



1.19 Noise, ultrasound and vibration protection

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This standard applies to buying and projecting machines, technology, transport facilities (fork lift trucks, conveyors and their motors) or components of facilities (hereafter as machines/machinery) as well as working means and tools (hereafter as tools). Requirements stated in the standard apply also for machine equipment of integrated companies which is located on ŠKODA AUTO's premises. In the cases where this is technically feasible and economically viable the standard applies also for machines and tools after general inspection.

Technical procedures aiming to reduce noise from the machines and tools (protection from noise emissions and imissions) are not a subject matter of the present standard. Dampening of the noise from machines and tools is performed based on specific acoustic studies.

Requirements on acoustic parameters of the machines and tools stated in this standard are in keeping with the demands of the ordering party as well as with legal regulations of the Czech Republic (section 5).

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The latest updated version of this ITS is available at the "<http://cts.skoda-auto.com/>" web site, the company is not obliged to notify their business partners on the ITS update.

Therefore we strongly recommend that everybody checks the ITS regularly. These documents become valid on the date of their last update. For the contracts signed is decisive the validity of the ITS at the time of the order.

Note: In case of any differences between the Czech, English or German language mutation of this ITS, the Czech version takes precedence. The Czech version is available at <http://cts.skoda-auto.com/>.

First issue: 1993-09-24

Change - number:	Date:	Remark:
1.	1997-06-01	fully revised
2.	2001-03-16	new legal requirements added
3.	2002-02-01	Arial font, ŠKODA AUTO logotype
4.	2010-12-21	fully revised
5.	2012-02-28	revised
6.		



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1 Noise

1.1 Emission limits

1.1.1 Requirements on noise emission values at workplaces is based on legal regulations applicable in the Czech Republic (Government regulativ no.502/2000 Coll.) and EG regulations (Committee standards no.86/188/EWG). Noise emission values permissible for electric revolving machines are stipulated by ČSN EN 60034-9 ed.2.

1.1.2 Noise emission from the machines and tools must be reduced to the lowest possible level according to the current state of technology. In particular it is necessary to prevent impulse noise. This may be achieved through the use of procedures that are as silent as possible, suitable construction-acoustic designs of machines and tools and integrated secondary protection against noise (acoustic shields).

1.1.3 The level of acoustic pressure $L_{pA,1m}$ (medial value of noise emission on a measuring surface of the referential cube 1m from the machine, tool) and the level of acoustic pressure at working spaces $L_{pA,eq}$ (noise level of the machine and tools at working spaces) may be maximally: $L_{pA,eq}$

a)	in production shops	80 dB (A)
b)	in administration spaces where simple or mechanical administration work is conducted	60 dB (A)
c)	in calm administration spaces where mental activities are mostly performed	45 dB (A)

1.1.4 Level of acoustic pressure $L_{pA,1m}$ is obtained as a medial value of multiple $L_{pAi,1m}$ values measured at measuring surfaces of the referential cube 1m from the machine, tool. The individual levels of $L_{pAi,1m}$ must not exceed the medial value $L_{pA,1m}$ by more than 5 dB.

1.1.5 Discrete tones in the machine's noise are not permissible. The noise is regarded as tone (discrete) of the level of discrete octave in the octave range exceeds the neighbouring octaves by more than 5 dB.

1.1.6 Levels of noise imissions at working spaces $L_{pA,eq}$, non-production facilities (indirectly connected with the production o fair-technical unit and its outlets, heat sources, conveyors and their motors and other sources of noise in the surroundings of the working station) must not exceed the level of acoustic pressure of 70 dB(A) in the production shop working stations and in other spaces of the level stated in section 1.1.3.b), c). This requirement must be followed when drawing projecting the placing of machines, non-production afilities and designing working tools.

1.2 Measuring noise emissions

1.2.1 Methods of measuring and recording the measured values are stipulated based on the design of the machine and tools by the following technical guidelines: ČSN EN ISO 11201, ČSN EN ISO-3746, ČSN EN ISO-11201, ČSN EN ISO-7779, ČSN EN ISO1680.

1.2.2 Pro Operational parameters expected apply for the operational status of machines or tools. This is mostly maximal nominal power in a loaded operation. Any deviations thereof must be clearly stated and justified. Length of measuring must be adapted with regard to the operational status to include it completely.

1.2.3 Values of noise emissions are determined as a permanent equivalent level of the acoustic pressure A under the conditions stated in section 1.2.2. If the machine emits sound surges (impulses shorter than 0.2 exceeding the background noise by more than 10dB), noise impulsiveness $\Delta L = L_{pAi,eq} - L_{pA,eq}$ is recorded (sound is regarded as impulse if $\Delta L > 2,0$ dB).



