MIL-A-8860B(AS)
20 May 1987
SUPERSEDING
MIL-A-8860(ASG)
18 May 1960

MILITARY SPECIFICATION

AIRPLANE STRENGTH AND RIGIDITY GENERAL SPECIFICATION FOR

This specification is approved for use within the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification contains general requirements, which, in combination with other applicable specifications, define the structural design, analysis, test, and data requirements for fixed wing piloted airplanes. These requirements include, but are not limited to, the following:

a. The strength and rigidity of the structure of the airplane including supporting and carry-through structures for fixed equipment and useful load items.

b. The strength and rigidity of control systems for operation of lateral, longitudinal, and directional control surfaces; dive or speed brakes; high lift devices; tabs; stabilizers; spoilers; certain other mechanisms; and their respective carry-through structures.

c. The shock-absorption characteristics and strength of landing-gear units and the strength and rigidity of their control systems and of their carry-through structures. Requirements for wheels, tires, and brakes are also included.

d. The strength of structures integral with the airplane provided for transmitting catapulting forces to the airplanes, and for engaging shipboard and shorebase arresting gear, and barricades.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Naval Air Engineering Center, Systems Engineering and Standardization Department (Code 93), Lakehurst, NJ 08733-5100, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

AMSC N/A FSC 1510

e. The strength of anchor-line clamps, and the airplane strength for hoisting, jacking, towing, tie-down, and other ground- or deck-handling conditions.

f. Flutter and other aeroelastic instability prevention, and aeroacoustic and vibration characteristics.

g. Determination of special weapons effects.

h. Structural design, analysis, and test data.

i. Laboratory and flight tests performed to obtain information regarding strength rigidity and loads.

j. Definitions.

1.2 Modifications and amplification. This specification may be modified and amplified in contracts for piloted airplanes by type, detail, and design data specifications, and addenda thereto.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

QQ-A-367	-	Aluminum Alloy Forgings.

MILITARY

MIL-F-7190	-	Forgings, Steel, for Aircraft/Aerospace Equipment and Special Ordnance Applications.
MIL-D-8708	-	Demonstration Requirements for Airplanes.
MIL-A-8861	-	Airplane Strength and Rigidity Flight Loads.
MIL-A-8863	-	Airplane Strength and Rigidity Ground Loads for Navy Procured Airplanes.
MIL-A-8865	-	Airplane Strength and Rigidity Miscellaneous Loads.
MIL-A-8866	-	Airplane Strength and Rigidity Reliability Requirements, Repeated Loads, and Fatigue.
MIL-A-8867	-	Airplane Strength and Rigidity Ground Tests.
MIL-A-8868	-	Airplane Strength and Rigidity Data and Reports.

SPECIFICATIONS

MILITARY (con't)

MIL-A-8869	-	Airplane Strength and Rigidity Special Weapons Effects.
MIL-A-8870	-	Airplane Strength and Rigidity, Vibration, Flutter, and Divergence.
MIL-A-21180	-	Aluminum Alloy Castings, High Strength.
MIL-A-22771	-	Aluminum Alloy Forgings, Heat Treated.
MIL-T-81259	-	Tie-downs, Airframe Design, Requirements for.
MIL-F-83142	-	Forging, Titanium Alloys, for Aircraft and Aerospace Applications.

STANDARDS

MILITARY

MIL-STD-210	-	Climatic Extremes for Military Equipment.
MIL-STD-1374	-	Weight and Balance Data Reporting Forms for Aircraft.
MIL-STD-2175	-	Castings, Classification and Inspection of.

HANDBOOKS

MILITARY

MIL-HDBK-5	-	Aerospace Vehicle Structures, Metallic Materials and Elements for.
MIL-HDBK-17	-	Plastic for Aerospace Vehicles Part 1 Reinforced Plastics.
MIL-HDBK-23	-	Structural Sandwich Composites.

2.1.2 Other Government documents (publications). The following other Government documents (publications) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

PUBLICATIONS

NAVAL AIR SYSTEMS COMMAND

SD-24	-	General Specification for Design and Construction of Aircraft Weapon Systems.

