

Semi-annual Environment & Social Monitoring Report (June to December 2014)

April 2015

GEO: Adjaristsqali Hydropower Project

Annex 6

Prepared by Adjaristsqali Georgia LLC

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Annex 6

Noise, Dust & Water Monitoring

		SEGAL ÇEVRE ÖLÇÜM ve ANALİZ LABORATUARI Aşağı Öveçler Mah. 1322.Cad (eski 6.cad) ÇANKAYA-ANKARA Tel: 0 312 481 83 00 Fax: 0 312 481 83 99 mail: segai@segalanaliz.com web: www.segalanaliz.com www.segal.com.tr	Report Number
			R-13355/15
İlk Basım: 03.05.2010			Report Date
RP.01 / Rev.01			17.03.2015
Rev. Tarihi: 20.01.2011			
Sayfa 1 / 2			

Müşterinin adı/ adresi: Customer Name / Address	SELİN İNŞ. TURZ. MÜŞ. SAN. ve TİC. LTD. ŞTİ. Aşağı Öveçler Mah. 1042.Cad. 1335. Sk. No:20/10 Dikmen/ANKARA
<u>Numuneyi Alan Kurum / Kuruluş</u> <u>Sampler Institution / Company</u>	SELİN İNŞ. TURZ. MÜŞ. SAN. ve TİC. LTD. ŞTİ.
Numunenin Adı ve Örnekleme Tarihi: Name and Sampling Date of the Sample	Wastewater (N-13978/15)
Numunenin Alınış Şekli: Receipt of the Sample Shape	---
Numuneyi Teslim Eden: Deliverer of the Sample	Murat DİNÇ
Proje Adı ve No: Name and Number of the Project	P-7122/15
Numunenin Kabul Tarihi: Date of Sample Acceptance	11.03.2015
Numunenin Teslim Koşulları: Delivery Conditions of the Sample	Glass container
Açıklamalar: Remarks	The analysis of the sample from Chirukhiststskali
Deneyin yapıldığı Tarih: Date of the Test	11.03.2015 – 16.03.2015
Raporun Sayfa Sayısı: Number of the Pages of the Report	2 pages
<p>"This report is not used for officially in terms of enviromental legislation."</p> <p>Deney ve/veya ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve deney/ölçüm metotları takip eden sayfalarda verilmiştir. The test and /or measurements results, the uncertainties with confidence probability and test methods are given on the following pages which are part of this report.</p>	
Raporu Hazırlayan Prepared by Esra UZEL Chemist	Raporu Onaylayan Confirm by Fevzi KARAKAYA Laboratory Manager

Bu rapor, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz. İmzasız ve mühürlü raporlar geçersizdir. Sonuçlar sadece deneyi yapılan numunelere aittir. (This report shall not be reproduced other than in full except with the permission of the laboratory. Testing reports without signature and seal are not valid. The results belong to the tested sample.)

Example of
Water Monitoring

İlk Basım: 03.05.2010 RP.01 / Rev.01 Rev. Tarihi: 20.01.2011 Sayfa 2 / 2	 	Report Number R-13355/15 Report Date 17.03.2015
	SEGAL ÇEVRE ÖLÇÜM ve ANALİZ LABORATUARI Aşağı Öveçler Mah. 1322.Cad (eski 6.cad) ÇANKAYA-ANKARA Tel: 0 312 481 83 00 Fax: 0 312 481 83 99 mail: segal@segalanaliz.com web: www.segalanaliz.com www.segal.com.tr	

NUMUNE ADI ve NUMUNE NO: Wastewater- N-13978/15
SAMPLE NAME and NUMBER

Parametre-Birim Parameter-Unit	Analiz Sonucu Test Result	SKKY tablo 21.1 Limit values Composite 2 hour	IFC Genel ÇSG Rehberleri Max. Value	Analiz Metodu Test Method
Dissolved Oxygen (mg/L)	9,08	-	-	TS EN 25814
Suspended Solids (mg/L)	<10	70	50	TS EN 872
Biological Oxygen Demand (mg/L)	<4	50	30	SM 5210 B
Chemical Oxygen Demand (mg/L)	<10	180	125	SM 5220 B
Oil-Grease (mg/L)	<10	-	10	TS 8312

"Samples are preserved under the rules of TS EN ISO 5667-3 - Water quality - Sampling - Part 3: Storage and Transport of Samples. During that time the chemical, microbiological and physical perishable or hazardous samples, the sample will be destroyed without waiting for the end of the storage period. "

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Environmental Conditions:

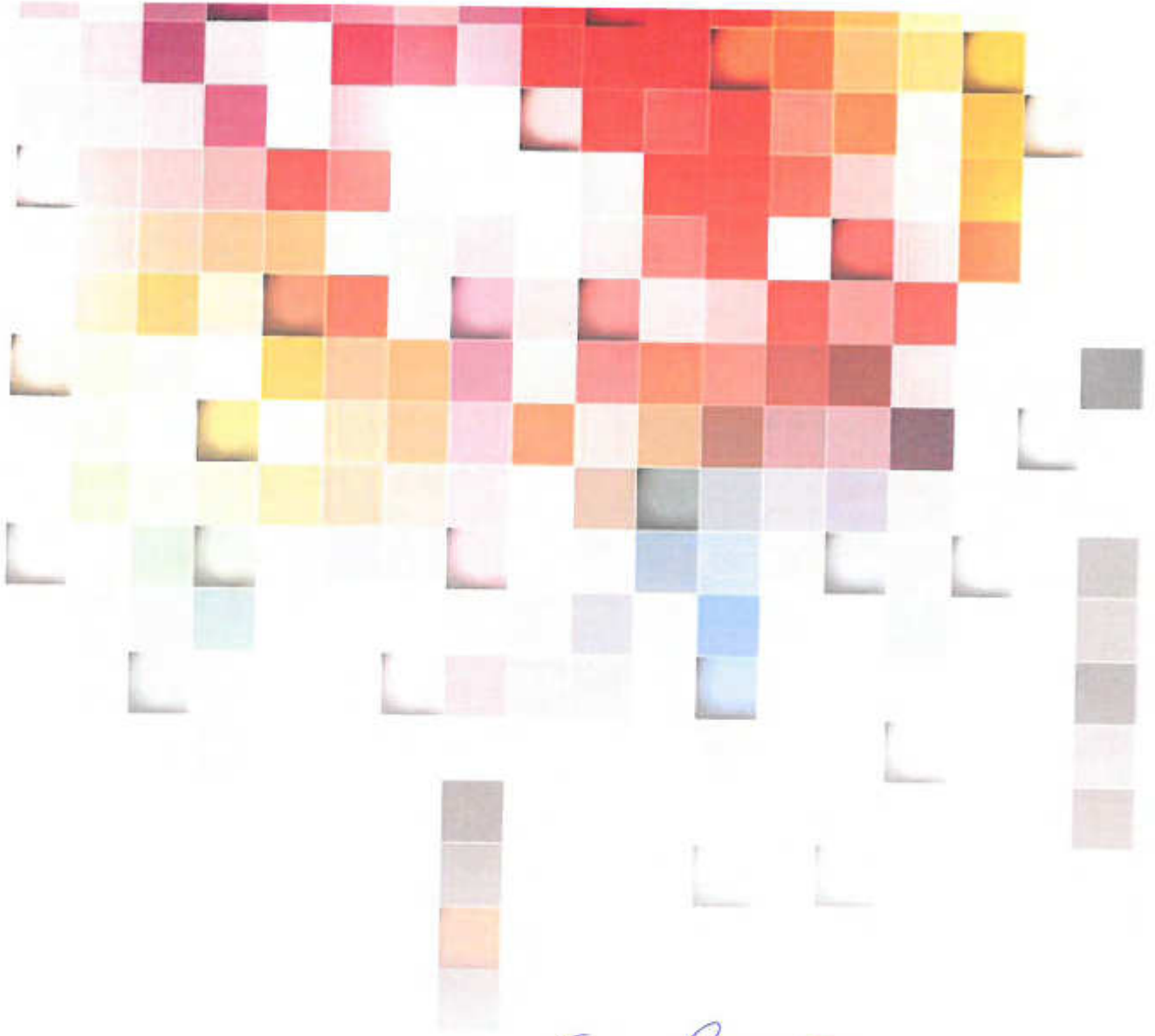
<u>Weather</u>	<u>Open</u>	<u>Rain</u>	<u>Yes</u>	<u>Weather Temperature °C</u>	<u>Coordinates</u>	<u>E</u>	277017
	<u>Close</u>		<u>No</u>			<u>N</u>	4602133

Görüş ve Yorumlar:

Seal

Signature

Bu rapor, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz. İmzasız ve mühürsüz raporlar geçersizdir. **Sonuçlar sadece deneyi yapılan numunelere aittir.** (This report shall not be reproduced other than in full except with the permission of the laboratory. Testing reports without signature and seal are not valid. **The results belong to the tested sample.**)



EXAMPLE OF
NOSE MONITORING



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Müşterinin Telefonu/Faksı: +995 422 21 22 05/06/07
Customer Phone/Fax: +995 422 21 22 05/06/07

İstek Numarası: 14-027/IV
Order No.

Numunenin Adı ve Tanıtı: Noise Measurement
Name And Identity Of The Test Item

Deneyin Yapıldığı Tarih: 13/08/2014
Date Of Test

Raporun Numarası ve Tarihi: 14-LG-027/IV-1 – 19/08/2014
Number And Date Of The Report



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AB-0237-T

14-LG-027/IV-
1

19/08/2014

Deney Raporu / Test Report

Müşterinin adı/adresi: AGE Batumi LTD - Shuakhevi HES
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İstek Numarası: 14-027/IV
Order No.

Numunenin adı ve tanımı: Noise Measurement
Name and identity of the test item

Numunenin kabul tarihi ve no: 15/08/2014 - 140813-G-2
The date and number of receipt of the test item

Açıklamalar:
Remarks

Deneyin yapıldığı tarih: 13/08/2014
Date of test

Raporun sayfa sayısı: 32
Number of pages of the Report

Türk Akreditasyon Kurumu (TÜRKAK) deney raporlarının tanınması konusunda Avrupa Akreditasyon Birliği (EA) ve Uluslararası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanınma antlaşması imzalamıştır.

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Deney ve/veya ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri (olması halinde) ve deney metodları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir.

The test and/or measurement results, the uncertainties (if applicable) with confidence probability and test methods are given on the following pages which are part of this report.

Mühür Seal	Tarih Date	Deneyi Yapan Test Done by	Analizi Yapan Analyzed by	Raporu Hazırlayan Report Prepared by	Onay Approved by
19/08/2014					

Murat DİNÇ
Measurement
Responsible

İsmail ARSLAN
Quality Management
Representative

Ersan ÖZKİŞİ
Laboratory Technical
Manager

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14-LG-027/IV - 19/08/2014

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14-LG-027/IV – 19/08/2014

A. INTRODUCTION

This report was prepared as a result of the measurements performed in the explicit address mentioned below;

Date of the : 13.08.2014
Measurement
Location of the : Shuakhevi HEPP
Measurement

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B. INFORMATION ABOUT THE FACILITY

The construction phase of the Shuakhevi HEPP Project, located in Adjaristsqali River, Georgia, is carried out by AGE Batum LTD.

