REPORT

DELTA
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AV 519/97

Test of Antivibration Glove, type Prensio

Title

Test of Antivibration Glove, type Prensio

Journal no.	***Project no.***	***Our ref.***	***Date of test***
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Client

FORCE Instituttet
Park Allé 345
2605 Brøndby
Denmark

Client ref.

Leif Egon Andersen

Summary

DELTA Acoustics & Vibration has for FORCE Instituttet tested a set of gloves type Prensio according to ISO 10819:1996, "Mechanical vibration and shock - Hand-arm vibration - Method for the measurement and evaluation of the vibration transmissibility of gloves in the palm of the hand".

The minimum criteria for accepting that the gloves have antivibration properties were observed.

According to the ISO standard antivibration properties can be claimed by the manufacturer.

DELTA Acoustics & Vibration, 1997-06-19

Stig Z. Jønsson

1. INTRODUCTION

At the request of Mr Leif Egon Andersen of FORCE Instituttet, Denmark, DELTA Acoustics & Vibration has investigated vibration isolation properties of antivibration gloves type Prensio. The glove test has been performed according to ISO 10819:1996, "Mechanical vibration and shock - Hand-arm vibration - Method for the measurement and evaluation of the vibration transmissibility of gloves in the palm of the hand".

2. MINIMUM REQUIREMENTS FOR ANTIVIBRATION GLOVES

ISO 10819:1996, "Mechanical vibration and shock - Hand-arm vibration - Method for the measurement and evaluation of the vibration transmissibility of gloves in the palm of the hand" describes a laboratory method to measure, analyse, and calculate the vibration transmissibility (TR) of gloves. The transmissibility is defined as the ratio of vibration transmitted from a handle to the palm of the hand in the frequency range 31.5 Hz to 1250 Hz.

The standard states that antivibration properties for gloves only can be claimed if both the following criteria are fulfilled:

$$\overline{TR}_M < 1.0 \text{ and } \overline{TR}_H < 0.6$$

$\overline{TR}_M$ is the mean transmissibility for the medium frequency range (31.5 - 200 Hz) for an excitation spectrum defined in the standard.

$\overline{TR}_H$ is the mean transmissibility for the high frequency range (200 - 1250 Hz) for a spectrum defined in the standard.

M is a subscript used to denote the medium frequency range between 31.5 Hz (32 Hz for narrow band analysis) and 200 Hz.

H is a subscript used to denote the high frequency range from 200 Hz to 1250 Hz.

These requirements express that :

1) gloves are not allowed to amplify vibration in the M-frequency range, and

2) gloves have to reduce vibration to 60% of the level measured without the glove in the H-frequency range.

3. MEASUREMENT EQUIPMENT

The following equipment has been used for the measurement:

Description	Make	Type	Calibrated	Instr. No.
Charge Amplifier	Brüel & Kjaer	2626	96-08-13	22575/5003①
Charge Amplifier	Brüel & Kjaer	2635	96-08-13	22573/5001①
Accelerometers	Brüel & Kjaer	4374	96-08-08	85①
Accelerometers	Brüel & Kjaer	4374	95-09-29	294②
Vibration Controller	GenRad	2530	96-06-11	22598/9875①
Exciter	MB Electronics	MB EL250	N/A	Y220①
Amplifier	Ling Dynamics	LDS DPA 16	N/A	U2503①
Oscilloscope	Hewlett Packard	54501A	96-10-03	665T③
Strain-Gauge Amplifier	HBM	KWS 3073	N/A	490
DAT-Recorder	HHB PortaDAT	PDR1000	96-12-04	1076L④
Frequency Analyzer	Hewlett Packard	3562A	96-12-12	706③

The calibration is internationally traceable. All vibration and force signals have been recorded on tape during the measurements for subsequent analysis in our laboratory.

① Instrument belongs to DELTA Electronics Testing. DELTA Electronics Testing is accredited to perform vibration measurements and calibrate accelerometers according to DANAK. DANAK accreditation no. 19.

② Calibrated by DELTA Electronics Testing. DANAK accreditation no. 19.

③ Calibrated by Hewlett-Packard A/S. DANAK accreditation no. 195.

