CENTRAL INSTITUTE FOR LABOUR PROTECTION
– NATIONAL RESEARCH INSTITUTE
Czerniakowska 16, 00-701 Warszawa

Notified Body No.1437 in the area of EU directives: 89/686/EEC, 2006/42/EC and 2000/14/EC

DEPARTMENT OF VIBROACOUSTIC HAZARDS

LABORATORY OF MECHANICAL VIBRATION

TEST REPORT

Order No.: 239/PB-TSB/2016/NA

Subject of the order: Tests of gloves intended for protection against vibration

Contract-holder:

Vicsa Safety Comercial Ltda.
Panamericana Norte 5151, Conchali, Santiago
Chile

Date of compilation of the test report: 07. 07. 2016.

Main performer: Piotr Kowalski

Authorized by:

KIEROWNIK ZAKŁADU
ZAGROŻEŃ WIBROAKUSTYCZNYCH
dr hab. inż. Dariusz Pleban
prof. nadzw. CIOP-PIB

Approved by:

KIEROWNIK ZESPOŁU
LABORATORIÓW BADAWCZYCH
I WZORCUJĄCYCH
mgr inż. Kinga Makuła

Copy No 2

1. Tests base

Order for tests performance dated 13. 04. 2016., received from Vicsa Safety Comercial Ltda., Panamericana Norte 5151, Conchali, Santiago, Chile.

2. Tests performer

Department of Vibroacoustic Hazards of the Central Institute for Labour Protection – National Research Institute (CIOP-PIB).

3. Tests performance location

Laboratory of Mechanical Vibration – room No 021 in the Central Institute for Labour Protection – National Research Institute, 00 - 701 Warsaw, ul. Czerniakowska 16.

4. Test objects and their description

Five pairs of gloves intended for protection against vibration type GUANTE STEELPRO ANTIVIBRACIÓN PORON, size 9, CIOP-PIB identification No: NA2/134 (Fig.1).

Fig.1. Gloves intended for protection against vibration type GUANTE STEELPRO ANTIVIBRACIÓN PORON, CIOP-PIB identification No: NA2/134

The average thickness (measured according to EN ISO 10819:2013) of the vibration-reducing pad of gloves type GUANTE STEELPRO ANTIVIBRACIÓN PORON:

- in the palm section: 7.0 ±0.1mm,
- in the finger section: 7.0 ±0.1mm,
- in the thumb section: 7.0 ±0.1mm.

5. Date of samples reception: 01. 07. 2016.

6. Date of tests performance: 06. 07. 2016.

7. Aim of the tests

The aim of the tests was to determine:

- mean corrected transmissibility $\overline{T}_{(M)}$ and $\overline{T}_{(H)}$, and
- transmissibility as a function of frequency.

8. Test method

The glove test has been performed according to the method given in EN ISO 10819:2013 „Mechanical vibration and shock - Hand - arm vibration - Method for the measurement and evaluation of the vibration transmissibility of gloves at the palm of the hand" (Method 1).

9. Test equipment

The following equipment has been used for the test:

- exciter, Ling Dynamic Systems, type V721, identification No. NA2/30/31,
- two accelerometers, Brüel & Kjaer, type 4374, identification No. NA2/99, NA2/11,
- accelerometer, Brüel & Kjaer, type 4384V, identification No. NA2/52,
- two charge amplifiers NEXUS, Brüel & Kjaer, type 2692, identification No. NA2/62, NA2/82,
- power amplifier, Ling Dynamic Systems, type PA 2000, identification No. NA2/29,
- multianalyzer system PULSE, Brüel & Kjaer, type 3560C, identification No. NA2/84,
- grip and feed force meter, PI-W Movir, type MSZN-1, identification No. NA2/32,
- platform for feed force measuring, CIOP PIB, identification No. NA2/34,
- test handle, CIOP PIB, identification No. NA2/33,
- proximity transducer, Sensor, CW 6/30, identification No. NA2/42,
- proximity transducer, Sensor, CW 18/80, identification No. NA2/43,
- vibration control and analysis system VibPilot, M+P International, identification No. NA2/70,
- electronic digital caliper, identification No. 6051695,
- measurement weight, identification No. NA2/109,

- termohigrometer, LAB-EL, type LB-103, identification No. NA2/95.

The measurement set up was calibrated using calibrator Brüel & Kjaer, type 4294-002, identification No. NA2/98.

All measurement equipment used for the tests have been calibrated and have valid calibration certificates.

