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**APPLICATION OF BLASTWARE SOFTWARE FOR MEASURING MICROCLIMATIC CONDITIONS**

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**Abstract:** Safety and health at work as per legislation is conceived as an integral part of the organization of work and work process and on this basis is provided every worker and every useful work, regardless of the type and complexity of the work, which is in accordance with the constitutional principle regarding the right of every worker for protection at work. InstanTel Blastware software, the Windows software companion to your InstanTel vibration monitor offers powerful, easy-to-use features, for event management, compliance reporting and advanced data analysis. Blastware software is designed to perform several tasks to assist with your monitoring operations. The software can be used to program any Series II, III or IV InstanTel monitor, manage recorded events, remotely control monitors, as well as customize report content, language, frequency standard, and more. The program consists of two modules: the Compliance Module and the Advanced Module. The Compliance Module comes standard with each InstanTel monitor. The Advanced Module, which is optional, includes powerful data analysis features and extended monitor setup options. Powerful Event Manager simplifies file transfer from monitor and file management on the computer, Operator interface is intuitive and user-friendly, Customized Event Reports with over 20 selectable National Frequency Standards to create compliance reports, Easy-to-use Frequency (FFT) Analysis and reporting, Monitoring setup utilities to configure systems for remote monitoring with modem communications, Blastware Mail automatically distributes event data to email and text messaging devices, Transfer event data to ASCII format. The purpose of this paper is the correlation of periodic measurements for the summer season in the company "Newko Balkan L.L.C." - Suharekë, with InstanTel Blastware software.

**Keywords:** software, measurements, correlation, microclimatic conditions.

**1.0 INTRODUCTION**

The employer has a duty to provide his / her employees with security and health during their work from any aspect of work. Within his obligations, the employer must, of course, take the necessary measures for the safety and health of workers during work, including protection against occupational hazards, provision of information and training and provision of appropriate organization and means, respectively to incorporate protective measures and to optimize such methods of work and productivity, which will improve the level of safety and health during work, while being included in all employer activities and at all levels of the organization. Obligations and security and health work during the work, the employer can entrust to authorized legal or natural persons if he or she is not able or does not have adequate professional staff and technical equipment to carry out such duties and duties independently. The engagement of competent and authorized natural or legal persons for the performance of occupational safety and health duties does not relieve the employer from his or her responsibilities in this field.

Obligations of employees in the field of safety and health at work do not affect the employer's liability principle. The employer applies the safety and health measures during work on the basis of the following basic principles: avoidance of risks, risk assessment that cannot be avoided, dealing with risks from the outset; adapting work to the individual, especially with regard to the characteristics of the workplace and the working environment; selection of personal protection equipment; selection of chemical substances or preparations; selection of working and production methods; implementation of measures that are necessary for the maintenance and welfare of the health; adapting to other technological advances.

**1.1 Application of software for measuring microclimate conditions of workplaces**

The Blastware software is designed to perform several tasks to assist with your monitoring operations. The software can be used to program any Instate Series II, Series III, or Series IV monitor, manage recorded events, remotely control monitors, and customize report content, selectable Frequency Standards, and more. Innovative features, specialized sensors, and a variety of recording formats increase the functionality of InstanTel monitors and allow for flexibility across applications, from regulatory blast monitoring to remote data collection. Renowned for their ease of use and reliability, InstanTel vibration and overpressure monitors are the instruments of choice for various mining, construction, and geotechnical applications. Supported by dedicated service and technical support from InstanTel,

our worldwide network of qualified dealers offer InstanTel equipment sales and rentals, as well as professional consulting and monitoring services, for any project. In addition, InstanTel instruments are calibrated and serviced through international factory authorized calibration and service sites. The **InstanTel Micromate**, a 4-channel unit, is designed to monitor and transmit event data with one triaxial geophone and one air overpressure microphone. Easy-to-use with a touch-screen interface including intuitive menus, color display, and an associated keypad, the Micromate offers a rugged design featuring a high-impact case. Introduce yourself to advanced monitoring technology with a real-time operating system, USB interface, expansive memory, and a variety of plug and play peripherals that provide unequalled versatility across multiple applications.

Measurements of physical - chemical pests have been done at the workplaces; measuring points are determined by the employer. The measurements were carried out in 2018. Measurements were made for each metering point and were measured: microclimatic conditions, temperature, humidity, air movement velocity, noise, lighting, vibrations, air flow, dust and gases. The measurement procedure is carried out in accordance with the laws of the Republic of Kosovo and the EU-European standards. The metering points (work places) are assigned by the investor; the measurements were carried out in the presence of the company's representative.



