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REQUIREMENTS OF THE DISABLED FOR HOUSING

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Abstract: *Housing as such significantly influences the quality of life, it reflects the social and cultural level of the society. The current trend is to explore the ways of sustainable housing. The needs of people who have more difficult access to housing, due to their age or health conditions, are in current Czech legal environment reflected in specific requirements on construction and technical parameters of barrier-free flats with extreme demands on the layouts. On the current real estate market the barrier-free flats are represented very little, because the ordinary housing is not a subject to this regulation. Therefore, for needs of people who have more difficult access to housing due to their age or health condition, the ordinary housing is a barrier one.*

Keywords: Accessibility of the environment, housing, lifelong housing, barrier-free housing, adaptable housing

1 HOUSING TRENDS

Aging population, an increasing proportion of seniors is a trend all over Europe that has lasted for several decades. This trend is also observed for persons with disabilities. According to a sta-tistical survey conducted by the Czech Statistical Office in 2013 [CSO 2014],there are 1,078,673 persons with disablement in the Czech Republic, which is 10.2% of the popula-tion;over 29 % of this group represent persons with physical disablement. It is evident from the above-mentioned facts that these are significant groups of citizens, and this fact creates the need to adequately respond to the creation of the necessary conditions of civil engineering construction, including housing.

One of the conceptual materials in the Czech Republic is the Housing Concept [Ministry for Regional Development 2011], which mentions, in connection with it, the specific aspects of housing for people with disablement. One of the objectives of the Concept is to create conditions for ensuring decent and adequate housing usable regardless of age, gender or health restrictions. A precondition for independent and self-reliant life of persons with disablement is ensuring adequate housing with the accessibility within the block of flats' interior layout and in relation to the accessibility of the external environment. As far as the flats themselves are concerned, their adaptability should be ensured aiming at minimum efficient modifications to adapt to the changing needs of individual users throughout their lives.

In 2009 in the Czech Republic the Diaconia Evangelical Church of Czech Brethren realized within the project Housing of the Elderly Citizens [Diaconia 2009] a research to find out that majority of the flats of the respondents does not meet the requirements of lowered mobility and sensory abilities of elderly people and it does not offer safe conditions for living. The character of barrier-free housing should mobilize people and improve the general quality of their life. It should ensure the senior and disabled citizens' satisfaction with such housing and delaying the potential need for their retirement to a specialized facility.

It is not so easy for the customers themselves to distinguish between a necessity and their individual interest. Taking into consideration the above-mentioned facts the main purpose of this article is description of a methodology, which is specified for measuring of the customer's satisfaction by means of the KANO model, together with application of this method to a real engineering product, namely to the bucket elevator.

2 LEGAL REQUIREMENTS GOVERNING BARRIER-FREE HOUSING

2.1 Legislative requirements for barrier-free housing

The basic concept document for the housing policy of the Czech Republic is the Housing Concept [Ministry for Regional Development 2011], the objectives of which (among other things, increasing the supply and quality of housing) are specifically implemented by legislation and support tools in the area of housing. From this general perspective, there is currently no requirement with respect to the necessity of construction of barrier-free housing, if such housing is not supported by grant programs.

The legal requirements of constructions for housing are in the Czech Republic in general way governed by the Building Act. The regulation to apply the law of Building Code that stipulates technical requirement of constructions [Regulation No. 398/2009 Coll] as opposed to similar regulations abroad does not order the buildings with more than 3 flats to be barrier-free on all its floors. According to this regulation it is an obligation to furnish a new block of flats with a lift in case of entrances to the flats on the level of fifth and higher above-ground floors.

Specific technical requirements aimed at people with limited mobility and orientation are the subject of the Building Act implementing regulation. This is

Regulation No. 398/2009 Coll., on general technical requirements ensuring barrier-free use of buildings. Requirements for technical solutions to blocks of flats are only set down for blocks containing a special purpose flat. Requirements for technical solutions of barrier-free flats are specified as requirements for the layout of modifiable flats and special-purpose flats.

Note: A special-purpose flat is a flat specially adapted for persons with disablement. A mod-ified flat is a flat that can be used by persons with reduced mobility without further structural modifications.

Technical solution of barrier-free flats is the subject of the Annex to this regulation, which regulates the conditions for persons with reduced mobility in respect of the layout, requirements for sanitary facilities, loggias, balconies and terraces, the size of doors and windows, placement of controls. For people with visual impairments, conditions of technical solutions for energy distribution and equipment with electrical outlets are specified.