④ Calibrated by DELTA Acoustics & Vibration. DANAK accreditation no. 100.

4. MEASUREMENTS AND CALCULATIONS OF GLOVE PERFORMANCE

The measurements were performed on 4th of June, 1997, at the premises of DELTA Electronics Testing, Hoersholm, Copenhagen.

For the investigation three operators with hand sizes between 7 and 9 (as described in EN 420, "General requirements for gloves") were selected and instructed thoroughly.

A reference measurement for each operator was performed without glove for later correction of the calculated mean transmissibility. From the reference measurement the transmissibility is calculated as:

$$TR_{sb} = a_{wspb} / a_{wsRb}$$

which states the transmissibility (TR) for bare (b) hand in the frequency range s (M or H). The ratio is based on the weighted (w) level of acceleration (a) measured in the palm (p) and at the handle (R = reference point), respectively.

The grip force and feed force are defined as the force the operator uses to hold around the handle and the force applied to the excitation system in the horizontal direction, respectively. Grip force and feed force are measured simultaneously to the acceleration signals. During the measurements the operators were able to monitor the grip force and feed force continuously. They were instructed to maintain the forces within the required limits (30N ± 5N for grip force and 50N ± 8N for feed force).

Each operator was provided with one fitting glove of the model to be investigated and measurements were repeated twice while the operators were wearing the glove. The ratio:

$$TR_{sg} = a_{wspg} / a_{wsRg}$$

states the transmissibility (TR) for the gloved (g) hand (other subscripts as defined earlier). Requirements for grip force and feed force are identical to those for measurement with bare hand. According to the standard gloved hand measurements were performed twice.

Six corrected transmissibilities for each of the two spectra M and H are then calculated from the measured data:

$$TR_s = TR_{sg} / TR_{sb}$$

Finally, the corrected mean transmissibility $\overline{TR}_s$ is calculated.

Measurement conditions and procedures are described in more detail in ISO 10819:1996, "Mechanical vibration and shock - Hand-arm vibration - Method for the measurement and evaluation of the vibration transmissibility of gloves in the palm of the hand".

5. MEASUREMENT RESULTS

Glove tested:

Description	Condition	Left/Right	Material	Size
Prensio	New	L/R	Leather	M

The three operators selected are:

Name	No.	Hand length	Circumference	Size
S. Joensson	1	191 mm	217 mm	9
K. Smith	2	196 mm	222 mm	9
O. Truelsen	3	194 mm	216 mm	9

Measurement Conditions

Humidity: 52%
Temperature: 25°C

The transmissibilities have been calculated on the basis of narrow band spectra and indicates the mean value of acceleration between 32 Hz to 200 Hz with a 0.25 Hz resolution for the M-spectrum and 200 Hz to 1250 Hz with a 1.6 Hz resolution for the H-spectrum.

M-spectrum measurements for glove type Prensio:

Spectrum	Operator	Glove	TR_{Mb}	TR_{Mg}	TR_{M}
M	1	none	0.9949		
M	1	1		0.8197	0.8230
M	1	1		0.7172	0.7201
M	2	none	0.9836		
M	2	1		0.7255	0.7368
M	2	1		0.7682	0.7802
M	3	none	0.9868		
M	3	1		0.7771	0.7875
M	3	1		0.7641	0.7743

Calculated mean transmissibility for glove - spectrum M (1 STD):

$$\overline{TR}_M = 0.77\ (0.03)$$

H-spectrum measurements for glove type Prensio:

Spectrum	Operator	Glove	TR_{Hb}	TR_{Hg}	TR_H
H	1	none	0.9960		
H	1	1		0.5359	0.5381
H	1	1		0.5215	0.5236
H	2	none	0.9847		
H	2	1		0.6279	0.6377
H	2	1		0.4928	0.5005
H	3	none	1.0112		
H	3	1		0.5293	0.5235
H	3	1		0.6304	0.6235

Calculated mean transmissibility for glove - spectrum H (1 STD):

$$\overline{TR}_H = 0.56\ (0.05)$$

6. RESULT OF THE GLOVE TESTS

Transmissibilities for glove type Prensio:

$$\overline{TR}_M = 0.77 < 1$$
$$\overline{TR}_H = 0.56 < 0.6$$

The minimum criteria mentioned in the ISO 10819:1996 standard are, thus, fulfilled.

