IMPLEMENTATION OF THE REQUIREMENTS FOR ACCREDITATION OF THE EXECUTIVE AGENCY "BULGARIAN ACCREDITATION SERVICES" AND THE REQUIREMENTS OF THE STANDARD ISO / IEC 17020: 2012 TO "SPECTRI - MEASUREMENT" CONTROL AUTHORITY WITH SPECTRI LTD

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Abstract: The document examines the requirements for accreditation and technical competence of the exemplary control body of type C "SPECTRI - MEASUREMENTS" at SPECTRI Ltd. The scope of accreditation, technical capability and control measurement capabilities and evaluation of noise and vibration parameters by the accredited body are presented in detail.

Key words: Accreditation, noise, vibrations

1. Introduction

EN ISO / IEC 17020 is an international harmonized standard that contains requirements for the competence of the controlling authorities, their impartiality and the consistency of their control activities.

This standard applies to **control body of type "A", "B" or "C"** which are defined therein and pertains to each stage of control.

The type of control body, according to the conditions under which it performs its services and the type of its independence, is of the following type:

• "A" - performing third party control;

• "B" - performing first-party control and only controlling the organization to which it belongs, and

• "C" - performing first-party control, second-party control, or both, and providing control services to the organization from which it is part or to other countries, or both.

Control body carry out an assessment of the compliance of the Controlled Site against predefined requirements that may be defined in: regulatory acts, standards, technical specifications, etc.

In 2011 SPECTRI Ltd. developed and implemented a quality system in compliance with the requirements of the standard EN ISO / IEC 17020. The SPECTRI - MEASUREMENTS control unit is of type C. The purpose of the certification was to offer customers a service with proven and recognized Technical and expert competence in an area where the company and staff are proven every day, namely noise and vibrations, without spreading resources and competence in other areas.

In order to fulfill the idea and the purpose of accreditation SPECTRI Ltd. is guided by two main facts - possession of high-end equipment, which is metrologically traceable and expert staff who has proved its competence in the dozens of projects of national and social significance.

After a 4 year accreditation period in 2016 SPECTRI successfully passed re-accreditation from Executive Agency "Bulgarian Accreditation Services" .

SPECTRI LTD provides to the customers activities in the field of delivery, service and maintenance of measuring equipment in the field of acoustics and vibrations and performs engineering tasks in connection with measurement, diagnostics and analysis of noise and vibrations.

The control body type C at SPECTRI Ltd., Sofia, is accredited according to BDS EN ISO / IEC 17020: 2012 by Executive Agency "Bulgarian Accreditation Services" with unique Certificate No. 122 OKS. The validity of the certificate is until 30.11.2020 and will be reissued for a period of 4 years.

2. Control body Type C Scope of Accreditation with "SPECTRI-MEASUREMENTS":

Environmental noise with a range of parameter control: quantitative noise level, daily, night and night noise level, dBA;

Noise in premises of residential and public buildings with parameter control range: noise level and equivalent noise level, dBA;

Operating noise with a range of parameter control: daily noise exposure level, weekly noise level, dBA, peak sound pressure level, dBC, noise level and equivalent noise level, dBA;

Vibrations transmitted on the arm-and-arm system, with a range of parameter control: Daily Vibration Exposure Value;

Vibration of machines with a range of parameters controlled by vibration, vibration, vibration;

Vibration in residential premises with a range of vibration control parameters.

Fig. 1 Accreditation certificate

3. Regulatory documents on which the control is carried out

Using the most modern and world-renowned instrumentation for noise and vibration measurement, SPECTRI Ltd. is technically provided for various measurements depending on the needs of the customers. As conditions of accreditation, the described parameters and the stated scope are performed in accordance with the requirements of the following test methods, internal approved control procedures, and the assessment of the control carried out is carried out in compliance with the cited regulatory documents

3.1. When environmental noise is measured, the control methods are in accordance with 15471, ISO1996-1, ISO1996-2 and internally developed procedures for environmental noise measurement Control procedure 10-1. Conformity assessment shall be carried out in accordance with Ordinance № 6, State gazette No. 58 / 2006g. (Annex 2, Table 2) and Technical Specification;

3.2. Measurement of noise in the premises of

Residential and public buildings, the control methods are in accordance with 15471 and procedure of quality 10-3, and the conformity assessment in accordance with the requirements of Ordinance No. 6, State gazette. 58/2006 (Annex 2, Table 1), Ordinance No. 24, State gazette, no. 95/2003, Ordinance No. 9, State gazette no. 46/1994, Ordinance № 2, SG No. 15/2007, Ordinance No. 26, State gazette, no. 103/2008, Ordinance № 4, State gazette, no. 6/2007 And Technical Specification of the customer.

With high-class equipment that is metrologically traceable, we have the ability to offer our customers high-precision and outstanding tonal detection, impulse noise, air conditioning noise, switchgear, elevators, low-frequency measurements, etc.