*Fig.1/1. InstanTel Blastware software, the Windows software*

## 1.2 Work methodology

Physical - chemical pest measurements (dust, vibration noise, lighting, gases and microclimate conditions (temperature, relative humidity, air movement) are carried out on the basis of the employer's request. The instruments used for the above noted measurements are: Thermometer for Temperature Measurement, Relative Humidity Measurement Hygrometer, Anemometer for Air Movement Measurement, Dust Measurement with Two Methods (Gravimeter and Conomoniometer), Sound Metering Fonometer, Vibration Meter for Vibration Measurement, Measuring Lens for Lighting, Text AG for measuring gases. The working methodology is carried out in accordance with the laws of the republic of Kosovo and EU standards. The standards applied during the measurement and processing of data are:

- Dust standard applied according to the concentration allowed maximum after the laboratory participation analysis of free SiO<sub>2</sub>.
- Noise standard applied "EU 2002 / 49EU" and "AI no. 08/2009 and RKS".
- Vibration standard applied "EU 2002/44", and Directive 89/391 / EEC).
- Lighting standard applied "EN 12464-1". –
- Gases standard applied "AI No. 06/2007 of RKS"

**DUST** - Measurement and processing of dust data is carried out according to International Standards by these methods: Gravimetric concentration of respiratory dust in air in mg / m<sup>3</sup>, Conomoniometric method of flying dust, in air, in particles / cm<sup>3</sup>, Content of SiO<sub>2</sub> free in the sample dust, in%.

The measurements were performed with the following instruments:

- Personal suction pumps of type BENDIX SUPER SAMPLER PUMP (USA), with filters for eight hours of suction.
- Concerto 10, type "CARLL CEISS JENA" (Germany).

**PROCESSING OF SAMPLES TAKEN DURING MEASUREMENTS-** After sampling from the field, during the measurements of physical-chemical pests and microclimatic conditions, these samples have been sent to further treatment in the labs concerned by this Institute for determining their values.

**1.3 Results of the analysis of  $SiO_2$**

**Tab.1/1.**

Nr	Place of receiving $SiO_2$ free	caption	percentage	W o r k e r
1	Balbo	$SiO_2$	11.12	
2	Conveyor belt	$SiO_2$	8.65	

*The average percentage of  $SiO_2$  is 9.89%*

In the weighing of dust weights taken from the working environment, the participation of free  $SiO_2$  was analyzed. After obtaining the results obtained by the laboratory, then the calculation of these results and their comparison are compared to the limits allowed, comparing them with the European standards. The location and the position of the measuring points is assigned by the person in charge of the company

**CRITERIA FOR ASSESSING THE SITUATION IN REAL TIME**

Determination of maximum permissible dust coefficient (KLM),

- A. Gravimetric method  
Dust General

$$KLM = \frac{30}{\% SiO_2 + 2}, \text{ mg/m}^3 \dots\dots\dots(1)$$

- B. Cononomiometric method

$$KLM = \frac{8800}{\% SiO_2 + 5} + 10\%, \text{ particles/ cm}^3 \dots\dots\dots(2)$$

Determining the Overweight Factor (Ft)

Ft = KM / KLM < 1, rating: Allowed  
 Ft = KM / KLM > 1, rating: Not allowed  
 Where are: Ft - Factor of overdrift.

KM - Prudent Concentration.  
 KLM - Maximum permissible concentration.

For each measurement site, a measurement report was performed on the computer in the Excel program, where:

- Participation of  $SiO_2$  free in dust ..... [%].
- Concentration measured, ..... [ $mg / m^3$ ].
- Maximum permissible concentrations ..... [ $mg / m^3$ ].
- Overrun factor ..... [in%].
- Diagrams, (graphical) and
- Evaluation.

**1.4 Lighting**

The measurement of the lighting at each measurement site is done in accordance with international norms, with the reading directly on the instrument table in Lx (lux), where these parameters are read:

- Natural lighting, in ..... [Lx].
- Artificial lighting, in ..... [Lx].
- General lighting, in ..... [Lx].

The LUXEMETER type "SHAstra" (Slovenia) is used for the measurement of the lighting, The report is compiled with the Excel software, where are presented:

- The measured level of workplace lighting,
- Permissible level of illumination
- Diagrams, (Graphic Shapes) and Evaluation

The measurement and data processing procedure is carried out in accordance with the standards and the "EN 12464-1" directive.

