ISO 22955 – Acoustic quality of open office spaces

Progress and content update

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The history

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The history

- ISO committee convened in December 2017
- ISO TC/43
- Meetings so far in Paris, London, Birmingham, Madrid and Amsterdam
- Contributors from France, Germany, UK, US, Netherlands, Sweden and Norway
- Initially based on NF S31-199
- Desire to use ISO 3382: 3 parameters in international application
- Low levels of input from key stakeholders such as Netherlands, Finland and Australia
- Final CD draft issued to ISO for internal comment and comments received
- Draft International Standard now complete
- Publication 2020

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Key features

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Scope

- Space type 1: when the activity isn’t known yet – vacant floor plate;
- Space type 2: activity mainly focusing on outside of the room communication (by telephone/audio/video);
- Space type 3: activity mainly based on collaboration between people at nearest workstation;
- Space type 4: activity based on a small amount of collaborative work;
- Space type 5: activity which may involve receiving the public;
- Space type 6: combining activities within the same space.

Design for privacy

Interaction	Acoustic challenges	Description, criterion	Target values	Required values
At workstation	Improving intelligibility at workstation (telephone activity: frequent short conversations) Limiting noise exposure	Achieving a suitable signal-to-noise ratio	$L_{Aeq,T}$ < 55 dB [a]	
Between workstations	Reducing disturbance between adjacent workstations	Increasing discretion by reducing intelligibility between workstations		Attenuation $D_{A,S} \geq$ 6 dB
On the floorplate	Minimising effect of many simultaneous sources Preventing "Lombard" effect Reducing voice-related disturbance	Attenuating amplification inherent to room as much as possible by reducing reverberation Reducing voice propagation in room		$T_r \leq$ 0,5 s [b] $T_r \leq$ 0.8 s at 125 Hz Noise reduction inside room $D_{2,S} \geq$ 7 dB Lp,A,S,4 m ≤ 47

[a] During activity (see Annex E)

[b] Arithmetic mean of times for octave bands centred on 250 to 4000 Hz

Table 1 – Acoustic indicators and values when activity mainly focusing on outside of the room communication (by telephone/audio/video)

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Design for collaboration

Interaction	Acoustic challenges	Description, criterion	Target values	Required values
At workstation	Ability to communicate without raising voice	Good to excellent intelligibility at workstation when speaking normally	$L_{Aeq,T}$ < 52 dB[a]	
Between workstations	Communicating between team members Satisfactory intelligibility within team when speaking normally	Moderate attenuation between same team workstations		Attenuation $D_{A,S} \leq 4$ dB
On floorplate	Reducing disturbance between teams	Attenuating amplification inherent to room as much as possible by reducing reverberation Reducing noise in room by doubling distance		$T_r \leq 0.5$ s [b] $T_r \leq 0.8$ s at 125 Hz $D_{2,S} \geq 8$ dB $L_{p,A,S,4\,m} \leq 48$ dB

[a] During activity (see Annex E)

[b] Arithmetic mean of times for octave bands centred on 250 Hz to 4000 Hz

Table 3 – Acoustic indicators and values when the activity is mainly based on collaboration between people at the nearest workstation

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Design for general use – some collaboration

Interaction	Acoustic challenges	Description, criterion	Target values	Required values
Workstation	High level of intelligibility at workstation	Low ambient noise Intelligibility good to excellent when speaking at normal level	$L_{Aeq,T}$ < 48 dB [a]	
Between workstations	Need for discretion among workstations Average intelligibility among workstations	High level of attenuation		Attenuation $D_{A,S} \geq$ 6 dB
On floorplate	Reducing disturbance from conversations in other services	Attenuating amplification inherent to room as much as possible by reducing reverberation Reducing noise in room by doubling distance		T_r < 0.5 s [b] T_r < 0.8 s at 125Hz $D_{2,S} \geq$ 7 dB $L_{p,A,S,4m} \leq$ 47

[a] During activity (see Annex E)

[b] Arithmetic mean of times for octave bands centred on 250 Hz to 4000 Hz

Table 4 – Acoustic indicators and values when the activity is mainly based on a small amount on collaborative work

