



German experience in the design and construction of mass housing and its adaptation to Soviet realities

Irina S. Cheredina¹, Ekaterina Yu. Rybakova²

ABSTRACT:

The article is devoted to the construction experience of German settlements in the 1920s and post-war housing estates. Its impact on the development and construction of mass housing in the USSR was reviewed. Common features and differences were identified.

KEYWORDS:

villages for workers in Germany and the USSR; Moscow; the industrial housing estates; prefabricated panel construction; reforms of the 1960s

1. Introduction

The problem of mass housing construction has always been and remains the focus of attention in all developed countries. The relevance of the topic is beyond question, since housing – or rather the lack of housing – is the most significant challenge that has to be addressed in the short term, particularly with industrial development, where there is a need for the integration of new residents flooding into cities as yesterday's peasants turn into tomorrow's workers. Rapid urban growth stimulated the search for the accelerated construction of low-income housing.

The history of architecture remembers that Germany has achieved significant success in this area of construction.

The construction of new worker settlements was recategorized as «mass production» in the late 1920s in Germany. Of all the German cities, Berlin became one of the centers of the social reform of housing in terms of both quantity and quality after the First World War.

The problem of the mass production of housing was no less acute in the 1920s in the USSR. But the country, exhausted by war, revolution and intervention, could not solve these problems at the same level as Germany. High-quality building materials weren't available, and therefore inventive Soviet architects used local materials for low-rise buildings. It was during these years that original solutions appeared for mass housing. In 1911 engineer P. Galakhov suggested using his invention – the building block, called «thermolite», 90% of which contained organic substances (sawdust, needles, peat, straw, etc.), 5% gypsum or alabaster and 5% lime. Its most frequent application began in Moscow in the 1920s.

The cost-effective approach of mass housing construction made it possible to build up relatively large territories with worker settlements. In the Sokolniki district, the village of Krasny Bogatyr was built, consisting of blocked one-and two-storey buildings for 2, 4 and 8 apartments

¹ Moscow Architectural Institute (State Academy), Russia, 107031, Moscow, 11 Rozhdestvenka str., e-mail: cherrina@mail.ru, orcid id: 0000-0002-3662-6035

² Moscow Architectural Institute (State Academy), Russia, 107031, Moscow, 11 Rozhdestvenka str., e-mail: missfishygirl@mail.ru, orcid id: 0000-0003-4350-6637

with stove heating (a stove in the center of each apartment), separate kitchens designed for wood stoves (requiring a larger area) and sanitary facilities without bathrooms. In the area of Oktyabrsky field, architect B. Venderov built the village «Duks» with two-storey buildings made of cinder blocks.

The experimental cooperative settlement «Sokol» was built and designed on the principle of a garden-city in the «Vsehsvyatskoe» village, for which the construction bureau "Standart-proekt" (appeared due to the NEP) offered a selection of small 1-2 storey buildings from different materials and designs. Engineer P. Galakhov with his invention also participated in the construction of buildings in the village «Sokol» [1].

Settlements for workers in the 1920s and 1930s were also built around industrial enterprises. The principle of the garden-city was often used in their planning, where each building was placed on a green individual plot. The architectural solution for buildings was very modest in such settlements, created on the basis of a rational approach and functional necessity.

2. The experience of German architects in the design and construction of mass housing

The residential complexes of Germany, particularly Berlin, in the 1920s and 1930s are a heritage that combines all the achievements of early modernism. Created during a period of technical and cultural prosperity, worker villages demonstrated the country's success in the field of social policy. When the best architects in Germany entered the business, the complexes became a model for the development of residential architecture

Under the leadership of B. Taut and M. Wagner, together with H. Sharon, H. Poelzig, O.R. Salvisberg and H. Häring a large number of housing estates were created in the vicinity and in central parts of Berlin. These included: «Schillerpark», (1924-1930); «Hufeisensiedlung», (1925-1933); «Wohnstadt Carl Legien», (1928-1930); «Onkel Toms Hütte», (1931); «Weiße Stadt», (1929-1931); «Siemensstadt», (1929-1934) and many others.

Bruno Taut was one of the first to implement mass development of the Berlin suburbs with standard residential complexes. The housing program under which Taut, Wagner, Poelzig, Salvisberg, and Häring operated, was very impressive: more than 135 000 housing units were built between 1924 and 1930.