7. CONCLUSION

DELTA Acoustics & Vibration has for FORCE Instituttet tested a glove type Prensio according to ISO 10819:1996 "Mechanical vibration and shock - Hand-arm vibration - Method for the measurement and evaluation of the vibration transmissibility of gloves in the palm of the hand". It has been found that the minimum criteria mentioned in the standard draft were observed.

Antivibration properties can therefore (with reference to the standard) be claimed by the manufacturer of these gloves.

EF typeafprøvningsattest for personlige værnemidler

Nummer: DK-0200-C.584

udstedt af FORCE-Dantest CERT, Danmark
EF-notificeret organ nummer 0200

I overensstemmelse med Arbejdstilsynets bekendtgørelse nr. 1273 af 18. December 1996, som i Danmark gennemfører Rådets direktiv nr. 89/686, nr. 93/68, nr. 93/95 og nr. 96/58, udstedes EF typeafprøvningsattest til:

PRENSIO AB
Kvarnängsgatan 3
S-598 22 Vimmerby
Sverige

for værnemiddel: **Vibrationsdæmpende arbejdshandsker**

med leverandørbetegnelse: **PRENSIO str. M og L**

der fremstilles af: **PRENSIO AB, Sverige**

De undersøgte eksemplarer er fundet at opfylde kravene til:

DS/EN ISO 10819:1996 for Band-limited HA-weighted measurement in defined exication frequency ranges: M (31.5-200 Hz) og H (200-1000 Hz) samt de relevante krav i bilag II til bekendtgørelse nr. 1273.

Den typeafprøvede model og grundlaget for typegodkendelsen er beskrevet i bilaget til typeafprøvningsattesten. Fabrikanten skal underrette FORCE-Dantest CERT om enhver påtænkt ændring.

Udstedelsesdato: 1998-03-04 Underskrift:

Bent Larsen
Direktør

FORCE-Dantest CERT
Park Allé 345
DK-2605 Brøndby
Tlf. 43 26 70 00
Telefax 43 26 70 11

FORCE INSTITUTTET

Fremstilling

Hele handsken: PRENSIO AB

Materialer

Handskelæder: Fåreskind, SUB MM .35/.45 P 0432, C.W. Pittard & Co., England
For: Gedeskind
Vibrationsdæmpende materiale: Neopren cellegummi, Nep 440, National Gummi AB

Typegodkendelsesattester, norm krav

DELTA Acoustics & Vibration: Journal No. AV 519/97

Delkonklusion: Krav i DS/EN ISO 10819:1996 for Band-limited HA-weighted measurement in defined exication frequency ranges: M (31.5-200 Hz) og H (200-1000 Hz) fandtes opfyldt for de udførte prøvningspunkter.

Dokumentation for overholdelse af relevante krav i bilag II til Arbejdstilsynets bekendtgørelse nr. 1273

Følgende dokumentation foreligger:

Beskrivelse af kontrolsystem: Beskrivelse af 1998-01-25
Erklæring om uskadelighed: Erklæring af 1998-01-25
Brugsanvisning: Anvisning af 1998-01-25

Konklusion
På baggrund af ovennævnte attestation kan det konkluderes, at vibrationshandsken kan EF-typegodkendes i henhold til Arbejdstilsynets bekendtgørelse nr. 1273 af 18. december 1996.

Dato: FORCE-Dantest CERT

02-03-1998 Leif Egon Andersen

MP 78933/m1440-227

Bilag til
EF typeafprøvningsattest for personlige værnemidler

Nummer: DK-0200-C.584

udstedt af FORCE-Dantest CERT, Danmark
EF-notificeret organ nummer 0200

Udstedt til:	PRENSIO AB Kvarnängsgatan 3 S-598 22 Vimmerby Sverige
for værnemiddel:	Vibrationsdæmpende arbejdshandsker
med leverandørbetegnelse:	PRENSIO str. M og L

Udformning