

Sound impact evaluation of a Padel-Tennis Court
done by Bel-Air Tennis Club in Estepona, as
requested by Huddersfield Lawn Tennis and Squash
Club

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Porpouse

The porpouse of this inform is to obtain certain data about the noise emissions generated by a Paddle-Tennis Court in two different essays. The first essay will be the registration of data during a match -60 minutes- and the second with an empty Court -60 minutes. The most relevant data to be collected will be the following:

- Maximum noise produced
- Minimum noise produced
- Average noise during a trial hour.
- Average noise during 90% of the trial (Percentile 90)

Requestant

Name	Huddersfield Lawn Tennis and squash club
Registry No	3660903
Address	Cemetery Road, HD1 5NF
City	Huddersfield
Country	United Kingdom
Activity	Sports Centre

Description of the analysed Area and the considered origins of noise considered.

Location and description of the Analised Area.

The research has been realised in the tennis and paddle-tennis club Bel-Air, urbanisation located in Estepona, Malaga.



The analysed area consists on a glass paddle-tennis court located on an old fronton court in the tennis club. This is a relevant information due to the effect made by the walls of the fronton court as the results of the studio will be influenced by it.





2.2. GENERAL CHARACTERISTICS OF THE COURT::

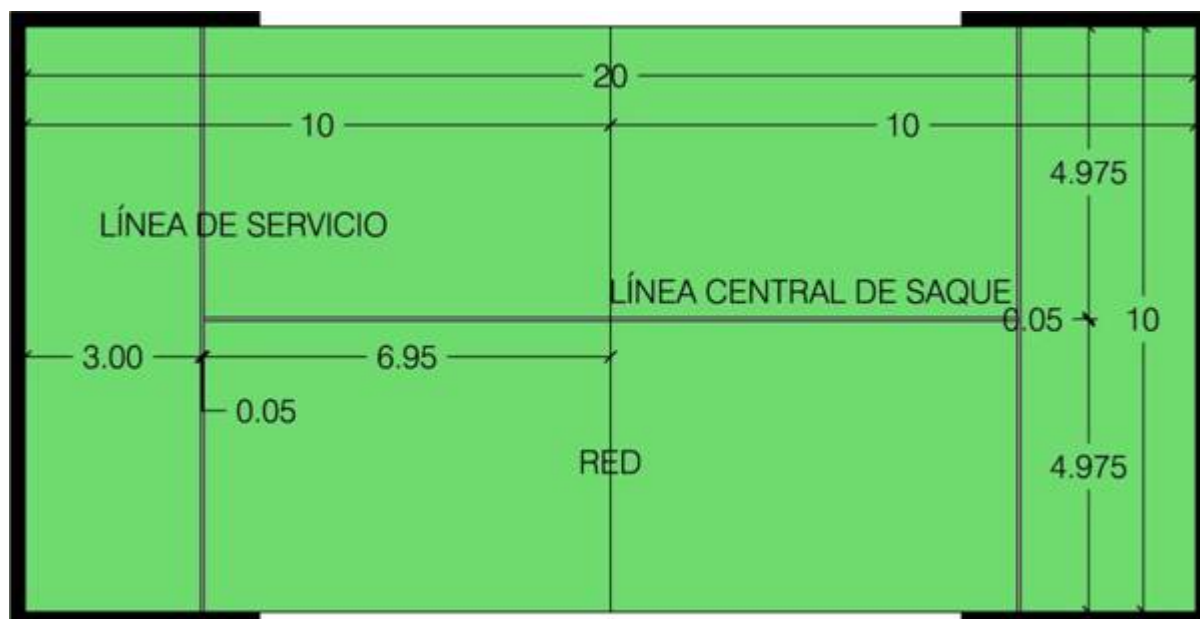
- The playing area represents a rectangle 10 metres wide and 20 metres (interior measures) and a tolerance of 0,5%.
- This rectangle is divided in two halves by a net, hung by a metal string of a maximum diameter of 0,01 millimetres, which edges are joined to two side posts that hold the named string. The net has a length of 10 metres and a height of 0,88 metres right in its middle. The edges are to a maximum of 0,92 metres above the floor. The posts of the net, raised from the court surface, have their interior sides matching the lateral limits of the court.
- The perimeter enclosure is done of glass and galvanized steel oven painted (as included with the lightning system formed by four projectors)
- The court is completely enclosed. In each back of the enclosure, the walls are U shaped, with a 3 metre height. The frontal walls are rectangular, 3 metre high and 10 metre long.
- The lateral walls have a length of 4 metres, with a height of 3 metres in each wall during the first two metres as seen from the back of the court. On the remaining 2 metres the walls could be of a height of 2 metres (european court). The walls are made of crystal. In one of its lateral walls there is a door or an open space to get in and out.
- A metal fence encloses the lateral parts that are opened and comes on the walls, to increase the height to a total of 4 metres all around the perimeter; on the lateral walls; on the lateral walls a total height of 4 metres is also permitted during the first 2 metres counting from the back of the court, and a height of 3 metres on the remaining 16 metres. The fence is installed by putting it inside the walls to a maximum of 0,08 millimetres.
- Both sides of the net and parallel to themselves are the service lines, to a distance of 3 metres from the walls of the back of the court. The area between the net and the lines is divided in two halves by a perpendicular line, called central line, that divides two equal areas. All lines will be 5 centimetres wide.