3.3. Measurement of noise in the working environment, the control methods are in accordance with ISO 1999 (EN ISO 9612), 15471 and developed and approved procedures procedure of quality 10-2, the conformity assessment is according to Ordinance № 6, State gazette no. 70/2005, Ordinance № 6, issue 56 / 2006g. (Annex 2, Table 1), Ordinance No 7, State gazette No. 88/1999, Ordinance No. 9, State gazette No. 46/1994, Ordinance No. 26, State gazette, no. 103/2008 And Technical Specification of the customer.

3.4. Measurement of *vibrations transmitted to the hand-arm and the whole body, control methods are defined in* ISO 2631-1, EN ISO 5349-1, EN ISO 5349-2, procedure of quality 10-6, procedure of quality 10- 7, and the conformity assessment under Ordinance № 3, procedure of quality no. 40/2005 And Technical Specification of the customer.

3.5. Vibration measurements of machines are carried out according to the described control methods ISO 10816 (-1-6), Ordinance No. 9 (State gazette No. 72/2004) and approved procedures procedure of quality 10-8, procedure of quality 10-9, procedure of quality 10- 10, and conformity assessment is carried out according to BDS ISO 10816 (-1-6), Ordinance No. 9 (State gazette No. 72/2004) and Technical specification of the customer.

3.6. Measurement of vibrations in living quarters, the method for control and conformity assessment is described in Ordinance No. 9, (State gazette 17/2010), and the procedure of measurement is described in procedure of quality 10-11.

4. Technical means of control

4.1. The technical means used for noise control in the environment, work and home environment is an integrated noise meter, 20 - 140 dB (A), type 2250, manufacturer Brüel & Kjær. Calibration Calibrator is a Sound Calibrator, 94 dB (A) / 1kHz, type 4231, manufacturer Brüel & Kjær. The appliances are Class 1 and meet the requirements of the standard and metrologically traceable.

Fig. 2 Integrating noise level meter 2250

In pursuance of the quality objectives and policy for the continuous development and improvement of the services offered by the SPECTRI MEASUREMENTS - technically and expertly, in 2016 SPECTRI Ltd. purchased for the purposes of control a personal noise type 4448 for measuring the noise parameters of Workplace, with the ability to determine daily noise exposure level, weekly noise exposure level, dBA.

Fig. 3 Personal 4488 Noise Dozer

4.2. For the control of *vibrations transmitted to the hand-arm and the whole body,* we use a vibration analyzer for "human vibrations" type 4447, manufacturer Brüel & Kjær, three-channel “full body” system accelerometer - 4515-B-002 And accelerometer type 4515-B-002, Brüel & Kjær, the calibration standard for the technical devices is a vibration calibrator type 4294 of our Brüel & Kjær partners.

Fig. 4 Vibration Analyzer Type 4447

4.3. The PULSE multi-channel multi-analyzer, type 3560-B-140, and accelerometer 4514-B-001, manufactured by Brüel & Kjær, is used to control machine vibrations and vibration. The calibration before each measurement is performed with a Brüel & Kjær type 4294 standard.

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Fig. 5 Multi-Analyzer Pulse Type 3560-B-140

Calibration Standards for Noise and Vibration Techniques

Fig. 6 Sound Calibrator Type 4231

Fig. 7 Vibration Calibrator, Type 4294

In addition to the listed technical controls, prior to each measurement, the environmental parameters are recorded with the Kestrel environment 5000 Meter.

The control body respects the traceability policy of Executive Agency "Bulgarian Accreditation Services" and according to the requirements of BAS QR 27 uses the following traceability sources:

National Metrology Institutes (NMIs), including the Bulgarian Institute of Metrology (BMI), for areas published in (Appendix C) of the CIPM MRA and accredited calibration laboratories that are recognized for calibration and measurement and traceability with appropriate uncertainty , Accredited by the National Accreditation Body party to the EA Multilateral Agreement (EA MLA) or ILAC (ILAC-MRA) in the Calibration Area.

5. Company competencies and staff

The specialists in the body are appointed by the Company Manager. They have years of experience and additional qualifications in the assessment and control of noise and vibrations and can perform their assigned control functions as well as make professional assessments of control compliance and assess the significance of detected deviations / discrepancies.

Staff training are continuous internal or external and are performed to improve skills and enhance the quality of the control activities.

The employees are holders of certificates for quality systems and internal auditors under EN ISO / IEC 17020: 2012, issued by the Union of Metrologists in Bulgaria and Executive Agency "Bulgarian Accreditation Services", training for measurement and control of noise in the environment, work and home environment, issued by Technical University of Sofia, Vibration Measurement Training at the Technical University - Sofia, equipment training for Brüel & Kjær, as well as training for metrological traceability of BIM technical devices and training on metrological traceability means for measurement. Team members participate in trainings organized by the Union of Metrologists in Bulgaria as lecturers.

