Research Article

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EVALUATION OF NOISE FROM JACQUARD AND DOBBY IN THE WEAVING FACILITY THE IN TERMS OF OCCUPATIONAL HEALTH AND SAFETY

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ABSTRACT: Noise is an important problem affecting workers' health and quality of life in countries where industrialization is experienced effectively. Workers are in noisy areas in different environments of working life. The people who are harmed by the noise are the workers working in the workplace where there is a high rate of noise. Of noise; It is known to negatively affect worker health physiologically and psychologically. Noise causes loss of productivity as a result of the fact that workers complain about their activities and negatively affects the productivity of the workers. It was aimed to examine the noise exposure status of workers in changing noisy working environments in factories. The noise level of the jacquard and dobby weaving sections of the weaving mill was determined by measuring. The noise sound pressure level values emitted by weaving machines to the environment were measured. During the measurement; It was observed that the nominal day conditions determined in the job analysis were not exceeded. The tasks were carried out within the specified periods and all noise sources were studied within the determined periods.

Keywords: Noise, Jacquard, Dobby, Exposure

1. INTRODUCTION

One of the machine effects that negatively affects work efficiency with mechanization is noise. Noise causes high damage to the workers who use the machines in the environment where there are more than one work equipment. High noise levels negatively affect workers' health and performance. It is necessary to determine the negative effects of the noise generated by the machines used in the weaving mill on the worker health and the noise level emitted by the machines to the environment. The noise level in the weaving mill was measured and its effects on the worker were examined.

Sound is a measurable objective concept that does not change depending on the individual. Noise is a subjective concept. Noise can be defined as "disturbing sound". The acceptance of sound as noise may differ depending on the individual [12].
In a person whose hearing is damaged, a weakening of the hearing ability, called hearing loss, is seen. Hearing loss can be temporary or permanent. Hearing loss being permanent or temporary and the degree of hearing loss; It depends on the level of noise, the frequency of

the noise, the time the worker is exposed to the noise. [5]

The exposure time of the noise includes the time the person is affected by the continuous noise and the years when the person is affected by the noise from time to time. Staying for a while under the influence of a certain level of sound causes hearing loss[2] . Noise limit values in industrialized countries are the longest exposure to a certain level of noise in a day or a week. The frequency of the noise, the duration of its stay in the environment, the age of the worker exposed to the noise, the physiological and psychological condition, and the distribution of noise in the environment over time are important factors in the perception of noise as a disturbance by the receiver[11] . The negative effects of noise on the individual are mostly physiological and psychological[1].

Hearing loss is the main physiological effect. It is possible to categorize the hearing effects caused by noise in the ear in three groups as acoustic trauma, temporary and permanent hearing loss [13]. Noise-induced hearing loss is one of the common causes that negatively affect the quality of life in developed societies[4]. Physiological problems include increased blood pressure, rapid heartbeat, muscle reflexes, and sleep disorders. Do not be affected by noise for hours; adrenaline may cause deterioration in blood pressure with the increase of circulatory stress hormones [10]. The psychological effects of noise emerge as anxiety, tension, anger, concentration disorder, and perception difficulty [6].

Various collective and personal protective measures are taken in order to reduce the effects of noise on employee health. First of all, determining the factors causing noise and reducing the effects on worker health comes first. However, laws have been enacted in most countries to reduce the effects of noise.

In this factory located in Denizli Organized Industrial Zone, there are 350 employees in total. In the factory, which operates 24 hours, in three shifts, in the measurement section of the factory A total of 48 weaving machines are in service. Thirty "A" brands of machines The jacquard model produced in 2000, the dobby model of the 18 brand "A" produced in 2000, machines are operated at a speed of 300-600 rpm.

2. MATERIAL AND METHOD

2.1. Material Model

In experimental studies, noise measurements were made on looms used in the weaving factory.

2.1.1. Noise

Noise; It is an important environmental pollutant consisting of unwanted sounds with a random spectrum that negatively affects the hearing health and sense of people, disrupts the physiological and psychological balance, reduces work performance, reduces or destroys the pleasantness and calmness of the environment. [7,8,13]

2.1.1.1 Technical Abbreviations in the Report

dB: Decibel
dBA: A Weighted Decibel

Leq: Equivalent Noise Level
Lmax: Maximum Noise level
Lmin: Minimum Noise Level
m: Meter
mm: Millimeter
m^2: Square meter
Kg: Kilogram
% : Percent
μ Pa: Micro Pascal

2.1.1.2. They are The Negative Effects of Noise on Hearing

They are the negative effects of noise on hearing. It can be examined temporarily and permanently in two parts. The most common transient effects are temporary loss of hearing sensitivity known as temporary hearing threshold shift and hearing fatigue. Hearing loss is permanent in cases where the effect is too high and the hearing system is affected by noise again when it regains its former characteristics. [13]

2.1.1.3. Physiological Effects of Noise

These are changes that occur in the human body. Major physiological effects; muscle strains, stress, increase in blood pressure, changes in heart rate and blood circulation, pupil dilation, respiratory acceleration, circulatory disorders and sudden reflexes.

2.1.1.4. Psychological Effects of Noise

In the press of the psychological effects of noise; nervous breakdown, fear, discomfort, anxiety, fatigue and mental effects slow down. Suddenly rising noise levels can create fear in people. [9]

2.1.1.5. Effects of Noise on Performance

It is the effects of noise such as reducing work efficiency and not understanding the sounds heard. The blocking of functions such as the perception and comprehension of speech is largely related to the level of background noise. Studies on the effects of noise on work efficiency and productivity have shown that the environment where complex works are performed is quiet, and the environments where simple works are performed need to be a little noisy. In summary, if the background noise determined for a certain job or function in the environment is excessive, work efficiency decreases.[13]

2.1.2. Principles Regarding Personal Exposure Noise Measurement

A) Care is taken not to generate any noise that will affect the measurements of the device during noise measurements.
B) The measuring device should be positioned so that it does not interfere with the selected personnel while being mounted on it.
C) It should be paid attention that the measurement is made for eight hours during the working hours of the personnel.