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C. NOISE MEASUREMENT REPORT

a. Introduction

The noise measurement report has been prepared to take necessary measures to prevent the deterioration of peace and tranquility and physical and mental health of the people due to exposure to environmental noise, according to the "Regulation of Permissions and Licenses to be Obtained in the Scope of Environmental Law" published in Official Gazette dated 04.06.2010 and numbered 27601 and amended on 27.04.2011 with a number of 27917, the following precautions will be taken;

- a) Determining the exposure to environmental noise levels using assessment methods by preparing noise maps, acoustic report and environmental noise levels evaluation reports,
- b) Informing the public about environmental noise and its effects
- c) Preparing the noise prevention and mitigation action plans and implementation of these plans, based on noise maps, acoustic report and environmental noise level evaluation reports results , especially in areas where exposure to environmental noise levels may have harmful effects on human health and in areas where environmental noise quality protection is required,

This regulation scopes the principles and criteria of the environmental noises that the people are exposed in area especially densely populated areas, other quiet areas such as parks or in residential areas, quiet areas in open fields, schools, hospitals and other noise-sensitive areas and the principles and criteria of the damages caused by the environmental vibration in buildings.

Accordingly, for the noise emissions that are emitted from various sources, limit values are determined and Regulation for Assessment of Environmental Noise necessitates the measurement and monitoring noise emissions in these mentioned sources and the compliance with the principles are being determined.

In scope of the mentioned Project, environmental noise measurements have been made in the nearest residential areas to the Diakonidze and Chanckalo working area.

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b. Measurement Methods

The measurements were performed according to the standard given below.

- | | |
|--------------------|---|
| TS ISO 1996-2 | Acoustics -- Description, measurement and assessment of environmental noise --
Part 2: Determination of environmental noise levels |
| TS 9315 ISO 1996-1 | Acoustics -- Description, measurement and assessment of environmental noise --
Part 1: Basic quantities and assessment procedures |

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c. General Principles

- Sources of noise are determined by searching the construction site during the measurement.
- Environmental factors are observed during the measurement and situations which may affect the measurements are registered.
- Measurement time intervals should be chosen as it includes all meaningful deviations in noise emissions and dispersions.
- Noise observations given in related legislation are taken as basis for the evaluation of results of measurement provided.
- Location of microphone used in measurement is determined according to the standards implemented for measurements.
- Attention is paid not to make noise which may affect the measurement during noise measurement.
- Calibration of measurement instrument is carried out before and after the measurement.
- Sound pressure levels change according to weather conditions.

Microphone Locations

Outdoor

To evaluate the situation at a certain location, microphone should be used in subject location.

Free Field Location

Near this location there are not any reflective surface affecting the Noise Pressure Level except ground. Apart from microphone and ground, the distance between a sound reflecting surface and ground should be two times larger than the distance between the microphone and dominant side of sound source.

Microphone on the Reflective Surface

In this case, correction factor to be used to find instantaneous sound area, is +6 dB.

This location is on a reflective surface and an aluminum joint plate with a rubber tape is used as reflective surface.

The front which is 1 m inside of the microphone, should be within $\pm 0,05$ m tolerance and straight. Distance between the edges of microphone and front surface should be more than 1 m. The distance from plate edges of the microphone should be more than 0,1 m in order to decrease the sound refraction in plate edges. Microphone can be used without joint plate if it is produced of solid material such as wall, concrete, stone, glass or wood. In this case, wall surface should be smooth in the 1 m radius from microphone within the $\pm 0,01$ m tolerance.

There are nail holes at the 4 corners of the plate. Plate is fixed to the wall by nailing down from the holes.

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Microphone near the reflective surface

In this case, correction factor to be used to find instantaneous sound area, is -3 dB.

In an ideal case, i.e., if there is not any vertical deflection barrier interfering the sound dispersion to the receiver, the difference between the microphone set up 2 m front of the front and the microphone in the free field area conditions is approximately 3dB. Therefore, the microphone is placed in 2 m distance from the front.

For more general addressing, microphone height should be $(4,0 \text{ m} \pm 0,5) \text{ m}$ when choosing the microphone location in multistory building regions. In single-floor regions, microphone height should be used as $(1,5 \text{ m} \pm 0,1) \text{ m}$.

In order to address the noise, generally, noise levels at grid points are calculated. Measurements for special cases are conducted according to intensity of the grid points chosen in a certain location, spatial resolution required for research subject and spatial change of sound pressure levels in noise. This change is larger at regions near the source and around the larger barriers. Therefore, in these areas, intensity of grid points should be more. In general, difference of Noise Pressure Level between two neighbor grid points should not exceed 5 dB. When it is come across with larger differences, grid breakpoints should be added.

Dependant to the limitations and rules whose outlines are given below, this location aims to reach the 3 dB increase at instantaneous sound pressure level(free field area level). When the microphone is in a certain distance away from the reflective surface, direct sound and reflective sound are equally strong and if the related frequency band is wide enough, this reflection doubles up the sound area energy and leads to a 3 dB increase in sound pressure level.

Front should be a platform within a $\pm 0,3 \text{ m}$ tolerance and microphone, it should be placed in a sound area between building surfaces that stand out where it will be affected by multiple reflections of sound. Windows should be accepted as a part of the front. And they should be closed during measurements. In total, measured equivalence is intended to provide that the instantaneous sound level does not deviate more than +3 dB.

Indoor

At least three different microphone locations, distributed into the room at even intervals, should be used where the persons affected by the sound will spend time.

If it is thought that the noise with a lower frequency is dominant, one of the three microphone locations should be at the corner of the room. Location of the corner microphone should be 0,5 m distant from whole circumference surfaces of a corner which is a wall and 0,5 m distant from the nearest wall opening.

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Other microphones should be placed at a 0,5 m distance away from walls, ceiling and laying and 1 m distance away from conducting components such as Windows or air intakes. The distance between two neighbor microphones should be at least 0,7 m.

The operations in this subject are designed for rooms with a volume of smaller than 300 m³. In larger rooms it is appropriate to use more microphone locations. In such cases, one third of the additional microphone locations should be in corners for noises with low frequency. If the room volume exceeds 300 m³, additional microphone locations are defined.

Tone Sound

If the noise characteristics at the receiver location involve audible sound tone(s), objective measurement should be done for the precision of these tones. Microphone locations where more audible tones exist, should be selected and analysis should be done as explained below.

Experiment for the determination of the existence of spectrum component with separated frequency, is typically done by comparing the Noise Pressure Level with time average in the some part of the 1/3 octave band, and the Noise Pressure Level with time average in two neighbor 1/3 octave bands. Time averaged Noise Pressure Level in 1/3 octave band concerned in order to reveal the existence of spectrum component with separated frequency, should exceed the two neighbor time averaged sound pressure levels in 1/3 octave bands with a certain level difference.

Constant level difference can be change depending on the frequency. Possible options for the level differences are given below:

- 15 dB in low frequency 1/3 octave bands (25 Hz -125 Hz).
- 8 dB in middle frequency bands (160 Hz - 400 Hz).
- 5 dB in high frequency bands (500 Hz-10000 Hz).

Tone analysis of noise is not done in indoors.

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d. Measurement System

Measurements were carried out with 20814 serial numbered measurement instrument. Technical specifications of the equipment is given below whereas calibration certificate is given in **Appendix 2**.

- Instrument is able to perform measurement between 10Hz – 20kHz. It gives statistics such as SPL, LEQ, SEL, Lden, Ltm3, Ltm5 etc.
- It can make measurement independently at A, C, Lin bands of IMPULSE, FAST, SLOW detector for each channel.
- Instrument automatically saves the measurements.
- Measurement in dark areas can be performed by its light.
- Time constants: (SLOW, FAST, IMPULSE).
- It can make 1/1 and 1/3 octave band analysis from 0.8 Hz up to 20kHz (45 filters).

The calibrations were made with 22612 serial numbered calibrator. After and before each measurement series, the calibrations are being performed. In this process, the microphone of the device is placed into the calibrator conjunction and then the reference noise level is being monitored from the screen, and if there are any deviations, they are kept in the specified tolerances.

Technical specifications are as follows:

- Calibrator produces noise in 1 KHz frequency, 94 dBA and 114 dBA.
- The heat and pressure values are entered in atmospheric conditions and the corrections about these data are performed automatically by the calibrator.
- Stabilization duration is 3 seconds.
- The device is complied with the IEC 60942:2003 Class 1 standards.

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e. Definitions and Abbreviations

L_{eq} TS 9315 (ISO 1996-1) : An indicator of a of a noise levels that varies within a certain time in terms of energy which is equivalent to a constant level.

dBA = This is a sound assessment unit of which the human ear is most sensitive and the mid and high frequency sounds are emphasized. dBA unit is commonly used in the noise reduction or in the control, is also related to the subjective evaluation of the volume.

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f. Legal Status

The mentioned activity is being scrutinized in scope of the Article 22, items b and c of the Regulation for Assessment of Environmental Noise and IFC Noise Guidelines Table 1.7.

“Environmental noise criteria for businesses, Properties and plants”

ARTICLE 22 – (1) The criteria for the noise level emitted to the environment by facilities, plants, workshops, factories and workplaces are given below;

b) Each facility, plant, workshop, factory and workplace, etc. that are active under or below the noise-sensitive areas that could affect such areas, the environmental noise level that is emitted through the air or public partition elements, floors, ceilings or adjacent walls, cannot exceed L_{eq} , noise indicator 5 dBA in terms of background noise levels.

c) In each facility, plant, workshop, factory and workplace, etc., the impact noise that that may occur as a result of activities, the impact L_{Cmax} noise indicator cannot exceed 100 dBC

“IFC Noise Guidelines Table 1.7”

Table 1 IFC Noise Guidelines Table 1.7.

Receiver	IFC GENERAL CGS GUIDELINESS April 2007 - Table 1.7.1. Noise Level Guidelines	
	Hourly LAeq (dBA)	
	Day 07:00 – 22:00	Night 22:00 – 07:00
Residential; institutions, educational	55	45
Industrial, commercial	70	70
Note:	Values that are measured besides the values given in the Guidelines. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999 These limits should be met by either with noise preventive activities or the noise should be more than 3 dBA, at max.	

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Accreditation No: AB-0237-T

14-LG-0277/M – 19/08/2014

g. Measurement Results

In scope of the mentioned Project, environmental noise measurements have been made in the nearest residential areas to the Diakonidze ve Chanckalo working area.

Table 2 Results of Noise Measurements.

Measurement Point	Date	Measurement Type	Result of Measurement (dBA)			Limit Value (ÇGDYY)		Limit Value (IFC)	
			L _{eq}	L ₉₀	L _{Cmax}	L _{eq}	L _{Cmax}	L _{eq}	L _{Cmax}
Diakonidze – Receiver Point (38 277738 E – 4615211 N)	13 August 2014	Noise Level Measurement	55,36	53,52	79,17	-	100	55,0	-
Diakonidze – Receiver Point (38 277738 E – 4615211 N)	13 August 2014	Background Plan	50,97	48,98	63,15	-	-	-	-
Chanckalo-Receiver Point (38 268993 E – 4613129 N)	13 August 2014	Noise Level Measurement	57,02	53,63	81,42	-	100	55,0	-
Chanckalo-Receiver Point (38 268993 E – 4613129 N)	13 August 2014	Background Plan	52,26	49,36	63,81	-	-	-	-

Background exceeding levels are given in Table 3.

