# Updating the regulatory framework for the design and construction of water supply and sanitation systems

*Oleg* Primin*

Moscow State University of Civil Engineering, 26, Yaroslavskoye shosse, Moscow, 129337, Russia

**Abstract**. The paper discusses the aspects of updating and approaches to improving the regulatory and technical documents, i.e. Codes of Practice (CPs), State Standards (GOSTs) to enhance the efficiency of design, construction and operation of water supply and wastewater disposal systems in Russian cities and communities. The development of a methodology for switching over the system of regulatory and technical documents to the parametric standardization is analyzed. It is demonstrated that in recent years, the Russian construction sector has set a course for revising and updating the regulatory framework in the field of design and construction, thus reducing the statutory requirements in the Codes of Practice. The definitions of various methods for the development and application of regulations and standards in construction are given. It is demonstrated that the planned transition from the prescriptive regulation system to a parametric one with specified quality criteria for the finished product is aimed at the development of the quality criteria for the finished project or product using any alternative approaches and methods, transferring a significant part of building codes and regulations to the voluntary category. Evidently, such amendments to the regulatory framework require a very detailed scientific and practical justification.

**Key words:** improvement, construction, designing, regulatory framework, standards, updating, method.

## Introduction

Technical regulation in the construction sector means setting technical characteristics, requirements and indicators for the objectives of the technical regulation, so that meeting them ensures the required functional characteristics of the projects based on the requirements of safety, reliability and durability [1,2].

The system of regulatory documents in the construction sector is a set of interrelated regulatory (legal and technical) documents in construction that contain requirements, rules, methodological or prescriptive provisions relating to various aspects or results of urban

*Corresponding author: tepper2007@yandex.ru

planning including but not limited to the preparation of urban planning documents, engineering surveys, front end engineering design, architectural and building design, construction, operation, capital repairs, reconstruction, demolition and dismantling of capital construction projects, as well as building materials, products and structures in terms of their use in construction [3].

## Methods

In recent years the Russian construction sector has set a course for revising and updating the regulatory framework in the field of design and construction, thus reducing the statutory requirements in the Codes of Practice (CP) [4].

V.V. Putin, President of Russia, charged the Russian Government with drafting proposals to simplify licensing procedures in the construction sector. Hereupon, the Government decided to revise 70% of SNiPs (building codes and regulations), state standards (GOSTs) and other requirements. Marat Khusnullin, Deputy Prime Minister of the Russian Government, stated that the Government had already repealed a third of the statutory requirements of a declarative character: "... we have repealed the statutory requirements related to SNiPs and GOSTs. Today, out of 10 thousand, we have 3 thousand that have become recommendations, and as for the remaining 7 thousand, we have considered and revised 90% of them, simplified and adapted them as close as possible to the modern requirements. At the same time, we continue working in this direction planning to bring more 2-3 thousand regulations into compliance", - said M. Khusnullin during a meeting of the President of the Russian Federation V.V. Putin with the Government [5].

However, what did the designers get? Repeal of almost all SanPiNs (Sanitary Norms and Regulations) that were replaced with two basic ones - on the safety of living and working conditions, and on the requirements for the protection of the environment; simplification of the chain of actions to get permits and approvals, etc.) - the abolition of almost 4,000 statutory requirements of the codes of practice, supported by Decree of the RF Government No. 815 instead of the short-lived Resolution No. 985, in addition to the transfer of almost all clauses of the codes of practice to the voluntary category. [6,7,].

Discussion continues among the construction industry experts related to the standardization system reform.

Currently, different methods for the development and application of regulations and standards in the construction sector have been worked out around the world. First of all, this is a prescriptive method which is the simplest one. However, none of the prescriptive rules clarify the purpose of the regulations. [6,7].

For example, CP 31.13330.2021 "SNiP 2.04.02.84* Water supply. External networks and structures" states that: "... the length of repair sections of water pipelines should be assigned as follows: while laying water pipelines in two or more lines and in the absence of switching - no more than 5 km" [8].

However, none but the developer of this regulation knows why this is even so. The execution scheme within the prescriptive method is also maximally easy. Like building codes and the procedure for meeting them is also compulsory. And standardization, in essence, consists of an element-by-element description of a construction project, in accordance with which the solutions, designs, materials, performance characteristics, etc. are prescribed. In other words, building codes turn into instructions; as a rule, they contain direct references to standards that become prescribed standards [9].

Further, the parametric method, has been widely practiced in economically developed countries [10,11,12]. The world famous function-oriented (flexible) regulation system "performance-based requirement", interpreted as a "parametric regulation method", is known also in the professional environment and is outlined as follows: the parametric regulation

method is a method of establishing regulatory requirements in case the establishment of obligatory requirements applies only to the operational (functional) characteristics of the object of technical regulation, including quantitative parameters, regardless of its design and execution [13].