2.1.3. Method and Device Used in Personal Exposure Noise Measurement

The exposure noise measurements made in the facility were made with a dosimetric noise measurement device, within the scope of the Regulation on the Protection of Employees from Noise Related Risk, Determination of the Noise Exposed at the Workplace Estimation of the Hearing Loss Caused by This Noise was made according to the method of TS 2607 ISO 1999. Three personal noise exposure measurements between 600-300 cycles were performed on jacquard and dobby weaving looms in the facility.[13]

Table 1.Meter features

Device	Brand	Model
Personal Noise Meter	Pulsar	22-R
	Pulsar	Dosebadge-22

Table 2: Ambient Conditions During Measurement

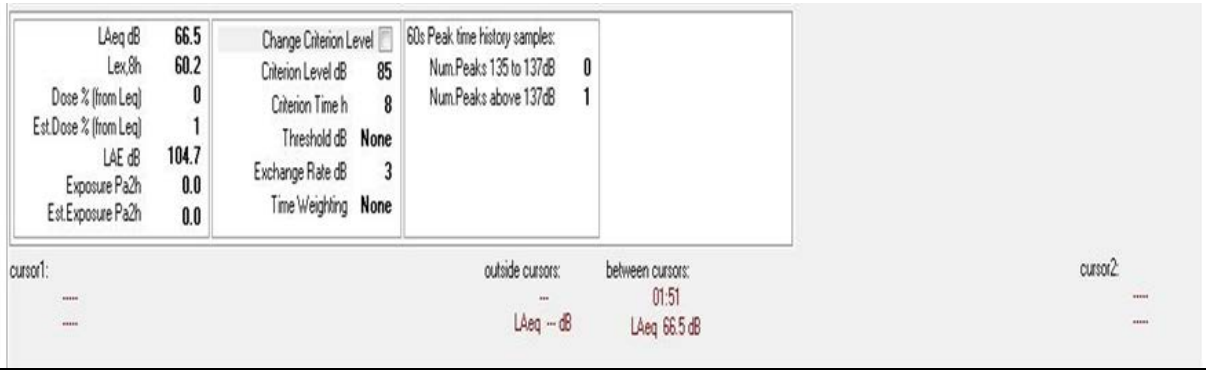
Temperature	Pressure(mbar)	Moisture (%)	Air Flow Velocity (m/s)
22,1	1.005,7	64,1	0,1
22,0	1.005,0	64,0	0,1

3. EXPERIMENTAL RESULTS

Measuring results for jacquard and dobby 600-300 revolutions in table 3-10

Table 3. Jacquard 600 rpm

Measurement Date	Measurement Start Time	Measurement Time	Peak Level dB(C)	*8 Hourly Exposure LegA Value*
April 2021	09:30	01:51.29	138,4	60,2



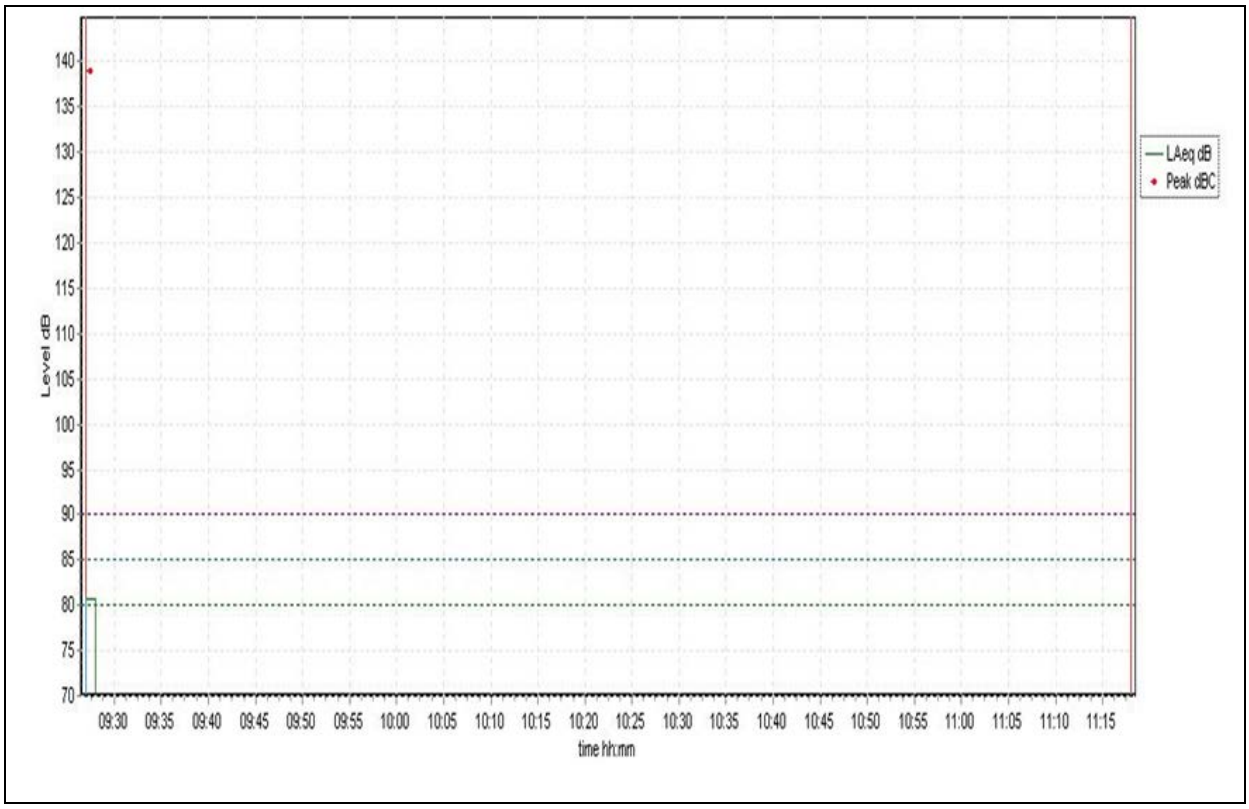
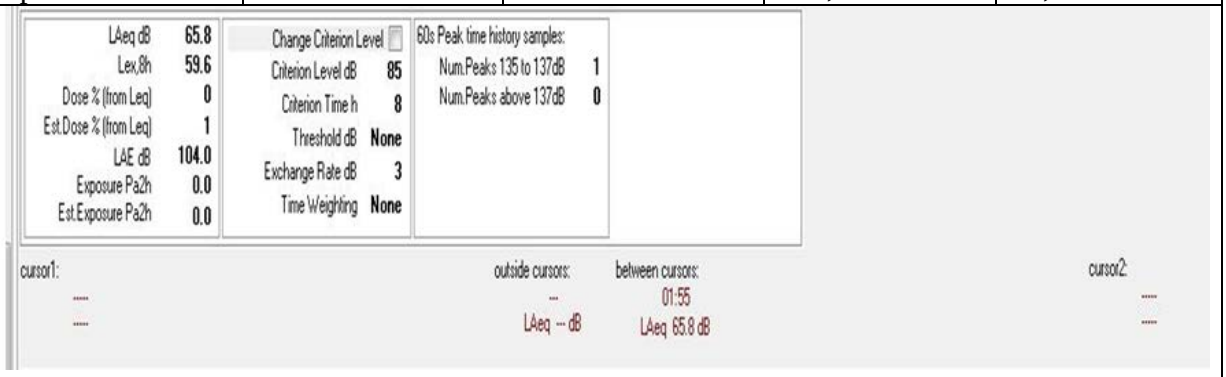