Table 3 Background exceeding levels.

Measurement Point	L _{Source + Background}	L _{Background}	L _{Source}	*Background Noise Adjustment is Done	Background Noise Adjustment isn't Done	Limit Value (ÇGDYY)	Limit Value (IFC)
	Result of Measurement (dBA)	Result of Measurement (dBA)	(dBA)	Difference	Difference		
				L _{Source} - L _{Background}	L _{Source + Background} - L _{Background}	dBA	dBA
Diakonidze – Receiver Point (38 277738 E – 4615211 N)	61,42	56,63	59,67	3,04	4,79	5,0	-
Chanckalo-Receiver Point (38 268993 E – 4613129 N)	61,43	55,76	60,06	4,30	5,67	5,0	-

* TS ISO 1996-2 – If the background noise level is 3dB or much lower than the measured noise pressure level, no correction is not allowed. The corrections are only done in cases where the background noise level is lower than 3 or 10 dB.

-The red colored numbers are taken into consideration during the assessment values.

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14-LB-027/IV – 19/08/2014

h. Assessment of Measurement Results

"Environmental noise criteria for businesses, Properties and plants"

ARTICLE 22 – (1) The criteria for the noise level emitted to the environment by facilities, plants, workshops, factories and workplaces are given below;

b) Each facility, plant, workshop, factory and workplace, etc. that are active under or below the noise-sensitive areas that could affect such areas, the environmental noise level that is emitted through the air or public partition elements, floors, ceilings or adjacent walls, cannot exceed L_{eq} , noise indicator 5 dBA in terms of background noise levels.

As it is seen in the measurement results given in Table 3, L_{eq} the level of background noise in terms of noise indicators, the 5 dBA value is exceeded.

ç) The impact noise, caused by the activities of the facilities, plants, workshops, factories and workplaces, cannot exceed the 100 dBC, L_{Cmax} in terms of noise indicators.

As it is seen in the measurement results given in Table 2, the 100 dBC limit value is not exceeded.

"IFC Noise Directive Table 1.7."

As it can be seen from the measurement results given in Table 2, the background noise level is higher than 55 dBA. Thus, an assessment haven't been made in scope of IFC Noise Guidelines Table 1.7.

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SKF-SLB-01/39 17.04.2013/ Rev:04

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Accreditation No: AB-0237-T

14-LG-027/V – 19/06/2014

D. APPENDICES

- APP-1** : LABORATORY DOCUMENTS
- APP -2** : DOCUMENTS OF THE MEASUREMENT EQUIPMENT
- APP -3** : DOCUMENTS OF THE PERSONNEL WHO PREPARED THE REPORT AND MADE THE MEASUREMENT

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SKF-SLB-01/3P 17.04.2013/ Rev:04

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14-LG-027/V – 19/08/2014

APP-1
LABORATORY DOCUMENTS

This report is only valid for the NOISE measurements performed on 13.08.2014 in the scope of AGE Batum LTD – Shuakhevi HEPP Project and cannot be copied without the written permission of SELIN Measurement Laboratory Co. Inc. Reports without sign and seal are invalid. Measurement results are only related to operation conditions during measurement. Our accreditation is restricted with the scope of the experiment methods in our scope. Competence of the opinions and interpretations stated except this is not in the scope of the accreditation. This report cannot be used for official procedures related to environmental legislation.

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Accreditation No: AB-3237-T

14-LG-027WV – 19/08/2014



TÜRK AKREDİTASYON KURUMU

AKREDİTASYON SERTİFİKASI

Deney Laboratuvarı olarak faaliyet gösteren,

SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ
Bilişim Müşavirlik İnşaat San Ve Tic A. Ş.
Deney Laboratuvarı
 1324.Cadde Özlem Apt. No:30/C Öveçler
 06450 ANKARA / TÜRKİYE

TÜRKAK tarafından yapılan denetim sonucunda TS EN ISO/IEC 17025:2012 Standardına göre Ek'te yer alan kapsamlarda akredite edilmiştir.

Akreditasyon No : AB-0237-T

Akreditasyon Tarihi : 31-Temmuz-2009

Revizyon Tarihi / No : 28-Kasım-2013 / 05

Bu Sertifika, yukarıda açık adı ve adresi yazılı Kuruluşun TS EN ISO/IEC 17025:2012 Standardına, ilgili Yönetmelik ve Tebliğlere uygunluğunu sürdürmesi halinde 27-Kasım-2017, tarihine kadar geçerlidir.



Dr. H. İbrahim ÇETİN
 Genel Sekreter Vekili

#701-040

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Accreditation No: AB-0237-T

14-LG-027/IV - 19/09/2014

Akreditasyon Sertifikası Eki (Sayfa 3/3)

Akreditasyon Kapsamı

	SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ Bilişim Müşavirlik İnşaat San Ve Tic A. Ş. Akreditasyon No: AB-0237-T Revizyon No: 05 Tarih: 28-Kasım-2013	
Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
(BACA GAZI (EMİSYON) (TS CEN/TS 15675 ve TS EN 15250 Şartlarına Uygun) Devam)	Alev İyaniştirme Dedektörü (GC-FID) ile Uçucu Organik Bileşik ve Buhar Tayini	TS EN 13649
HAVA KALİTESİ (İMİSYON)	Gravimetrik Metot ile Partikül Madde (PM10) Tayini Gravimetrik Metotla Çöken Toz Tayini	EPA 40 CFR Part 50 Appendix J ve M TS EN 12341 TS 2342
ÇALIŞMA ORTAMINDA MARUZİYET	Kişilerin Maruz Kaldığı Elden Vücuda İletilen Titreşimin Ölçülmesi ve Değerlendirilmesi	TS EN ISO 5349-1 TS EN ISO 5349-2
	Kimyasal Madde Ölçümleri ve Değerlendirilmesi (CO ₂ (Karbondikoksit), HCl (Hidroklorik asit), NO _x , NO ₂ (Azotdioksit), H ₂ SO ₄ (Sülfürik asit), NH ₃ (Amonyak), H ₂ S (Hidrojen Sülfür), CH ₃ COOH (Asetik asit)	TS EN 689 ASTMD 4490-96
	Kişisel Toz Ölçümleri ve Değerlendirilmesi	MDHS 14/3
	Tüm Vücut Titreşimine Maruz Kalmanın Ölçülmesi	TS ISO 2631-1
	Hareketli Makinaların Deneye Tabi Tutulması Esnasında Kullanıcıdaki El-Kol Vücut Titreşiminin Ölçülmesi	TS EN 1032-1+A1
	Silikon Diyot Sensör Prensibi ile Aydınlatma Düzey Ölçümü	COHSR-928-1-IPG-39
	İş Yeri Maruz Kalınan Gürültü Maruziyetinin Ölçülmesi İşletme Kayıplarının Tespiti	TS 2607 ISO 1999

KAPSAM SONU



H. İbrahim Çetin
Dr. H. İbrahim ÇETİN
 Genel Sekreter Vekili

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SKP-SLB-01/32 17.04.2013/ Rev:04


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Accreditation No: AB-0237-T

14-LG-C271V – 19/08/2014

Akreditasyon Sertifikası Eki (Sayfa 1/3)

Akreditasyon Kapsamı

 Tutar TS EN ISO/IEC 17025 AB-0237-T	SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ Bilişim Müşavirlik İnşaat San Ve Tic A. Ş.	
	Akreditasyon No: AB-0237-T Revizyon No: 05 Tarih: 28-Kasım-2013	
Deney Laboratuvarı		
Adresi : 1324.Cadde Özlem Apt. No:30/C Öveçler 06450 ANKARA / TÜRKİYE		Tel : 0 312 472 94 35 Faks : 0 312 481 33 01 E-Posta : selinlab@gmail.com Website : www.selinlab.com.tr
Deneyi Yapılan Matzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
GURULTU	Alicida Çevresel Gürültü Düzeyinin Değerlendirilmesi	TS 9315 ISO 1996-1
	Alicida Çevresel Gürültü Düzeyinin Ölçülmesi	TS ISO 1996-2
AKUSTİK	Çoklu Gürültü Kaynağına Sahip Sanayi Tesisleri Etrafında Yapılacak Ses Basıncı Düzeyi Ölçümlerinden Ses Gücü Düzeyinin Hesaplanması	TS ISO 8297
	Mühendislik Metodu ile Makine Ekipmanların Etrafındaki Yansıtma Düzleminde Serbest Bir Alanda Yapılacak Ses Basıncı Düzeyi Ölçümlerinden Ses Gücü Düzeyinin Hesaplanması	TS EN ISO 3744
	Gözetim Metodu ile Makine Ekipmanların Etrafında Bir Yansıtma Düzlemi Boyunca Çevreleyici Ölçme Yüzeyinde Yapılacak Ses Basıncı Düzeyi Ölçümlerinden Ses Gücü Düzeyinin Hesaplanması	TS EN ISO 3746
	Demiryolu Ulaşım Araçlarının Ses Gücü Düzeyinin ve Sesin Alanısal Dağılımının Hesaplanması	Holland Ulusal Hesaplama Yöntemi RMR SRM II
	Nokta Kaynaklar İçin Alanısal Dağılım Haritasının Hazırlanması	TS ISO 9613-2
	Karayolu Ulaşım Araçlarının Ses Gücü Düzeyi ve Sesin Alanısal Dağılımının Hesaplanması	Fransız Ulusal Hesaplama Yöntemi NMPB-96 ve Fransız Standardı XPS 31-133
	Yapıların Akustik Performansının Değerlendirilmesi	TS EN 12354-4
	Odalar Arasında Hava ile Yayılan Sesin Yapı Elemanlarında Ses Yalıtımına Ait Alan Ölçümleri	TS ISO 140-4

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SKF-SLB-01/38 17.04.2013/ Rev.04


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Accreditation No: AB-0237-T

14-LG-027/IV – 19/08/2014

Akreditasyon Sertifikası Eki (Sayfa 2/3)

Akreditasyon Kapsamı

	SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ Bilişim Müşavirlik İnşaat San Ve Tic A. Ş.	
Akreditasyon No: AB-0237-T Revizyon No: 05 Tarih: 28-Kasım-2013		
Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
TİTREŞİM	Makine ve Ekipmanlardan Kaynaklanan Mekanik Titreşim Sonucu Oluşan Yapı Titreşiminin Ölçülmesi ve Binalara Etkilerinin Değerlendirilmesi	TS ISO 4866
	Makine Titreşimi -Akışkan Yataklı Gaz Türbini Setlerinde Dönmeyen Parçalarda Titreşim Ölçümleriyle Makinelerin Değerlendirilmesi	ISO 10816-4
	Makine Titreşimi-Hidroelektrik santrallerde Dönmeyen Parçalarda Titreşim Ölçümleriyle Makinelerin Değerlendirilmesi	ISO 10816-5
	Madencilik Faaliyetleri Sonucunda Oluşan Hava Şoku ve Yer Titreşiminin Ölçülmesi	TS 10354
BACA GAZI (EMİSYON) (TS CEN/TS 15675 ve TS EN 15259 Şartlarına Uygun)	Elektrokimyasal Hücre Metodu ile SO ₂ Tayini	TS ISO 7935 TS ISO 7935
	Elektrokimyasal Hücre Metodu ile CO CO ₂ O ₂ Tayini	TS ISO 12039
	Elektrokimyasal Hücre Metodu NO, NO ₂ ve NO _x Tayini	EPA CTM 022
	Pilot Top Metodu ile Hız Tayini	TS ISO 10780
	İslik (Renk Karşılaştırması-Bacharach Skalası ile)	TS 9503
	Nem Tayini (Gravimetrik Metot)	EPA Metot 4
	Nem Tayini (Dijital Sensör ile)	İşletme İçi Metot (Baca Sıcaklığı < 180 C)
	Alev İyonlaştırma Dedektörü (FID) ile Toplam Organik Karbon Tayini	TS EN 13526
	Gravimetrik Metot ile Partikül Madde Tayini	TS ISO 9096 TS EN 13284-1 EPA Metot 5 EPA Metot 17
	HF Tayini	EPA Metot 13 A ISO 15713
	HCL Tayini	TS EN 1911