One of the activities included in the Development Strategy of the construction industry and housing and utilities sector of the Russian Federation for the period until 2030 with a forecast until 2035 is the **gradual** transition of the construction industry to the parametric regulation [14].

In this regard, the RF Ministry of Construction has currently set a course for the transition to the parametric model of standardization of the regulatory framework in the construction sector where the criteria for the quality of the final project or product are determined; the quality can be ensured through any alternative approaches and methods. The existing 10-20 requirements enlisted in the standard will be added to the general parametric- oriented functional requirement.

The Federal Autonomous Institution "Federal Center for Regulation, Standardization and Technical Evaluation of the Conformity in the Construction Industry" (FAI "FRS") declared establishing a working group on the transition to a model of technical regulation in the construction sector.

Transition from the prescriptive regulation system to a parametric one with specified quality criteria for the final product will provide for transferring a significant part of building codes and regulations to the category of voluntary ones - told journalists Sergei Muzychenko, Deputy Minister of RF Construction and Housing and Utilities Sector during "100+ TechnoBuild" Forum [15].

According to the experts of the RF Ministry of Construction it seems advisable to restructure building codes into the documents of three levels:

- 1st level Codes of Practice (CP) of "Main Provisions" type that will contain the requirements set out in the form of tasks to ensure safety (approximately 36 new CPs first developed on the basis of a number of acting CPs);
- 2nd level Codes of Practice (CP) of "Design Rules" type in elaboration of the "Main Provisions" will contain methods for implementing the requirements; herewith, there may be several such CPs in elaboration of one "Main Provision", which includes those containing alternative methods (approximately 80 - 100 revised CPs based on the acting ones);
- 3rd level Codes of Practice (CP) of "Guidance Manuals" type that are not advisable to be included in the "voluntary list".

It is proposed that the Federal Law of December 30, 2009 N 384-FZ (as amended on July 2, 2013) "Technical Regulations on the Safety of Buildings and Structures" as a "specific feature of technical regulation in construction", in addition to the voluntary one, introduce a "recommendatory" list that includes CP IIIrd level.

It should be noted that none of the levels assumes the availability of digital parameters. Instead, there are general provisions: the goals are formulated at the first level; the functional requirements are formulated at the second level, and the requirements for the performance characteristics of the project subjected to the regulation are at the third level.

Building regulations being a technical component of the building law, will be obligatory. This is where the obligingness of the regulatory documents ends.

In the Russian Federation, the issue of transition to the parametric standardization method is still based on the international experience and translations of foreign sources. Therefore, persistent attempts to introduce a parametric method eliminating any appropriate justification and considering the Russian actual situation in the construction industry are unconvincing. Russia cannot be viewed through the prism of analyzing the current systems of technical regulations in the construction sector in countries with developed economies.

In economically developed countries, the educational level and living standards increased gradually, the economy became globalized, technologies developed rapidly, and a huge amount of building materials and products, most of them innovative, began to enter the market, [16]. In Russia the situation has been also changing, but not so rapidly.

Besides, Russia lacks such tool as our foreign colleagues have in the form of Technical Specifications, where all the requirements of voluntary standards become mandatory for a specific project.

It should be noted that in Russia the system of regulatory documents in construction has been in force since 1955. Until 2023, this system was a standard for many countries, including China, and remains so until now. Of course, it is gradually changing. However, recently, the number of design institutions has decreased, the number of specialists and the qualification of graduates of civil engineering universities downgraded; besides their work in the construction sector with no account for the mandatory, prescriptive construction rules and requirements is somewhat troublesome. University graduates and young professionals coming to replace stay alone in the situation where they are not taught, they have no practice, no one to consult; textbooks are rarely published, on-job-training is extremely limited. Evidently, such amendments to the regulatory framework require a very detailed scientific and practical justification.

## Results

Currently, updating acting Codes of Practice and GOSTs is in progress. In so doing, the following main Codes of Practice for the design of external water supply systems and house plumbing have been updated: CP 30.13330.2020 “Internal water supply and sewerage of buildings”, CP 31.13330.2021 “SNiP 2.04.02-84* Water supply. External networks and structures”, as well as CP 32.13330.2018, SNiP 2.04.03-85 “Sewerage, external networks and structures” and a number of other documents. GOST R 21.623-2023 “System of design documentation for construction. Rules for basic and detailed engineering of infrastructure facilities. Water supply and wastewater disposal” has been developed and approved by the RF Ministry of Construction.

Besides, GOST R 21.620-2023 “System of design documentation for construction. Rules for basic and detailed engineering of house and external sewer networks”, GOST R 21.619-2023 “System of design documentation for construction. Rules for basic and detailed engineering of house plumbing systems and external water supply networks” have been put in force [18,19,20].

