In-House Testing Report to Compare Noise and Strength of the ULTI Bar – May 2013

Summary

Van Guard required a report to show how their new aerodynamic roof bar (Ulti bar) performed with regards to noise and strength.

Noise intensity readings were taken to show a comparison between the Ulti bar and an existing 40mmx40mm square section bar, whilst travelling at 70mph.

Deflection tests were carried out to practically show the strength or load carrying capacity comparison between the Ulti bar and Van Guard's previous aluminium bar.

The results showed that the Ulti bar gave a 2.7dBA reduction in noise intensity and weight carrying capacity increase from 50kg to 55kg for the same deflection.

Noise Intensity Testing

A Peugeot Partner L1 hdi van was used for testing purposes and the noise readings were taken inside the cab at the same location whilst the vehicle was travelling at 70mph. We carried out two tests, one with 40mmx40mm square section bars fitted, and one with Ulti bars fitted.

The A weighting scale was used on the noise meter which is the most commonly used and widely adopted for environmental noise measurement. The noise/intensity level using the A weighting scale is expressed in decibels or dBA and *examples of this noise intensity are explained below:

Source	Intensity Level	# of Times Greater Than TOH
Threshold of Hearing (TOH)	0 dB	10^0
Rustling Leaves	10 dB	10^1
Whisper	20 dB	10^2
Normal Conversation	60 dB	10^6
Busy Street Traffic	70 dB	10^7
Vacuum Cleaner	80 dB	10^8
Large Orchestra	98 dB	$10^{9.8}$
Walkman at Maximum Level	100 dB	10^{10}
Front Rows of Rock Concert	110 dB	10^{11}
Threshold of Pain	130 dB	10^{13}
Military Jet Takeoff	140 dB	10^{14}

The noise/intensity readings for the tests are as follows:

Noise readings taken with 40mmx40mm bars fitted.

Noise reading taken with Ulti bars fitted.

As can be seen from the screenshots there is a difference of 2.7db between the two readings which, cross referencing the examples table, corresponds to * $10^{0.27}$ or 1.86 times the noise intensity.

This result shows that the noise/intensity of the 40mmx40mm bar was 1.86 times or 86% greater than Ulti Bar for the Peugeot Partner L1 hdi van travelling at 70mph.

*Examples and calculation taken from http://www.physicsclassroom.com/class/sound/u11l2b.cfm

Deflection Testing

In order to practically test the carrying capacity of the new Ulti bar, a deflection test was carried out to compare the Ulti bar with Van Guard's previous aluminium bar.

The longest roof bar Van Guard supply (1920mm) was chosen for the test as this will show the most deflection. Roof brackets were then added to the bar and positioned 135mm in from each end of the bar to simulate a roof bar on a vehicle.

A 50kg weight was then positioned centrally on the bar and the deflections were measured at the centre point of the bar using a digital vernier calliper. Measurements as follows:

- Previous aluminium bar deflection – 15mm
- Ulti bar deflection – 14mm

Extra weight was then added to the Ulti bar until the deflection measured the same as the previous bar or 15mm. In total an extra 5kg was added to the original 50kg.

This result showed the Ulti bar's load carrying capacity had increased from 50kg to 55kg or 10% from the previous bar for the same deflection.

Although for test purposes the weight was added to the centre of the bar. When fitting Van Guard roof bars to any vehicle we recommend the 55kg weight should be distributed across the length of the bar with the maximum load in accordance with the manufacturers load bearing capacity for the roof. This information can be found in the vehicle handbook.