UD 2014 Conference

Norwegian acoustic building criteria and socio-acoustic study on accessibility for all

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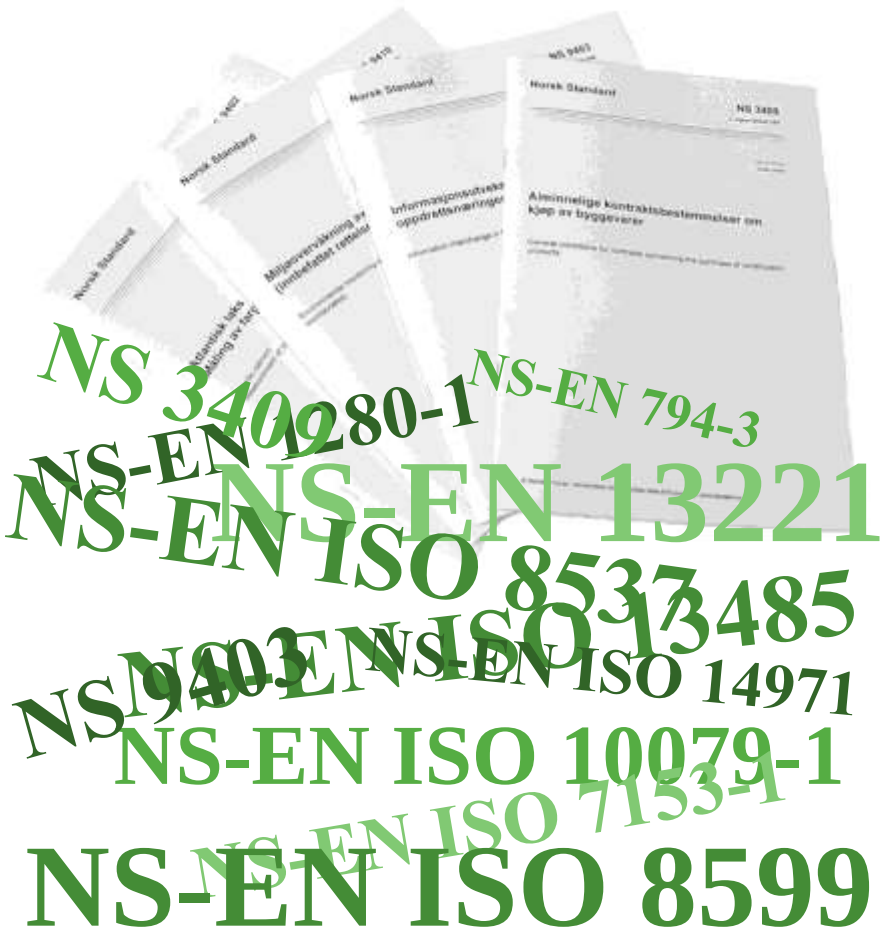
About Standards Norway

NATIONAL STANDARDISATION BODY

- Private and independent member organisation
- Develops standards in most fields
- Annual adaptation of 1 200 Norwegian Standards
- Norway's member of CEN and ISO
- Funding through Government grants, project financing and royalties from the sale of standards
- Non-profit – incomes are re-allocated to standardisation activities

What is a “standard”?



STANDARD

- description of a product, a system or a process
- a suggested alternative, but other options possible
- made by stakeholders in need for system and regulations in the market
- are voluntary to use

standard norge

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Norwegian building codes and standardisation

The Norwegian building codes

- Acoustics is an important factor for universal design, among others in buildings
- Require fulfilment of needs for hearing and vision impaired so that no additional measures need be taken later in the building itself
- Norwegian standard NS 8175 provides technical criteria for noise and sound insulation for indoor conditions, outdoor noise nearby buildings and inn surrounding outdoor areas

Revision of Norwegian acoustic criteria

- Was made as a consequence of the new legal requirements for universal design in the building codex
- To find out how acoustic and noise conditions were functioning for hearing and vision impaired in public/work buildings a socio-acoustic survey was conducted among members of relevant groups.
- Objective: Find out what types of buildings should be regulate and find suitable limit values regarding degree of annoyance.