B. Taut's individual approach to the design of each object is interesting. Introducing structures into the historical context in the central areas of the city, Taut arranged the buildings so that they corresponded to the traditional block development (resulting in a courtyard). This layout is typical of the residential complexes «Schillerpark» and «Wohnstadt Carl Legien». To improve the closed block, the architect deliberately «broke» the perimeter of the buildings and created a cosy green courtyard, which residents shared with a picturesque suburb.

Settlements located far from the central parts of the city had linear buildings. Thus, the horseshoe-shaped complex «Hufeisen» is based on a curved extended «ribbon» of a 3-storey apartment block, from which rows of 2-3-storey town houses radiate. All living rooms and balconies in the horseshoe building are oriented inside a large green space with the courtyard in the center. Therefore, a vast territory was formed, which was accessible to any visitor, but actually belonged to the residents of the complex.

Developing layouts, architects pursued the idea of making them as functional, convenient and compact as possible. Apartments in complexes mostly have 2-3 rooms (2 on the ground floor), with combined bathrooms, small kitchens and spacious loggias or balconies facing sunward. The smallest area of such housing units was 43 meters. For the apartments of the first floors without balconies, a land plot was attached to the buildings. Because the municipality had provided funding for most of the settlements, architects were able to experiment with various standardized plans. For example, they developed four types of standard with almost identical kitchens. In quarter buildings, the dining areas, kitchens and bathrooms are oriented to the street, while the bedrooms and living rooms face the courtyard. In complexes with linear buildings, many apartments had a through-the-wall layout (windows overlooked from both sides of

the building). There were high-comfort apartments in some buildings: 4-room residential cells occupied 2 floors, had a small corridor, a combined bathroom with a toilet, a kitchen, a dining room, bedrooms, a living room, a large loggia or balcony. These apartments were in high demand despite the fact that not all of them were provided with central heating and hot water. Small square footage of apartments (even in higher comfort apartments) contributed to the use of compact furniture. Screens and lightweight racks were used everywhere to divide rooms into zones.

Each building had an individual facade solution despite the standardization and typified construction. Bruno Taut was a master of color. He used a complex color scheme for his projects, which contributed to the creation of colored accents. In the «Hufeisensiedlung» complex, the architect complicated the look of the extended white horseshoe-shaped building by painting the loggias, staircases, upper floors and ends of buildings in blue. This technique created the illusion of deepening these parts of the facade, making them look dynamic. Located next to the "horseshoe", groups of town houses had a solid color. In this way, Taut created larger color units.

The buildings in the «Carl Legien» complex were painted alternately in dark shades: maroon, green, and blue. The street facades and main buildings located on the Central axis were bright yellow, which created a strong contrast with the courtyard facades. The specific color of the complexes was selected by Taut depending on the orientation of the buildings to the cardinal directions: in the East the buildings had cold shades, in the West, warm. Non-standard and original use of color distinguished B. Taut from other German architects. Thus, he was far from the ascetic functionalism of V. Gropius.

Housing construction was carried out everywhere in many cities in Germany. Major projects were implemented in Frankfurt am Main (E. May, 15 000 apartments, 1925-1930), in Magdeburg (J. Göderitz, K. Rühl, 12 000 apartments, 1924-1930), in Hamburg (F. Schumacher, 65 000 apartments, 1924-1933), in Karlsruhe (W. Gropius, O. Haesler, 1928-1929) and others. Although the hygiene conditions and standards of these buildings were at a level similar to Berlin, they did not achieve the same architectural and art quality. Berlin settlements for workers became the best manifestation of housing reform and their influence later spread throughout Europe. These residential complexes with sunny apartments, combined bathrooms, small kitchens, spacious recreation areas, playgrounds and developed infrastructure set future social standards and made a great contribution to the development of mass housing construction.

3. Mass standard housing in East and West Berlin

The problem of housing shortages in post-war Berlin became the starting point for the development of mass standard construction in both parts of the divided city. This was due to the fast and inexpensive method of construction. For that, German architects and engineers turned to their pre-war standards. It is noteworthy that the first prefabricated panel complexes appeared in West Berlin in the district of Hansaviertel. Architects created a modern residential complex for people of different income levels, based on the experience of Berlin's pre-war settlements.

