

Of general relevance

Up until the end of the 1800s, Denmark applied the old measuring system that had been in common use since 1728: 1 favn = 3 alen = 6 fod = 72 tommer = 864 linjer.

With the Act on the Introduction of the Metric System for Weights and Measures of 4 May 1907, one alen became equal to 0.6277 metres and one tomme equal to 2.615 cm.

Following the Act of 8 June 1912 on the “conversion to the metric system of weights and measures from the hitherto applicable systems in existing acts, etc.”, the building acts, statutes and regulations were proclaimed as using the new metric system.

There were no changes as such in the actual content, but permission was granted for the figures to be rounded locally. This resulted in minor differences: for example, the requirement for 4 alen of headroom in living areas converted exactly to 2.5108 cm – in Copenhagen the requirement thereafter became 2.51 cm while in Frederiksberg it became 2.50 cm.

The issuance of three nationwide sets of provisions cutting across all acts, statutes and regulations was significant to the subsequent design of multi-storey housing, the last two with decisive effect – firstly, concerning relaxations in the requirements for masonry and roof constructions; secondly, with respect to the number and construction of stairways; and lastly, in the requirements relating to fireproof storey partitions.

Ultimately, the materials situation during and after the Second World War also had an impact on building work during this period.

Relaxed requirements

Following the First World War, the country was in the depths of a major and ever-worsening housing shortage. The Housing Commission (Boligkommissionen) of 1918 was set up with the aim of proposing and finding solutions to this problem. Among the many measures proposed in the Commission’s report of 1920 were a number intended to make construction, material and workforce-related economies, and the proposals included all types of residential construction.

Specific to multi-storey housing, there was a relaxation of the requirements relating to the construction of masonry and roof structures.

Following the Ministry of Justice’s circular of 30 November 1920, the possibility arose of exemption from otherwise applicable legislation pertaining to the construction of residential buildings with up to three floors of living accommodation, inclusive of any attic space.

Load-bearing exterior walls of 1½-brick thickness could thereafter be erected in such buildings on the two uppermost floors and of two-brick thickness in the ground floor and basement, provided that the basement ceiling was placed no more than one metre above ground level. There was a further concession available for the use of cavity walls (with permanent ties) in the normal uppermost floor.

Roof frames on these buildings, where the attic was being used as living space, were permitted to be made of weaker timber than otherwise specified if the roof covering was lightweight, i.e. slate or felt. If tile was being used, such a concession could be expected only on condition that “the rafters and collar beams are properly supported, e.g. with solid board partitions, thereby limiting the actual isolation of the timber in some way; however such supports must not be included in the calculation of the isolation”.

The following year, the Ministry of Justice’s circular of 30 April 1921 offered a further possibility of exemption from the requirements on the dimension of facade walls in residential buildings with living space on up to five floors without apartments in the attic.

Permission could thereafter be expected for load-bearing exterior walls in the buildings described to be constructed of 1½-brick thickness in the two uppermost floors, 2-brick thickness in the next two floors down and 2½-brick thickness in the ground floor and basement. This was all conditional upon the basement ceiling being placed no more than 60 cm above ground level and the wall openings not exceeding 5/8 of the facade length. Lastly, the 1½-brick wall was not to be weakened by using continuous timber wall plates; structural iron or a layer of hardwood blocks was to be used instead.

In addition, there were requirements relating to minimum pillar width and maximum dimensions for house depth, floor height, cornice height, roof slope and distance between transverse and supporting partition walls. These were all requirements that would normally be met in standard multi-storey housing.

These two circulars were merged in the Ministry of Justice’s circular of 9 February 1924, without change to the described conditions for multi-storey housing. The amendments that were present related to conditions affecting low rise construction in the form of detached and terraced housing.

Later still, in the circular of 22 January 1929 – this time from the office of the Minister for the Interior (construction having been placed under this ministry from April 1924) – very little was changed in terms of multi-storey housing.

The first three circulars contained the phrase that “until further notice, the following exemptions from the Building Act are expected to be granted”. The last circular contained a time restriction on construction commenced before 1 April 1933.

Number of staircases

The requirement for all apartments to have access to two (wooden) staircases had existed since the first Copenhagen Building Act of 1856. Not until the Building Act of 1889 was the requirement expressed sufficiently clearly as to allow it to actually live up to its purpose.

The whole of Copenhagen’s building legislation, as well as the statutes and regulations derived thereof nationwide, gave the building authorities an opportunity to grant dispensations to smaller buildings (up to three floors in height). This dispensation was applied locally: in Copenhagen for example, in the construction of workers houses at the Kartoffelrækkerne (the “Potato Rows”) and also later, in individual buildings in Blidah Park.

One of the economic solutions to be facilitated by a relaxation of the design and construction requirements was a proposal for the use of a single fireproof stairway, to

which every apartment would have access. This would lead to savings in space, material usage and labour and, as a direct result, more housing.

On the basis of this, the circular from the Ministry of the Interior on 22 January 1929 granted a general dispensation from the two-staircase requirement.

It also applied to higher buildings with a single staircase where every apartment had access to an escape balcony. It could be on both sides of the building or just one, possibly constructed as a contiguous and common staircase for several apartments depending on whether or not it led to the basement.

This option was used extensively and came to leave its mark on the distinctive character of the multi-storey housing of the 1930s and later.

The idea of a single fireproof staircase in (multi-storey) residential buildings was not new, but in practice had been used only once before, and that was in 1906 in Frederiksberg, where the Forsøgshusene ("Experimental houses") were erected. In this five-storey building, there was access to four apartments from the same stone-built staircase constructed of one-brick masonry. The apartments were also equipped with balconies that were offset from one floor to the next, allowing someone to lower themselves from balcony to balcony as a means of escape, and thus reach the ground without the use of a staircase.

Material shortages and rationing

The Second World War and the period thereafter led to material shortages and, in many cases, rationing. This occasioned the re-appearance of a number of previously used materials and structures. The use of iron in particular was rationed. For joists in general, the use of iron was allowed only where it was absolutely necessary, i.e. where bathrooms were concerned, and for the closure of window cavities, the use of brick/relieving arches and rear planks became relevant once again. The use of iron in concrete and hollow block floors was generally minimised, or such structures were avoided (cf. below on fireproof storey partitions).

Descriptions of this situation can be found in HFB 10, 1942 – see the articles on material situation and construction.

Fireproof storey partitions

In 1938, the Ministry of the Interior's proclamation of 11 August set the requirement for residential buildings with more than three floors to have a fireproof floor (i.e. reinforced concrete) in the attic. However, this requirement was temporarily repealed less than three years later in the proclamation of 28 June 1941, and this was due to the shortage of iron. The requirement was not reinstated until the Act of 27 May 1950, when it was also expanded upon. Thereafter the requirement applied to storey partitions over basements in all residential buildings having more than two floors or housing more than two families. For buildings of three floors or more, the storey partition over the first floor was also to be made fireproof, and for buildings of four floors or more, the requirement applied to all storey partitions.

Reinforced concrete was the material of choice for fireproof structures, but the majority of hollow block floors on the market were also considered, as were later arrivals.