**1.5 Microclimates**

Measurement of microclimatic conditions is done on the basis of international norms (European standard "EN 13 573" where the instrument tables are read directly:

- Air temperature ..... [°C].
- Relative air humidity ..... [%].
- Leap - air movement ..... [m / sec].

The report is compiled with Excel software, where the thermometer was used for temperature:

- Measured temperature level at work,
- Permissible temperature range (from - to)
- Evaluation

**For moisture:**

- Measured humidity level at workplaces.
- Permissible temperature range (from - to) according to standard "EN 13 573".
- Evaluation.

**1.6 Gases**

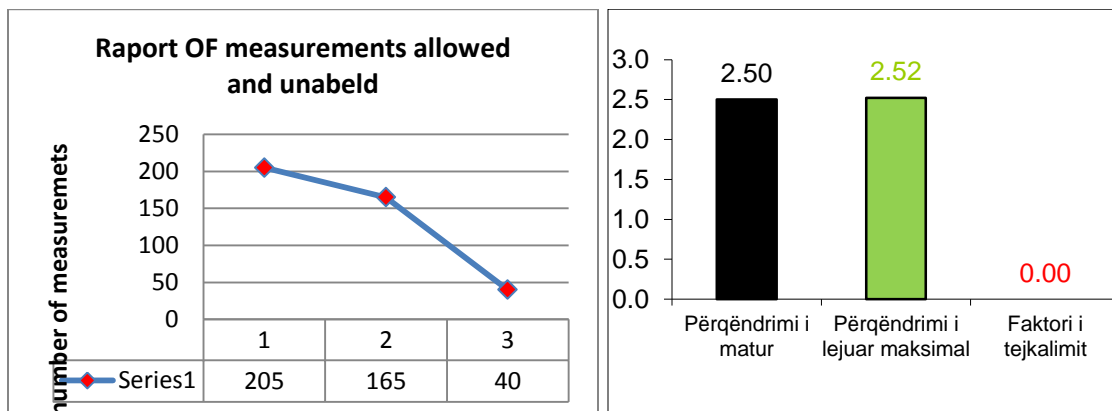
Gauge measurement is read directly into the instrument, then the gains are set in the report table for each measuring site where their comparisons are made according to the permitted standards. Gas measurements were carried out with the instrument "Testo AG" (German production) and are measured these six (6) gases; Carbon Dioxide (CO<sub>2</sub>), Carbon Monoxide (CO), Nitrogen Dioxide (NO<sub>2</sub>), Nitric Oxide (NO), Sulfur Dioxide (SO<sub>2</sub>), Oxygen (O<sub>2</sub>).

**2.0 THE NAMING OF MEASURING POINTS "NWKO BALKAN" SUHEREKA**

The metering points at the job sites are assigned by the company representative. Measurements were made at these points; Balbo aunt knitting, Balboa aka, Balbo aka second floor mixers material, Perforation of first floor mixers material, Two cylinder intake material conveyor, Conveyor Conveyors, Crumbs, Conveyor Conveyors, Preset Entries, Conveyor Conveyors Environment Pressure Extruder Conveyors, Extruder Extruders, High Pressure Conveyors, Vulcanization Belt Chains, Belt, Straps, Point 1 West, Point 1 East, Steel Strips, Warehouses point 1, Warehouse Point 2, Warehouse Point , Office of Accountant Administrator, Physical Laboratory, Chemical Laboratory.

**Tab: 1.1 Number of measurements allowed and unauthorized.**

N.re	The name of the environment is prudent	Number of measurements	Allowed	unlabeled
Overall, the number of measurements		205	165	40
Percentage		100.00	80.48	19.52



**Diagrame:1/1 Measurement Diagram: All 205 measurements, 165 measurements allowed, 40 unmanaged measurements.**

**2.2 Reasonable measurements of physico-chemical deters and microcolimic conditions**

- Company: new co-balkan l.l.c – Suhareka
- Working environment: balbo - knitting aunts

**1. DUST - GRAVIMETRIC METHOD**

- The presence of silicon dioxide (SiO<sub>2</sub>)% .....9.89
- Concentration measured (KM) mg / m<sup>3</sup> / 8 hours .....2.50
- Maximum Permissible Concentration (KLM) mg / m<sup>3</sup> ..... 2.52
- Overrun factor (f = KM / KLM) ..... 0.00