Table 4. Jacquard 500 rpm

Measurement Date	Measurement Start Time	Measurement Time	Peak Level dB(C)	*8 Hourly Exposure LegA Value*
April 2021	09:45	01:54.48	135,6	59,6



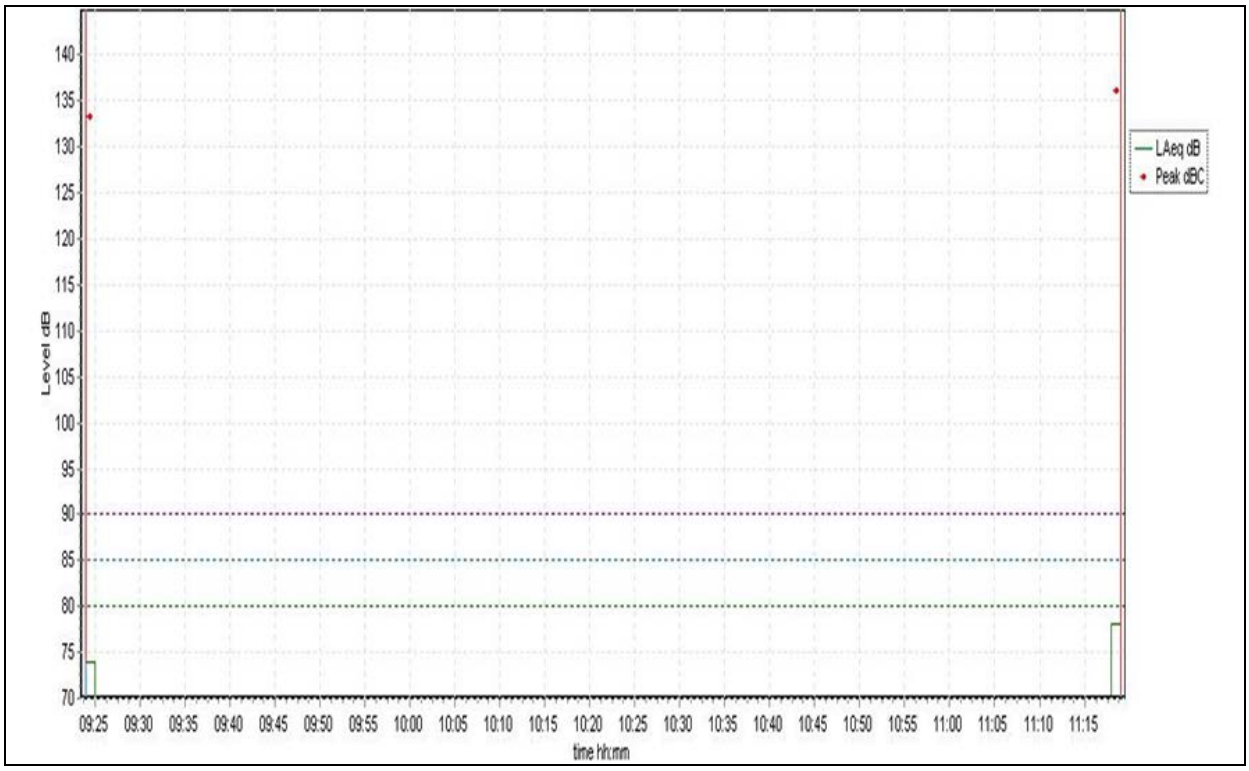
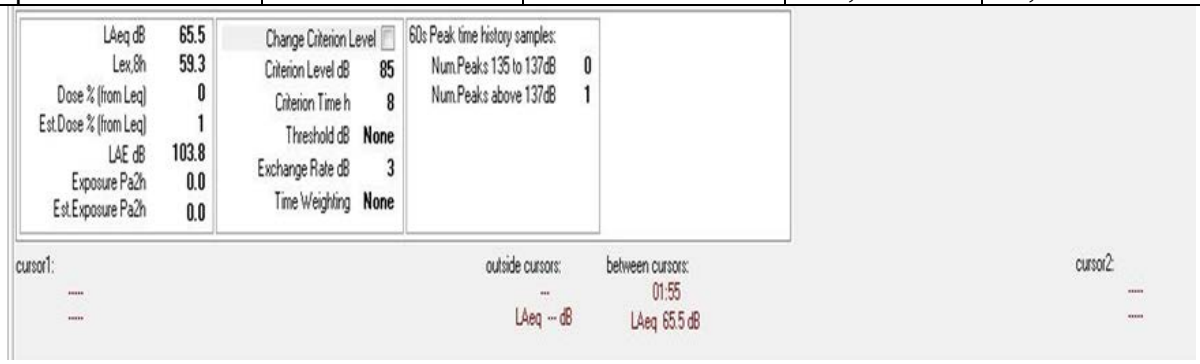


Table 5. Jacquard 400 rpm

Measurement Date	**Measurement Start Time**	**Measurement Time**	**Peak Level dB(C)**	***8 Hourly Exposure LegA Value***
April 2021	10:00	01:55.25	141,0	59,3



