Valladolid City Council
Department of Environment
and Sustainability
Environment Service

MUNICIPAL ACOUSTICS CENTRE OF VALLADOLID CITY. **SPECIALISED IN VEHICLE SOUND MEASUREMENT**

Quality Management System UNE-EN-ISO/IEC 17025:2005

Version 8

2015

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

INDEX

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

1. MUNICIPAL ACOUSTICS CENTRE, VALLADOLID CITY COUNCIL - CMA: DESCRIPTION

Image. Building of the Municipal Acoustics Centre of Valladolid City Council.

The Municipal Acoustics Centre, herein after CMA from its Spanish initials, was built in 2002.

The CMA is equipped with modern facilities, as well as technical and human resources to carry out acoustic testing, primarily to measure sound power level of noise sources and the sound pressure level of moving (Pass-by and tyre noise) and stationary vehicles.

The grounds and facilities, owned by the city council, cover four hectares and are located at Calle Olimpiadas N^{o}40 47008, Valladolid, in the Santa Ana area, between Camino Viejo de Simancas and the Pisuerga River.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: Aerial view of facilities. Source: GoogleMap. CMA COORDINATES 41°36'50.72'' N 4°46'19.90'' W

Facilities are located on a largely rectangular plot of 200X250 metres and include an ISO track for measuring sound pressure in motion (Pass-by and tyre noise) a zone for measuring sound power of noise sources, a car park and a building with offices and control rooms for tests. These facilities are closed and protected from outside view by rows of conifer trees.

The building is prefabricated, consisting of a metallic structure interspersed with large windows, crowned with a solar-powered roof in the shape of a sail and is comprised of the following rooms:

- 2 offices
- 1 lecture room or communal working area
- 1 waiting room or controlled access area
- 2 control rooms for testing
- 1 kitchen
- 1 storage room for instruments
- 1 control room containing electrical panels and the centre's IT server
- Toilets with showers

Various acoustic tests are carried out outdoors on a purpose built track, using appropriate equipment.

The test track has been designed for automobiles, motorbikes and other motor vehicles to circulate in normal conditions in the form of a test circuit and to verify noise measurements using specialised equipment in addition to other tools such as tracking radar and weather stations.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

The following is a list of the basic equipment used at the CMA:

1) Pass-by – Noise from accelerating vehicles and Tyre noise

- Four free-field Brüel & Kjaer 4190 microphones. UA0237 Windscreens and two weatherproof Brüel & Kjaer 4184 microphones.
- 208 DTX Mesta Radar, Encoder in non-moving tyres and laser speed gauge.
- Two photoelectric cells with corresponding reflectors to start and finish measurements.
- Photocell to assist the driver in the -10m position.
- Tachometers
- Pressure sensors in accelerator pedals.
- Two Frontend 3560C Brüel & Kjaer audio analyzers, one for the measurement control room and another for audio analysis inside the vehicle.
- Work station with data processing specific software. (Brüel & Kjaer PULSE SYSTEM, Pass-by Type 7788).
- ISO 10844 track.
- Weather station (Temperature T^a, Relative humidity, HR%, Wind speed, Wind direction, Barometric pressure).
- Thermohygrometers
- Sound calibrators (Brüel & Kjaer 4231) and multifrequency (Brüel & Kjaer 4226).

2) Sound power – Noise from stationary cars:

- Fourteen 4190 L1 Brüel & Kjaer microphones.
- Various supports for positioning microphones.
- Windscreens UA0237.
- Extension leads.
- Weather station.
- One Frontend 3560C Brüel & Kjaer signal detector.
- Workstation with data processing specific software. (**Brüel & Kjaer PULSE SYSTEM, Sound Power Type 7799**).
- Sound level meters 2260 (Brüel & Kjaer).
- Exhaust Noise Inspector (Brüel & Kjaer Type 3638).
- Thermohygrometers.
- Sound calibrators (Brüel & Kjaer 4231) and multifrequency sound calibrators (Brüel & Kjaer 4226).

To control environmental conditions outside the building, a weather station is available to record levels of:

- Wind speed.
- Wind direction.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

- Barometric pressure.
- Air temperature.
- Relative humidity.

Data generated by each instrument is gathered by the PULSE analyzer platform, feeding this into an IT system via relevant instruments (Front-end). Once processed, such data is digitally stored in the PULSE system.

Information gathered by instruments is managed in our Laboratory, using specific Brüel & Kjaer PULSE software.

2. TECHNICAL MEANS TO MEASURE EXTERNAL NOISE FROM MOVING VEHICLES

2.1 Weather Station

All instruments have temperature and relative humidity scales for their use and storage.

External environmental conditions are recorded and regulated by a modern weather station.

The weather station is connected to the CMA Data Acquisition System, providing readings of environmental variables during tests.