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Design for public offices (e.g. ticket offices)

Interaction	Acoustic challenges	Description, criterion	Target values	Required values
Workstation/ counter	High level of intelligibility at workstation	Acceptable ambient noise	$L_{Aeq,T}$ < 55 dB [a]	
Between workstations	Need for discretion between workstations	High level of attenuation		Attenuation $D_{A,S} \geq$ 6 dB
On the floorplate	Ensuring that ambient noise level at reception workstations shall not disturb intellectual work or concentration and shall ensure a high level of comfort. Providing adequate isolation from outside noise Minimising extent of disturbance due to noise emissions (customer, incoming call, signals, etc.)	Attenuating amplification inherent to room as much as possible by reducing reverberation Providing adequate isolation from outside noise		T_r < 0.8 s [b] T_r < 1.0 s at 125 Hz $L_{Aeq\ 1hr}$ < *50 dB - unoccupied*

[a] During activity (see Annex E)

[b] Arithmetic mean of times for octave bands centred on 250 Hz to 4000 Hz

Table 5 – Acoustic indicators and values when the activity may involve receiving the public

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$D_{A,S}$

Source / receiver space type	Informal meetings (open plan)	Outside of the room communication (phone)	Collaborative	Non-collaborative	Focussed phone	Focussed individual work
Social and welfare	15	15	18	24	27	32
Informal meetings (open plan)	15	12	15	21	24	29
Outside of the room communication (phone)			12	18	21	29
Collaborative				18	21	26
Non-collaborative					18	23
Focussed phone					21	26

Table 6 – Potential $D_{A,S}$ ratings between different types of spaces [4]

The global A-weighted in-situ level difference for a speech spectrum is:

$$D_{A,S} = L_{p,A,S,1m} - L_{p,A,S} \text{ (dB)}$$

where

$L_{p,A,S,1m}$ is the A-weighted sound pressure level at a distance of 1m in the free field from the acoustic centre of the loud speaker source for a speech source spectrum;

$L_{p,A,S}$ is the A-weighted sound pressure level at a certain point for the speech source spectrum

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Cat A design

Acoustic challenges	Description, criterion	Target values	*Required values*
Minimising effect of many simultaneous sources Preventing "Lombard" effect	This parameter should only be assessed if a suspended ceiling has been installed. Attenuation of the amplification of the room as much as possible by reducing reverberation.		$\frac{A}{SFloor} \geq 0.9$
Limit the disturbance due to exterior noise	Attenuation of exterior noise		Internal noise level (ventilation turned off): - $L_{Aeq,T} \leq 41$ dB* without reverberation control - $L_{Aeq,T} \leq 38$ dB* where reverberation control is in place
Limit the disturbance due to interior noise sources	Limit the noise level of equipment such as ventilation systems, elevators...		Intermittent Lmax < 40 dB
Avoid poor insulation between adjacent spaces in case of subdivision	Attenuation of interior noise		$D_{nT,A} \geq 40$ dB. Between created spaces
Support future sub-division of the space	Control of sound insulation within a tenancy		$D_{nf,w}$ for mullions and transoms of ≥ 50 dB
* These values account for the lack of reverberation control and furnishings in the space with a view to achieving 35 dB when in use.			