10. Measuring conditions

Room temperature: 22.3 ± 0.1°C

Humidity: 44.0 ± 1%

11. Description of the tests and results

Five right gloves type GUANTE STEELPRO ANTIVIBRACIÓN PORON size 9, (CIOP-PIB identification No: NA2/134/1, NA2/134/2, NA2/134/3, NA2/134/4, NA2/134/5) have been tested using the method 1 given in EN ISO 10819:2013. Five operators wore the gloves supplied by the customer. Before beginning the tests the gloves were stored in room temperature. During the measurements operators were able to monitor the grip force and feed force continuously in order to keep them at the required levels (automatically control by measuring system). Measurements were performed during excitation of test handle by the test signal according to EN ISO 10819:2013. The mean corrected transmissibilities have been calculated from the measured data using dedicated software.

The results of glove tests are given in table 1 (mean corrected transmissibility), and in tables 2 (mean corrected transmissibility in one-third-octave frequency bands).

Table 1. Mean corrected transmissibility, standard deviation and coefficient of variation for tested gloves in frequency ranges Δf_M and Δf_H

Type of gloves	FREQUENCY RANGE Δf_M			FREQUENCY RANGE Δf_H		
	$\overline{T}_{(M)}$	Standard deviation $s_{T(M)}$	Coefficient of variation $C_{V,T(M)}$	$\overline{T}_{(H)}$	Standard deviation $s_{T(H)}$	Coefficient of variation $C_{V,T(H)}$
GUANTE STEELPRO ANTIVIBRACIÓN PORON *CIOP-PIB id. No NA2/134*	0.686	0.054	0.079	0.595	0.037	0.062

Table 2. Mean corrected transmissibility, standard deviation and coefficient of variation for tested gloves type GUANTE STEELPRO ANTIVIBRACIÓN PORON, (CIOP-PIB identification No: NA2/134) in one-third-octave frequency bands

Centre frequency of one-third-octave band *f*, [Hz]	**Operator**	$\overline{T}_{(f)}$	**Standard deviation $s_{T(f)}$**	**Coefficient of variation $C_{V,T(f)}$**
25	1	1,060	0,018	0,017
	2	1,182	0,007	0,006
	3	0,894	0,017	0,019
	4	0,824	0,017	0,021
	5	0,956	0,012	0,013
	mean	**0,983**	**0,005**	**0,005**
31.5	1	0,866	0,023	0,026
	2	1,192	0,023	0,019
	3	0,839	0,022	0,026
	4	0,713	0,032	0,045
	5	0,888	0,009	0,011
	mean	**0,900**	**0,008**	**0,009**
40	1	0,656	0,038	0,058
	2	0,864	0,043	0,050
	3	0,692	0,035	0,050
	4	0,657	0,056	0,085
	5	0,764	0,005	0,007
	mean	**0,727**	**0,019**	**0,026**
50	1	0,534	0,019	0,035
	2	0,600	0,009	0,016
	3	0,601	0,023	0,038
	4	0,685	0,085	0,123
	5	0,694	0,024	0,034
	mean	**0,623**	**0,030**	**0,048**
63	1	0,529	0,013	0,025
	2	0,537	0,015	0,027
	3	0,524	0,032	0,062
	4	0,626	0,046	0,073
	5	0,668	0,011	0,016
	mean	**0,577**	**0,015**	**0,026**
80	1	0,503	0,017	0,035
	2	0,530	0,018	0,033
	3	0,508	0,014	0,028
	4	0,564	0,041	0,073
	5	0,627	0,014	0,022
	mean	**0,547**	**0,012**	**0,021**
100	1	0,539	0,020	0,038
	2	0,575	0,018	0,031
	3	0,546	0,009	0,017
	4	0,615	0,038	0,062
	5	0,625	0,014	0,022
	mean	**0,580**	**0,011**	**0,019**
125	1	0,561	0,015	0,026
	2	0,615	0,013	0,020
	3	0,576	0,012	0,021
	4	0,621	0,022	0,036
	5	0,660	0,010	0,015
	mean	**0,607**	**0,005**	**0,008**
160	1	0,549	0,018	0,032
	2	0,627	0,012	0,019
	3	0,576	0,020	0,035
	4	0,615	0,032	0,052
	5	0,660	0,011	0,016
	mean	**0,605**	**0,008**	**0,014**

Table 2 cd. Mean corrected transmissibility, standard deviation and coefficient of variation for tested gloves type GUANTE STEELPRO ANTIVIBRACIÓN PORON, (CIOP-PIB identification No: NA2/134) in one-third-octave frequency bands