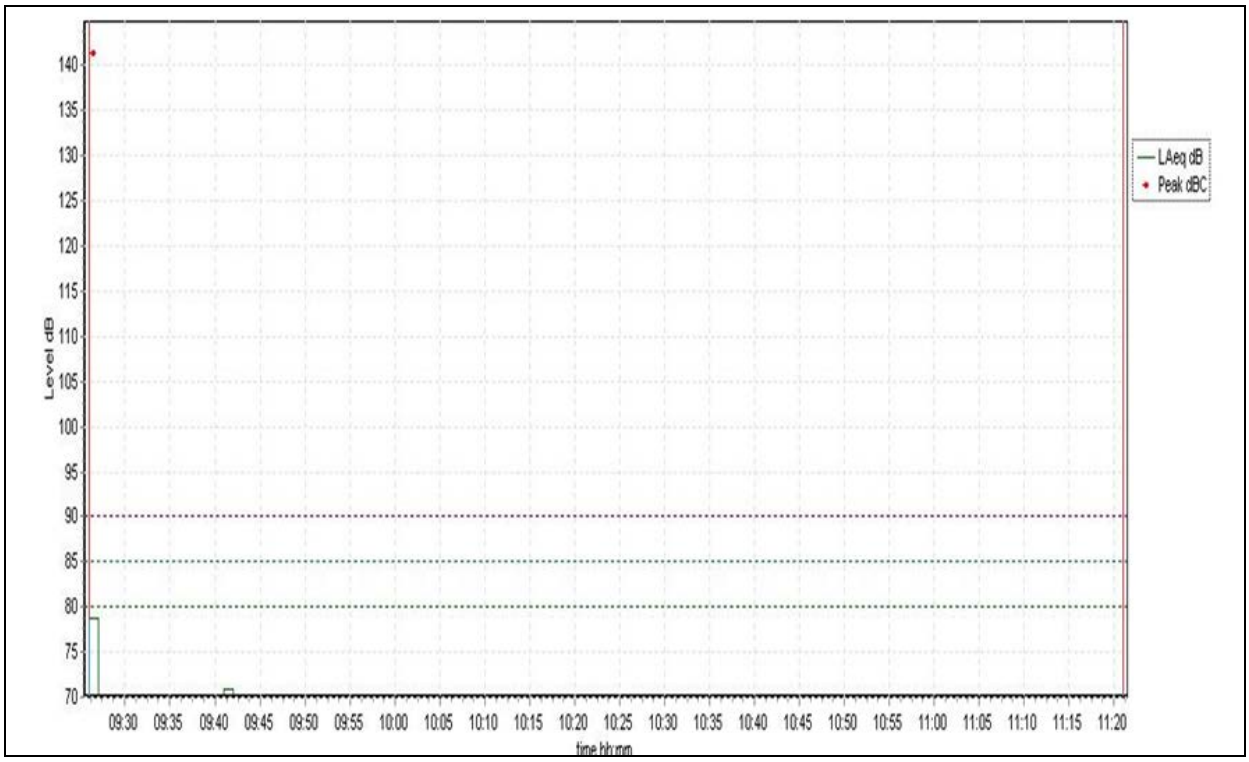
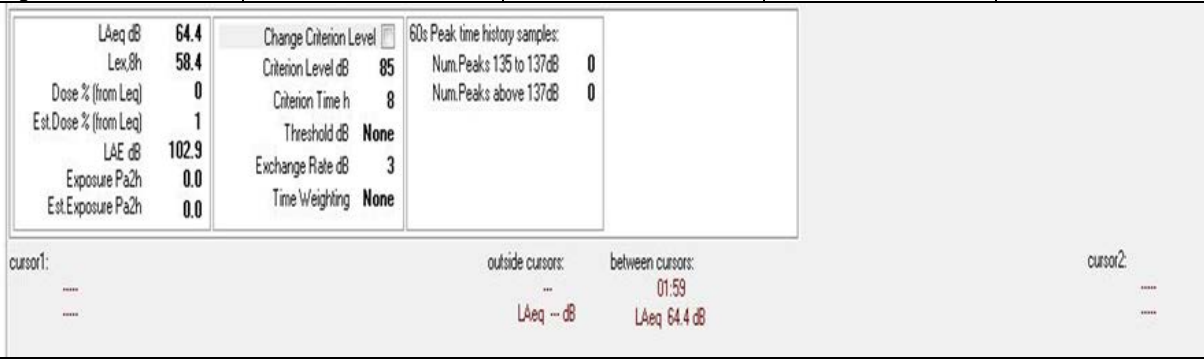


Table 6. Jacquard 300 rpm

Measurement Date	**Measurement Start Time**	**Measurement Time**	**Peak Level dB(C)**	***8 Hourly Exposure LegA Value***
April 2021	10:15	01:59.20	130,5	58,4



