INTERNATIONAL CONTEST

OF STUDENTS PROJECTS

2022

STEEL 2REAL '22

The subject of the contest project for 2022

«Residential multi-storey building of at least 9 floors made of steel modular constructions»

TABLE OF CONTENTS

1. INITIAL DATA

Construction area	at the contestant's choice
Purpose of a building	multi-storey residential apartment building
Number of aboveground floors with living rooms	at least 9, but no more than 16
Number of underground floors	at the contestant's choice
Total area of apartments within a floor	no more than 500 m^2
Total area of a building	up to 12,000 m^2
Floor-to-ceiling height	as per SP 54.13330
The level of facility responsibility	normal (GOST 27751-2014)
Type of locality for wind load	B
Functional purpose of the roof	non-exploitable
Building frame	steel modular structures
Modular structures	individual modular panels or prefabricated three-dimensional blocks
Staircase and elevator section	to be defined in the project

2. OBJECTIVE OF CONTEST PROJECT

The Contest participants are invited to develop architectural and structural solutions for **a multi-storey residential building made of steel modular structures** based on the requirements of this terms of reference, as well as requirements of the design regulations valid in the Russian Federation.

AS PART OF THE PROJECT, PARTICIPANT MUST:

- Define the exterior and interior views of a building, its spatial, planning and functional organization.
- Define and develop a typical modular structure (prefabricated panel or three-dimensional block). A required number of typical modular structures may be developed.
- Develop a building frame with due regard for accepted architectural solutions and typical modular structures.
- Ensure the unity of the accepted space planning, architectural, artistic and structural solutions.
- Describe the solutions for interior decoration and architectural and construction activities ensuring thermal protection, as well as protection from noise, vibration, and other impacts.
- Define an optimal design scheme with due regard for space planning and structural solutions, and carry out calculations for the first and second groups of limit states (see para. 5.1 of GOST 27751-2014).
- There is no task to design foundations and carry out soil investigation as part of the contest, so the calculation of a building shall be performed without considering foundations and bases under it. It is recommended to accept a fixed support (pinned or rigid) at the foundation top elevations.
- Any types of shape steel rolled stock, welded beams or cold-formed steel profiles ensuring the required load bearing capacity and made from the rolled steel of Evraz, Severstal, OMK, NLMK may be used for steel modular structures.

3. PROJECT EXECUTION

A calculation note and drawings shall be accepted in electronic form (pdf) with indication of a unique code of the participant that is assigned to each contestant automatically when registering for the contest. No surnames, first names, educational institutions or other identifying information of the participant shall be indicated on materials. The finished project shall be emailed to steel@steel2real.ru along with a list of files sent.

CALCULATION NOTE

1. Substantiation of space planning solutions, main technical and economic indicators, description of interior design(finishing of the premises).
2. Description of the adopted typical modular structure (prefabricated panel or three-dimensional block factory-made).
3. General description of a structural scheme and its individual elements.
4. Load summary, load application scheme.
5. Design parameters of building elements (design lengths, stiffness properties, limit displacements, material properties), conditions for connecting finite elements.
6. Frame three-dimensional configuration calculation results from the least favorable design combinations of loads.

GRAPHICAL PART

The drawings shall be made in accordance with the requirements of GOST 21.501-2011 and GOST 21.101-2020.

The following shall be presented for assessment:

1. Architectural floor plans with the schedule of premises, facades and sections drawings.
2. Building visualization in space.
3. Scheme of a typical modular structure(s).
4. Frame structures layout plan and characteristic cross-sections with due regard for adopted modular structures.
5. Typical connections of the frame elements in accordance with those accepted in the calculation scheme.
6. List of frame elements.
7. Specification of rolled stock for one module and for the whole building.
8. Bill of quantities of reinforcement and concrete.

4. ASSESSMENT CRITERIA*

GENERAL REQUIREMENTS

1. Compliance of the project with the terms of reference.
2. Compliance of solutions with the Russian regulatory requirements.
3. Degree of detail of the project preparation.
4. Graphical presentation of materials.

ARCHITECTURAL SOLUTIONS

5. Town-planning solutions of the design area general plan.
6. Architectural expression.
7. Architectural and planning solutions.
8. Functionality.

STRUCTURAL SOLUTIONS

9. Expressiveness of steel structures.
10. Optimality of solutions in terms of structure manufacturing and installation.
11. Metal intensity of the frame.
12. Validity of the choice of calculation scheme, correct load summary and determination of displacements and forces.

* See the Regulation on the Contest.

5. RECOMMENDED READING

1. SP 54.13330.2016 Residential Apartment Buildings.
2. SP 118.13330.2012 Public Facilities.
3. SP 16.13330.2017 Steel Structures.
4. SP 294.1325800.2017 Steel Structures. Design Rules.
5. SP 20.13330.2016 Loads and Actions.
6. SP 70.13330.2012 Bearing and Enclosing Structures.
7. GOST 27751-2014 Reliability of Building Structures and Foundations. General Provisions.
8. GOST R 57837-2017 Hot Rolled Parallel Flange I-Beams.
9. SP 266.1325800.2016 Composite Structures. Design Rules.
10. SP 260.1325800.2016 Steel Thin-Walled Structures Made of Cold-Formed Galvanized Profiles and Corrugated Plates. Design Rules.
11. SP 2.13130.2020 Provision of Fire Resistance of Protected Facilities.
12. SP 4.13130.2013 Measures for Controlling Spread of Fire at Protected Facilities.
13. SCDA Guide Fire Resistance of Steel Bearing Structures.
14. SP 28.13330.2017 Protection of Building Structures Against Corrosion.
15. SP 50.13330.2018 Buildings Heat Insulation.
16. SP 51.13330.2011 Noise Protection.