New 360 m high television tower structure in Alma-Ata

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Objekttyp: **Article**

Zeitschrift: **IABSE structures = Constructions AIPC = IVBH Bauwerke**

Band (Jahr): **2 (1978)**

Heft C-4: **Structures in the USSR**

PDF erstellt am: **29.04.2024**

Persistenter Link: https://doi.org/10.5169/seals-15105

12. New 360 m High Television Tower Structure in Alma-Ata

Designed by: TSNIIproektstalkonstructsiya, USSR
Dimensions:
Height: 360 m
Body diameter: 18.5 – 9.0 m
Material:
Grade of steel for main structure: C 60/45
Mass:
of metal structural members: 3700 t
including the antenna structure: 250 t
Consumption of steel per linear meter of the tower: 14 t

A new 360 m high television tower is being constructed in Alma-Ata, Central Asia, on the summit of the Kok-Tiube mountain. The relatively small size of the construction site determined the choice of the tower design with a small body diameter at the base. This was also conditioned by a specific combination of design wind and seismic loads.
The tower consists of the main body and the antenna structure. The body has a base of 18.5 m whose diameter decreases with height in a step-by-step manner to 13 and 9 m. The antenna structure has a height of 120 m and consists of cylindrical shells with a base 3 m in diameter which decreases in a stepped manner to 2.6, 1.72 and 0.72 m.
The body structure has been designed in the form of latticed prisms. The vertical chords are of welded I-beams connected by a lattice of angle shapes and welded I-beams struts. It is for the first time that a structure of this type has been constructed using welded I-beams of C 60/45 grade steel 16Г2АФ. The body is assembled from all-welded panels 8.0 m high. Chords of separate sections are interconnected by welding.
Along the body height and perimeter the lattice fills the side faces along the section heights in a staggered way which excludes field joints of the diagonals. Parts of the body with a different diameter are interconnected telescopically. The upper, smaller diameter, part enters the lower part having a larger diameter. Chords of the interconnected body parts are connected radially by a lattice. This allows the moment induced by eccentricity of the chords to be resisted by the transverse membranes. To lower the aerodynamic resistance of the structure, the latticed faces of the body are covered with corrugated aluminium alloy panels. At a height of 170 and 244 m annular technological rooms are constructed; inside the tower body there is a staircase which passes into a step-ladder in the antenna structure. There are two 1000 kg lifts operating inside the tower, one to the rooms at 170.0 m, the other to the room at the height of 244.0 m. To reach the antenna structure sections, a 200 kg capacity rack hoist is used.
To decrease the amplitude of oscillations of the tower resulting from wind and seismic loads, special dampers are installed at several levels along the height of the tower.

(B.V. Ostroumov, Ye.P. Morozov)

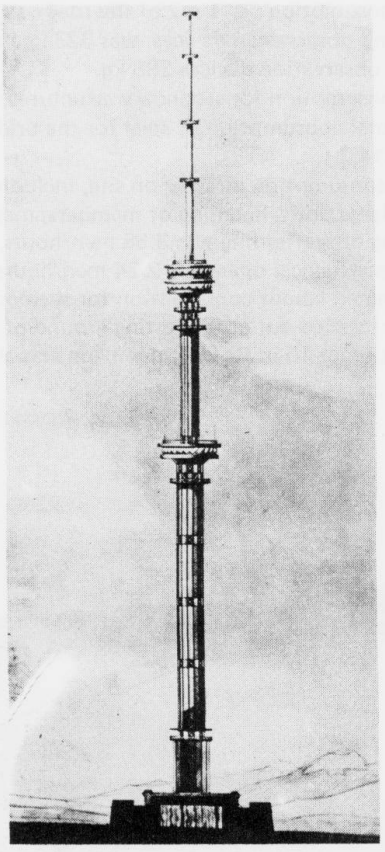

Fig. 1 General View

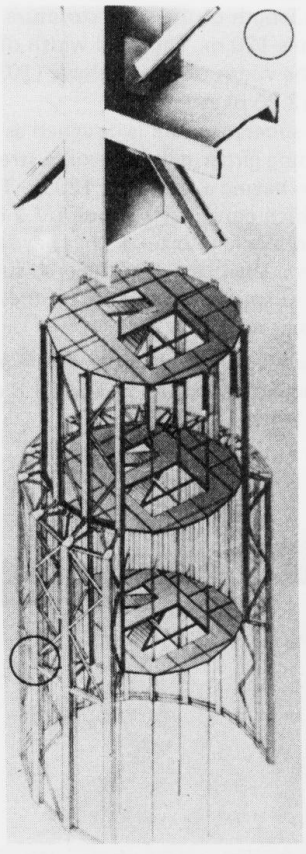

Fig. 2 A Structural Unit of the Tower Body, Junction of Structural Members