2.2 Layout of the barrier-free flats

The layout of the barrier-free flats shall be in accordance with the handling and manoeuvrability capabilities of persons in a wheelchair. Suggested smallest living area and the area of kitchen based on the size of the flat is provided by the Czech Technical Standard ČSN 73 4301 Residential buildings - see Table 1 and 2. For the layout, the minimal furnishings is also important, which is the subject of another technical standards ČSN 73 4305, and which, inter alia, in Article IV regulates furnishings for people with limited mobility. Following the request of recommended smallest kitchen area, it provides the recommended lengths of kitchen sets.

Tab. 1Recommended smallest living area depending on the size of the flat according to ČSN 73 4301

Functional use of the living area	Min. area *	Flat characteristics
Living room without dining space	20 m^2 22 m^2 24 m^2	flat with 1 and 2 rooms used as living area flat with 3 and 4 rooms used as living area flat with more than 4 rooms used as living area
Living room with dining space	20 m^2 24 m^2 26 m^2	flat with 1 and 2 rooms used as living area flat with 3 and 4 rooms used as living area flat with more than 4 rooms used as living area
Living room without dining space with 1 bed	20 m^2 24 m^2	flat with 1 and 2 rooms used as living area flat with 3 rooms used as living area
Living room with dining space with 1 bed Bedroom with 1 bed Bedroom with 2 beds	22 m^2 12 m^2 17 m^2	flat with 1 and 2 rooms used as living area

* Min. area barrier-free flat

Tab. 2 Recommended smallest kitchen area, depending on the size of the flat according to ČSN 73 4301

Type of kitchen	Min. area *	Flat characteristics
Working kitchen	7 m^2 8 m^2 10 m^2	flat with 1 to 3 rooms used as living area flat with 4 rooms used as living area flat with more than 4 rooms used as living area
Kitchen with dining space	8 m^2 12 m^2 14 m^2 17 m^2	flat with 1 and 2 rooms used as living area flat with 3 rooms used as living area flat with 4 rooms used as living area flat with more than 4 rooms used as living area
Kitchen used as living area replacing a living room	22 m^2 24 m^2	flat with 1 rooms used as living area flat with 2 rooms used as living area
Kitchen used as living area with 1 bed replacing a living room	24 m^2	flat with 1 rooms used as living area

* Min. area barrier-free flat

2.3 Requirements for hygienic facilities

The solution of barrier-free sanitary facilities set out in Regulation No. 398/2009 Coll. is based on partial general requirements for the solution of wheelchair accessible toilets, wheelchair ac-accessible bathtubs, and wheelchair accessible showers and shower cubicles. On the other hand, the applicable ČSN 73 4305 Furnishing flats provides obsolete and invalid data of substandard small size hygiene facilities

as at 1 May 1989. Requirements for sanitary blocks with the bar-rier-free parameters - bathrooms with shower or bathtub are specified in another Czech Technical Standard ČSN 73 4108 Hygienic Facilities and Changing Rooms, which already responds to the requirements of applicable Regulation No. 398/2009 Coll. Although the standard is not applicable for designing sanitary facilities in residential buildings, it may provide some inspiration for solving these challenging areas.

2.4 Doors and windows

Entry doors, interior passages and door openings must have a width of at least 900 mm. It should be noted that the larger the width of the door leaf, the more difficult it becomes to handle with the leaf for a person on a wheelchair; at the same time, wider door occupy a larger manipulation area within the flat layout, and thereby reduce the usable area of the individual rooms.

2.5 Construction and technical requirements

Construction and technical requirements of modifiable flats and special-purpose flats are large-ly demanding, spatial comfort is comparable with the parameters of special medical equipment and it is inadequate for many active seniors and persons with disablement. The disadvantage of these flats is a large surface area with a relatively unfavourable ratio of living/usable area. The buildings are then more costly in terms of both investment and operation, but also in the outcome less comfortable for many people with common types of disablement.

Meeting all the legal requirements limits the availability of barrier-free housing. The regula-tions often do not provide sufficiently broad range which would properly take into account the circumstances of use associated with housing for people with disablement and the elderly, and in many cases it is not possible to implement a solution that would offer optimally compliant environment to the residents. Such an attitude, however, in terms of a relatively high legislative standard of buildings and unsteady practices for granting exemptions leads to relatively high costs for building without a proper increase of the utility value.

The starting point should be a compromise provision of legal and standard environment in relation to the new view of barrier-free housing. For example, due to the security requirements to ensure necessary handling and manoeuvring area, the standard values for barrier-free housing are higher than the values for conventional flats. A sample survey and questionnaire surveys conducted among users listed below show that a significant proportion of users in habit conventional housing stock, mainly because of the lack of barrier-free housing in the real estate market.