**2. ASH- GONIOMETRIC METHOD**

- The presence of silicon dioxide (SiO<sub>2</sub>) %..... 9.89
- Measured Concentration (KM) Particles / cm<sub>3</sub> .....640
- Maximum permissible concentration (KLM) gr. / cm<sub>3</sub> ..... 650
- Overrun factor (f = KM / KLM) ..... 0:00

**3. NOISE**

- Measured noise level ..... 86.0 dB
- Noise level allowed..... 80.0 dB
- Overrun factor..... 6.0 dB
- Rating: ..... Without permission

**4. VIBRATIONS**

- Measured Vibration Level..... 0.11 m / s<sup>2</sup>
- Permissible vibration level .....1.15 m / s<sup>2</sup>
- Overrun factor..... 0:00
- Rating: ..... allowed

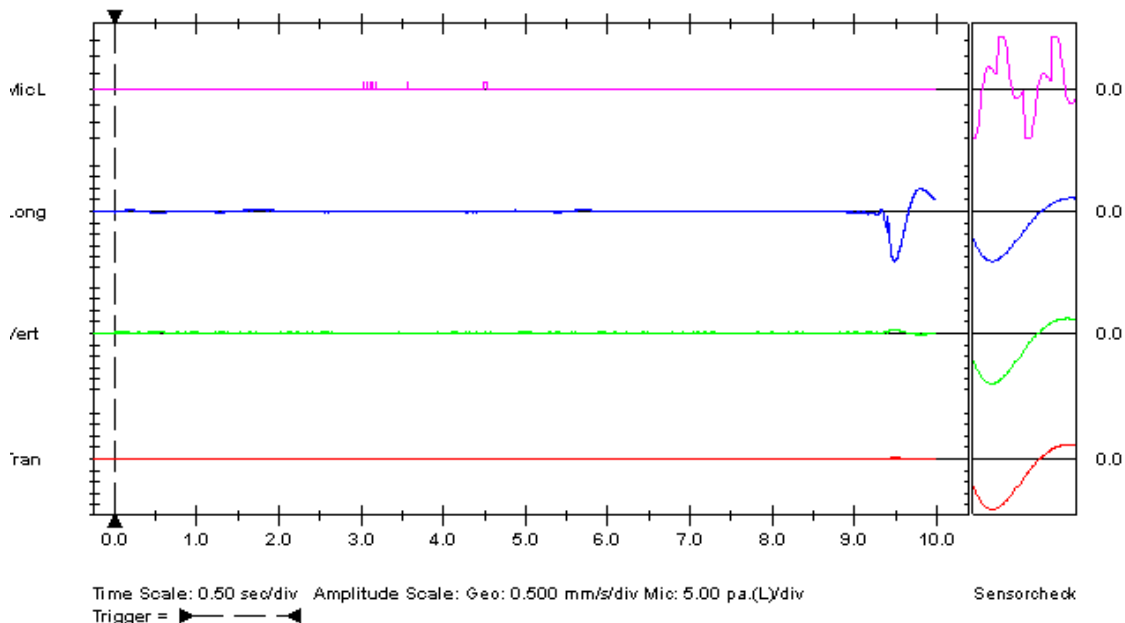
**5. LIGHTING**

- Measured luminance level ..... 100 Lx
- Permissible level of illumination ..... 100 Lx
- Overrun factor ..... 0:00

**MEASUREMENTS WITH SOFTWARE**

Peak Vector Sum 2.22 mm/s at 9.477 sec

4/A: Not Applicable



## CONCLUSION

1. Lighting from 130 measurements performed, 11 measuring points are permissible and 119 measurements are unacceptable, the total number of measurements is 100% realized, permissible measurements are 8.46% whereas 91.53% are not permissible.
2. Microclimate (humidity) of 130 measurements performed, 130 measurement locations are allowable or 100% of the measurements are permissible.
3. Microclimates (Temperature) of 130 measurements performed, 110 measurement locations are permissible and 20 measurements are not permissible, the total number of measurements is 100% realized, permissible measurements are 84.61% whereas 15.38% are not permissible.
4. Gaseous emissions (CO, SO<sub>2</sub>, NO<sub>2</sub>, NO and O), although not foreseen in the purchase order no. 3 / B dated 23.04.2018, are carried out by 130 metering points for the above-mentioned gases. Out of 130 measurement locations at any metering point there is no excess of gases according to the standard applied, but approximation of the measured values at some metering points see reports by metering points.

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