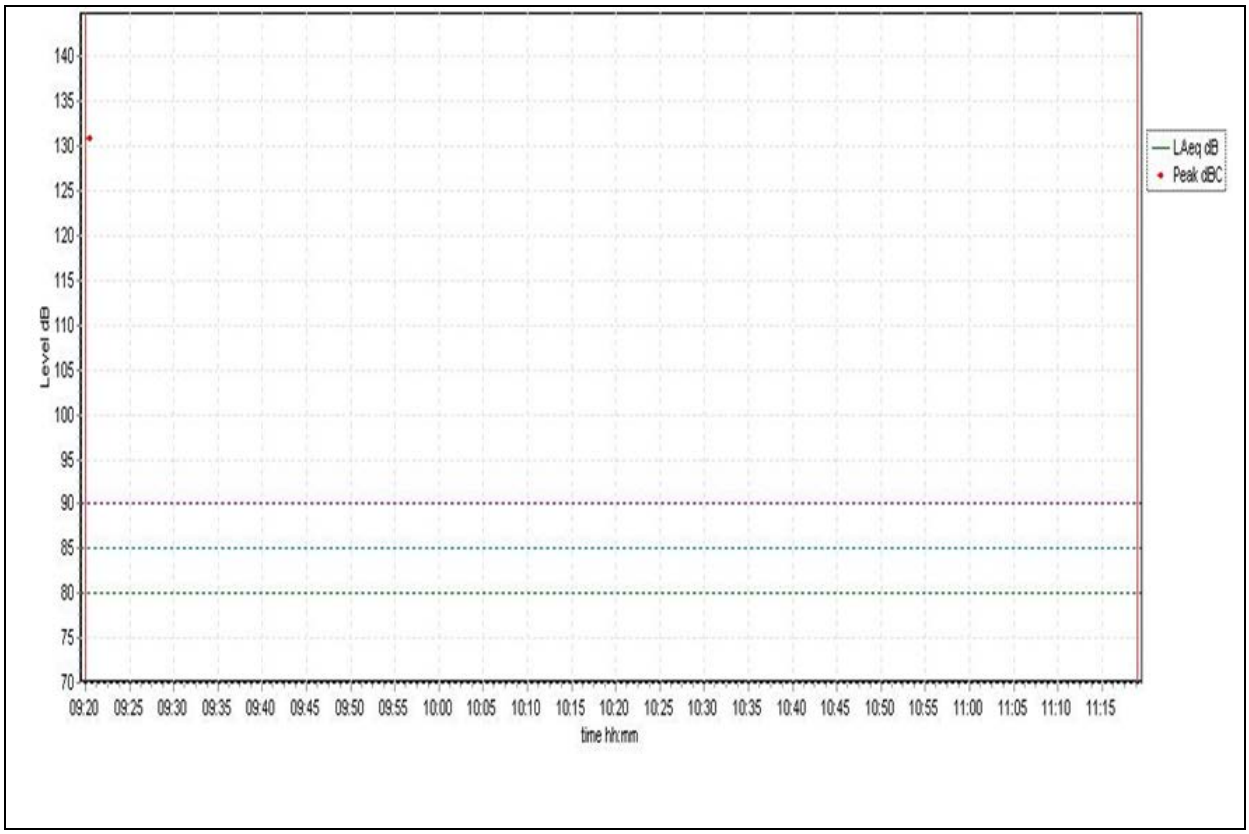
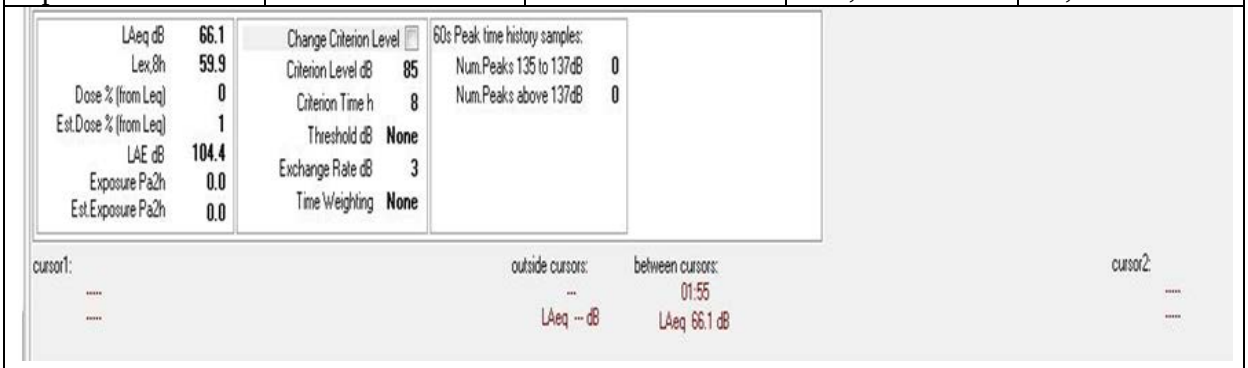


Table 7. Dobby 600 rpm

Measurement Date	**Measurement Start Time**	**Measurement Time**	**Peak Level dB(C)**	***8 Hourly Exposure LegA Value***
April 2021	10:30	01:55.37	122,1	59,9



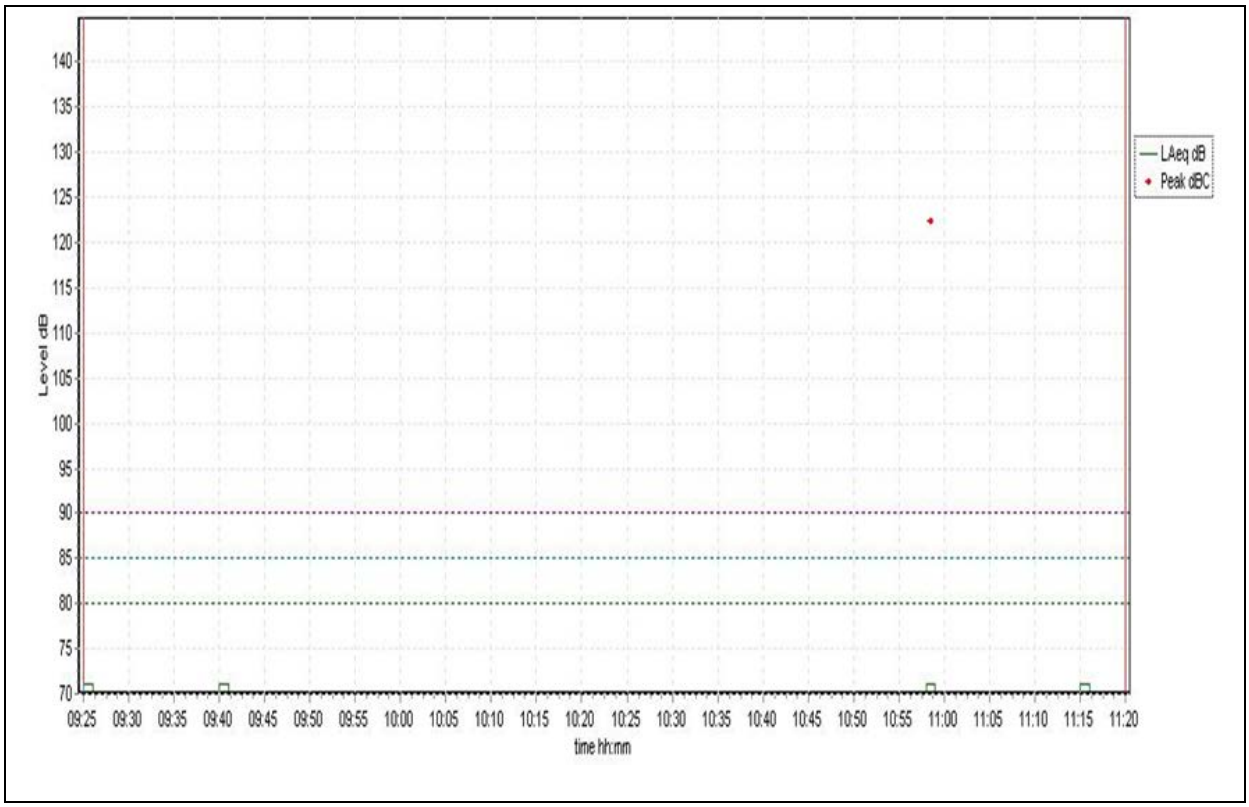
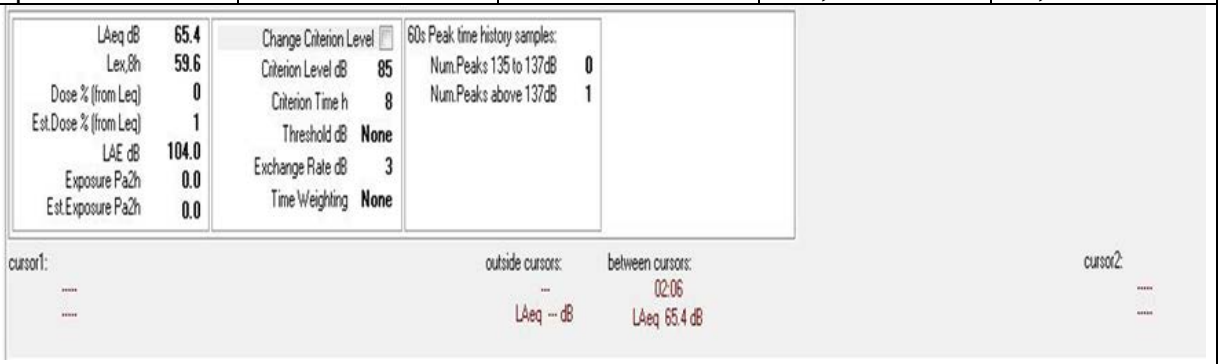