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14-LG-027/IV - 19/08/2014

APP -2
DOCUMENTS OF THE MEASUREMENT EQUIPMENT

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14-LG-027/V - 19/08/2014

CALIBRATION CERTIFICATE OF THE NOISE MEASUREMENT DEVICE

 AVL Kalibrasyon Laboratuvarı		TÜRKAK TÜRK AKKREDİTASYON KURUMU TURKISH ACCREDITATION AGENCY tarafından akredite edilmiştir.		 Akreditasyon T.C. EĞİTİM, KÜLTÜR VE T.C. YEREL YERİNEKLER BAKANLIĞI AB-0089-K
AVL AKUSTİK VİBRASYON KALİBRASYON LABORATUVARI Avusturya Caddesi 1385, 5. Kat No: 10, OSTİM / ANKARA		AB-0089-K 2014-0707 07-2014		
<i>Kalibrasyon Sertifikası</i> Calibration Certificate				
Cihazın Sahibi Customer Name	SELİN ÖLÇÜM LAB. HİZM. BİL. MÜH. MÜŞ. İNS. SAN. VE TİC. A.Ş.			
İstek Numarası Order No	TEK-2014-315			
Makine / Cihaz Measurement Device	Gürültü & Titreşim Ölçer			
İmalatçı Manufacturer	SVANTEK			
Tip Type	SVAN 958			
Seri Numarası Serial Number	20814			
Kalibrasyon Tarihi Date of Calibration	11.7.2014			
Sertifika Sayfa Sayısı Certificate Page Count	6			
<p>Bu kalibrasyon sertifikası, Uluslararası Birimler Sisteminde (SI) tanımlanmış birimleri realize eden ulusal ölçüm standartlarına izlenebilirliği belgeler.</p> <p>This calibration certificate documents the standards in national standards which realize the unit of measurement according to the International System of Units (SI).</p> <p>Türk Akkreditasyon Kurumu (TÜRKAK) kalibrasyon sertifikalarının tanınması konusunda Avrupa Akkreditasyon Birliği (EA) ve Uluslararası Laboratuvar Akkreditasyon Birliği (ILAC) ile karşılıklı tanıma anlaşmasını imzalamıştır.</p> <p>The Turkish Accreditation Agency (TÜRKAK) is a signatory to the international agreements of the European organization for the Accreditation (EA) and of the International Laboratory Accreditation (ILAC) for the Mutual Recognition of Calibration certificates.</p> <p>Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metodları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir.</p> <p>The measurement results, extended measurement uncertainty and calibration methods are given on the following pages which are part of this certificate.</p>				
Mühür Stamp	Tarih Date	Kalibrasyonu Yapan Calibrated By	Laboratuvar Müdürü Head of the Calibration Laboratory	
	11.7.2014	Arşegül Bırmaz	Yunus NEVAYE SHIRAZI	
Bu sertifika, laboratuvarın, yada dış akkreditasyon kurumuna kayıtlıdır. İşletme ve mühürsüz nüshaları geçersizdir. This certificate shall not be reproduced other than in full except with the permission of the laboratory. Calibration certificates without signature and seal are invalid.				
Tel: +90 312 364 10 52 Faks: +90 312 364 10 50 Web sitesi: www.avl.com.tr E-posta: bilgi@avl.com.tr				

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SKF-SLB-01/39 17.04.2013/ Rev:04

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Accreditation No: AB-C237-T

14-G-027/IV - 19/08/2014

AVL AKUSTİK VİBRASYON
KALİBRASYON LABORATUARI

AB-0232-T
2014-0207
07-03-14

1. Cihaza Ait Bilgiler

Name of the Instrument

Cihazın Adı : Gürültü & Titreşim Ölçer

Name of the Manufacturer

İmalatçısı : SVANTEK

Manufacturer

Seri Numarası : 20814

Serial Number

Ölçüm Aralığı : 17 dB - 140 dB

Measuring Range

Bölüntüsü : 0,1

Scale Division

Tipi : SVAN 958

Type

2. Cihazın Laboratuvara Kabul Tarihi : 11.7.2014

Date of Receipt of Device

3. Kalibrasyon Metodu

Calibration Method

Kalibrasyon IEC 61672-3 Standardında tarif edilen testlere göre yapılmıştır. AVL PR LB6R 501 Elektroakustik Ses Ölçerleri Periyodik Kalibrasyon prosedürü kullanılmıştır. Ölçümlerden ve testlerden önce ses seviyesi ölçüm cihazı kalibre edilmiştir.

Calibration was performed according to the tests specified in IEC 61672-3. The calibration was performed using the periodic calibration procedure for AVL PR LB6R 501 Electroacoustic Sound Meters. The sound level meter was calibrated before the measurements and tests.

4. Çevresel Şartlar

Environmental Conditions

Ortam Sıcaklığı : 22,3 ± 3 °C

Air Temperature

Bağıl Nem : 59 ± 25 %

Relative Humidity

Ortam Basıncı : 910 ± 1 hPa

Air Pressure

5. Kalibrasyonda Kullanılan Referans Cihazlar

Cihaz	İmalatçı	Seri No	Tipi	Sertifika No	İzlenebilirlik
Mikrofon	Brüel & Kjaer	2700959-2154	4192-MV203	0352	Spektra
Akustik Kalibratör	Brüel & Kjaer	2705957	4231	0530	Spektra
Pistonfon	PCON	37290219	NC-72A	0531	Spektra
Termo - Hygrometre	KIMO	7122652	KH100	4.02209	UMS

Kalibrasyonlarımızda Spektra C518 kalibrasyon sistemi ve yazılımını kullanılmaktadır.

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AB-000814

2014-07-01

07.0018

6. Ölçüm Belirsizliği

Measurement Uncertainty

Frekans Ağırlıklı Akustik Test

Acoustical Tests of Frequency Weighting

31,5 ile 2 KHz : $\pm 0,30$ dB2 KHz ile 5 KHz : $\pm 0,50$ dB

Seviye Doğrusallığı Testi

Level Linearity Test

 $\pm 0,10$ dB

7. Kalibrasyon Sonuçları

Calibration Results

7.1. 1000 Hz 94 dB Kalibrasyon

Calibration of frequency galei 1000 Hz 94 dB

Kalibrasyondan Önceki Değer

Previous Value Calibration

: 94,7 dB

Sapma

Deviation

: 0,70 dB

7.2. C - Frekans Ağırlıklı Akustik Test

Acoustical Tests of C-Frequency Weighting

Frekans	Uygulanan SPL	Okunan Ses Seviyesi	Standart Sapma	Tepki Farkı	C-Ağırlıklı Filtre Karakteristiği	Tepki Farkı Sapma	Tolerans
Frequency	Applied SPL	Measured Sound Level	Standard Deviation	Response Difference	C-Weighted Filter Characteristic	Response Deviation	Tolerance
Hz	dB	dB	%	dB	dB	dB	dB
63,00	75,01	74,40	0,41	-0,64	-0,80	0,16	$\pm 1,5$
80,00	74,99	74,60	0,12	-0,39	-0,50	0,11	$\pm 1,5$
100,00	74,93	74,90	0,91	-0,03	-0,30	0,27	$\pm 1,5$
125,00	75,01	74,90	0,06	-0,11	-0,20	0,09	$\pm 1,5$
160,00	74,98	75,00	0,01	0,02	-0,10	0,12	$\pm 1,5$
200,00	75,01	75,00	0,18	-0,01	0,00	-0,01	$\pm 1,5$
250,00	74,98	75,10	0,12	0,12	0,00	0,12	$\pm 1,4$
315,00	74,99	75,10	0,04	0,12	0,00	0,12	$\pm 1,4$
400,00	75,02	75,10	0,05	0,08	0,00	0,08	$\pm 1,4$
500,00	75,01	75,10	0,03	0,09	0,00	0,09	$\pm 1,4$
630,00	75,01	75,10	0,13	0,09	0,00	0,09	$\pm 1,4$
800,00	75,03	75,10	0,11	0,07	0,00	0,07	$\pm 1,4$
1000,00	75,03	75,00	0,03	-0,03	0,00	-0,03	$\pm 1,1$
1250,00	75,03	74,90	0,01	-0,13	0,00	-0,13	$\pm 1,4$
1600,00	75,00	74,80	0,02	-0,20	-0,10	-0,10	$\pm 1,6$
2000,00	75,01	74,60	0,02	-0,41	-0,20	-0,21	$\pm 1,6$
2500,00	75,02	74,30	0,01	-0,72	-0,30	-0,42	$\pm 1,6$
3150,00	75,01	73,60	0,01	-1,41	-0,50	-0,91	$\pm 1,6$
4000,00	75,01	73,40	0,01	-1,61	-0,80	-0,81	$\pm 1,6$
5000,00	75,00	72,80	0,00	-2,20	-1,30	-0,90	$\pm 2,1$

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7.3. 1 kHz de Frekans & Zaman Ağırlıklı Test

Frequency & Time Weighted Test at 1 kHz

Frekans Frequency	Frekans / Zaman Ağırlığı Frequency / Time Weighting	Voltaj Voltage	Okunan Değer Measured Value	Sapma Deviation
1000.000	A-Fast	0.051368	94.00	Referans Değer
1000.000	C-Fast	0.051349	94.00	0.00
1000.000	Z-Fast	0.051466	94.00	0.00
1000.000	A-Slow	0.051478	94.00	0.00

İşlem Procedure	İşlem Sonucu Procedure Result	Tolerans Tolerance
LAF - LAS	0.00	±0.3
LAF - LCF	0.00	±0.4
LAF - LZ	0.00	±0.4