Centre frequency of one-third-octave band *f*, [Hz]	**Operator**	$\overline{T}_{(f)}$	**Standard deviation $s_{T(M)}$**	**Coefficient of variation $C_{V,T(M)}$**
200	1	0,597	0,016	0,026
	2	0,628	0,007	0,012
	3	0,594	0,018	0,030
	4	0,640	0,047	0,073
	5	0,684	0,022	0,032
	mean	**0,629**	**0,015**	**0,024**
250	1	0,618	0,022	0,036
	2	0,653	0,006	0,009
	3	0,637	0,013	0,020
	4	0,729	0,057	0,078
	5	0,745	0,011	0,015
	mean	**0,677**	**0,020**	**0,030**
315	1	0,620	0,029	0,046
	2	0,671	0,009	0,013
	3	0,687	0,019	0,028
	4	0,736	0,040	0,055
	5	0,727	0,007	0,010
	mean	**0,688**	**0,014**	**0,020**
400	1	0,566	0,020	0,036
	2	0,574	0,021	0,036
	3	0,687	0,021	0,031
	4	0,636	0,025	0,039
	5	0,647	0,009	0,015
	mean	**0,622**	**0,006**	**0,009**
500	1	0,498	0,006	0,012
	2	0,467	0,024	0,051
	3	0,621	0,027	0,044
	4	0,467	0,023	0,050
	5	0,540	0,010	0,018
	mean	**0,519**	**0,010**	**0,019**
630	1	0,392	0,006	0,015
	2	0,346	0,016	0,046
	3	0,520	0,022	0,042
	4	0,311	0,018	0,058
	5	0,405	0,002	0,005
	mean	**0,395**	**0,008**	**0,021**
800	1	0,269	0,000	0,002
	2	0,241	0,006	0,023
	3	0,433	0,026	0,060
	4	0,207	0,014	0,067
	5	0,278	0,006	0,023
	mean	**0,286**	**0,010**	**0,035**
1000	1	0,190	0,001	0,003
	2	0,173	0,003	0,018
	3	0,342	0,025	0,073
	4	0,154	0,014	0,090
	5	0,183	0,005	0,029
	mean	**0,208**	**0,010**	**0,048**
1250	1	0,136	0,001	0,006
	2	0,134	0,001	0,004
	3	0,264	0,023	0,086
	4	0,121	0,012	0,095
	5	0,130	0,005	0,037
	mean	**0,157**	**0,009**	**0,059**

12. Uncertainty of transmissibility determination

The expanded uncertainty of the transmissibility values determined on the base of measured acceleration of vibration is estimated at 18 %.

13. Criteria and main requirements for antivibration gloves

A glove shall not be considered as antivibration glove according to the EN ISO 10819:2013 standard if it does not fulfil both of the following criteria:

$$\overline{T}_{(M)} \leq 0{,}9 \text{ and } \overline{T}_{(H)} \leq 0{,}6$$

The thickness of vibration-reducing material placed in the palm section of the glove should not be greater than 8 mm.

The same vibration-reducing material shall be placed in the palm section and the finger and thumb sections of the glove. The vibration-reducing material shall cover the complete palm area of the hand and shall cover the three phalanges of each finger and the two phalanges of the thumb. The thickness of vibration-reducing material placed in the fingers and thumb sections of the glove shall be equal to or greater than 0,55 times the thickness of the vibration-reducing material placed in the palm section of the glove.

Antivibration gloves may be fabricated in which the vibration-reducing material placed in the thumb section of the gloves is not directly connected to the adjacent vibration-reducing material placed in the palm section. When this is the case, the following requirements shall be met:

- The area of the palm directly between the index finger and the thumb shall be covered by vibration reducing material that is part of the vibration-reducing material in the palm section of the gloves.
- The lacks (gap) between the thumb section and adjacent palm section vibration-reducing material should not be greater than the thickness of the palm section vibration-reducing material along the length of the lacks.
- The thumb section vibration-reducing material shall be secured in the thumb section of the gloves so that the material does not slip or move out of position during normal use of the gloves.
- Gloves that are designated as antivibration gloves according to this International Standard that will be used in workplace environments in the European Union are also required to meet the minimal requirements for mechanical risks specified in EN 388.

14. Notes

- The results relate only to the items tested.
- The test report shall not be reproduced except in full, without written approval of CIOP-PIB Laboratory.

Opinion/Interpretation

According to the requirements of the EN ISO 10819:2013 standard a glove should fulfill criteria set out in section 13 of this report. The values obtained during the tests for $\overline{T}_{(M)}$ (0.69 < 0.9) and $\overline{T}_{(H)}$ (0.59 < 0.6) for gloves type GUANTE STEELPRO ANTIVIBRACIÓN PORON, imply that this type of gloves can be considered as antivibration protection. It means that the gloves dampen vibration from the frequency range of 25 – 1250 Hz well enough and can be used as a personal protective equipment against hand-arm vibration.

THE END OF THE REPORT