Table 8. Dobby 500 rpm

Measurement Date	**Measurement Start Time**	**Measurement Time**	**Peak Level dB(C)**	***8 Hourly Exposure LegA Value***
April 2021	10:45	02:06.09	137,1	59,6



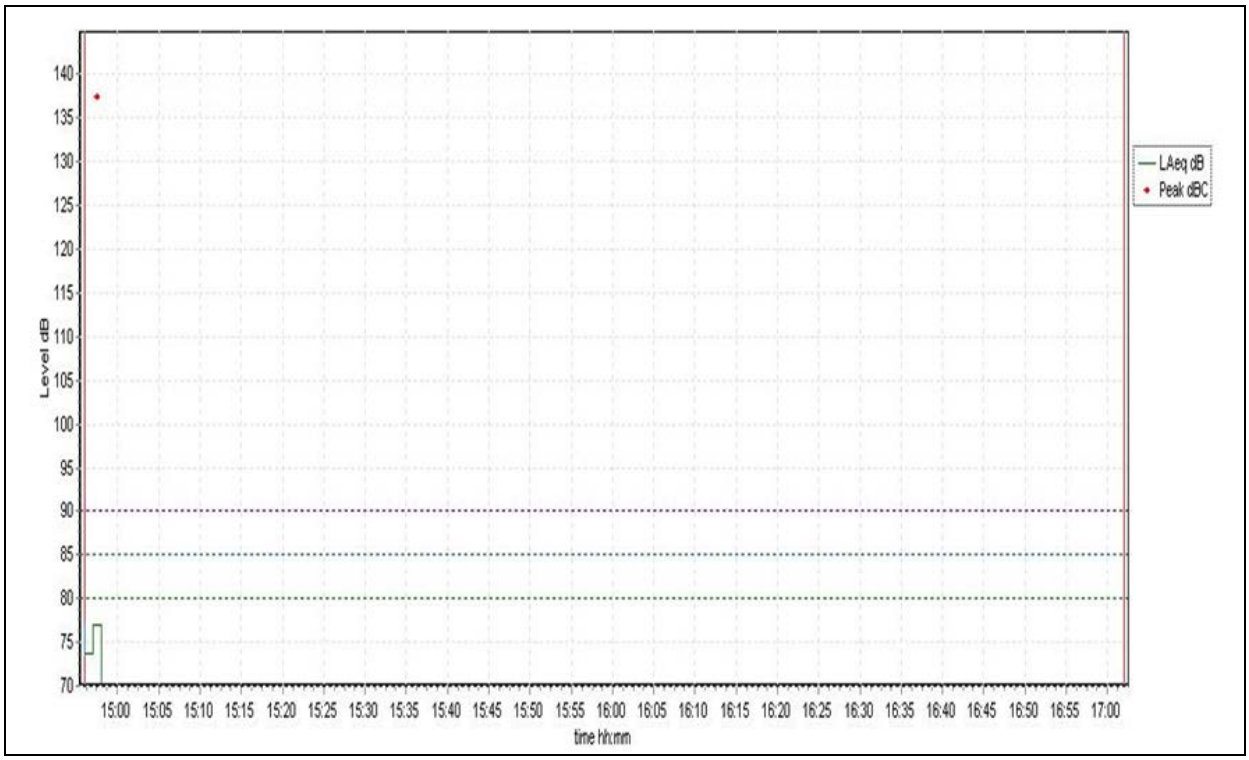
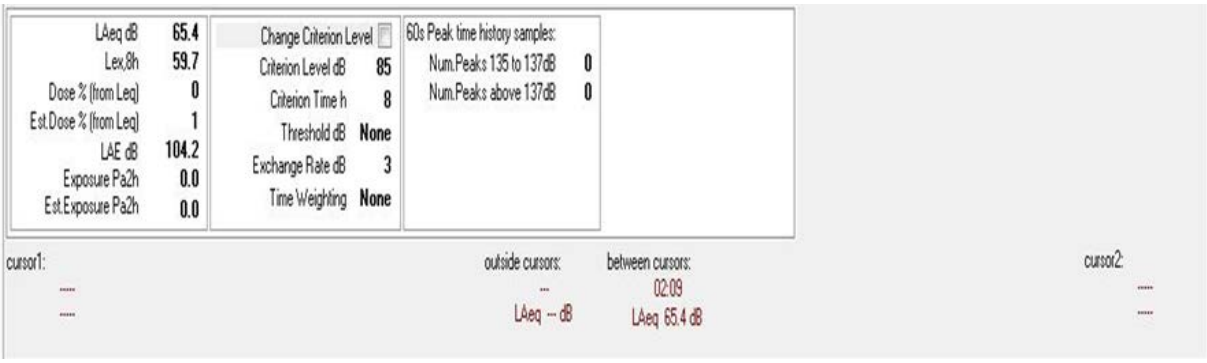