From the 1960s, the construction of large residential panel arrays began in West Berlin, each of which was designed by architects individually. These districts include Märkisches Viertel (1963-1974, architects W. Düttmann, H. Müller, G. Heinrichs, O.M. Ungers; 40 000 inhabitants), Gropiusstadt (1962-1975, architect V. Gropius, 40 000 inhabitants), Falkenhagener Feld (1962-1980, architect K. Müller-Rehm, 40 000 inhabitants). Each residential complex of 6, 7 and 9-storey buildings is individual in its architecture. Complex in their volume and connected to each other building forming a variety of shapes in the plan that resembled a honeycomb. Inside each «comb» was arranged a landscaped courtyard. There was a community center with shops, department stores, and restaurants in each micro-district. The area of the apartments ranged from 54 to 110 m, they all had individual and convenient layouts. Micro-districts were built

isolated from the center: according to the architects, they were supposed to become a picturesque green oasis away from the bustling city, similar to the settlements of the 1920s.

In contrast to West Berlin, prefabricated panel buildings in East Berlin were classified by series and had significantly smaller areas. From 1957 to 1969 the most common was the Q3A series. Buildings of this type had a height of 3 to 5 floors, with an average floor height of 2.7 meters. During this period, 28,600 residential apartments were built, ranging in size from 36 to 66.7 m². The P2 series was commissioned in 1961 in parallel with the Q3A series by engineers A. Felz, H. Kuschy and W. Stallknecht. These types of buildings were created to be 4-storey and 4-section. The buildings were constructed without load-bearing partitions and had improved planning. Studio apartments were created to save and optimize space, where the functions of the living room, kitchen and bedroom were combined. Especially for this series, W. Stallknecht created a glass cabinet that served as a partition between the kitchen and the living room. Residents immediately received a fully equipped combined bathroom with a toilet, sink, faucets and washing machine, which were introduced into the design at the construction stage when apartments were put into operation. Buildings of the P2 series were built not only in Berlin, but also in other cities of Germany, until it was replaced by the more versatile WBS-70 series developed in Dresden in 1970.

Engineers managed to completely minimize construction costs, so the WBS-70 series became the most popular design in Germany and the construction of buildings of this type continued until the 1990s. Initially the buildings had a height of 4 and 6 floors, but after 1977 construction of 11-storey buildings of this type had begun. Despite the fact that the area was significantly reduced (in contrast to the P2 series), the ceiling height was increased to 2.8-3 m. The area of the rooms was slightly increased: one-room apartment – 32 m², two-room apartment – 60 m², three-room apartment – 66 m². The apartments consisted of one or more rooms, a separate kitchen (with a total area of 5 m²) and a combined bathroom. The two-room residential cells had a small storage room, in which the entrance was accessed from hall and bedroom.

4. Mass standard housing in the USSR

The period during the first post-revolutionary years in Russia relating to the field of mass housing construction is characterized primarily by the search for a rational layout, taking into account hygienic requirements and the availability of infrastructure.

The USSR's appeal to the experience of building German settlements in the 1920s and 1930s was quite natural, since it was there that rational examples of modern housing were created. It is noteworthy that the Germans themselves in the 1960s turned to their pre-war developments when creating mass housing.

Back in the late 1920s and mid-1930s, many foreign architects were actively involved in the development of new projects by the Soviet government. In 1923, a Pro-Soviet organization «Friends of the new Russia» (German: «Freunde des neuen Russland») was established in Berlin, whose members included B. Taut, H. Poelzig, E. May, and P. Behrens. For example, Bruno Taut, a master of housing construction in Germany, visited the Soviet Union several times, participating in competitions and various architectural discussions. Foreign architects saw the USSR as «the country of the architecture of the future». In their opinion, the abolition of private ownership of land contributed to the possibility of implementing the most ambitious urban planning plans and ideas. And Soviet architects were interested in the issue of typification and industrialization of construction, in which the Germans largely succeeded. In 1925 and 1926, a domestic group of architectural experts was sent to Germany to study flow-through construction technologies. In 1927, Germany was visited by Soviet civil engineers and architects, who got acquainted with the solution to technical problems in mass construction [2, 3].

In the twenties in Russia, mostly low-rise construction was carried out, often inspired by the ideas of the "garden city". However, in this construction, you can also find characteristic techniques that were followed by Russian architects. This took into account the landscape conditions, fitting settlements into the natural environment and using local materials [4].

Before 1941, architects in the USSR were commissioned by the Moscow City Council to develop several variants of a typical section for multi-storey (mostly 4-7) residential buildings. The standard section was tested in the course of operation in the development of residential areas, which are now called working settlements. However, due to economic problems in the USSR, there was in principle, a family located in every room. Therefore, in the standard section, the main condition was isolated rooms, although to some extent this solved the acute social problem of housing shortage in Moscow, but did not create quite normal conditions for residents.