7.4. Frekans Ağırlıklı - Elektriksel Test

Frequency Weighted - Electrical Test

Frekans Frequency	Uygulanan Voltaj Applied Voltage	Okunan Ses Seviyesi Measured Sound Level	Tepki Farkı Response Difference	A-Ağırlıklı Filtre Karakteristiği A-Weighted Filter Characteristic	Tepki Farkı Sapma Response Difference Deviation	Tolerans Tolerance
1000.00	0.051480	94.00	Ref. Değer	—	—	—
63.00	0.051480	67.80	-26.20	-26.20	0.00	±1.5
80.00	0.051700	71.60	-22.44	-22.50	0.06	±1.5
100.00	0.051440	74.90	-19.09	-19.10	0.01	±1.5
125.00	0.051500	77.80	-16.20	-16.10	-0.10	±1.5
160.00	0.051700	80.80	-13.24	-13.40	0.16	±1.5
200.00	0.051440	83.20	-10.79	-10.90	0.11	±1.5
250.00	0.051510	85.30	-8.71	-8.60	-0.11	±1.4
315.00	0.051610	87.40	-6.62	-6.60	-0.02	±1.4
400.00	0.051450	89.20	-4.80	-4.80	0.00	±1.4
500.00	0.051500	90.80	-3.20	-3.20	0.00	±1.4
630.00	0.051610	92.10	-1.82	-1.90	-0.02	±1.4
800.00	0.051410	93.20	-0.79	-0.80	0.01	±1.4
1000.00	0.051550	94.00	-0.01	0.00	-0.01	±1.1
1250.00	0.051490	94.60	0.60	0.60	0.00	±1.4
1600.00	0.051470	95.00	1.00	1.00	0.00	±1.6
2000.00	0.051480	95.20	1.20	1.20	0.00	±1.6
2500.00	0.051480	95.30	1.30	1.30	0.00	±1.6
3150.00	0.051480	95.30	1.30	1.20	0.10	±1.6
4000.00	0.051480	95.00	1.00	1.00	0.00	±1.6
5000.00	0.051480	94.70	0.70	0.50	0.20	±2.1

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07-2014

7.4. Frekans Ağırlıklı - Elektriksel Test

Frequency Weighted Electrical Test

Frekans Frequency Hz	Uygulanan Voltaj Applied Voltage V	Okunulan Ses Seviyesi Measured Sound Level dB	Tepki Farkı Response Difference dB	A-Ağırlıklı Filtre Karakteristiği A-Weighted Filter Characteristic dB	Tepki Farkı Sapma Response Deviation dB	Tolerans Tolerance dB
6300.00	0.051420	94.00	0.01	-0.10	0.11	+2.1,-2.6
8000.00	0.051340	93.00	-0.99	-1.10	0.12	+2.1,-3.1
10000.00	0.051290	91.60	-2.37	-2.50	0.13	+2.6,-3.6
12500.00	0.051210	89.70	-4.26	-4.30	0.04	+3.0,-6.0
16000.00	0.051020	87.00	-6.92	-6.60	-0.32	+3.5,-17.0
20000.00	0.050910	84.60	-9.30	-9.30	0.00	+4.0,-∞

7.5. Elektriksel Seviye Doğrusallığı Testi

Electrical Level Linearity Test

Frekans Frequency Hz	Uygulanan Voltaj Applied Voltage V	Referans Ses Seviyesi Reference Sound Level dB	Okunulan Ses Seviyesi Measured Sound Level dB	Sapma Deviation dB	Tolerans Tolerance dB
8000.00	0.051338	94.00	94.00	0.00	+2.1,-3.1
8000.00	0.051340	99.00	99.00	0.00	+2.1,-3.1
8000.00	0.162440	104.00	104.00	0.00	+2.1,-3.1
8000.00	0.288680	109.00	109.00	0.00	+2.1,-3.1
8000.00	0.513620	114.00	114.00	0.00	+2.1,-3.1
8000.00	0.913430	119.00	119.00	0.00	+2.1,-3.1
8000.00	1.024800	120.00	120.00	0.00	+2.1,-3.1
8000.00	1.149800	121.00	121.00	0.00	+2.1,-3.1
8000.00	1.290300	122.00	122.00	0.00	+2.1,-3.1
8000.00	1.447500	123.00	123.00	0.00	+2.1,-3.1
8000.00	0.051365	94.00	94.00	0.00	+2.1,-3.1
8000.00	0.028889	89.00	89.00	0.00	+2.1,-3.1
8000.00	0.016244	84.00	84.00	0.00	+2.1,-3.1
8000.00	0.009137	79.00	79.00	0.00	+2.1,-3.1
8000.00	0.005134	74.00	74.00	0.00	+2.1,-3.1
8000.00	0.002887	69.00	69.00	0.00	+2.1,-3.1
8000.00	0.001623	64.00	64.00	0.00	+2.1,-3.1
8000.00	0.000912	59.00	59.00	0.00	+2.1,-3.1
8000.00	0.000511	54.00	54.10	0.10	+2.1,-3.1
8000.00	0.000289	49.00	49.20	0.20	+2.1,-3.1
8000.00	0.000256	48.00	48.20	0.20	+2.1,-3.1
8000.00	0.000228	47.00	47.30	0.30	+2.1,-3.1
8000.00	0.000203	46.00	46.30	0.30	+2.1,-3.1
8000.00	0.000181	45.00	45.30	0.30	+2.1,-3.1

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10-2014

8. Uygunluk Beyanı

Statement of Compliance

Ölçüm sonuçları ve ölçüm belirsizliği yukarıda verilmiştir. Kullanıcı bunları dikkate alarak uygunluğuna karar vermemelidir. Beyan edilen genişletilmiş belirsizlik değeri standart belirsizliği normal dağılımı için yaklaşık % 95 güvenlik seviyesini sağlayan $k=2$ kapsam faktörü ile çarpımının sonucudur. Standart ölçüm belirsizliği GUM ve EA-4-02 dokümanlarına uygun olarak belirlenmiştir. Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metodları bu sertifikanın tamamlayıcı bir bölümüdür.

The measurement results and measurement uncertainty are given above. The user should take them into account when making a decision on suitability. The stated expanded uncertainty value is the result of multiplying the standard uncertainty by a coverage factor of approximately 2, which corresponds to a confidence level of approximately 95%. The standard measurement uncertainty is determined in accordance with GUM and EA-4-02. The measurement results, expanded measurement uncertainty and calibration methods are part of this certificate as supplementary information.

9. Açıklamalar

Comments

Bu sertifikada bulunan sonuçlar cihazın kalibrasyon tarihindeki durumu kapsar ve uzun dönem kararlılığı hakkında bir öngörü içermez.

This certificate contains measurement results for the calibration date and does not provide a forecast of long-term stability.

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CALIBRATION CERTIFICATE OF CALIBRATORS

 AVL Kalibrasyon Laboratuvarı		TÜRKAK TÜRK AKREDİTASYON KURUMU TURKISH ACCREDITATION AGENCY tarafından akredite edilmiştir.		
		AVL AKUSTİK VİBRASYON KALİBRASYON LABORATUVARI İvedik D.Ş.B. 1335 Sk. No: 10 DŞİM / ANKARA		
		<i>Kalibrasyon Sertifikası</i> Calibration Certificate		AB-0089-K 2013-0857 11-2013
Cihazın Sahibi Customer Name	SELİN ÖLÇÜM LAB. HİZM. BİL. MUH. MÜŞ. İNŞ. SAN. VE TİC. A.Ş.			
İstek Numarası Order No.	TEK-2013-1590			
Makine / Cihaz Instrument / Device	Ses Kalibratörü Sound Calibrator			
İmalatçı Manufacturer	SVANTEK			
Tip Type	SV 30A			
Seri Numarası Serial number	22612			
Kalibrasyon Tarihi Date of calibration	23.11.2013			
Sertifika Sayfa Sayısı Number of pages of the certificate	3			
<p>Bu kalibrasyon sertifikası, Uluslararası Birimler Sisteminde (SI) tanımlanmış birimleri realize eden ulusal ölçüm standartlarına izlenebilirliği belgeler.</p> <p>This calibration certificate documents the traceability to national standards, which require the unit of measurement according to the International System of Units (SI).</p> <p>Türk Akreditasyon Kurumu (TÜRKAK) kalibrasyon sertifikalarının tanınması konusunda Avrupa Akreditasyon Birliği (EA) ve Uluslararası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanınma antlaşmasını imzalamıştır.</p> <p>The Turkish Accreditation Agency (TÜRKAK) is signatory to the multilateral agreements of the European co-operation for the Accreditation (EA) and of the International Laboratory Accreditation (ILAC) for the Mutual Recognition of calibration certificates.</p> <p>Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metodları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir.</p> <p>The measurements, the uncertainties with confidence probability and calibration methods are given on the following pages which are part of this certificate.</p>				
	Tarih Date 23.11.2013	Kalibrasyonu Yapan Calibrated by Ayşegül Batmaz	Laboratuvar Müdürü Head of the Calibration Laboratory Younes NEVAYE SHIRAZI	

Bu sertifika, laboratuvarın yazın ismi olmadan kâğıt kopyaları çoğaltılamaz.

İmzasız ve mühürlü sertifikalar geçersizdir.

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AVL AKUSTİK VİBRASYON
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AB-0035-K

2013-0857

11-2013

1. Cihaza Ait Bilgiler

Device to be Calibrated

Cihazın Adı : Ses Kalibratörü
Name of the Instrument : Sound Calibrator
İmalatçısı : SVANTEK
Manufacturer
Seri Numarası : 22612
Serial Number
Ölçüm Aralığı : 1000 Hz 94 dB / 114 dB
Measuring Range
Tipi : SV 30A
Type

2. Cihazın Laboratuvara Kabul Tarihi

Date of Receipt of Device

22.11.2013

3. Kalibrasyon Metodu

Calibration Method

Kalibrasyon TS EN 60942 standardına uygun olarak karşılaştırma metodu ile yapılmıştır.

4. Çevresel Şartlar

Environmental Conditions

Ortam Sıcaklığı : 21,1 ± 3 °C
Ambient Temperature
Bağıl Nem : 42 ± 25 %
Relative Humidity
Ortam Basıncı : 909 ± 1 hPa
Ambient Pressure

5. Kalibrasyonda Kullanılan Referans Cihazlar

Reference Equipments Used During Calibration

Cihaz Device	İmalatçı Manufacturer	Seri No Serial No	Tipi Type	Sertifika No Certificate No	İzlenebilirlik Traceability
Mikrofon	Brüel & Kjaer	2709959-2154	4192-MV203	0289 / 0230	Spektra
Pistonfon	RION	37290219	NC-72A	0229	Spektra
Termo - Hygrometre	KIMO	7122852	KH100	3.02209D	UMS

6. Ölçüm Belirsizliği

Measurement Uncertainty

6.1. 94 dB 1000 Hz

Ses Basıncı Seviyesi : 0,14 dB
Sound Pressure Level
Ses Frekansı : 0,10 %
Sound Frequency
Bozulma Faktörü : 0,28 %
Correction Factor

6.2. 114 dB 1000 Hz

Ses Basıncı Seviyesi : 0,14 dB
Sound Pressure Level
Ses Frekansı : 0,10 %
Sound Frequency
Bozulma Faktörü : 0,22 %
Correction Factor



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AB-0089-K

2013-0657

11-2013

7. Kalibrasyon Sonuçları

Calibration Results

7.1. 94 dB 1000 Hz

Ses Basıncı Seviyesi

Sound Pressure Level

Nominal Değer

Nominal Value

Ölçülen Değer

Measured Value

Sapma

Deviation

Ses Frekansı

Sound Frequency

Nominal Değer

Nominal Value

Ölçülen Değer

Measured Value

Sapma

Deviation

Bozulma Faktörü

Distortion Factor

Ölçülen Değer

Measured Value

Referans Ses Basıncı

Reference Sound Pressure

20

µPa

8. Uygunluk Beyanı

Statement of Compliance

Ölçüm sonuçları ve ölçüm belirsizliği yukarıda verilmiştir. Kullanıcı bunları dikkate alarak uygunluğuna karar vermemelidir. Beyan edilen genişletilmiş belirsizlik değeri standart belirsizliğin normal dağılımı için, yaklaşık % 95 güvenlilik seviyesini sağlayan k=2 kapsam faktörü ile çarpımının sonucudur. Standart ölçüm belirsizliği GUM ve EA-4/02 dokümanlarına uygun olarak belirlenmiştir. Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metodları bu sertifikanın tamamlayıcı bir bölümüdür.