Table 9. Dobby 400 rpm

Measurement Date	Measurement Start Time	Measurement Time	Peak Level dB(C)	*8 Hourly Exposure LegA Value*
April 2021	11:00	02:09.09	128,9	59,7



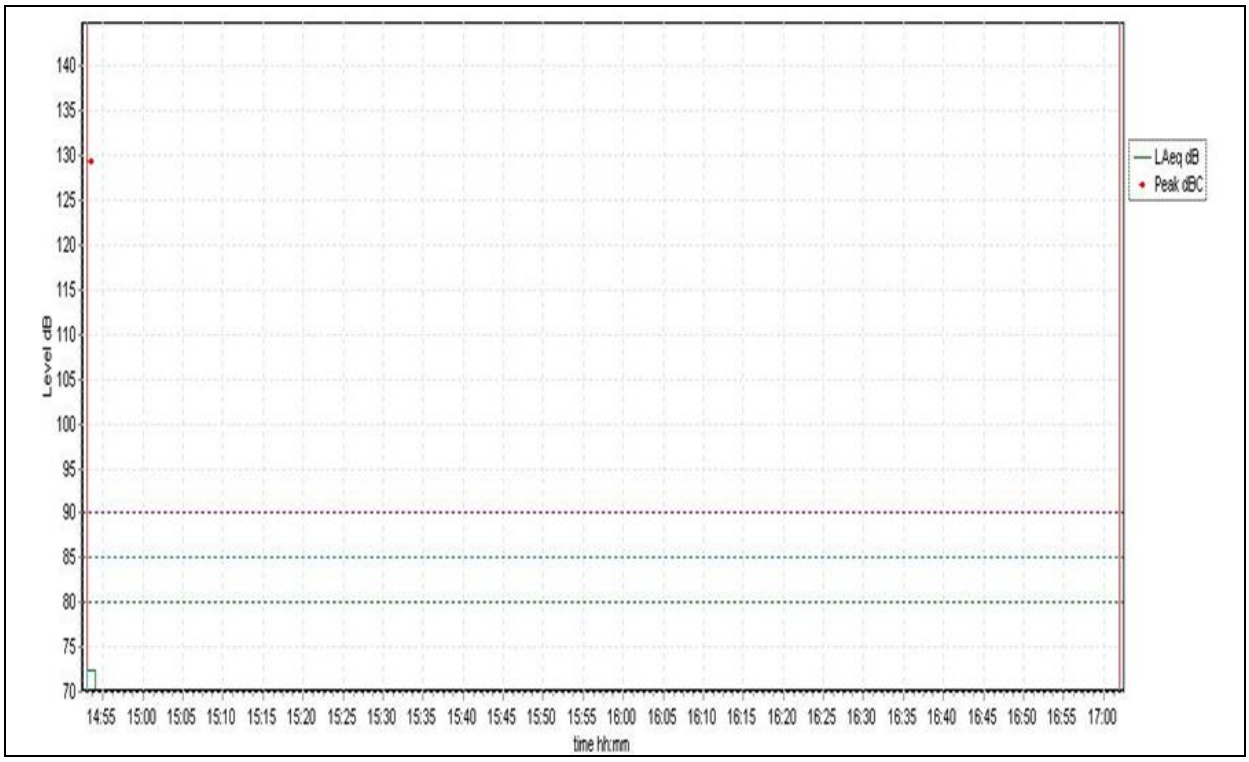
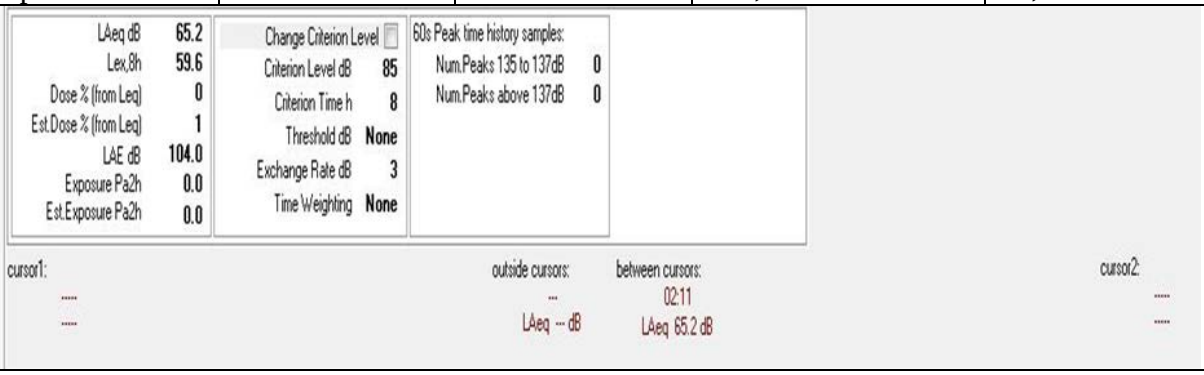
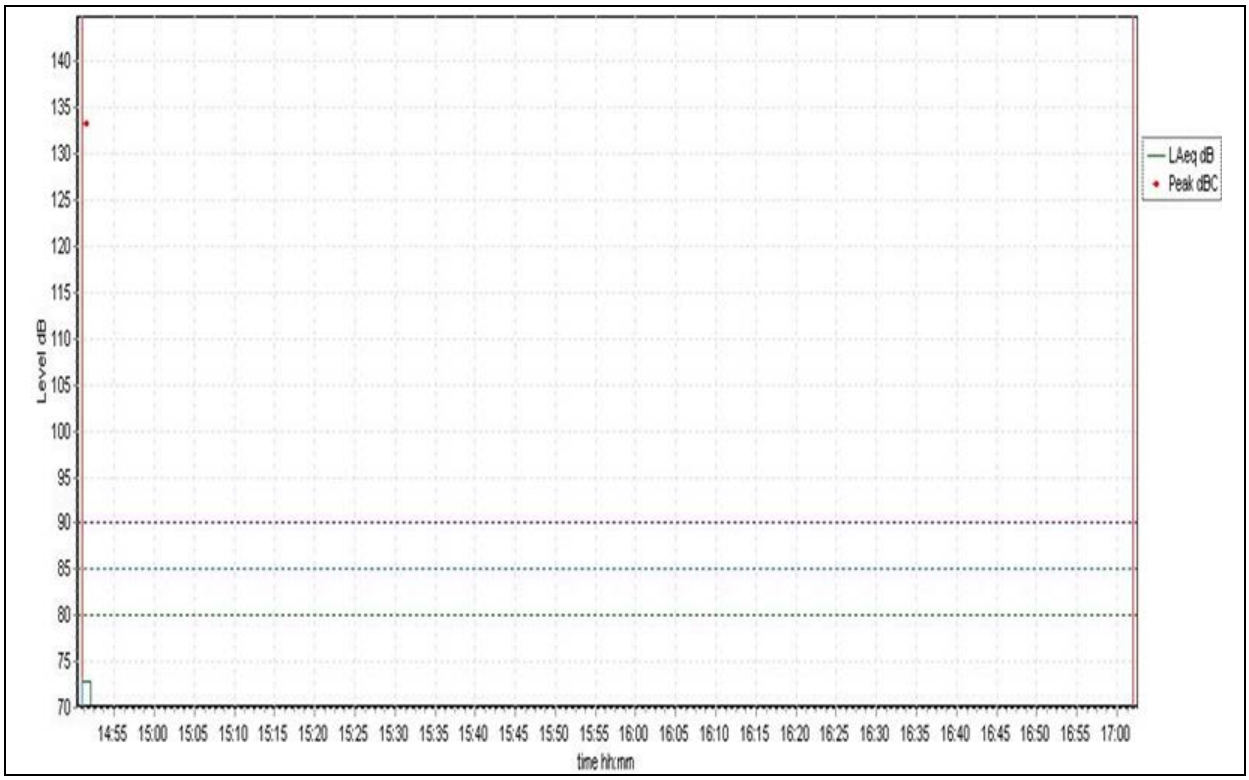


