Have our standards slipped?

Are your client reports vulnerable to challenge because the Class 1 sound level meter used may not be Class 1?Can the consultant's report you're reviewing be disregarded because the equipment listed is not Type Approved? Are your sound insulation tests not meeting the required standard because the instruments used are not BS EN 61672 series compliant?

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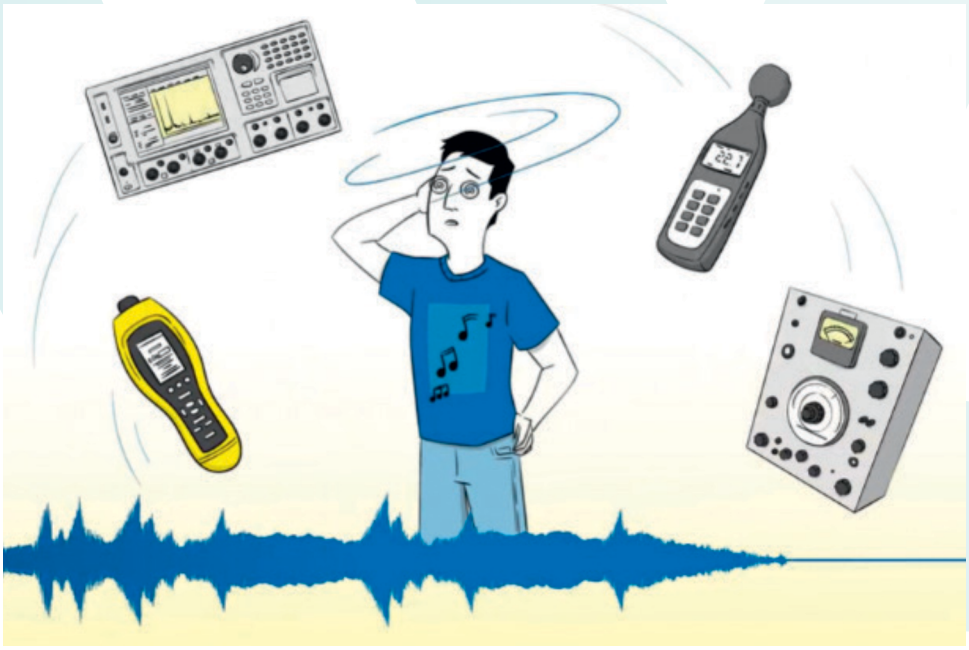
Scenariossuch as these regarding questionable measurement integrity are increasingly likely in recent years as the clarity around what is and what isn't Class 1has become clouded. This article attempts to clarify the requirements of the sound level meter standard series BS EN 61672 in simple terms, how to check if your equipment is indeed Class 1 and the benefits in general of meeting the requirements of the sound level meter standard.

Class 1sound level meters, why are they important?

The technology which offers precision grade measurements in a hand-held sound level meter or in a fixed noise monitor, has been available for many years. Consequently, the national and international standards to which we work in order to carry out noise surveys or acoustic compliance testing often require this grade as a minimum standard of measurement accuracy.

In some instances, a maximum permitted sound level is incorporated into a legally binding agreement where the agreement may well stipulate that a Class 1 and calibrated instrument must be used to verify compliance with the permitted sound level. In such cases nothing less than Class 1will do.



Above: Is my sound level meter truly Class 1?

One of the benefits of using Class 1sound level meters which are fully compliant with the sound level meter standard is that regardless of the model of sound level meter used, from whichever manufacturer, the measurement results are consistent.

An example might be two measurement professionals tasked with assessing the noise level from an air handling unit on different days and under identical operating conditions. Both use Class 1and calibrated instruments for their measurements. If a difference in measurement result is evident between the two surveys, then this could be attributed to the variability in background noise, or a change in the prevailing weather conditions or possibly something has changed in the air handling unit load or duty cycle but the difference cannot be attributed to any variability in the Class 1and calibrated equipment as this is accepted to be correct. The ability to compare measurements between different meters and different practitioners is often taken for granted and is hugely beneficial but it is only possible if the equipment is unquestionably Class 1 and calibrated. P26

Left: Class 1 and calibrated instruments offer a high degree of precision

Overview of the sound level meter standard series BS EN 61672

The sound level meter standard series BS EN 61672 is an impressive body of work but is not an easy read for measurement practitioners or instrumentation experts. It 'weighs in' at almost 110pages over three sections with numerous extensive formulae and many technical references to electronic specifications, as might well be expected in an instrument standard.

A helpful overview was published by the IOA Measurement and Instrumentation Specialist Group in the September/October 2019 issue of Acoustics Bulletin titled A guide to sound level meters. This excellent article covers in a good level of detail the standards, the importance of pattern evaluation and instrument calibration along with a summary of common misconceptions relating to the standards. The guide was prompted by a growing influx of low-cost sound level meters into the UK and Ireland claiming Class 1performance but falling short on various tests during a standard sound level meter laboratory calibration.

What follows is a short and simplified summary of the key components of the standard.