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1.2.4 If emitted by the machine or tool level of high frequency noise emission is measured at the working stations as an equivalent value of acoustic pressure in free-octave bands of 8 to 16 kHz. The logarithmic total of basic L_{teq} levels in three-octave bands of 8, 10, 12,5 and 16 kHz can reach a maximum level of 70 dB.

1.2.5 If the ordering party allows this the level of acoustic pressure $L_{pA,1m}$ may be measured in opposing points on a simple measuring surface in the machine's surrounding 1m far from the machine's surface and at the height of 1.6m above the basic working surface of the machine (para. 7.6)

2 Ultrasound

2.1 The level of ultrasound emission of a machine/tool must be as low as possible based on the current status of technology. The logarithmic total of the basic levels L_{teq} in ultrasound frequency bands may reach maximal level of 105 dB.

2.2 Level of ultrasound emission of a machine/tool is measured at working spaces in basic three-octave bands L_t 20, 25, 31,5 a 40 kHz.



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3 Mechanical vibrations

3.1 Assessing mechanical vibrations at work places is conducted in line with ČSN ISO 2631 a ČSN EN ISO 5349-1.

3.2 Emissions of machine and tool vibrations must be maintained as low as possible based on the current status of technology used for reducing vibrations and reduced by secondary measures (active isolation by vibration dampeners) to the lowest possible level to fulfil the requirements stated in paras. 3.3 and 3.4.

3.3 Effective measured level for speeding the total vibrations in three-octave frequency bands from 0.5 to 1000 Hz for the vibrations of the whole body (vertical and horizontal) for working activities while standing and sitting can reach the following maximum levels for machines:

a)	in common operational spaces	vertically	$0,050 \text{ m s}^{-2}$
		horizontally	$0,035 \text{ m s}^{-2}$
b)	for activities with higher demands on exactness and concentration	vertically	$0,032 \text{ m s}^{-2}$
		horizontally	$0,022 \text{ m s}^{-2}$

3.4 Comprehensive measured level of the total vibration acceleration transferred to hands a_{vwp} in three-octave band of 8 to 1000 Hz may be a maximum of $1,4 \text{ m s}^{-2}$ for tools.

3.5 Measuring and recording of acceleration values of the overall vibrations is conducted in line with ČSN ISO 2631 a ČSN ISO 5349. Measurements are conducted on working stations of the machine under the conditions stated in para. 1.2.2.

4 Fire-technical requirements

4.1 Materials used for sound isolation must be inflammable and must adhere to ČSN 730804, construction material class D1 or D2. The above mentioned ČSN and testing protocols issued by state material testing centres in the Czech Republic are decisive for documentation of the construction material class.

4.2 Exceptions from these stipulations are permissible only in justified cases with a explicit agreement of the PSU/1 department.



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5 Requirements in technical offers of machines, tools

5.1 All acoustic parameters of a machine, tools (noise, ultrasound, vibration) is submitted by the supplier to the ordering party for assessment always in the form of a protocol in line with para.7 which is an integral part of the technical offer (the supplying party may also enclose their measurement protocols or binding acoustic study). At the same time all dominant noise, ultrasound and vibration sources must be stated including the description and values of noise, ultrasound and vibration levels (para.7.3).

5.2 The protocol must document that acoustic parameters of a machine/tool correspond with the current state of the noise reducing technology (referring to the noise emission values and vibrations of comparable machines).

5.3 Operation manual for a machine/tool that reduces vibrations must always contain maximum time of exposition of the employee when using the machine in eight-hour working shift.

5.4 If the supplier cannot fulfil the requirements of paras. 1.1, 1.2, 2.1, 3.3, 3.4, 4.1 (e.g. for presses, vibration machines, etc.) or if the acoustic measurements cannot be performed and it is further necessary to take any actions regarding the construction of machines, tools, basement alterations or construction alterations of buildings the ordering party must recese an explicit memo regarding the fact.

5.5 All acoustic parameters of the machine/tool in line with paras. 1.2, 2.2, 3.5 are provided by the supplier to the ordering party completely free of charge.

6 Guidelines, standards

6.1 Legal regulations:

Government ordinance no.502 on health protection from harmful effects of noise and vibrations.

6.2 EG regulations

Committee standards from 14.06.89 regarding the legal regulations of the member states for machines (89/392/EWG).

Committe standards from 12.05.86 on the protection of workers from the danger imposed by the noise at the workplace (86/188/EWG).