Image: CMA Weather Station. (Left: temperature sensors, relative humidity and pressure. Right: Wind direction and wind speed sensors).

2.2 ISO 10844 Track for noise measurement in moving vehicles. Pass-by and tyre noise.

The geometry, surface and texture of the ISO track conform to ISO 10844 specifications.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: Southwest view of the CMA Pass-by track.

2.3 ISO 10844 Track equipment

Track equipment consists of two photocells to capture measurements in both directions, two free-field microphones 4190 or weatherproof microphones 4184 (Brüel & Kjaer) to measure sound pressure level (SPL) to the left and right and radar, to measure vehicle speed.

Image: Photoelectric cell for trigger of measurements.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: Weatherproof microphone (Brüel & Kjaer 4184)

Image: Free-field microphone (Brüel & Kjaer 4190L001)

Image: Brüel & Kjaer Radar SAGEM MESTA 208DTX.

2.4 Pass-by control room equipment

Data from the two photoelectric cells, radar and microphones are processed by the front-end audio analyzer Brüel & Kjaer 3560C.

Image: Frontend data analyzer in the Pass-by control room, Brüel & Kjaer 3560C.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

The test vehicle is equipped with another Frontend 3560C of similar characteristics in order to measure vehicle parameters throughout the test.

These two Frontend and the data gathered are synchronized and connected to a PC in the Pass-by control room through a TCP/IP internal network, using Brüel & Kjaer PULSE Vehicle Pass-by Noise Test Solutions, based on Vehicle Pass-by software Type 7788 which manages and uses such data to produce measurements. Variables are recorded at each 20cm interval or a lesser distance, depending on the position of the vehicle, to guarantee data acquisition at maximum intervals of 30 milliseconds.

From the Pass-by control room position, the entire Pass-by track and complete vehicle trajectory can be observed.

Image: Passby control room PC.

The control room communicates with the vehicle Frontend through a wi-fi antenna located at the side of the building.

2.5 Test vehicle equipment

In order to capture test vehicle parameters, a second Frontend is used primarily to receive data pertaining to RPM, accelerator pedal pressure, tachometers, and an encoder or optional laser to measure vehicle speed.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: Frontend for acquiring data from vehicle, Brüel & Kjaer model 3560 C and wireless access point.

This Frontend remains inside the vehicle during the test and communicates with the control room via its wi-fi network.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: Wi-fi antenna on the vehicle roof allows communication with the Pass-by control room.

Image: Encoder to measure vehicle speed

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: Monarch laser used to measure vehicle speed

2.6 Night time track illumination

In cases where a test must be carried out at night, due to lower levels of background noise or for confidentiality purposes, e.g. prototype testing, the track is sufficiently illuminated and marked.

CMA facilities, particularly the Pass-by track are clearly marked using colour-coded solar markers for night time tests.

Beacons fitted in the concrete track surface mark out the longitudinal track axis with intermittent yellow flashes, significantly aiding driving during night time testing.

Image: Track stud markers.

The rest of the beacons are on the edges of the track or signal obstacles. In the case of the latter, the CMA operates a colour-coded system:

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

- Blue: Test track zone, either Pass-by or Power
- Red: Obstacles and end of track
- Yellow: Non-testing track, transit only

Image: Solar beacons on the edge of track in the non-testing zone.

Image: Solar beacons illuminating the Pass-by track for night time testing.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: Solar beacons illuminating the sound power track for night time testing.

3. TECHNICAL CAPACITY TO MEASURE EXTERNAL NOISE IN STATIONARY VEHICLES

The CMA measures noise in stationary vehicles using the following instruments:

- Sound level meters Brüel & Kjaer 2260 Investigator.
- Equivalent Pulse system Brüel & Kjaer 3560D (12 channels) y 3560C (6 channels).
- Exhaust Noise Inspector Brüel & Kjaer Type 3638.

Such instruments ensure that measurement methods are consistent and in accordance with current legislation.

Measurements for noise control are carried out within standardisation processes of vehicles and components to 50 cm and 45º (Directive 70/157, R51.02) and 7m for used cars (Order 1439/72), depending on the age of the vehicle.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: Noise measurement of a stationary motorcycle in accordance with Directive 97/24/CE using Exhaust Noise Inspector Type 3638 (Brüel & Kjaer). Source: Brüel & Kjaer.

Image: Measurement of external vehicle noise using Exhaust Noise Inspector in accordance with Directive 70/157/CEE.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: Noise measurement of stationary vehicle using the Brüel & Kjaer Investigator sound level meter.

Image: Noise measurement of stationary vehicle using 4190L001 Brüel & Kjaer microphones and equivalent Pulse system, with one microphone measuring SPL and the other the determination of vehicle RPM through exhaust noise with Pulse Autotracker.