The measurement results and measurement uncertainty were given. The user have to consider the results and decide compliance of the device. The reported expanded uncertainty of measurement is stated as the standard uncertainty of multiple by coverage factor k=2, which for a normal distribution corresponds to coverage of approximately 95%. The standard measurement uncertainty is defined according to the GUM and EA-4/02 documents. Measurement results, the expanded measurement uncertainty of measurement and calibration methods, is an integral part of this certificate.

9. Açıklamalar

Remarks

Bu sertifikada bulunan sonuçlar cihazın kalibrasyon tarihindeki durumu kapsar ve uzun dönem kararlılığı hakkında bir öngörü içermez.

The result reported in this certificate refer to the condition of the instrument at the date of calibration and with no indication regarding the long-term stability of the instrument.

SERTİFİKA



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29/32

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APP-3
DOCUMENTS OF THE PERSONNEL WHO PREPARED THE REPORT AND MADE THE MEASUREMENT

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Accreditation No: AB-0237-T

14-LG-027/IV – 19/09/2014



TMMOB FİZİK MÜHENDİSLERİ ODASI BAŞARI BELGESİ

Sayın İsmail ARSLAN

TMMOB Fizik Mühendisleri Odası ile Çevre ve Orman Bakanlığı işbirliği ile 2-5 Nisan 2009 tarihleri arasında Fizik Mühendisleri Odası Genel Merkezi'nde gerçekleştirilen

“A-2 Tipi Mühendislik Akustiği”

Sertifika Programına katılarak “BAŞARILI” olmuştur .

Dr. Abdullah ZARARSIZ
Dr. Abdullah ZARARSIZ
Yönetim Kurulu Başkanı

Belge Kodu: FM01 Belge No: 14 Veriliş Tarihi: 5 Nisan 2009

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14LG-0270V - 1808/2014

3132

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Example of
Dust Monitoring



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BİLİŞİM MÜH.MÜŞ. İNŞ. SAN. VE TİC. A.Ş.

Müşterinin Adı/Adresi: AGE Batumi LTD - Shuakhevi HES
Customer Name/Address BATUM/Gogebashvili N:60

Müşterinin Telefonu/Faksı: +995 422 21 22 05/06/07
Customer Phone/Fax +995 422 21 22 05/06/07

İstek Numarası: 14-027/IV
Order No.

Numunenin Adı ve Tanımı: Dust (PM10) Measurement
Name And Identity Of The Test Item

Deneyin Yapıldığı Tarih: 13/08/2014
Date Of Test

Raporun Numarası ve Tarihi: 14-LT-027/IV-1 – 19/08/2014
Number And Date Of The Report



TÜRKAK
TÜRK AKREDİTASYON KURUMU
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19/08/2014

Deney Raporu / Test Report

Müşterinin adı/adresi: AGE Batum LTD - Shuakhevi HES
 Customer name/address BATUM/Gogebashvili N:60

Müşterinin telefonu/faksı: +995 422 21 22 05/06/07
 Customer phone/fax +995 422 21 22 05/06/07

İstek Numarası: 14-027/IV
 Order No.

Numunenin adı ve tanımı: Dust (PM10) Measurement
 Name and identity of the test item

Numunenin kabul tarihi ve no: 15/08/2014 - 140813-T-1
 The date and number of receipt of the test item

Açıklamalar:
 Remarks

Deneyin yapıldığı tarih: 13/08/2014
 Date of test

Raporun sayfa sayısı: 16
 Number of pages of the Report

Türk Akreditasyon Kurumu (TÜRKAK) deney raporlarının tanınması konusunda Avrupa Akreditasyon Birliği (EA) ve Uluslar arası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanınma antlaşması imzalamıştır.

The Turkish Accreditation Agency (TÜRKAK) is signatory to the multilateral agreements of the European co-operation for the accreditation (EA) and of the International Laboratory Accreditation (ILAC) for the Mutual recognition of test reports.

Deney ve/veya ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri (olması halinde) ve deney metodları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir.

The test and/or measurement results, the uncertainties (if applicable) with confidence probability and test methods are given on the following pages which are part of this report.

Mühür
 Seal

Tarih
 Date

19/08/2014

Deneyi Yapan
 Test Done by

Murat DİNÇ
 Measurement
 Responsible

Analizi Yapan
 Analyzed by

Ebru ŞAHİN
 Analysis
 Responsible

Raporu Hazırlayan
 Report Prepared by

İsmail ARSLAN
 Quality Management
 Representative

Onay
 Approved by

Ersan ÖZKİŞİ
 Laboratory Technical
 Manager

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1/16

Accreditation No: AB-0237-T

14-LT-0271V-1 – 15/08/2014

A. INTRODUCTION

This report was prepared as a result of the measurements performed in the explicit address mentioned below;

Date of the Measuremer : 13.08.2014

Location of the Measurement : Shuakhevi HES

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14-LT-027/MV-1 – 13/08/2014

B. INFORMATION ABOUT THE FACILITY

The construction phase of the Shuakhevi HEPP Project, located in Adjaristsqali River, Georgia, is carried out by AGE Batum LTD.

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14-LT-027/V-1 – 19/08/2014

C. EMISSION MEASUREMENT REPORT

i. Introduction

The aim of the Regulation of Evaluation and Management of Air Quality is to determine and develop air quality targets to prevent or mitigate the harmful effects of air pollution on human health and environment, to evaluate the air quality based on determined methods and criteria, to conserve the present situation in the regions where the air quality is well and to increase the air quality in other situations, to collect enough information related to air quality and to provide public information via warning thresholds.

The aim of the Regulation of Control of the Air Pollution Due To Industrial Facilities is to control the emissions in the form of soot, smoke, dust, gas, vapor and aerosol due to industrial and energy production facilities; to protect human beings and their environment from the dangers caused by the pollutions in the air receiving environments; to eliminate the negative effects causing significant harms to neighborly relations and public and to prevent these effects.

For the mentioned Hydroelectric Power Plant (HEPP) construction, to monitor the PM10 (dust) emissions and Total suspended particulates (TSP), PM10 (dust) measurements were performed and the results are presented in this report.

i. Measurement Methods

The measurements were performed according to the standard given below.

TS EN 12341 Air quality- Determination of the PM 10 fraction of suspended particulate matter- Reference method and field test procedure to demonstrate reference equivalence of measurement methods

ii. General Principles

Correct emission results depend both on applying a correct measurement technique and general principles of the measurement.

Our company provides correct and trustable results by the on-site measurements, preparation in the laboratory and checks made before measurement. Therefore emission analysis is made in three stages.

• Preparation

Before measurement, devices are checked by authorized personnel under the supervision of Technical Manager of the Laboratory before they are moved out of the laboratory and they are delivered to measurement team by Technical Manager of the Laboratory

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- **Determination of the Measurement Points**

When selecting the measurement points, integrity in terms of macro environmental scale (type of the experiment location) and micro environmental scale (area surrounding directly the station) is taken into account.

- **Measurement and Analysis Process**

Device is designed for the sampling of the particulate matter (PM10) in the air in the environment. Determination of the PM10 amount was made according to TS EN 12341 standard. In the sampling process dust is retained on the filters and determined gravimetrically in the laboratory condition.

When selecting the measurement points, TS EN 12341 norms were applied and the nearest areas to the Project area and points that might be affected by the activity were selected. Samples were taken from sampling locations according to sampling technique mentioned in the TS EN 12341 and sampling representing the whole was made and measurement was performed.

ii. Measurement System

During measurements Dust Sampling Device with Serial No. of E 1225284 was used. Device is designed for the sampling of the particulate matter (PM10) in the air in the environment.

iii. Definitions and Explanations

PM 10: in EN 12341, PM10 is defined as a particulate matter that passes through with 50% efficiency from 10 μm aerodynamic diameter pervious input

TSP: Total suspended particulates

iv. Measurement Results

Measurements were performed in two different points and the results of these measurements are given below.

Table 1: Measurement Points.

Source Code	Measurement Date	Source of Emission	Dust(PM10)	Dust(TSP)
T1	13.08.2014	Diakonidze – (38 277738 E, 4615211 N)	X	X
T2	13.08.2014	Chanckalo- (38 268993 E, 4613129 N)	X	X
T3	13.08.2014	Central Camp Site – (38 262896 E, 4613438 N)	X	X

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$$\text{PM 10 Konsantrasyonu (mg/m}^3\text{)} = \frac{D}{A} \quad \text{PM 10 Konsantrasyonu (mg/Nm}^3\text{)} = \frac{D}{A} \times \frac{273^\circ\text{C} + B}{273^\circ\text{C}} \times \frac{101.3 \text{ kPa}}{C}$$

Table 2: Dust (PM10) Measurement Results

	A	B	C	D	E	F
Source Code	Sample Volume (m ³)	Ambient Temperature (°C)	Ambient Pressure (kPa)	Mass (µg)	PM 10 (µg/m ³)	PM 10 (µg/Nm ³)
T1	1,09372	20,51	99,181	30,0000	27,4293	30,12009
T2	1,09243	22,66	99,127	30,0000	27,4617	30,39310
T3	1,07237	23,06	99,137	40,0000	37,3006	41,33387

Table 3: Dust (TSP) Measurement Results

	A	B	C	D	E	F
Source Code	Sample Volume (m ³)	Ambient Temperature (°C)	Ambient Pressure (kPa)	Mass (µg)	TSP (µg/m ³)	TSP (µg/Nm ³)
T1	1,07271	21,20	99,181	40,0000	37,2887	41,04296
T2	1,09981	24,15	99,127	50,0000	45,4624	50,56883
T3	1,07031	24,35	99,137	70,0000	65,4016	72,78928

v. Evaluation of Measurement Results

The comparison of the mean measurement results with the limit values are given below.

Table 4: The comparison of the mean measurement results with the limit values

Source Code	Measurement Date	Measuring Results PM 10 (µg/Nm ³)	Regulation of Evaluation and Management of Air Quality	WHO Ambient Air Quality Guidelines (and IFC General Work HS Guidelines)
T1	13.08.2014	30,12009	50 µg/m ³	50 µg/m ³
T2	13.08.2014	30,39310	50 µg/m ³	50 µg/m ³
T3	13.08.2014	41,33387	50 µg/m ³	50 µg/m ³

When we look at the Table 4, it is seen that the measurement results are below the limit values given in related regulations.

Table 5: The comparison of the mean measurement results with the limit values

Source Code	Measurement Date	Measuring Results TSP (µg/Nm ³)	Regulation of Evaluation and Management of Air Quality	WHO (1999) Guideline
T1	13.08.2014	41,04296	-	120 µg/m ³
T2	13.08.2014	50,56883	-	120 µg/m ³
T3	13.08.2014	72,78928	-	120 µg/m ³

When we look at the Table 5, it is seen that the measurement results are below the limit values given in related regulations.

