internal temperature as quickly as the design benchmark with & without air-flow when tested to 120°C. Samples with air gap cooled at a comparable rate to the design benchmark. Decision made from test results to reduce design & production complexity of product by maintaining minimal air gap instead of assembling grease & to paint the thin wall cartridge to prevent corrosion.





## FATIGUE AND DURABILITY :

Fatigue testing of original equipment vs. OME front clevis & body assembly. 3 samples of original equipment shock absorber & 3 samples of OME body were fatigue tested on MTS. Clevis bracket assembled to lower mount of width 72 mm, using original equipment bolt & dealer specified torque to replicate vehicle fitment. Threaded plugs were welded into the body tubes to allow application of loads. Cyclic load of 700 kg tensile & 2,200 kg compressive applied at frequency of 5 Hz. Original equipment samples cracked, fatigued & broke through clevis leg at 1.3, 1.7 & 3.5 million cycles. OME samples were each tested, and test halted between 5-6 million cycles with no evidence of cracking or deterioration.



Fatigue testing of original equipment vs. OME rear standard suspension clevis & body assembly. 3 samples of original equipment shock absorber & 3 samples of OME body were fatigue tested on MTS. Clevis bracket assembled to lower mount of width 62 mm, using original equipment bolt & manufacturer specified torque to replicate vehicle fitment. Threaded plugs were welded into the body tubes to allow application of loads. Cyclic load of 700 kg tensile & 1,900 kg compressive applied at frequency of 10 Hz. Original equipment samples cracked, fatigued & broke through clevis leg at 93, 118, & 136 thousand cycles. OME samples cracked, fatigued & broke through clevis leg at 600, 247, & 517 thousand cycles.



Fatigue test of OME spring seat on weld ring of body assembly tube section. Cyclic loaded 800 kg to 1,500 kg for 500,000 cycles. Sample tested with tooling to represent spring contact on seat. Test represents load at spring length of 305 mm (full extension) to minimum spring length of 190 mm (full compression). No evidence of failure, confirming strength & durability of spring seat internal plate.



## WELD ANALYSIS:

OME body assembly sectioned & analysed for weld quality compliance. Welds metallurgically assessed for fillet throat size, depth of penetration, undercut, cracks, notching, melt back, porosity, under fill & non-metallic inclusions. Welds met minimum requirements of weld quality specified in Specification W27-031 (Class A welds).

New stud, washer & rod projection welded assembly for rear standard suspension product sectioned & analysed for weld quality compliance. Weld metallurgically assessed for adequate fusion zone, grain size in heat affected zone, cracks, holes, porosity, & non-metallic inclusions. Welded joint met minimum requirements of weld quality specified in Specification W27-001.



## FRONT SUSPENSION:

3 spring options were created for each engine variant which to cater for a range of front accessory fitments. Front strut was tuned to match the spring weights and minimise the frequency of bump stop contact and top out events. Extensive development went into the front strut as there had been some reported issues of durability of the front clevis. Another challenge with manufacturing of the front strut was the physical length of the strut which is currently the longest body shock absorber in the OME range. A significant development project was undertaken to model and optimise the clevis design using 3D cad modelling and FEA (Finite Element Analysis). A number of manufacturing options were considered and resulted in a forged and machined clevis design which resulted in a design that is considerably stronger and more durable than the original equipment. Another unique design feature is an outer body assembly housing a twin tube cartridge which increases the overall strength of the strut assembly. Further to FEA testing, extensive physical tests were conducted to verify all computer aided engineering and benchmark against the original.

A front trim packer was developed to assist with fine tuning ride heights.



## REAR SUSPENSION:

A 50mm lift was achieved and 2 progressive rate spring designs were created to cater for medium loads and constants loads of 200kgs. As the Jeep WK2 is available with an optional tow pack, 2 different designs needed to be created. The tow pack option introduces a Nivomat (self-levelling) rear shock absorber which has a different top pin mount and different extended and compressed lengths. With 2 different shock designs and 2 springs to cater for loading options, this resulted in 4 different shock options for the rear. Please note when replacing Nivomat shocks, you must fit the appropriate OME spring. To identify whether a vehicle has the standard fitment rear shock or Nivomat shock, the outer body diameter will need to be measured.