The importance of acoustic conditions

- Acoustic conditions are of utmost importance for speech communications and general behaviour
- For people with normal hearing and vision and even more critical for those with reduced hearing and vision, including elderly
- Poor acoustic conditions will require
  - a higher degree of efforts to handle tasks
  - stress and fatigue will often be the result

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Socio-acoustic survey

Socio-acoustic survey

QUESTIONNAIRE

- Some examples of questions:
  - *“How annoyed have you been by sound and noise conditions during the last 12 months in restaurants, cafés and canteens?”*
  - *“How often do you find it difficult to work and concentrate in office/school open plan spaces due to noise from the talk of others?”*
  - *“How often do you find it difficult to have a conversation in foyers or swarm areas in cultural centres or assemblies due to noise from speech?”*
- Questionnaire based on ISO/TR 15666 concerning annoyance and noise studies:
  - 5-point annoyance scale for replies plus «not relevant» or «do not know»

Socio-acoustic survey

SELECTED SAMPLE

- The written questionnaire was sent to 1183 subjects
  - Responses from 271 hearing impaired, final percentage 23 %
- For the telephone interviews, the number of selected subjects was originally 683, but the interviewer was able to come into contact only with 347 of these:
  - Responses came from 250 visually impaired, final percentage 37 %

Socio-acoustic survey

- The questionnaire was relatively long (about 10 pages) which may have influenced the low percentage of replies
- For telephone interviews, reasons for low reply percentage were e.g.:
  - The subjects did not answer the phone,
  - They asked the interviewer to call back later, or
  - The selected subjects did not wish to participate in the study

Socio-acoustic survey
- Among visually and hearing impaired people

NIBR Notat 2011:102

- Survey conducted by Norwegian Institute for Urban and Regional Research (NIBR)
- Survey on experience of acoustic conditions in rooms and spaces in public buildings and work premises, and some outdoor areas
- Questionnaire among the hearing disabled people

Socio-acoustic survey

- AMONG VISUALLY AND HEARING IMPAIRED PEOPLE

- Telephone interview of the visually disabled people
- Annoyance scale from ISO/TS 15666:2003 was used
- Large differences between hearing and visually disabled people
- The results will probably be studied and analysed further in the future

Annoyed hearing and visually impaired people

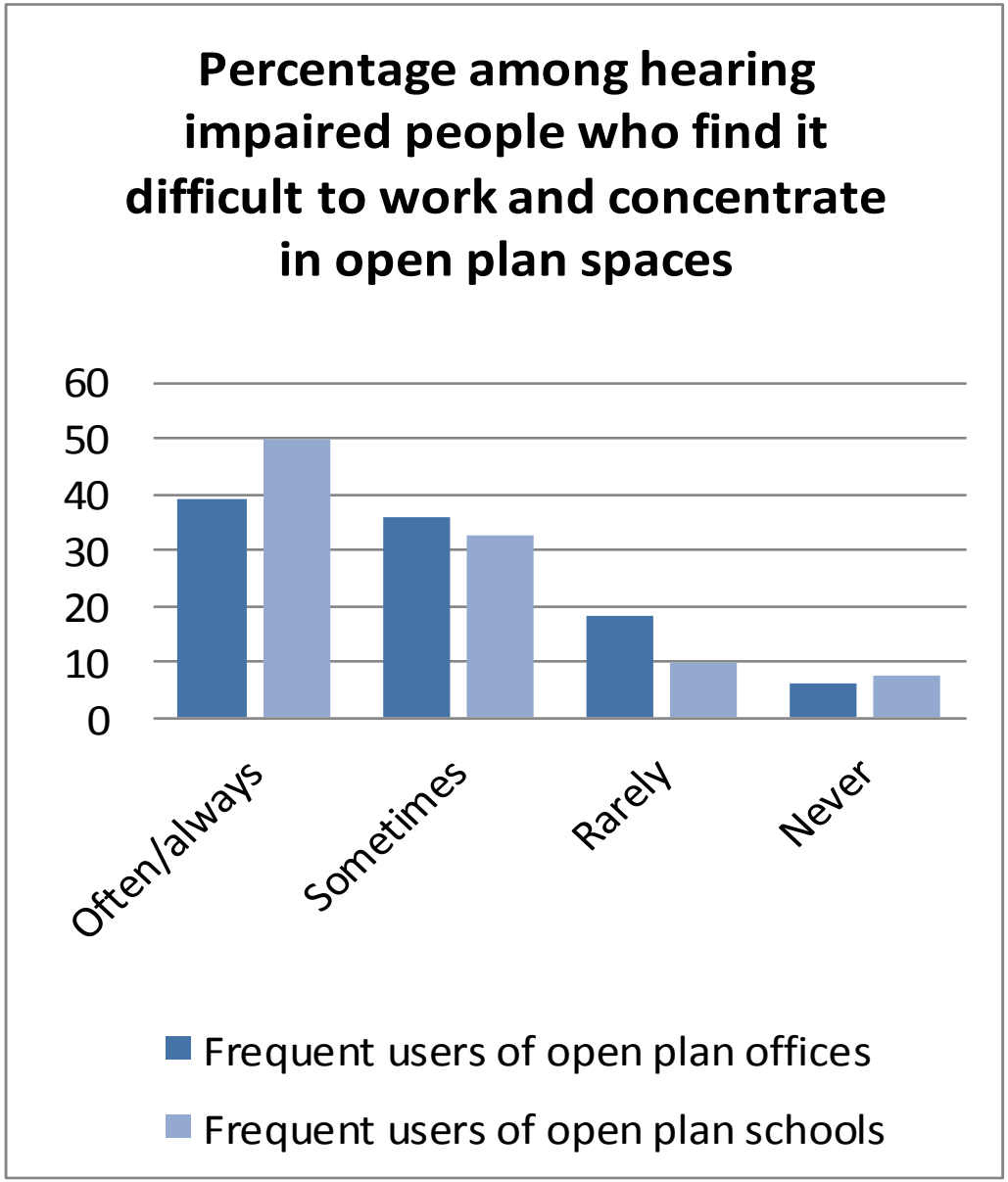
- Very much or extremely annoyed in % in different premises or spaces