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14-LT-027/IV-1 – 19/03/2014

D. APPENDICES

APP-1 : LABORATORY DOCUMENTS

APP-2 : CALIBRATION CERTIFICATE

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14-LT-027/IV-1 – 10/08/2014

APP-1 LABORATORY DOCUMENTS

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TÜRK AKREDİTASYON KURUMU

AKREDİTASYON SERTİFİKASI

Deney Laboratuvarı olarak faaliyet gösteren,

SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ
Bilişim Müşavirlik İnşaat San Ve Tic A. Ş.
Deney Laboratuvarı
 1324.Cadde Özlem Apt. No:30/C Öveçler
 06450 ANKARA / TÜRKİYE

TÜRKAK tarafından yapılan denetim sonucunda TS EN ISO/IEC 17025:2012 Standardına göre Ek'te yer alan kapsamlarda akredite edilmiştir.

Akreditasyon No : AB-0237-T

Akreditasyon Tarihi : 31-Temmuz-2009

Revizyon Tarihi / No : 28-Kasım-2013 / 05

Bu Sertifika, yukarıda açık adı ve adresi yazılı Kuruluşun TS EN ISO/IEC 17025:2012 Standardına, ilgili Yönetmelik ve Tebliğlere uygunluğunu sürdürmesi halinde 27-Kasım-2017, tarihine kadar geçerlidir.



[Handwritten Signature]

Dr. H. İbrahim ÇETİN
Genel Sekreter Vekili

T701-040

T701-040-01-001 www.turkak.org.tr

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Akreditasyon Sertifikası Eki (Sayfa 3/3)

Akreditasyon Kapsamı

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Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
(BACA GAZI (EMİSYON) (TS CEN/TS 15675 ve TS EN 15259 Şartlarına Uygun) Devam)	Alev İyaniştirme Dedektörü (GC-FID) ile Uçucu Organik Bileşik ve Buhar Tayini	TS EN 13649
HAVA KALİTESİ (İMİSYON)	Gravimetrik Metot ile Partikül Madde (PM10) Tayini Gravimetrik Metotla Çöken Toz Tayini	EPA 40 CFR Part 50 Appendix J ve M TS EN 12341 TS 2342
ÇALIŞMA ORTAMINDA MARUZİYET	Kişilerin Maruz Kaldığı Elden Vücuda İletilen Titreşimin Ölçülmesi ve Değerlendirilmesi	TS EN ISO 5349-1 TS EN ISO 5349-2
	Kimyasal Madde Ölçümleri ve Değerlendirilmesi (CO ₂ (Karbon dioksit), HCİ (Hidroklorik asit), NO _x , NO ₂ (Azot dioksit), H ₂ SO ₄ (Sülfirik asit), NH ₃ (Amonyak), H ₂ S (Hidrojen sülfür), CH ₃ COOH (Asetik asit)	TS EN 689 ASTMD 4490-96
	Kişisel Toz Ölçümleri ve Değerlendirilmesi	MDHS 14/3
	Tüm Vücut Titreşimine Maruz Kalmanın Ölçülmesi	TS ISO 2631-1
	Hareketli Makinaların Deneye Tabi Tutulması Esnasında Kullanıcıdaki El-Kol Vücut Titreşiminin Ölçülmesi	TS EN 1032-A1
	Silikon Diyot Sensör Prensipli ile Aydınlatma Düzey Ölçümü	COHSR-928-1-IPG-39
	İş Yerinde Maruz Kalınan Gürültü Maruziyetinin Ölçülmesi İşitme Kayıplarının Tespiti	TS 2507 ISO 1999

KAPSAM SONU




Dr. H. İbrahim ÇETİN
 Genel Sekreter Vekili

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14-LT-027/IV-1 – 19.06/2014

Akreditasyon Sertifikası Eki (Sayfa 1/3)

Akreditasyon Kapsamı

 TS EN ISO/IEC 17025 AB-0237-T	SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ Bilişim Müşavirlik İnşaat San Ve Tic A. Ş.		
	Akreditasyon No: AB-0237-T Revizyon No: 05 Tarih: 28-Kasım-2013		
Deney Laboratuvarı			
Adresi : 1324.Cadde Özlem Apt. No:30/C Öveçler 06450 ANKARA / TÜRKİYE		Tel : 0 312 472 94 35 Faks : 0 312 481 33 01 E-Posta : selinlab@gmail.com Website : www.selinlab.com.tr	
Deneyi Yapılan Matzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)	
GURULTU	Alıcıda Çevresel Gürültü Düzeyinin Değerlendirilmesi	TS 9315 ISO 1996-1	
	Alıcıda Çevresel Gürültü Düzeyinin Ölçülmesi	TS ISO 1996-2	
AKUSTİK	Çoklu Gürültü Kaynağına Sahip Sanayi Tesisleri Etrafında Yapılacak Ses Basıncı Düzeyi Ölçümlerinden Ses Gücü Düzeyinin Hesaplanması	TS ISO 8297	
	Mühendislik Metodu ile Makine Ekipmanlarının Etrafındaki Yansıtma Düzleminde Serbest Bir Alanda Yapılacak Ses Basıncı Düzeyi Ölçümlerinden Ses Gücü Düzeyinin Hesaplanması	TS EN ISO 3744	
	Gözetim Metodu ile Makine Ekipmanlarının Etrafında Bir Yansıtma Düzlemi Boyunca Çevreleyici Ölçme Yüzeyinde Yapılacak Ses Basıncı Düzeyi Ölçümlerinden Ses Gücü Düzeyinin Hesaplanması	TS EN ISO 3745	
	Demiryolu Ulaşım Araçlarının Ses Gücü Düzeyinin ve Sesin Alanısal Dağılımının Hesaplanması	Holland Ulusal Hesaplama Yöntemi RMR SRM II	
	Nokta Kaynaklar İçin Alanısal Dağılım Haritasının Hazırlanması	TS ISO 9613-2	
	Karayolu Ulaşım Araçlarının Ses Gücü Düzeyi ve Sesin Alanısal Dağılımının Hesaplanması	Fransız Ulusal Hesaplama Yöntemi NMPB-96 ve Fransız Standardı XPS 31-133	
	Yapıların Akustik Performansının Değerlendirilmesi	TS EN 12354-4	
	Odalar Arasında Hava ile Yayılan Sesin Yapı Elemanlarında Ses Yalıtımına Ait Alan Ölçümleri	TS ISO 140-4	

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SKF-SLB-01/39, 17.04.2013/ Rev:04


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Accreditation No: AB-0237-T

14-LT-0271/V-1 - 19/08/2014

Akreditasyon Sertifikası Eki (Sayfa 2/3)

Akreditasyon Kapsamı

	SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ Bilişim Müşavirlik İnşaat San Ve Tic A. Ş.	
Akreditasyon No: AB-0237-T Revizyon No: 05 Tarih: 28-Kasım-2013		
Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
TİTREŞİM	Makine ve Ekipmanlardan Kaynaklanan Mekanik Titreşim Sonucu Oluşan Yapı Titreşiminin Ölçülmesi ve Binalara Etkilerinin Değerlendirilmesi	TS ISO 4866
	Makine Titreşimi -Akışkan Yataklı Gaz Türbin Setlerinde Dönmeyen Parçalarda Titreşim Ölçümleriyle Makinelerin Değerlendirilmesi	ISO 10816-4
	Makine Titreşimi-Hidroelektrik santrallerde Dönmeyen Parçalarda Titreşim Ölçümleriyle Makinelerin Değerlendirilmesi	ISO 10816-5
	Madencilik Faaliyetleri Sonucunda Oluşan Hava Şoku ve Yer Titreşiminin Ölçülmesi	TS 10354
BACA GAZI (EMİSYON) (TS CEN/TS 15675 ve TS EN 15259 Şartlarına Uygun)	Elektrokimyasal Hücre Metodu ile SO ₂ Tayini	TS ISO 7935 TS ISO 7935
	Elektrokimyasal Hücre Metodu ile CO CO ₂ O ₂ Tayini	TS ISO 12039
	Elektrokimyasal Hücre Metodu NO, NO ₂ ve NO _x Tayini	EPA CTM 022
	Pitot Tüp Metodu ile Hız Tayini	TS ISO 10780
	İslik (Renk Karşılaştırması-Bacharach Skalası ile)	TS 9503
	Nem Tayini (Gravimetrik Metot)	EPA Metot 4
	Nem Tayini (Dijital Sensör ile)	İşletme içi Metot (Baca Sıcaklığı<180 C)
	Alev İyonlaştırma Dedektörü (FID) ile Toplam Organik Karbon Tayini	TS EN 13526
	Gravimetrik Metot ile Partikül Madde Tayini	TS ISO 9096 TS EN 13284-1 EPA Metot 5 EPA Metot 17
	HF Tayini	EPA Metot 13 A ISO 15713
	HCL Tayini	TS EN 1911

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APP -2 CALIBRATION CERTIFICATE

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SKF-SLB-01/39: 17.08.2013/ Rev.04

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Accreditation No: AB-0237-T

14-LT-0271V-1 – 19/09/2014

 AVL Kalibrasyon Laboratuvarı		TÜRKAK TÜRK AKREDİTASYON KURUMU TURKISH ACCREDITATION AGENCY tarafından akredite edilmiştir.		
AVL AKUSTİK VİBRASYON KALİBRASYON LABORATUVARI İsmi O 5 B 1385 Sk. No 10/ ÖSTİM / ANKARA				
Kalibrasyon Sertifikası Calibration Certificate				
Cihazın Sahibi Customer		SELİN ÖLÇÜM LAB. HİZM. BİL. MÜH. MÜŞ. İNŞ. SAN. VE TİC. A.Ş. Aşağı Öveçler 1042. Cadde 1335 Sokak No 20/10 06450 Dikmen / ANKARA		
İstek Numarası Order no		ISK-0288		
Makine / Cihaz Instrument / Device		PM10 Toz Örnekleme Cihazı Particulate Sampling Device		
İmalatçı Manufacturer		TCR TECORA		
Tip Type		Echo PM		
Seri Numarası Serial number		E1225284		
Kalibrasyon Tarihi Date of calibration		29.04.2013		
Sertifika Sayfa Sayısı Number of pages of the certificate		3		
Bu kalibrasyon sertifikası, Uluslararası Birimler Sisteminde (SI) tanımlanmış birimleri realize eden ulusal ölçüm standartlarına izlenebilirliği belgeler. This calibration certificate documents the capability to realize standards which refers the unit of measurement assigned to the International System of Units (SI). Türk Akreditasyon Kurumu (TÜRKAK) kalibrasyon sertifikalarının tanınması konusunda Avrupa Akreditasyon Birliği (EA) ve Uluslararası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanınma antlaşmasını imzalamıştır. The Turkish Accreditation Agency (TÜRKAK) is a signatory to the multilateral agreements of the European co-operation for the Accreditation (EA) and of the International Laboratory Accreditation (ILAC) for the Mutual Recognition of Calibration Certificates. Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metodları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir. The measurements, the uncertainties with confidence probability and calibration methods are given on the following pages which are part of the certificate.				
	Tarih Date 29.04.2013	Kalibrasyonu Yapan Calibration  Younes NEVAYE SHIRAZI	Laboratuvar Müdürü Manager of the Calibration Laboratory  Younes NEVAYE SHIRAZI	
Bu sertifika, laboratuvarın yukarıdaki imzadan kaynaklı sorumluluğunu doğrular ve imzasız ve mühürsüz sertifikalar geçersizdir. This certificate shall not be reproduced other than in full except with the permission of the laboratory. Calibration certificate without signature and seal are not valid.				
faks: +90 312 394 15 53 tel: +90 312 394 15 50 web sitesi: www.avl.com.tr e-posta: bilgi@avl.com.tr				

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Accreditation No: AB-0237-T

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**AVL AKUSTİK VİBRASYON
KALİBRASYON LABORATUARI**

AB-0059-K
2013-0288
04-2013

1. Cihaza Ait Bilgiler / Device Attributions

Cihazın Adı / Name of the instrument	PM10 Toz Örneklemme Cihazı	PM10 Dust Sampling Device
İmalatçısı / Manufacturer	TCR TECORA	
Seri No / Serial Number	E1225284	
Ölçüm Aralığı / Measuring Range	10-50 LPM	
Bölüntüsü / Scale Division	0.001	
Tipi / Type	Echo PM	

2. Cihazın Laboratuvara Kabul Tarihi / Date of Receipt of Device: 26.04.2013

3. Kalibrasyon Metodu / Calibration Method

Test cihazının kalibrasyonu karşılaştırma metodu ile yapılmıştır. PR.LBBR.201 prosedürü kullanılmıştır.
The Calibration of the test device has made by the method of Comparison. PR.LBBR.201 was used in the calibration.