- The surface of the court can be made of synthetic grass, as long as it allows a normal bouncing of the ball. It can be green, blue or american red clay colour.
- On the outer premises of waterproof asphalt a maximum level of 1% can be tolerated to allow the evacuation of the water at the surface, in the manner that the court presents a unique surface in transversal fashion (from side to side), collecting the water on the exterior sides of the court by half piping with the necessary exits of the enclosure so that water can flow towards the general pipes.
- Height between the asphalt and the nearest obstacle must be completely free and have a minimum of 6 metres.
- The longitudinal line dividing the outer courts must be located in a North-South position, its variation will be admitted as long as it varies from North, North-East and North, North-West.

2.3. COMPOSITION OF THE COURT::

- Sport surface for different uses formed by a synthetic grass carpet. Its characteristics are adequate and specifically designed for a sport use for both high competition and intense use, solving the limitations of time of use derived from other types of surfaces. In addition, it allows its use in all weather conditions. The optimal use of the surface allows an ideal bouncing of the ball at the time it also allows a perfect slip controlled by the user, reducing the muscular fatigue and protecting the joints of the sporter.
- That carpet made of synthetic grass it's made of artificial fibres, string shaped that can be sewed, with which the filaments of the synthetic grass are made. The process to obtain the synthetic grass is made from a primary surface on which the bundles of filaments are sewed. The joint of the filaments to the carpet is reinforced by a heat-sealing process of additional fibres on the inferior side, followed by a secondary basement on that same surface made by synthetic resin.
- The synthetic grass can be installed in a quickly and simple way over the asphalt pavement. It is highly recommended for the pavement to be draining, but it can also be installed over non draining surfaces.
- If installed on non draining surfaces, the evacuation of the water should be done by a run-off of the water. That is why, in the project and construction a level to help this out will be taken into account, in the way that the court presents a unique surface with a maximum difference of 1% in a transversal way (from side to side), picking up the water on other sides by half piping that allow to evacuate the water to the lowest point.
- The previous operations before applying any kind of treatment start by a previous cleaning, that consist in sweeping the surface (manual or mechanical by a sweeping machine) or blowing of the surface to be treated.
- Synthetic grass installation starts by releasing a roll from one of the back walls and on a parallel fashion to any of the lateral parts of the court. After that, the line is completed by the releasing of the next roll, aligning it with the first one and parallel to the already mentioned. The join between rolls of the same line or lines are done at its edges, sealing them by the stuck of a 15 centimetre band on the inferior side of each of them and its fixation by a geotextile stripes not sewed made of polypropylene. For the sticking of the different joints a glue based of two components of polyurethane is used.
- After marking the brushing of all joints is proceeded between rolls so that they are not visible and do not affect the direction or the natural bounce of the ball.
- Last step consists in the brushing of the surface by using quartz sand. This sand is spread by a milling machine. Afterwards, it is distributed uniformly, assuring that it reaches the bottom and the inner parts of the filaments. This way the synthetic grass is kept together due to the sand weight, without any additional fixation. The quality and durability of the sporting surface depend on the quality of the sand and the profile of the sand grains used (irregular forms, with edges and few rounded shapes are very dangerous for the fibres of the grass).