6.3 ČSN IEC ISO and EN Guidelines

ČSN EN ISO 11201

Acoustics – Noise emitted by machines and facilities – Measuring emission levels of acoustic pressure at the operator's station and other designated places – Technical method in an approximately free field above the reflective surface; the guideline is identical with ČSN EN ISO 11201

ČSN EN 60034-9 ed.2 Revolving electric machines. Volume 9: Noise values permissible; the standard contains ČSN EN 60034-9 ed.2 including repairs from 3.1991

ČSN EN ISO 3746 Acoustics – Determining the values of acoustic power of noise sources using acoustic pressure – Operational method of measuring in free field above the reflective surface
The guideline is identical with ČSN EN ISO 3746 including repairs from 12. 1995.

ČSN EN ISO 1680 Acoustics – Testing regulation for measuring noise dispersed through air, emitted by revovling electric machines. Part 2: Operational method; the guideline is identical with ČSN EN ISO 1680.

ČSN EN ISO 7779 Acoustics – Measuring noise dispersed through air emitted by office technology.



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ČSN ISO 9296 Acoustics – The values of noise emissions of information and office technology declared.

ČSN ISO 2631-1 Assessing the exposition of a man to overall vibrations.

ČSN EN ISO 5349-1 Guideline for measuring and assessment of exposition to vibrations transferred on hands.

ČSN 730804 Fire safety of constructions for production compounds



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7 PROTOCOL FOR ITS 1.19 Noise, ultrasound and vibration protection

7.1 Data on machines and tools

7.1.1 Labelling/type

7.1.2 Manufacturer.....

7.1.3 Year of production

7.1.4 Inventory number

7.1.5 Placement

7.1.6 Electric nominal power.....

7.1.7 Manner of use

7.1.8 Operational conditions for measuring/presupposition.....

7.1.9 Remarks.....

7.2 Emission levels of noise, high-frequency noise, ultrasound and vibrations

If the measuring cannot be performed, please state the levels of noise according to the binding acoustic study. Operational status must adhere to para. 1.2.2 of ITS 1.19 and possible deviations must be stated.

7.2.1 Value of average noise emission on the measuring surface of 1m $L_{pA,1m}$ dB[A]

7.2.2 Level of acoustic pressure $L_{pA,eq}$ at the working station dB[A]

7.2.3 Impulsiveness at the working station $\Delta L = L_{pAi,eq} - L_{pA,eq}$ dB

7.2.4 Presence of discrete tone at Hz, reaches level L_{po} dB

7.2.5 Emission level of high-frequency noise L_{teq} in the band of 8 to 16 kHz dB

7.2.6 Maximum level of noise emission in the distance of 1m at the height 1.6m
(see ITS 1.19 para 1.1.4) $L_{pAi,1m}$ dB[A]

7.2.7 Level of ultrasound emission L_{teq} in the band of 20 to 40 kHz reaches dB

7.2.8 Weighted level of total vibration acceleration for whole body emissions a_{ewp}
vertically..... (ms^{-2})
horizontally..... [$m s^{-2}$]

7.2.9 Comprehensive weighted level of total vibration acceleration transferred to hands a_{vwp} [$m s^{-2}$]



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7.2.10 Measurement realized (location, time, measurement description, remarks
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7.3 Sound sources

7.3.1 Which sound sources determined the total noise level? (Please give the maximum level L_{AFmax} and possibly also statistic values of levels L_5 or L_{10}
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7.4 Measures preventing noise emissions

7.4.1 Which primary and secondary measures reducing noise, ultrasound and vibrations have been used?
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7.4.2 Do the noise reducing alterations used correspond to the current of noise dampening technology?

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7.4.3 Which other measures reducing noise, ultrasound and vibrations are proposed and what reduction of values measured can be achieved?