(Copies of specifications, standards, handbooks, and other Government documents (publications) required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.1.3 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Y 10.7 - Letter Symbols for Aeronautical Sciences.

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General. The requirements of this specification shall apply to fixed-wing piloted airplanes unless specific deviations therefrom are granted by the contracting activity. These requirements are selected for general usage on the basis of the particular type of airplane being designed and of the performance of the basic, alternate, and training missions relative to that design. The construction of the airplane shall conform to the manufacturing and process requirements of SD-24, as amended, to provide airplanes which comply with the design requirements of this specification, MIL-A-8861, MIL-A-8863, MIL-A-8865, MIL-A-8866, MIL-A-8867, MIL-A-8868, MIL-A-8869, and MIL-A-8870.

3.1.1 Terms. Terms, their definitions, and symbols shall be in accordance with 6.3.

3.1.2 Limit loads. The load factors and load formulas noted in any portion of this specification and the referenced specifications of section 2 represent limit loads, unless otherwise specified.

3.1.3 Ultimate loads. Except for loading conditions for which specific ultimate loads are delineated, the ultimate loads are obtained by multiplying the limit loads by the ultimate factor of safety. Failure shall not occur at the design ultimate load. The ultimate factor of safety to be used for the design of the structure shall be 1.50, except that in certain cases for

considerations of added safety, rigidity, quality assurance, and wear, additional strength or multiplying factors of safety are specified.

3.1.4 Deformations. The cumulative effects of elastic, permanent, and thermal deformations which result from application of repeated loads, and from application of design limit loads, shall not interfere with the mechanical operation of the airplane, affect adversely its aero-dynamic characteristics, require repair, or require replacements of parts other than as specifically approved by the contracting activity. This requirement applies both to flight articles and to structural test articles when loaded statically or dynamically, and when loaded in increments of load or sinking speed as specified for structural tests.

3.1.4.1 Control Systems. All loads up to ultimate load for flight loading conditions shall not cause binding or interferences in the control system between the control surfaces and adjacent structures such as to inhibit safety of flight operations.

3.1.5 Load and temperature redistribution. If thermal, elastic and aeroelastic deformations of the structure occur as a result of limit flight and ground loading conditions, the external load and temperature distributions shall include the effect of those deformations. Load redistributions and magnitudes shall include those caused by thermally induced deformations, airload redistributions caused by surface temperature changes, rigidity changes resulting from thermal stresses and other thermally induced effects, and aeroelastically induced deformations.

3.1.6 Superimposed loads. Residual loads remaining after extending or retracting landing gear and flaps, opening and closing bomb bay doors, or caused by rigging loads of magnitudes specified by the contractor in the aircraft maintenance instructions, and preloads such as those occurring when sway-bracing is fitted, shall be combined with the loads resulting from the pertinent loading conditions. Loads acting upon the aircraft structure as a result of the operation of armament and equipment, blasts, impingement of engine exhaust, and full engine power shall be combined with the loads acting on the aircraft structure at rest on the ground and the loads acting on the aircraft structure during flight, except spins, for the basic and high drag configurations and during landings, as applicable.

3.1.7 Transient response. The magnitudes and distributions of loads shall include the effects of the dynamic response of the structure resulting from the transient or sudden application of loads such as: the dynamic response resulting from abrupt maneuvers; detonation of special weapons; gusts; landings; taxiing; braking wheels in air; sudden release of catapult holdback force; catapulting; response to catapult-tow forces; arresting; oscillations of arresting gear deck pendants; slipping of arresting hooks on deck pendants; assisted-takeoff-unit loads; gun firing; release or ejection of stores; and parachute drop of cargo.

3.1.8 Thermal considerations. The design of the airplane shall include provision for the effects of: heating incidental to operation of powerplants and other heat sources from within the airplane; operation in ambient atmospheres consistent with both the cold and hot atmosphere temperature-versus-altitude relationship defined in MIL-STD-210 and extrapolated to cover operational altitudes; aerodynamic heating; and heating encountered during shipboard catapult launch operation, both forward and aft of the raised jet blast deflector (JBD). These effects shall include steady state and transient excursions of the airplane into and out of regimes of aerodynamic heating consistent with its anticipated employment. The design shall include provision for the cumulative effects of the time-temperature-load history of the airplane for its planned service life.