2.4.MEASURES MAP:



2.5 Descripción de the activity

The premises are destined to the practise of Paddle-Tennis. The noise emissions will be generated by the impacts of the ball against the paddle and against the limits of the court (glass). In addition some more noises are generated as a consequence of the conversations during the match. There is no other inner source. As the court is located outdoor, the environment will also generate remarkable noise recordable for the sound level meter, that can be high at certain moments due to the location inside a tennis club, therefore, the courts and playing fields next to the object of the study will generate additional noise.

The measures were taken on Thursday 8th July 2010, at 13:22:25. As previously stated, two measures of an hour each have been taken, first during a programme paddle match and the second with an empty court.

Location and Description of the main sources of acoustic pollution considered.

As it is said before, the main source of acoustic pollution comes from the sport activity itself. Furthermore, as it is located outdoor, another source is coming from othe adjacent courts from the Tennis and Paddle Club.

All these noises will also be amplyfied due to the near position of the walls of the old fronton court on which the paddle court, object of the measures, is now located.

Identification and description of the measure locations.

Justification of the selected measure locations.

As it is a simple measure of the noise generated by the activity what it is expected from these measurements, it is further logic to locate the measure apparatus in the dividing line of the fields (by the exterior), fulfilling an equidistant position from all sources possible. This will be the only spot selected.

Description and exact location of the measurement sites selected

To obtain data the sound level meter has been installed out of the paddle court, at a metre distance and at the same height of the dividing net of the court.



Equipment

Devices used

Device	Model	Serial No
Analysing sound level meter	2260D 002	*2459214
Acoustic calibrator First sound level type 1	4231	2459813
A swift tripod	UA-0801	--
Interface cable	AO-1442	--
Sound source Omnipower with Tripod	4296	2448559
Signal amplifier	2716	2461246
Cable 2260 for 2760 (10 m)	AO-0523	--
Linking cable for 2716	AQ-0667	--
NEUTRIK cable for speakers (10m)	AQ-0662	--
Wireless system	AKG-4000	--

Impact machine	3207	*2450756
Remote control for 3207	UA-1476	--
Inner battery for 3207	UA-1477	--
½" prepolarized microphone	4189	2458096
½" prepolarized microphone	4189	2458493
Two channel adapter	JP-1041	--
Flat cable	AR-0199	--
Extension cable for microphone 10 metre long	AO-0442	--
Signal preamplifier	ZC-0026	--
½" tweezer for the microphone	UA-1317	--
Vibrations kit for 2260	UA1219	--
Deltratron adapter for 2260	ZG-0423	*2310221
Accelerometer	4370V	*10723
Cable for accelerometer 1,2 m long	AO0038	--

Justification of the suitability of the devices used

The devices used for the project are valid for the fulfilment of the measurements done, as they comply with the international proceeding laws.

Device	Model	Reference law
Analysing sound level meter	2260D 002	IEC 651 (1979) tipo 1 IEC 1260 (1995) Octave and 1/3-octave bands Class 0
Acoustic calibrator First sound level type 1	4231	IEC 942 (1988) tipo 1
½" prepolarized microphone	4189	IEC 651 tipo 1

In addition to the laws shown above, all devices used have the obligatory CE mark.