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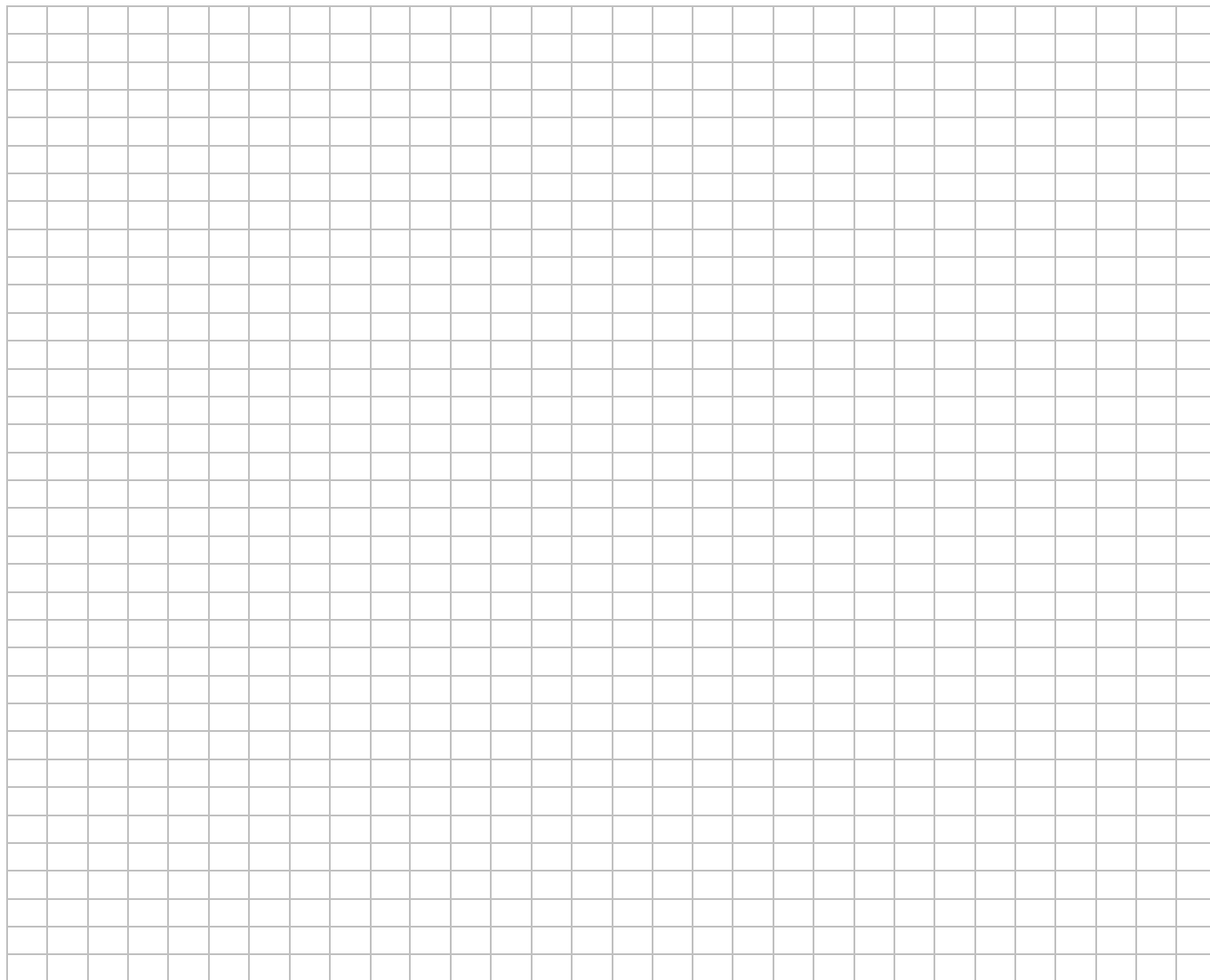
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- 7.5 Situation plan Situační pláněk. Načrtněte orientační půdorys stroje a vyznačte umístění měřicích bodů: For orientation please draw the machine floor plan and highlight the placement of measuring points:



- Measuring points Měřicí body $i = 1$ až n 1 2 3 4 5 6 7 8 9 10.
- Noise levels of a machine at measuring points Hladiny hluku stroje na měřících bodech (1m/1,6m)
 $L_{pAi, 1m}$ dB(A) podmínka: $b) - c) > 3$ dB.
- Background noise of the machine at measurement spots – off-status (1m/1,6m) $L_{pA, 1m}$ dB(A) without b).
- Correction of machine background noise, $K1$ 0 - 3 dB
 for $b) - c) > 3$ applies $K1 = 3$, for $b) - c) > 4$ applies $K1 = 2$, for $b) - c) > 6$ applies $K1 = 1$, for $b) - c) > 10$ applies $K1 = 0$
- Correction for testing environment (noise reflectiveness of the environment $K2$ dB mostly 0 - 6 dB.
- Levels of noise emissions $L_{pAi, 1m}$ dB(A) $b) - d) - e)$.
- Level of acoustic pressure on a measuring surface of 1m (average value of machine noise emission).
 $L_{pA, 1m} = 10 \log (1/n \sum 10^{0,1 L_{pAi, 1m}})$ [dB(A)] for measuring points 1 – n.
- Levels of acoustic pressure at working stations $L_{pA, eq}$ dB[A] $h) - i) > 3$ dB.
- Noise background at working stations $L_{pA, eq}$ dB[A] without h).
- Correction for background noise at working stations $K1 + K2$ dB like for d) and e).
- Levels of acoustic pressure at working stations $L_{pA, eq}$ dB[A] $h) - k)$.
- Noise impulsiveness at working stations $\Delta L = L_{pAI, eq} - L_{pA, eq}$ [dB].
- Linear levels of high-frequency noise at working stations L_t at 8, 10, 12,5 a 16kHz.
- Linear levels of ultrasound at working stations L_t at 20, 25, 31,5 a 40 kHz.

7.7 Poznámky a upřesňující sdělení: Remarks and specifying notes:

[illegible]