4. Çevresel Şartlar / Environmental Conditions

4.1 Referans Cihaz	
Ortam Sıcaklığı / Ambient Temperature	23,3 ± 3 °C
Bağıl Nem / Relative Humidity	39,0 ± 25 %
Ortam Basıncı / Ambient Pressure	913.00 ± 1 hPa

4.2 Teste Tabi Tutulan Cihaz		Ölçüm Belirsizliği	Hata
Ortam Sıcaklığı / Ambient Temperature	23,2 °C	± 0,3	- 0,1 °C
Ortam Basıncı / Ambient Pressure	913.00 hPa	± 1	0,0 hPa

5. Ölçüm Belirsizliği / Measurement Uncertainty

Ölçüm belirsizliği ölçüm tablosunda Tablo-1'de verilmiştir.

6. Kalibrasyonda Kullanılan Referans Cihazlar / Reference Equipment Used During Calibration

Cihaz / Device	İmalatçı / Manufacturer	Seri No / Serial No.	Tipi / Type	Sertifika No / Certificate No.	İzlenebilirlik / Traceability
Akış Kalibratörü	Tecora	MF104700	DELTA CALL	D-10 223075/1	Aerometrologie
Dijital Manometre	Beta	9342031	MasterCall 990	B35447	UMS
Termometre	KIMO	7122852	KH100	S49879	UMS

7. Tanımlar / Legend

- q_n : Standart Şartlarda Referans Cihazdan Ölçülen Debi
 q_{ms} : Standart Şartlarda Teste Tabi Tutulan Cihazdan Ölçülen Debi
Hata : Referans ve teste tabi tutulan cihazın akış sapması
 U_d : m3/saat veya LPM Cinsinden Ölçüm Belirsizliği
 $\%U_d$: % Cinsinden Ölçüm Belirsizliği = $100 \cdot (U_d / q_{ms})$

SRT.LBBR.203



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Accreditation No: AB-0237-T

14-LT-0274V-1 – 19/08/2014

AVL AKUSTİK VİBRASYON
KALİBRASYON LABORATUARI

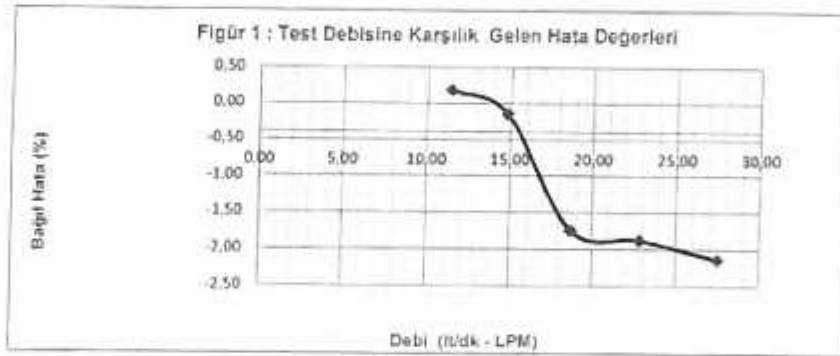
AB-0089-R

2013.0288

04-2012

8. Kalibrasyon Sonuçları / Calibration Results

Sıra No	Q_{15} lt/dk - LPM	Q_{100} lt/dk - LPM	Hata lt/dk - LPM	Bağıl Hata %	U_1 lt/dk - LPM	*U_2 %
1	11.4553	11.4758	0.020	0.18	0.047	0.41
2	14.8150	14.7931	-0.022	-0.15	0.064	0.43
3	18.7198	18.3923	-0.327	-1.75	0.084	0.45
4	22.8472	22.4173	-0.430	-1.88	0.103	0.45
5	27.4802	26.8924	-0.588	-2.14	0.174	0.63



NOT : Kalibrasyonda gaz olarak hava kullanılmıştır.
Havanın Yoğunluğu (ρ_{hava}) : 1.2 kg/m³
Ölçüm sonuçları standart şartlar için hesaplanmış değerlerdir.

9. Uygunluk Beyanı / Statement of Conformity

Ölçüm sonuçları ve ölçüm belirsizliği yukarıda verilmiştir. Kullanıcı bunları dikkate alarak uygunluğuna karar vermelidir. Beyan edilen genişletilmiş belirsizlik değeri standart belirsizliğin normal dağılımı için, yaklaşık % 95 güvenlik seviyesini sağlayan k=2 kapsam faktörü ile çarpımının sonucudur. Standart ölçüm belirsizliği GUM ve EA-4/02 dokümanlarına uygun olarak belirlenmiştir. Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metotları bu sertifikanın tamamlayıcı bir bölümüdür.

The measurement results and associated uncertainty are given in the above table. The user should take these into account when making a decision on conformity. The stated expanded uncertainty is the result of multiplying the standard uncertainty by a coverage factor k=2, which provides a level of confidence of approximately 95%. The standard measurement uncertainty has been determined in accordance with GUM and EA-4/02 documentation. Measurement results, expanded measurement uncertainties and calibration methods are an integral part of this certificate.

10. Açıklama / Remarks

Bu sertifikada bulunan sonuçlar cihazın kalibrasyon tarihindeki durumu kapsar ve uzun dönem kararlılığı hakkında bir öneri içermez.

The results given in this certificate cover the calibration date and do not cover long-term stability. No recommendation is made regarding long-term stability.

SRT LBBR 203



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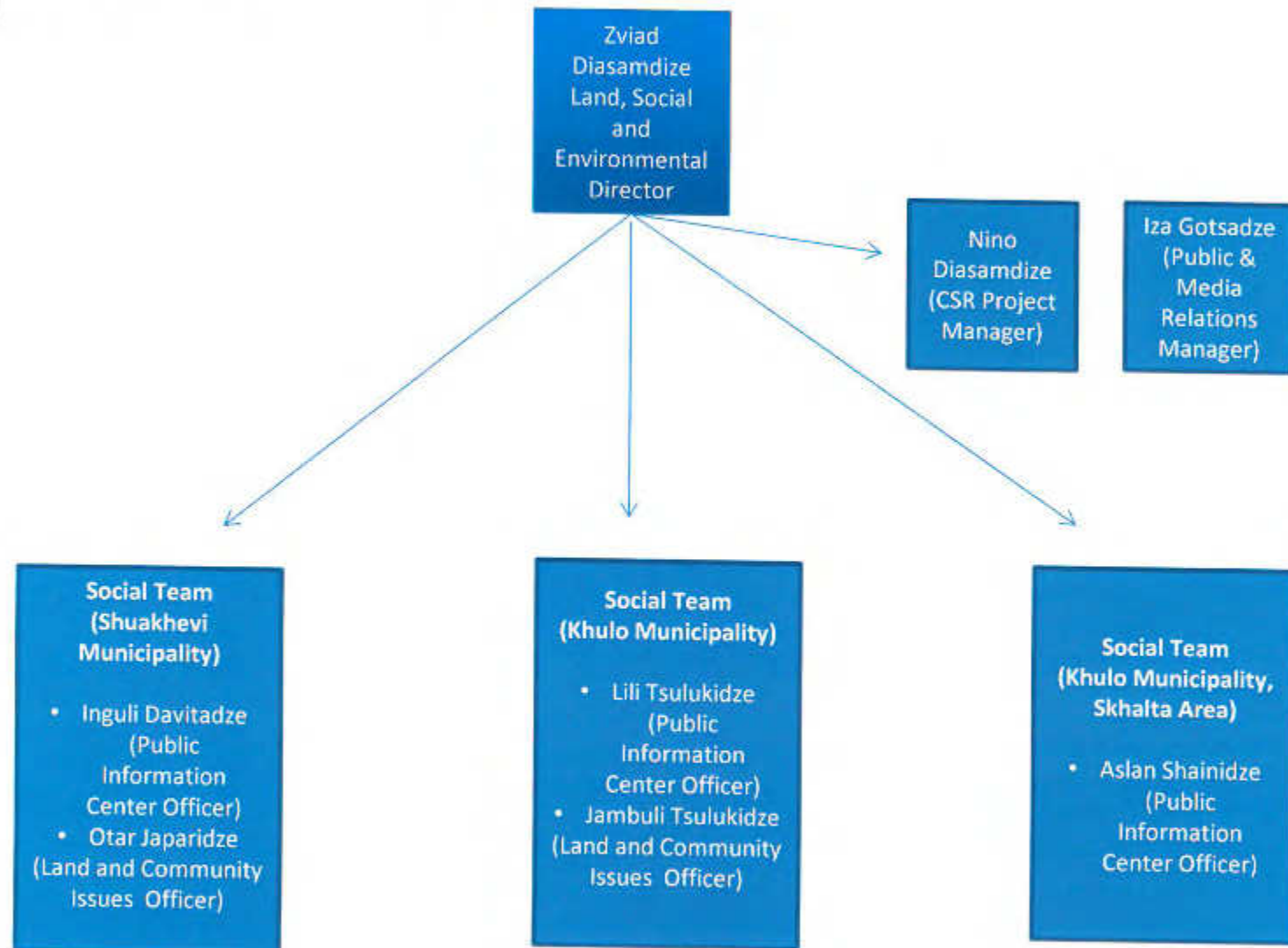
14-LT-027/IV-1 – 19/08/2014

Annex 7

Social Team Structure



Adjaristsqali Georgia LLC Shuakhevi HPP
Social Team Structure





Adjaristsqali Georgia LLC Shuakhevi HPP
Social Team Structure / Public Information Centers

Shuakhevi
Public
Informational Center

Khulo
Public
Information Center

Skhalta
Public Information Center
(opened by March 2015)

Public Information Centers cover all working areas in the both municipalities and provide the local communities with information about:

- Project Implementation (information about ongoing construction activities);
- Land, Social and Environmental issues;
- Employment Perspectives;
- Other issues related to the project.