3 SAMPLE SURVEY ON PERSONS WITH DISABLEMENT

3.1 Marital status of persons with disablement

As already mentioned in the introduction, in 2013, sample survey of persons with disablement was conducted in the Czech Republic [Czech Statistical Office 2014]. One of the points of the survey was also the issue of housing for people with disablement. In this area, for further con-sideration of construction and technical conditions and the size of the flats, marital status of these persons is equally important indicator, as it gives some idea of the background of people with disablement - see Table 3. The survey shows that the largest group is the marital status of married; its share is almost 41 %. The second, or the third place is occupied by very close groups amounting to 22-23 % - widow/er and single.

Tab. 3 Marital status of persons with disablement by age

Age	Single	Married	Window/er	Divorced	Not known	In total
0 - 14	41 598	0	0	0	0	41 598
15 - 29	35 983	1 072	0	0	419	37 473
30 - 44	30 680	17 491	0	5 193	2 140	55 504
45 - 59	24 413	56 589	1 318	17 004	4 655	103 979
60 - 74	13 020	119 600	15 449	18 840	8 883	175 793
75 +	2 312	57 622	33 361	3 297	1 821	98 414
In total	148 006	254 374	50 128	44 335	17 917	512 761

Source: Sample Survey of Persons with Disablement 2013 [Czech Statistical Office 2014]

3.2 Housing by the type of flat and the type of disability

The indicator of marital status is very closely followed by the indicator of housing with the necessary information on living in a household with another person and according to the type of housing. Living in a household with a husband/wife is represented by 36.4 %, 18.7 % live alone, 17.1 % live with a son/daughter, and 13.8 % live with parents (meaning

adults with disablement). These figures give us an idea of what size categories of flats are needed in present-day real estate market.

The most frequent type of housing reported by 80 % of people with disablement is a conventional flat in a standard block of flats. The second position was occupied by barrier-free flats (6.7 %), the third position by beds in social care facilities (6.4 %). The remaining seven types of housing, covering a total of about 7 % are quite marginal. If we consider the most widely represented form of housing in terms of age categories, without distinction of sex, then almost three quarters (exactly 76.3 %) occur in three age categories (45 and over).

The data presented show us the true picture and the living conditions of persons with disablement. It is worth noting that, for example, less than 7% of these individuals use barrier-free flats. Moreover, if we take into account other types of housing, which can be considered as suitable for them to ensure a good quality of life, we get a share of only 2.3 % (the high proportion of this type of housing is represented by flats with care service - 1.4 %).

This sample survey of persons with disablement confirms that in the context of ensuring quality barrier-free housing, emphasis must be placed on standard housing with the possibility of adaptability to the specific conditions of the changing needs of target users.

3. 3 Type of disability

Equally important data concern the frequency of type of disablement. This figure is a significant factor for the actual establishment of specific technical requirements, which are different for bodily, visual, and auditory, etc. disability, and which allow us to establish the necessary criteria for creating an adjustable housing.

That the most frequent disablement is internal disability in a proportion of 41.9 %. The second position is occupied by bodily disablement, in a proportion of 29.2 %, which is quite a small difference from the previous value, and other types of disablement range in a significantly lower interval from 5.1 to 8.5 %.

That almost half of the persons with multiple disablement - 49.6 % live in the most strongly represented form of housing, a conventional flat. The second place is occupied by those with internal type of disability - 22.3 %, and in the third place there are people with bodily disablement, amounting to 16.5 %. These data confirm the fact that technical requirements for barrier-free housing must be adapted especially to the users with bodily disablement, who also have the largest requirements for handling areas and clearways within the target groups of barrier-free housing. Therefore, these are the requirements that significantly affect the design of the flat layout itself.

4 QUESTIONNAIRE SURVEY ONBARRIER-FREE HOUSING

The current state of requirements for specific forms of barrier-free housing leads us to consider how to provide quality and satisfactory housing that would be adaptable and versatile over time to satisfy the needs of all potential users. Sample survey of persons with disablement conducted in 2013 clarifies the situation of the current housing for target groups in respect of the type of housing. But what are the real needs with respect to the inner space, equipment and technical solutions of these users? Issues associated with this were the subject of the survey. Based on the cooperation with organizations of disabled persons, a questionnaire was prepared dealing with the issue of barrier-free housing and sanitary facilities, which contains all the relevant questions that can influence the quality of good and satisfactory barrier-free housing in a positive way. The survey aimed to identify practical experience with current housing and needs of potential users of barrier-free housing. In order to analyse the obtained data, the problematic issues included:

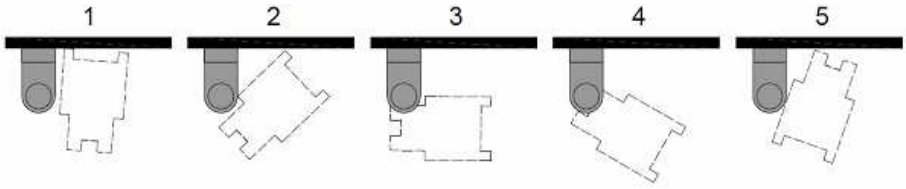
Type of health disability - different demands can be expected in paraplegics, quadriplegics, people with walkers, crutches and other,