Funding for staff training is done by the company as an ongoing identifies training needs and use all existing possibilities. The manager provides financial resources for the participation of specialists of the body in external forms of training such as seminars, courses, conferences and others.

6. Examples of real measurements

6.1. Daytime vibration exposure measurements - X, Y, Z (Aw (8) x, Aw (8) y and Aw (8) z), m/s² of a Renault Traffic clutch pedal

Fig. 8 Real "Whole Body" Vibration Measurements

6.2. Measurement of noise in the working environment at Toplofikatsia Sofia EAD, after performance of steam turbine generators General Turbo T12-2, 1500 KVA, Un-6300V, Speed - 3000 rpm, P - 12750 KW, I - 1375 A, Frequency - 50 Hz .

Fig. 9 Real Noise Measurements in Work Environment

6.3. Measurements of environmental noise - stage of acoustic project.

Fig. 10 Real Noise Measurements in the Environment

6.4. Implementation of measurement, investigation and analysis of the nature of a low frequency / tonal noise complaint caused by a transformer located under a sleeping facility in a residential building.

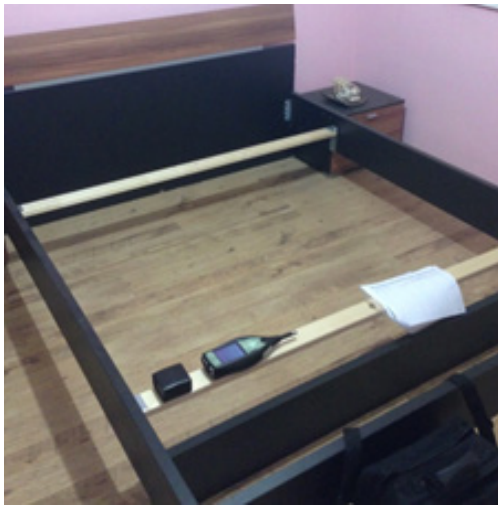

Fig. 11 Real tonal noise measurements

Determination, registration and recording of tonal noise is of utmost importance in the control and evaluation of noise in household / environment

The tonal noise correction could (as the case may be) lead to exceeding the normative limit values

In view of the correctness and traceability of the conclusions drawn, it is important to use reliable, verifiable and metrologically assured tools (hardware, software)

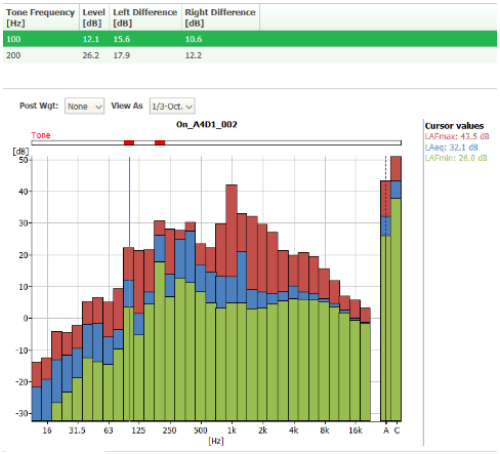

Fig. 12 Presentation of results in 1/3 octave spectrum

6.5. Demonstration of vibration measurements of buildings and vibration of machines according to the scope of accreditation

Fig. 13 Demonstration of vibration measurement of machines and vibrations of buildings during evaluation and monitoring for re-accreditation.

7. Conclusions

The existence of official recognition, accreditation by a specialized state body is a necessary condition for the legitimacy of each company in the country. It ensures the monitoring and control of the quality of the services provided, maintaining the competence of the personnel and the maintenance, management and development of the equipment during the whole

accreditation period. That is why it is very important for us to achieve better results in our work.

The accreditation of SPECTRI Ltd's services through SPECTRI-MEASUREMENTS is our mission to deliver valued and accredited high quality and recognized services to our clients, to gain their trust, guaranteeing recognized and maintained impartiality and high technical and expert competence.

8. References

[1] EN ISO / IEC 17020: 2012

[2] ISO 1996-1 / 2005 Acoustics. Description, measurement and assessment of environmental noise.

[3] ISO 1996-2 / 2011 Acoustics. Description, measurement and assessment of environmental noise.

[4] ISO 1999 Acoustics. Determination of the impact of noise at work and assessment of hearing damage caused by noise

[5] 15471/1982 Noise. Methods of measurement and assessment in the premises of residential, public buildings and settlements

[6] ISO 2631-1 / 2004 Vibration and impact. Evaluating the impact of vibrations on the whole human body.

[7] ISO 5349-1,2 / 2002 Vibration. Measurement and assessment of the impact of vibrations transmitted on the hand of a person.

[8] ISO 10816-1,2,3,4,5,6 / 2002 Vibration. Evaluate vibration of machines by measuring them on non-rotating parts.

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