Even though the law of the 16th December 1998, as per which the measurement control about the state of the instruments destined to meter the level of audible sounds does not include on an expressed manner the live analysers on yearly basis of the full chain of measurement, composed of the microphone kit, signal preamplifier and analyser 2260, as well as the acoustic calibrator used for the records.

The current calibration certificates are enclosed in the correspondent annexe.

Methodology. Applicable law.

Methodology of the measurement is according to Decree 326/2003 of the Junta de Andalucía and developed in the specific proceedings related to point 6.3

Legislation

- Law of the 29th June 2004, as per which the technicians accredited and the subsidiary action are regulated by the Consejería in the field of Acoustic Pollution.
- Correction of errors to the Law of the 29th June 2004 as per which the technicians accredited and the subsidiary action are regulated by the Consejería in the field of Acoustic Pollution.
- Law of the 16th December 1998, as per which the measurement control of the estate of the instrumentation destined to measure audible sounds is regulated.

Applicable norms

- UNE-EN ISO 140-4: Part 4: Measurements on the place of the isolation of the aerial noise between plots. April 1999.
- UNE-EN ISO 140-5: Part 5: Measurements on the place of the acoustic isolation of aerial noise to the exterior and its elements.
- UNE-EN ISO 140-7: Part 7: Measurements on the place of the acoustic isolation of floors to the noise of impacts. May 1999.
- NBE-CA-88 Acoustic conditions on buildings.

Procedimientos

- Documents index. See.1.1
- Quality manual. See.1.1
- Equipment for acoustic measurements and vibrations. See.1.0
- Proceedings for the measure of vibrations. See. 1.0
- Proceedings on the use of the equipment. See.1.0
- Acoustic proceeding. NAE and NEE Ver. 1.0

Evaluation level

Not necessary, as it is pretended to measure the noise and not to check whether it is in the permitted limits.

Admissible limits of NEE y NAE

Not necessary, as it is pretended to measure the noise and not to check whether it is in the permitted limits.

Data registration during the measurements

8.1. Trial on an occupied court::

The results Turing a programme match are registered here.

MAXIMUM NOISE..... 71,3 dB
MINIMUM NOISE..... 50,3 dB
AVERAGE MEASUREMENTS..... 64,1 dB
PERCENTILE 90 MAXIMUM..... 49,4 dB
PERCENTILE 90 MINIMUM..... 42,4 dB
PERCENTILE 90 AVERAGE..... 46,1 dB
RESULT OF THE MATCH..... 1st SET 7-6(3) → 27'33" playing time
2nd SET 4-6 → 54'35" playing time
3rd SET,Tie break 7-5→ 59'30" playing time

8.2. Trial on an empty course:

Data of an hour measurements on an empty court are added here, without any kind of activity in it.

MAXIMUM NOISE..... 52,8 dB
MINIMUM NOISE..... 41,8 dB
AVERAGE MEASUREMENT..... 46,5 dB
PERCENTILE 90 MAXIMUM.....46,6 dB
PERCENTILE 90 MINIMUM..... 36,4 dB
PERCENTILE 90 AVERAGE..... 41,0 dB

All results of all measurements are found on the annexes at the end of this report.

Conclusions

As it shows the court has a high level of noise during the first trial mainly because the proximity to the walls of the old fronton court over which the paddle court is located. The proximity of these walls act as an amplifier of the sound, so high level of sounds for the activity developed are produced. In more isolated paddle courts more optimal results will be obtained. In our case it is not of a great importance, as there is enough distance to the nearest urbanisation.

On the second measurement, the levels of noise raised are because of the activity on the paddle club. At the moment it was made, certain activities were being held on the adjacent courts of the one of the study, so all that noise has been recorded by the sound level meter, giving us such a level of noise.

Annexes

NAE Calculum Model annexes

Pictures

Aerial Photography



Sound analyzer



Checks certificates