



Acoustic Tightness Control with Ultrasound

Product Ref. Code: APPLTIGHTCARS

General Description:

Besides the passengers, luggage and pets, occasionally more annoying “guests” such as water, noise or dust sneak inside cars. At Citroën, the constant obsession to improve quality has resulted in the study of an efficient method to fight these uninvited guests.

The secret : ultrasound technology.

Technical Description:

When it concerns tightness, water is not the only thing to worry about. The noise from engine compartments, as well as air and dust infiltration are important factors when one wants to build a product of the finest quality. For about a year, the Quality and Method department of the Vigo plant (Spain) has been conducting a study regarding tightness control by using ultrasonic equipment. The system is characterised by its high level of efficiency, due to the fact that ultrasound is able to reach areas, which would be difficult to get at by using only water-based methods.

Working Principle:

Ultrasound cannot be heard by the human ear. An ultrasound meter measures ultrasonic frequencies between 36.7 and 40.7 kHz, whereas the human ear is sensitive to sounds up to 20 kHz. It is used for vehicle tightness control to detect the smallest opening which would allow noise, dust and of course, water, to get inside a vehicle. It is able to detect potential leaks along the door and window seals, and through penetrations between the engine and the passenger cabin.

Using the ultrasonic equipment is very easy. Two instruments are needed: a transmitter is placed inside the car, while the hand-held meter outside the car picks up the ultrasonic waves. The transmitting device has 8 electro-acoustic sources, which spreads up the sound into all the zones being tested. Outside the vehicle, the technician scans the car with the meter, as though he/she were using a metal detector. The meter is slowly scanned over all door and window seals, and near all the penetrations (connection points) between engine compartment and passenger cabin.

The higher the signal level, the larger the space through which the sound passed. The locations on the vehicle presenting high values are immediately marked so they can be studied further, as they might require special treatment, or at least as documentation of where the tightness problems are located.

When all areas have been checked, the car goes for a “shower”. This way, it is possible to see if water is entering through the spots, which the ultrasound test identified as problematic. If water does get into the car, one can assume that air is getting in also, but not vice versa. When this is the case, one should use another method of testing, for example, a road test to verify noise or air entrance. One may also put the vehicle in a dark room and do a visible light test.

(Translation “ Calidad - Lo detectan todo “ - Cithispa 2000 - juin 94 - N° 68 Citroën – Spain)

Revision History:

DATE	Version	Revision
June 1994		Article
September 1998	0.0	New Version
02 August 2000	1.0	Draft for internet and PDF file.
19 September 2000	1.1	English draft
29 January 2001	1.2	English version

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The information herein is believed to be accurate to the best of our knowledge.

Due to continued research and development specifications of this product can change without prior notice.

SDT International n.v. s.a.

**Bd de l'Humanité 415
B-1190 Brussels (Belgium)
Tel: ++32-(0)2-332.32.25
Fax: ++32-(0)2-376.27.07
e-mail: info@sdt.be**