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

4. QUALITY MANAGEMENT SYSTEM OF CMA. ADMINISTRATIVE, TECHNICAL AND QUALITY CONTROL ACTIVITIES: UNE-EN-ISO/IEC 17025: General requirements for technical competency in test and calibration laboratories.

CMA has established a Management System incorporating its Technical, Administrative and Quality Control activities within the laboratory, based on the accreditation reference norm **UNE-EN-ISO/IEC 17025** and particularly, in relation to activities pertaining to the requested accreditation, also under criteria **CGA-ENAC-LEC**.

ilac-MRA ENAC ENSAYOS Nº 627/LE1371

The current ENAC certificate for the laboratory is:

ENAC
Entidad Nacional de Acreditación

Otorga la presente
Grants this Accreditation

ACREDITACIÓN

a la entidad técnica
to the technical entity

AYUNTAMIENTO DE VALLADOLID
Centro Municipal de Acústica

Según criterios recogidos en la norma UNE-EN ISO/IEC 17025 para la realización de los ENSAYOS de ACÚSTICA definidos en el ANEXO TÉCNICO adjunto.

According to the criteria in UNE-EN ISO/IEC 17025 for the performance of Acoustics Test as defined in the attached Technical Annex.

Acreditación nº: 627/LE1371
Accreditation number:

Fecha de entrada en vigor: 25/01/2008
Coming into effect:

La acreditación mantiene su vigencia hasta notificación en contra.
The accreditation maintains its validity unless otherwise stated.

En Madrid, a 14 de noviembre de 2008
In Madrid, November 14, 2008

El Presidente
President

D. Antonio Muñoz Muñoz

Este documento no tiene validez sin su anexo técnico correspondiente, cuyo número coincide con el de la acreditación.
The present Accreditation is not valid without its corresponding technical annex, which number coincides with the accreditation.
La presente acreditación y su anexo técnico están sujetos a modificaciones, suspensiones temporales y retirada. El estado de vigencia de la misma puede confirmarse en el catálogo de ENAC (http: www.enac.es)
This accreditation and its technical annex could be reduced, temporarily suspended and withdrawn. The state of validity of it can be confirmed at www.enac.es

Ref.: CLE/3788 (El presente documento anula y sustituye al de referencia CLE/3487)

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

5. CMA ALARM SYSTEM

The CMA, like all other municipal departments, has an alarm connected directly to the police, both inside and outside the building.

6. SERVICES PROVIDED BY THE LABORATORY

In conclusion, services provided by the laboratory that can be requested by clients include the following:

- Accredited acoustics testing of moving and stationary vehicles, with client supervision, should this be preferred.
- Hiring of facilities: communal working area, internet connection, kitchen, showers, toilets, vehicle lift, electric screwdriver, air compressor, connection to electrical grid 230V 50Hz on tracks and work stations, vehicle lift up to 3.2 tonnes, forklift up to 1 tonne, storage container for parts and/or components, workbench. Others available upon request by clients.
- Hiring ISO 10844 track to allow clients to carry out testing with their own equipment and staff.
- Any other work as requested, subject to prior consultation and agreement by both parties.

Information is considered confidential at all times between the laboratory and the client or representative.

Equipment available to clients:

Image: Pneumatic screwdriver

Image: Pressure gauge

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: Air compressor

Image: Vehicle lift up to 3.2 tonnes

Image: 230V 50Hz power outlet in vehicle lift up to 3.2 tonnes

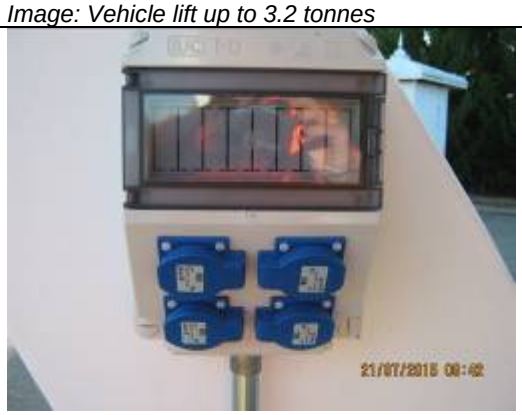

Image: Covered 230V 50Hz power outlet in workbench.

Image: Workbench.

Image: External storage container for equipment, parts and/or components

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es

Image: All-purpose forklift up to 1 tonne

Furthermore, the city of Valladolid offers a wide range of amenities (hotels, restaurants, garages, shopping centres, airport, proximity to Madrid etc.) within a short distance from CMA facilities and given it is a relatively small and quiet city, guaranteeing potential clients a comfortable, productive and enjoyable visit.

For more information, visit:

http://www.valladolid.es/es/ciudad/medio-ambiente-salud/servicios/centro-municipal-acustica-cma

C/ Olimpiadas nº 40
47008 Valladolid
Tel: +34 983 22 47 64
Fax: +34 983 27 47 08
e-mail: cma@ava.es