BS EN 61672 – Part 1 The specification for a sound level meter. This is the recipe for manufacturers to follow in order to design and build a Class 1or Class 2 sound level meter. Detailed over 50 pages this document specifies the linearity performance, frequency weightings, time weightings, overload and under-range indication, EMC emissions, response to mechanical vibration and many more specification requirements.

BS EN 61672 – Part 2 Pattern Evaluation also known as Type Testing. As you might imagine Part 1of the sound level meter standard is comprehensive, wide-ranging and detailed. To ensure that the manufacturer has interpreted the requirements correctly and implemented them reliably in their sound level meter design, the manufacturer has to send a number of instruments to an independent Type Testing organisation such as PTB in Germany or LNE in France for an extensive programme of specification verification. Testing takes many weeks, requires significant technical support and verifies every aspect of the meter's performance against Part 1of the standard. A Pattern Approval (Type Approval) certificate is issued by the independent organisation to the manufacturer on successful completion of the process.

BS EN 61672 – Part 3 Periodic Tests often referred to as Calibration. This details the periodic testing (calibration) of a number of key parameters of a sound level meter in order to verify that 'wear and tear' have not taken their toll on the performance of the meter such that it no longer meets the requirements of Part 1of the standard. Calibration is most certainly not an alternative to Pattern Evaluation as it takes at most two hours to test the key parameters of the meter whereas Pattern Evaluation takes many weeks testing every aspect of the sound level meter operation.

When a sound level meter model has been designed to Part 1of the standard and awarded a Pattern Approval certificate for successfully meeting all the requirements, then and only then can that model of meter be referred to as Class 1 according to series BS EN 61672.

Any meters which are described as Class 1without having been Pattern Evaluated have an unverified claim to Class 1performance and therefore unproven measurement integrity despite the meter possibly having a calibration certificate. P28

Below: Laboratory calibration in accordance with Part 3 of BS EN 61672

The calibration certificate must state if the meter has not been Pattern Evaluated to Part 1of the series BS EN 61672 standard in order to provide context to the calibration.

The Pattern Approval process

The Pattern Approval process is rigorous and some instruments simply don't pass, with some having to be subjected to a design rework while other manufacturers won't revisit the process following an unsuccessful Pattern Evaluation.

The Type Testing process is not unique to sound level meters. The car industry has a similar type of requirement. For example, a car manufacturer planning to introduce a new model must subject their design to a rigorous testing programme which tests every aspect of the car's operation and build including physical size, emissions, electrical safety, crash testing and many other checks. Once approved for road-use the car must be periodically verified, i.e. MOT, to ensure that wear and tear on the vehicle hasn't compromised the car's roadworthy status. The notable difference between the car industry and the sound level meter industry is that successful Type Testing is mandatory before a car is allowed on the roads whereas for sound level meters it's the equipment purchaser's responsibility to ensure that the meter is Class 1,so it's very much a case of 'buyer beware'!

How to check your meter is indeed Class 1

Peace of mind knowing your sound level meters are Class 1and fully compliant with the sound level meter standard is reassuring and important regardless of whether your equipment is from a well-known manufacturer or from a lesser-known brand.

There are a number of ways to verify the Class 1credentials of a sound level meter, a few of which are outlined as follows.

PTBin Germany has been, for many years, the organisation where most sound level meter manufacturers send their meters for Pattern Evaluation in accordance with IEC61672:2. Meters which are successfully approved are issued with a Type Approval certificate and listed on the PTB website with all the other approved meters, which is now an extensive list going back to 1995. (See more here: https://tinyurl.com/ptbdeslm).

LNEin France also publish the full list of instruments which they have successfully Type Approved here: https://tinyurl.com/lnesearch

Contact the manufacturer and request a Type Approval certificate for the specific model of meter. Many manufacturers will publish Type Approval certificates on their websites as its often considered an important item of documentation relating to the credentials for the meter. The certificate may often not be in English but reference to the sound level meter standard IEC61672 should be clear.

Contact an accredited sound level meter calibration laboratory to verify Class 1credentials. The accredited processes of a calibration laboratory require calibration engineers to have a depth of knowledge for a wide range of sound level meter models including the associated Pattern Evaluation status.

In conclusion

Class 1is a term born out of the sound level meter standard series BS EN 61672. To be a Class 1device the meter must be designed and built to Part 1of the standard and independently Pattern Evaluated in accordance with Part 2. Part 3 of the standard outlines the periodic tests of the meter more commonly referred to as calibration and is intended to check key parameters in the measurement chain to verify that the measurement performance is still accurate as per the specifications of Part 1.

Periodic testing or calibration, is not an alternative to Pattern Evaluation.

A high degree of measurement integrity is key to many acoustic measurement applications and the sound level meter standard BS EN 61672 serves to offer a framework for repeatable and accurate measurements which are traceable to national and international standards.

So, when taking your next set of measurements do take care that you're not vulnerable to challenge for using equipment which may not have been Pattern Evaluated as Class 1 and that you can still post photos on social media of your sound level meter in action safe in the knowledge that there is no question of the meter's credentials.

Below: PTB Type Approval certificate for a Class 1meter