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CIVIL AERONAUTICS MANUAL 3

U. S. Department of Commerce

Civil Aeronautics Administration

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Supplement No. 3

August 31, 1949

SUBJECT: 3.174 (previously 3.203)
Proof of Structure

The purpose of this supplement is to make available the current policies being followed pertaining to use of material correction factors in correcting results of tests of aircraft elements and components to standard values.

3.174-1 Material Correction Factors

Attached is a new page headed "CAR 3.174 Proof of Structure," and dated August 31, 1949. This page should be retained as the third in a series of similar statements that will be issued explaining or implementing Civil Air Regulation 3.

for John F. Hensley
E. S. Hensley
Director, Office of
Aviation Safety

Attachment

Distribution: Air 1, 2, 3, 13, 14, 40 all tabs,
40-B, 40-C, 40-D, 40-E, 40-F-1

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"CAR 3.174 Proof of Structure. Proof of compliance of the structure with the strength and deformation requirements of § 3.173 shall be made for all critical loading conditions. Proof of compliance by means of structural analysis will be accepted only when the structure conforms with types for which experience has shown such methods to be reliable. In all other cases substantiating load tests are required. In all cases certain portions of the structure must be subjected to tests as specified in Subpart D." previously 3.3

3.174-1 MATERIAL CORRECTION FACTORS. (CAA policies which apply to section 3.174, previously 3.203.)

(a) In tests conducted for the purpose of establishing allowable strengths of structural elements such as sheet, sheet stringer combinations, riveted joints, etc., test results should be reduced to values which would be met by elements of the structure if constructed of materials having properties equal to design allowable values. Material correction factors in this case may be omitted, however, if sufficient test data are obtained to permit a probability analysis showing that 90% or more of the elements will either equal or exceed in strength the selected design allowable values. The number of individual test specimens needed to form a basis of "probability values" cannot be definitely stated but must be decided on the basis of consistency of results; i.e., "spread of results", deviations from mean value, and range of sizes, dimensions of specimens, etc., to be covered. This item should therefore be a matter for decision between the manufacturer and the CAA. (Sections 1.654 and 1.655 of ANC-5a 1949 edition outline two means of accomplishing material corrections in element tests; these methods, however, are by no means considered the only methods available.)

(b) In cases of static or dynamic tests of structural components, no material correction factor is required. The manufacturer, however, should use care to see that the strength of the component tested conservatively represents the strength of subsequent similar components to be used on aircraft to be presented for certification. The manufacturer should, in addition, include in his report of tests of major structural components, a statement substantially as follows:

"The strength properties of materials and dimensions of parts used in the structural component(s) tested are such that subsequent components of these types used in aircraft presented for certification will have strengths substantially equal to or exceeding the strengths of the components tested."

August 31, 1949