3.1.9 Authorized changes. Government-responsible changes, authorized subsequent to the establishment of the original contract requirements, shall not increase or decrease the appropriate structural design gross weights unless specifically stated by the change. Strength is required in the changed airplane for all loads, load factors, accelerations, and loading conditions which result from application of the structural design requirements of the detail specification to the changed airplane at the specified structural design gross weights.

3.1.10 Fail-safe. The complete airframe shall be designed such that failure of a single structural element will neither cause catastrophic failure of the airplane nor prevent safe continuance of its flight to a planned destination or to an aircraft carrier. Redundancy, alternate load paths and systems, and other fail-safe principles are required to achieve this capability. For this fail-safe requirement, the airframe is defined as including all of the structural elements of major systems and all of the structural connecting and supporting elements of powerplant installations, whereby the failure of these elements can cause uncontrollable motions of the airplane within the speed limits for its structural design, prevent the airplane from achieving speeds sufficiently low to effect a safe landing, and reduce the ultimate factor of safety for flight design conditions from 1.5 to a value less than 1.0.

3.1.11 External store stations. Strength shall be provided at each store station for all flight conditions, including all flight attitudes and miscellaneous occurences (e.g., engine stalls), and all ground loading conditions for all possible combinations of stores specified in the detail specification. The loads imposed by the airplane response to the dynamic loads at each store station shall not create an exceedence of the strength limit of contractor furnished stores or suspension equipment.

3.2 Design strength. For all design conditions, strength shall be provided so that material yield allowable stresses will not be exceeded at limit loads and material ultimate allowable stresses will not be exceeded at ultimate loads. For repeated-load and fatigue conditions, strength shall be provided so that the fatigue life of the structure will equal or exceed the specified life, including specified scatter factors. The continuity of the

structural design of the attachments of movable aerodynamic surfaces shall be such that initial failures of the complete installations, under static and/or repeated loads, will be major failures of the movable or fixed surfaces, not failures of the attachment.

3.2.1 Design data and allowable materials properties. Design data and properties of materials shall be obtained from MIL-HDBK-5 and MIL-HDBK-23, or from other sources subject to acceptance by the contracting activity. SD-24 contains requirements on fibrous composites which shall be used in lieu of MIL-HDBK-17, and contains additional requirements for the use of high strength steels. Allowable properties based on static and fatigue test data other than handbook data may be used subject to acceptance by the contracting activity. Properties other than those contained in these handbooks shall be substantiated and analyzed with procedures used for corresponding data in the appropriate handbook, except as otherwise indicated for fibrous composites in the applicable requirements of SD-24. Where it is necessary to develop data and properties for metallic and nonmetallic materials and composites, the test materials, processes, and composites shall be those intended for use in production airplanes. Minimum guaranteed properties obtained from the foregoing sources shall be used for design purposes. In MIL-HDBK-5, "A" values shall be used in the design of structural components whose failure would result in loss of the airplane or loss of control of the airplane, and shall be used also for the design of structural components not subjected to structural tests. The "B" values of MIL-HDBK-5 may be used, subject to the approval of the contracting activity, for the design of structural components whose failure would cause a load redistribution which does not cause failure resulting in the loss of the airplane or control. Eightly-five percent of the average values or of the "B" values, whichever is less, shall be used in the design of the composite structural components. For the substantiation of structural integrity by analytical calculations, the nominal gage of material shall be the average gage between tolerances.

3.2.1.1 Castings. Castings shall be classified and inspected in accordance with MIL-STD-2175. Aluminum castings in structural applications shall conform to the requirements of MIL-A-21180 except that design data and allowable material properties shall be used as specified in 3.2.1. Calculated margins of safety using "A" values from MIL-HDBK-5 shall be not less than 0.33 for limit and ultimate calculations. AMS 5343 shall be used for 16-4 PH castings. Castings shall not be permitted for any structural application unless specified in the detail specification.