	Hearing %	Vision %
Production hall	61,2	16
Cafeteria/Restaurant/Café	49,8	12,8
Exposition and congress halls	47,6	16,3
Sports halls	46,8	15,7
Swimming pools	44,7	13,7
Indoor terminals/stations for public transport	38,9	16,6
School yards	37,1	4,7
Culture centre/assembly halls	36,8	8,1
Cinemas	33,6	16,4
Outdoor restaurants	31,5	8,6
Auditoria/meeting halls	29,4	8
Theatre halls	28,4	10
Concert halls	28	11,9
Meeting rooms	27,7	5,3
Open plan offices/schools	27,6	
Open plan offices		6,2
Open plan schools		8,9

Annoyed hearing and visually impaired people

- Very much or extremly annoyed in % in different premises and spaces

	Hearing %	Vision %
Shopping centre/Enterprises	24,6	14,6
Outdoor terminals/areas for public transport	23,3	12,3
Entrances with waiting rooms	20,6	6,1
Court rooms	20,2	6,9
Counter/reception/expedition	19,9	5,6
Staircases	18,8	12,9
Corridors in work or public buildings	15,6	6,2
Playground	15	6,3
Church	12,4	1,8
Parking area	7,2	4,7
Walkways and access roads close to buildings	5,5	4,8
Museum/art exhibition	5	3,9
Library	4,2	2,3
Park grounds	1,9	1,4



Knudtzon 2011

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Norwegian acoustic classification of buildings

Changes in acoustic criteria for buildings

- Norwegian classes for acoustic quality concern dwellings, hospitals, schools, kindergartens, offices, hotels and noisy work premises, etc.
- Updates were made for these buildings, especially open plan teaching environments and offices
- Room acoustics, noise levels and needs of sound amplification systems were evaluated for all buildings, including those without specified acoustic limits from beforehand (i.e. museums, assembly halls etc.)

Acoustic criteria changed in NS 8175

- Airborne and impact sound insulation:
  - No changes with exception of video conference rooms
- Sound level/noise level:
  - More strict or new limits added
  - Octave band noise rating evaluation included
- Criteria for reverberation time and acoustic absorption:
  - Were made more strict
  - Limits for reverberation time were related to room height
- Additional parameters given for acoustic conditions in open plan spaces:
  - Speech transmission index (STI), distance of distraction
  - Speech attenuation with distance etc.
- New requirements for use of technical aids in various buildings:
  - Induction loop, FM-equipment, sound equalization equipment or similar
  - Visual signals and written text

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Conclusions

Conclusions

- Increased knowledge about the experience of vision and hearing impaired people in various buildings, rooms and spaces
- More analyses could be made on the data – but there was a lack of money
- New criteria were adopted in the standard to follow up needs of the ageing population, children, hearing and vision impaired and others
- New criteria on room acoustics and noise conditions suitable for all in public buildings – with basis in the acoustic survey

Conclusions

- Updating specifically for open plan teaching environments and open plan offices
- Costs: the new limits may increase somewhat the project planning costs for buildings – less than 2 % of total costs
- For new buildings classified, acoustic quality is defined by using reverberation time related to room height, acoustic absorption, noise level and speech intelligibility index
- Acoustic classifications updated for all building types – provisions for sound amplification systems and assisted listening devices are required whenever relevant

Thank you!

More information?

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