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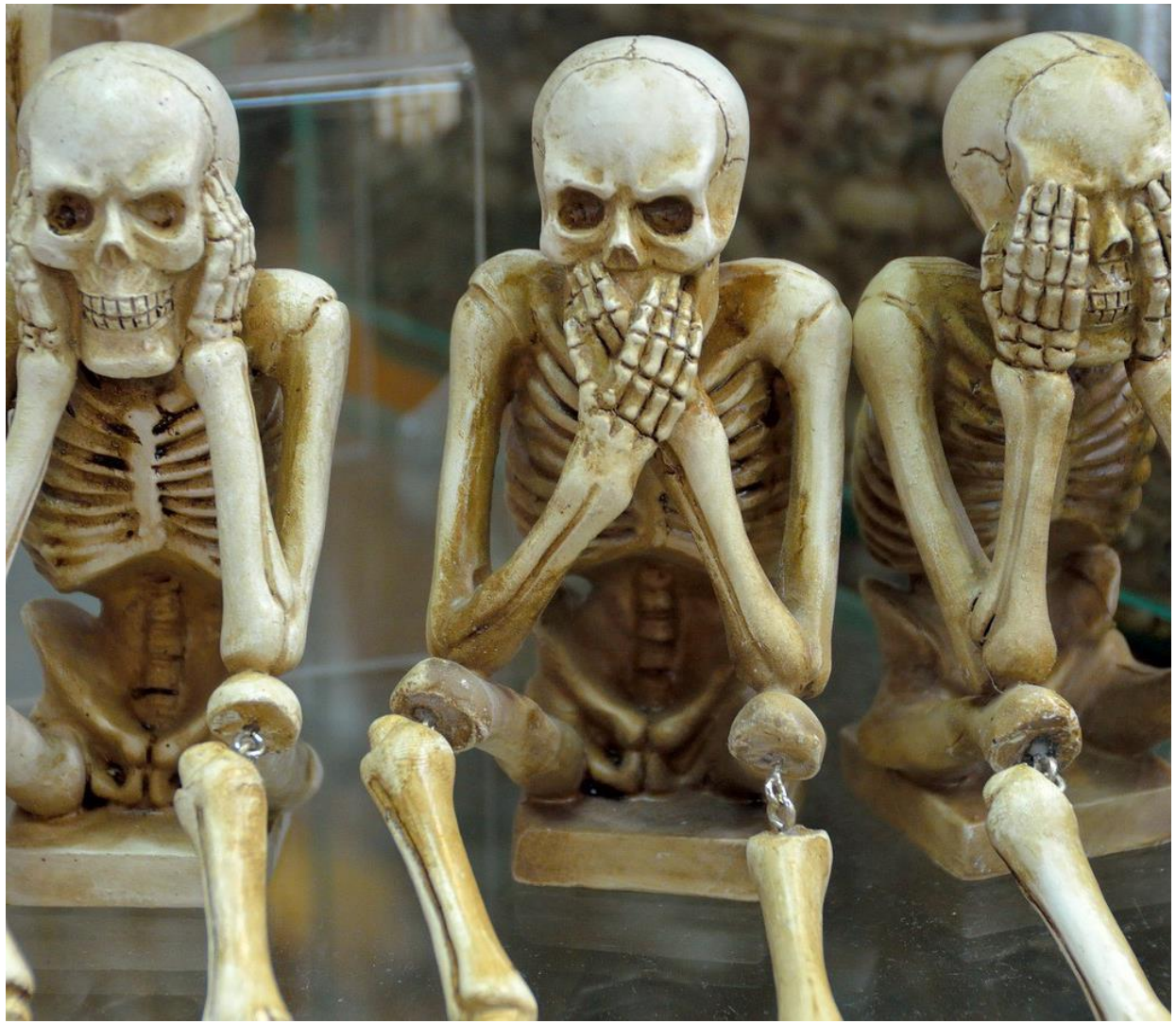
Key issues

Bones of contention

- Long discussions about STI
  - Inaccurate to use in design and measure?
  - Surely everything comes down to STI?
- Long discussions about background noise
- Occupancy density
  - In Europe 1:10 or 1:12 m^2
  - In co-working can be 1:4 m^2
- Cultural differences and expectations
- National guidance and rating systems in Scandinavia
- Different concepts of Shell & Core, Cat A and Cat B
- Conflicts with national and local guidance
  - Legislation takes precedence



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Key issues

- Many of the target criteria unproven, based on theory
- Strict labour laws in France and Germany
- Different working styles
  - UK, US and Netherlands more collaborative working
  - Central Europe more autonomous working
  - Scandinavia silent at desks
- Co-working!
- Speech masking highly contentious
- Each member country does things differently!
- End product will be majority, not consensus, view
- Consultation responses welcome

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