On approval are GOST 25151-2023 “Water supply. Terms and definitions" (revision of GOST 25151-82), GOST 25150-2023 "Sewerage. Terms and definitions" (revision of GOST 25150-82). They have not been revised for more than 40 years. Lecturers of the department of Water Supply and Wastewater Disposal of the National Research University of Civil Engineering (MGSU) took part in the development of these documents.

However, numerous issues of the water regulation still want solutions. And in this regard, of special note is the inadequacy of the regulatory framework in relation to designing systems for the surface runoff disposal and treatment (SRO), [21].

Surface runoff generated on the territory of cities and communities in Russia is an intensive source of technogenic pollution of water bodies. Deterioration, obsolescence of storm sewer networks and treatment facilities in most Russian cities cause a growing need for reconstruction (upgrade); whereas, in a number of cities the construction of new networks and treatment facilities is needed because of the lack of centralized disposal of surface runoff.

According to expert opinion in the field of surface runoff management, it calls for the improvement and development of innovative technologies, materials and treatment equipment to prevent pollution of the natural environment, including water bodies, by substances of

man-made origin; accounting of the amendments to the regulatory framework for the design of surface runoff disposal and treatment systems, as well as in the RF environmental and water legislations that regulate the discharges of pollutants into water bodies. This is a transition from the application of fishery standards ($MPC_{f.s.}$) to the regulation of discharges based on the performance indicators of the best available technologies (BAT). And accordingly, it calls for the adjustment, and in some cases, amendment to the regulatory and technical documents in this area [21].

The analysis of the current RF Federal Laws, regulatory, technical and methodological framework for the design, construction and upgrade of surface runoff drainage and treatment systems in communities and urban districts given in [21, 22], showed that at present, while designing surface runoff management systems some provisions not regulated by the law afford ground to the bodies of the State Expertise and the Federal Fisheries Agency for rejecting the approval of the project documentation for the implementation of activities on capital construction projects.

The main reason for the rejection is the ban on discharging wastewater into water bodies without any sanitary purification or neutralization (proceeding from the impermissibility of exceeding the norms of acceptable impact on water bodies and maximum permissible concentrations of pollutants in water bodies or technological standards), contained in paragraph 1 Part 6 Article 60 of the RF Water Code [21,22,23].

The provisions 4.11 and 6.1.1 of CP 32.13330.2018, “SNiP 2.04.03−85”. Sewerage. External networks and structures" also fell under the ban. These provisions indicate the following:

- the most contaminated part of surface runoff generated during the periods of rainfall, melting snow, and highway washing shall be removed to the treatment facilities in amount of minimum 70% of the average annual volume of surface runoff of the 1st type, and of the entire average annual volume of surface runoff waters of the 2ndtype (item 4.11);

- surface runoff disposal systems of the 1st type are allowed to discharge peak flows of heavy rains with an intensity exceeding the calculated one into a water body; however, less than 30% of the average annual volume of surface runoff (clause 6.11). Herewith, it is clear to experts that the discharge of storm water during intense rainfall is a forced technical solution, and the ban on the discharge of surface runoff under extreme conditions cannot be considered as the norm. In this case, it is quite obvious that it is Part 6 Article 60 of the RF Water Code that shall be revised, and not CP 32.13330.2018 [22].

It is noteworthy that at present, all design engineers in the country, while performing hydraulic calculations of surface runoff disposal systems, use “outdated” climatic parameters 50 years old. Updating climatic parameters used for hydraulic calculations in the process of designing storm sewers by the “limit intensity” method; and developing engineering measures to adapt to the changes in storm water collection and drainage systems are required.

The use of updated climatic parameters in hydraulic calculations of gravity networks will provide for increasing the discharge capacity of the storm sewers and, in case of shower rains, preventing the damage from flooding of urban areas.

## Conclusions

1.Recently, the Russian construction sector has set a course towards revising and updating the regulatory framework in the field of design and construction with the purpose of reducing the mandatory requirements in the Codes of Regulations.

2. The planned transition from the prescriptive standardization system to a parametric one with specified quality criteria for the final product is aimed at developing the quality criteria for the final project or product using any alternative approaches and methods; transferring a significant part of building codes and regulations to the category of voluntary ones.

3. In the Russian Federation switching to the parametric standardization method is based on the international experience and translations of foreign sources so far. Russia cannot be viewed through the prism of analyzing the current systems of technical regulations in the construction sector in countries with developed economies.

4. The transition to a parametric model of standardization of the regulatory framework in the construction sector of the Russian Federation requires scientific justification and consideration of the specifics and actual situation in the construction industry and socio-economic situation in Russia.

5. It is proposed to further update the system of the regulatory documents in the field of design, construction and operation of water supply and wastewater systems using the current structure of the regulatory framework.

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