In the 1960s, when the government "turned its face to the people" and took a course to provide families with small-sized, but separate apartments, the German experience of rational design was again useful. On behalf of the government, architects developed new standards for mass housing. The approach was based on austerity of funds and materials. Apartments were designed rationally and functionally. It was based on the experience of German residential buildings of mass construction. But domestic savings went even further. In a typical residential section, developed in Germany, the storerooms were removed from all apartments, which, of course, did not benefit the residents, but brought the creators some space savings. At this time, construction and planning standards for mass housing were developed. And this affected all parameters: the ceiling height fell to 2.50 m instead of 3.20 m. The area of apartments also decreased. Two-room apartments instead of having an area of 35-40 m² after the introduction of new standards became 22-27 m². Kitchens in these apartments are only 4.5 m². The construction of new Cheryomushki experimental districts on the outskirts of Moscow became a powerful incentive for the spread of such «Cheryomushki» throughout the cities of the USSR. In the end, it was a powerful social breakthrough that changed the lives of a huge number of people who enthusiastically moved into tiny, but separate apartments.

Problems were prevalent the construction of mass housing. So in 1956, without any competition, the most economical option was considered to be a five-storey building of engineer V. Lagutenko. The panel five-storey building, the main advantage of which was considered a significant saving of metal, was marked as a series of K-7. After the appearance of the first Lagutenko building in Moscow, the authorities considered it the most successful and economical option, and the construction of such buildings quickly spread throughout the cities of the USSR. The team system was very attractive in them. The entire building was assembled flat-pack style in just 5 days. However, in fact, the savings were very conditional. Too thin internal partitions had no sound insulation, and thin external walls froze and did not retain heat. In fact, these five-storey buildings rather heated the street.

Built in the early 1960s, the five-storey buildings were used for 20 years. And they stood until the mid-1990s, when it was decided that it did not make sense to repair dilapidated housing. In fact, it was the first standard industrial housing that initiated a new approach to mass construction in the USSR. Throughout the entire period of construction of mass standard housing, its level has constantly increased. The process of industrial manufacturing was improved. In the following decades, the assembly process began to be carried out according to the catalogue of finished parts. From factory components, as from a set of children's cubes, on the construction site collected residential buildings of a new generation.

5. Conclusions

Mass standard industrial construction in both Germany and the USSR actually followed the same path. Developing from working-class settlements with a fashionable orientation to the garden city, to large residential areas. Cost-effective solutions for apartments and building layouts developed in Germany were actively studied and adapted to local conditions in the USSR.

In mass housing in the USSR, there was no differentiation of apartments for residents of different levels of prosperity. The layout of the buildings was typical.

In turn, in Germany, buildings were constructed with a layout based on the criteria that an apartment would be for a family. In the USSR, until the 1960s, mass housing followed the principle that a room in an apartment would be allocated for a family. Khrushchev's reforms were aimed at overcoming this problem, in order to eventually get, though reducing the size of apartments (compared to the Germans), but giving the option of a separate apartment for a family.

Due to economic characteristics in Germany, a higher quality of materials was used and a more accurate application.

References

- [1] Meerovich M.G., Hmel'nickij D.S., Amerikanskije i nemeckije arhitektory v bor'be za sovetskiju industrializaciju, Vestnik Evrazii 2006, 1, 92-123.
- [2] Cheredina I.S., Rybakova E.Y. Moskva i Berlin. Industrial'nye metody stroitel'stva zhil'ja kak reshenie social'nyh zadach, Zeszyty Naukowe Politechniki Czestochowskiej 2018, seria Budownictwo 24, 50-54.
- [3] Meerovich M.G., Hmel'nickij D.S., Inostrannye arhitektory v bor'be za sovetskiju industrializaciju, Mir Istorii 2006, 1.
- [4] Cheredina I.S., Arhitektory Moskvy. S.E. Chernyshev, Progress-Tradicija, Moskva 2014.

Niemieckie doświadczenie w zakresie projektowania i budowy ogólnodostępnego budownictwa mieszkaniowego i jego dostosowanie do rzeczywistości radzieckiej

STRESZCZENIE:

W artykule dokonano analizy budowy niemieckich osiedli mieszkaniowych z lat dwudziestych XX wieku i powojennych oraz pokazano ich wpływ na rozwój i budowę mieszkań masowych w ZSRR. Omówiono wspólne cechy oraz różnice.

SŁOWA KLUCZOWE:

wioski robotnicze w Niemczech i ZSRR; Moskwa; masowe budownictwo mieszkaniowe; modelarstwo; reformy lat 60. XX wieku