Table 10. Dobby 300 rpm

Measurement Date	Measurement Start Time	Measurement Time	Peak Level dB(C)	*8 Hourly Exposure LegA Value*
April 2021	11:16	02:11.56	132,8	59,6





4. RESULT AND DISCUSSION

It is a fact that the noise that negatively affects the health of the employee and causes unrecoverable results must be controlled. It is necessary to raise the awareness of employees, especially young workers, about noise, which has increased effects on employee health. The solution to all problems arising from the workplace environment will be provided by training.

The physiological effects of noise on the worker vary depending on the amount of noise affected. These are permanent hearing problems due to noise, respiratory disorders, blood pressure, heart diseases. The negative physiological effects and psychological effects of noise on the working individual also occur. The most common of these is the low efficiency due to noise seen in workers in noisy environments, which can be directly correlated with the rate of noise exposure. Among the negative effects of noise on worker health are health problems affecting workers; They are permanent hearing problems due to noise due to their high prevalence among workers. These hearing losses will significantly increase the quality of life of the employee. In advanced levels of hearing loss, which increases with the effect of noise, speech is affected, and negative situations arise in communication between employees in the workplace.

Noise is a very important occupational health and safety element in the textile industry as in all other sectors. In this study, the personal noise exposure values of the weaving mill employees serving in the weaving branch of the textile industry were examined. Accordingly, measurements were made in a total of eleven weaving mills located in four provinces of Turkey, including eight fabric and towel factories and three carpet weaving factories. As a result of the measurements made, the personal noise exposure value in all factories has exceeded the limit values specified in our legislation. This shows that; In terms of the risks associated with noise, weaving mill workers are at a very serious risk.

Table 11. Results of the Measurement

Number of Revolutions (rpm)	**Episode**	**Calculated Value LEX, 8saat (dBA)**
600	Jacquard	60,2
600	Jacquard	60,0
600	Jacquard	60,1
500	Jacquard	59,6
500	Jacquard	59,5
500	Jacquard	59,5
400	Jacquard	59,3
400	Jacquard	59,2
400	Jacquard	59,4
300	Jacquard	58,4
300	Jacquard	58,6
300	Jacquard	58,3
600	Dobby	59,9
600	Dobby	59,5
600	Dobby	59,2
500	Dobby	59,8
500	Dobby	59,6
500	Dobby	58,5
400	Dobby	59,7
400	Dobby	59,2
400	Dobby	59,3
300	Dobby	59,1
300	Dobby	59,6
300	Dobby	59,9

Personal exposure emitted by jacquard weaving machines is between 600 rpm 60.0-60.2, 500 rpm 59.6-59.5, 400 rpm 59.4-59.3, 300 rpm 58.6-58.3 dB.

Personal exposure emitted by dobby weaving machines is between 600 rpm 59.9-59.2, 500 rpm 59.6-58.5, 400 rpm 59.7-59.2, 300 rpm 59.9-59.1 dB.

Earphones, etc., which reduce the effect of noise, are used by the workers in the workplaces where noise, which has a direct effect on human health, occurs. Personal protectors should be used. The first priority in preventing the noise caused by the Jacquard and Dobby weaving machine from spreading to the environment is the protection at the source, which is a collective protection method. Before personal precautions, it is necessary to reduce the noise levels at the source and effectively protect the workers from noise. In enterprises, noise should be considered during the construction phase of the workplace as a design criterion; Arrangements should be made to minimize noise during the placement of work equipment. In line with the provisions of the "Regulation on the Protection of Employees from Noise Related Risks", the highest exposure action value of 85 dBA has not been exceeded by any person.

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