SYMPOSIUM ON METALLIC MATERIALS FOR SERVICE AT TEMPERATURES ABOVE 1600 F

INTRODUCTION

By V. N. Krivobok

The quest for greater efficiency in power engineering creates a never-ending demand for metals capable of withstanding the higher temperatures of operation necessary for such attainment. Steam power plant designers are pushing temperatures and operating pressures beyond the safe limits of strength and endurance of the ferritic steels which have been used in such installations. Gas turbine engineers state that they are prepared to design for operations at temperatures higher than the present-day 1600 F limit to which they have been restricted because of want of materials capable of performing satisfactorily at higher temperatures. Those who have been trusted with the construction of such devices as guided missiles have multiple problems, the solution of which is dependent upon availability of metals with the necessary strength at still higher temperatures.

The American Society for Testing Materials, during its 1955 Spring Meeting, arranged a Symposium on the subject of Basic Effects of Environment on the Strength, Scaling, and Embrittlement of Metals at High Temperatures. This Symposium was held under the auspices of the General Research Panel (A. J. Herzig, chairman) of the ASTM–ASME Joint Committee on Effect of Temperature on the Properties of Metals. The same committee followed this Symposium with the present one at the Annual Meeting of the Society, this time on the subject of Metallic Materials for Service at Temperatures Above 1600 F. It is the papers that were carefully chosen for the latter Symposium that appear in this volume.

The problem of high-temperature strength of various alloys and of their stability was attacked from several approaches. Thus, a number of authors reported properties of nickel, cobalt, and molybdenum-base alloys; other metallurgical researchers sought a solution through the application of carbides, powder metallurgy techniques (for the production, for example, of high-temperature molybdenum-base alloys), while some described the effectiveness of ceramic coatings for protection of metal against oxidation and erosion.

While one may search in vain for the adequate solution to the extremely difficult problem of ultra-high-temperature strength and associated problems, the papers of the Symposium report the progress in a wide variety of approaches to find such a solution.

It is the wish of the General Chairman to offer, on behalf of the Society and on
behalf of those who attended this Sym­
posium, an expression of appreciation
of the efforts by the authors and by the
Chairmen of the two sessions, E. N.
Skinner, C. T. Evans, Jr., and A. W. F.
Green. These words of appreciation are
not offered as a routine matter of ac­
cepted politeness. They are offered in
the sincere belief that the gigantic task
of arranging a Symposium was made
easier and never exasperating by the
understanding and cooperation of every­
one connected with the Symposium.

The well-known name of one much
respected man, namely, Francis B. Foley,
does not appear on the official pro­
gram of the Symposium. Yet, it was
Mr. Foley who, as a colleague of the
General Chairman, carried out in his
usual efficient, considerate, and friendly
manner the burden of correspondence,
negotiations, and a multitude of other de­
tails. To this gentleman, this Symposium
on Metallic Materials for Service at
Temperatures Above 1600 F owes a
great deal.