The corrosion-fatigue strength of steel specimens with press-fitted sleeves was studied. It was established that the reduction in the corrosion-fatigue strength of steel does not depend on the sleeve material.

The endurance of steel in air is sharply reduced under the influence of press-fitted sleeves [1]. This reduction is considerably smaller in corrosive media, but even in this case the corrosion-fatigue strength (determined on a test base of $5 \times 10^7$ cycles) of specimens with press-fitted is 40% lower than that of specimens without such sleeves. The character of corrosion-fatigue curves of specimens with sleeves points to a low load-carrying capacity of the joint in long-time tests (low conditional fatigue limit, absence of a deflection point).

The reduction produced in the endurance of steel specimens in air by press-fitted steel or brass sleeves is probably due to a) stress concentration resulting from the pressing operation, b) bending strains, and c) friction-activated corrosion. The effect of stress concentration in corrosive media is less pronounced than that recorded for specimens fatigued in air [2]; this is attributed to the fact that corrosive media, which dissolve the material in the notch-root regions, reduce the effective stress concentration and so weaken its influence on the endurance of parts [with stress raisers] [3, 4]. Consequently, it could be postulated that the endurance of steel parts in corrosive media should not be reduced in the presence of press-fitted sleeves; experiment shows otherwise, however. To clarify the causes of the reduction in the corrosion-fatigue strength of steel specimens with press-fitted sleeves, the following experiments were carried out:

a) corrosion-fatigue tests on specimens with sleeves made of a flexible material (teflon) to eliminate stress concentration;

b) corrosion-fatigue tests on specimens continually in contact with stationary rubber glands, i.e., under continuous friction conditions.

The teflon sleeves were made from FT-4 powder by pressing in a special die, were annealed, turned, and finally bored to finished size. The specimens were assembled by a mechanical method using Class 2 press-fit tolerances (OST-1043).

Steel-specimen components were made from 40-mm diameter St. 35 steel rod (0.34% C; 0.58% Mn; 0.23% Si; 0.039% S; 0.032% P; $\sigma_b = 66.5$ kg/mm$^2$; $\sigma_y = 40$ kg/mm$^2$; $\delta = 20%$; $\psi = 51%$).

Fig. 1. Apparatus for corrosion-fatigue tests on specimens with press-fitted sleeves: 1) working chamber; 2, 3) inlets for air and corrosive medium; 4) specimen with a sleeve; 5) side walls; 6) rubber glands; 7) collet; 8) spindle; 9) support.

*Pressing force = 300 kg/cm$^2$; annealing temperature = 380–375° C.
Fig. 2. Corrosion-fatigue curves of specimens 1) without sleeves, 2) with teflon sleeves, and 3) in contact with rubber glands.

Fig. 3. Effect of the sleeve material on the corrosion-fatigue strength of steel specimens; 1) unnotched [i.e., plain] specimens without sleeves; 2) specimens with steel sleeves; 3) specimens with brass sleeves; 4) specimens with teflon sleeves; 5) specimens in contact with rubber glands.