- Current housing, if it is a specialised one in adaptable flats or normal housing with additional modifications,
- Lifts and platforms, their suitability and requirements of the minimum size,
- Doors - the required size of the front doors to the house, to the flat and the optimal size of the doors inside the flat
- Handling area for turning the wheelchair in respect of defining the minimum width of communication space inside the flat,
- Size of the rooms and requirements for the kitchen,
- Sanitary equipment - layout of the bathroom with preference of its equipment, ability of access to individual fixtures (toilet bowl, sink, shower) - see Table 4 and further information on the bathroom (I want to reach from the toilet bowl to the washbasin, I want to reach from the toilet bowl to the shower hose, I move on a wheelchair among toilet, bath, shower, washbasin, I move in a standing position among toilet, bath, shower, washbasin, I need help with moving to toilet and bath, shower, I use a bath lift, I use a hanging rail system, I always access the toilet, bath, shower from the same side - from the right, from the left, The shower and toilet should be next to each other),
- Other suggestions for additions particularly in the area of windows, balconies, floor surfaces, etc.

The first round of the investigation took place in a paper form but given the interest of target respondents, the questionnaire was converted into the

internet survey. In the mentioned first round of the research investigation only with regional impact the average age of the respondent was 43. All respondents were users of a wheelchair. The group consisted of 29% of paraplegics, 29 % of quadriplegics and 42 % of other form of health disability. Out of this sample 73 % of people live in normal housing, which had to be adapted to a barrier-free one due to their handicaps. Only 27% of respondents live in adaptable (barrier-free) flats. The satisfactory width of 800 mm of the inner doors of the flat was stated by 49 % of respondents. The width of 900 mm as it is defined by law is preferred by 51 % of respondents. Regarding the width of corridors and possibility of rotation with the wheelchair 44 % of people stated that 1200 mm is sufficient, 24 % prefer at least 1300 mm, 13 % require 1400 mm, 8 % of respondents stated less than 1200 mm and further 8 % on contrary the width 1500 mm, which is a requirement of construction regulations for barrier-free housing.

Tab. 4 Movement at the toilet bowl



	1	2	3	4	5
I can	24%	24%	18%	19%	15%
I prefer	27%	12%	27%	25%	9%
At my place	18%	11%	34%	20%	17%

1 – Sideways
2 – Diagonally from the back
3 – From the side
4 – Diagonally from the front
5 – From the front

Valuable knowledge of this questionnaire is represented by specific requirements of users with disablement to solve sanitary facilities, which confirm the need for variable and versatile space that can be adapted to the specific user.

5 CONCLUSION

Simultaneously, senior and barrier-free housing in relation to persons with disablement has certain specifics. It is necessary to take into account the needs of the target groups and to realize the fact that these people largely use the flat all day and all year round, and for many of them, in certain periods of life, the radius of movement may radically diminish to the block of flat itself and its immediate surroundings, or even just the flat itself. Therefore, living environment must be sensually stimulating, providing adequate space for different types of activities and levels of social contact. Physical living environment helps co-create a lively community where mutual support along with building modifications significantly prolongs stay in an environment that can be seen as their own home. It significantly delays and thus reduces the need for retirement to facilities providing institutional forms of care, which, in addition to reduced quality of life, also mean greater economic burden on our society.

The user's perspective of optimal living environment was done by a questionnaire with sub-sequent data analysis. The research pointed out to current inappropriate spatial optimization of barrier-free flats and various details of technical solutions, which decrease safety and increase accident rate. At the same time it shows that in higher amount the users live in ordinary barrier housing, because the offer of barrier-free flats is rather limited. Therefore, the obtained set of information is a primary precondition for achieving the equal conditions in access to housing, especially by modifying existing Czech construction legislation for adapting housing without a necessity to build special facilities or extremely large barrier-free flats.

The data obtained in the surveys conducted represent the fundamental basis for formulating the general principles of adaptable housing. Knowledge acquired from the questionnaire survey and its analysis is a prerequisite for achieving a state of equal conditions of access to housing. It can also enable to launch a system solution by defining model parameters with the basic principles of lifelong living in conventional housing construction. By reducing the requirements for e.g. the areal standard of rooms, we can achieve significant savings of up to 20 % of the flat area. These outputs will be a stimulus for expert discussion with a subsequent revision of the current legislative environment. On the other hand, a detailed analysis of the requirements for sanitary facilities can provide persons employed in construction with clearer idea of the use of space around the individual furnishing objects.

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