Standard fitment: 51mm  
Nivomat: 63mm



## SHOCK ABSORBER SPECIFICATIONS:

Part Number	Open Length (mm)	Closed Length (mm)	Upper Mount Bush Kit	Lower Mount Bush Kit
60124	585	415	Use OE	Clevis
60125	585	415	Use OE	Clevis
60126	550	385	Use OE	Clevis
60127	550	385	Use OE	Clevis
90026	815	665	Use OE	Clevis

## COIL SPRING SPECIFICATIONS:

Part Number	Bar Dia (mm)	Free Height (mm)		No. of Turns	Coil Weight (kg)	Spring Rate		OE Spring Rate lbs
		A	B			lbf/in	N/mm	
3059	15.5	480	480	9.5	5	250	44	220
3060	21	360	360	8	7.9	880	154	750
3070	15.5	445	445	9.5	5	250	44	220
3072	15.5	495	495	9.5	5	250	44	220
3073	15.5	460	460	9.5	5	250	44	220
3074	20	385	385	8	7	750	131	750
3085	15.5	510	510	9.5	5	250	44	220
3086	15.5	500	500	9.5	5	250	44	220

## AVAILABILITY:

Part Number	Barcode	Product Group	Available
3059	931909202718	265	May
3060	931909202719	265	May
3070	9319092028801	265	May
3072	9319092028825	265	May
3073	931909202883	265	May
3074	9319092028849	265	May
3085	931909202885	265	May
3086	931909202886	265	May
60124	9312891038880	283	August
60125	9312891039047	283	August
60126	9312891039078	283	August
60127	9312891039085	283	August
90026	9312891038958	284	August
FK79	9332018029010	320	June



# CHRYSLER

## JEEP GRAND CHEROKEE WK2 2011 ON

FRONT <i>Estimated Lift: 45mm</i>	V6 PETROL ENGINE			3.2L DIESEL ENGINE		
	PART NUMBER	QTY	UNIT PRICE \$	PART NUMBER	QTY	UNIT PRICE \$
<b>SPRING: No Bar</b>	<b>3070</b>	1	252.00	<b>3073</b>	1	252.00
STRUT - SPORT	90026 <sup>1</sup>	2	350.00	90026 <sup>1</sup>	2	350.00
<b>SPRING: Bar</b>	<b>3059</b>	1	252.00	<b>3086</b>	1	252.00
STRUT - SPORT	90026 <sup>1</sup>	2	350.00	90026 <sup>1</sup>	2	350.00
<b>SPRING: Bar / Winch</b>	<b>3072</b>	1	252.00	<b>3085</b>	1	252.00
STRUT - SPORT	90026 <sup>1</sup>	2	350.00	90026 <sup>1</sup>	2	350.00
TRIM PACKER	FK79		10.50	FK79		10.50

REAR <i>Estimated Lift: 50mm</i>	ALL MODELS (EXCLUDES TOW PACK OPTION)			TOW PACK		
	PART NUMBER	QTY	UNIT PRICE \$	PART NUMBER	QTY	UNIT PRICE \$
<b>SPRING: MEDIUM LOAD</b>	<b>3074</b>	1	290.00	<b>3074</b>	1	290.00
NITROCHARGER SPORT	60124 <sup>1</sup>	2	195.00	60126 <sup>1</sup>	2	195.00
<b>SPRING: CONSTANT 200 KGS</b>	<b>3060</b>	1	290.00	<b>3060</b>	1	290.00
NITROCHARGER SPORT	60125 <sup>1</sup>	2	195.00	60127 <sup>1</sup>	2	195.00

### REMARKS:

**1** No top mounting bushes and dirt shield supplied, re-use OE bushes and dirt shield.

**2** Tow Pack option uses a Nivomat (self leveling) shock absorber and requires a specific design.

**Please note:** when replacing Nivomat shocks, you **must** fit the appropriate OME spring.

To identify whether a vehicle has the standard fitment rear shock or Nivomat shock, the outer body diameter will need to be measured:

Standard: 51mm

Nivomat: 63mm