3.2.1.2 Forgings. Structural forgings shall be designed and produced in accordance with MIL-F-7190 for steel, MIL-A-22771 and QQ-A-367 for aluminum, and MIL-F-83142 for titanium, as applicable. Grain flow of the the forging material shall be such that no undesirable characteristics are inherent in the forging.

3.2.2 Properties of material for design purposes. The selection of the physical properties used in structural design shall include a consideration of all factors which affect the allowable strength. Such factors include, but are not limited to: grain direction; manufacturing processes; nature of

static, repeated, transient, vibratory, and shock loads; stress concentration areas; factors or conditions that are conducive to stress corrosion problems; operating environment consistent with overall planned usage; and effects of operating environment on residual physical properties.

3.2.2.1 Grain direction. The allowable stresses used in the design shall not exceed those applicable to the grain directions resulting from fabrication. So far as is practical, structural members shall be so designed that the directions of the critical stresses are favorably related to the directions of the grain resulting from forging, rolling, extruding, and other fabrication processes.

3.2.2.2 Temperature effects. The selection of allowable stresses used for design shall include consideration of reductions of material strength, both at expected maximum elevated temperatures and at ambient temperatures which follow exposure to elevated temperatures, including maximum and minimum exposure temperatures, duration of exposure including cumulative effects, rates of load application, and magnitude of load. Allowable stresses shall be selected on the basis of creep, thermal expansion, joint-fastener relaxation, and elevated-temperature fatigue.

3.2.2.3 Vibration effects. The effects of sustained vibration and repeated loads upon the strength of the material shall be considered in selecting allowable strength values for design.

3.3 Establishment of criteria. It is intended that structural criteria be established on a rational basis. Criteria delineated in this specification and the other specifications in the MIL-A-8860 series shall be used unless other criteria are determined to be more rational, or unless the criteria are found to be inapplicable because of the peculiarities of the aircraft under consideration. New criteria or methods which are proposed by the contractor shall be rational, and shall be submitted to the Naval Air Systems Command for approval prior to use in structural design computations.

3.4 Flight loads. Flight loads shall be in accordance with MIL-A-8861.

3.5 Landplane landing and ground handling loads. Landplane landing and ground handling loads for landplanes shall be in accordance with MIL-A-8863.

3.6 Additional loads for carrier-based landplanes. The additional loads for carrier-based landplanes shall be in accordance with MIL-A-8863.

3.7 Miscellaneous loads. Miscellaneous loading conditions shall be in accordance with MIL-A-8865.

3.8 Repeated loads and fatigue. Requirements for prevention of fatigue and repeated load damage shall be in accordance with MIL-A-8866.

3.9 Ground tests. The static, dynamic, repeated load, and other ground tests required for proof of structural design shall be as specified in MIL-A-8867.

3.10 Data and reports. The structural reports required to substantiate the strength of the airplane, the sequence of report presentation, and the contents of these reports shall be in accordance with MIL-A-8868.

3.10.1 Symbols and axes systems. The symbols required for all structural reports and the axes systems designations and their angular relationship, shall be those outlined in Publication ANSI Y 10.7.

3.11 Special weapons effects. Requirements pertaining to special weapons effects such as gust, thermal, and overpressure shall be in accordance with MIL-A-8869.

3.12 Vibration, flutter, and divergence prevention. The requirements pertaining to flutter, divergence, and other aeroelastic instability prevention, and for vibration and aeroacoustics shall be in accordance with MIL-A-8870.

3.13 Design requirements for tie-downs. Airframe structural requirements for tie-downs shall be in accordance with MIL-T-81259.

3.14 Flight tests. Structural flight-test requirements for the flight determination of airloads and the structural demonstration of piloted airplanes shall be in accordance with MIL-D-8708.

4. QUALITY ASSURANCE PROVISIONS

This section is not applicable to this specification. Quality assurance provisions shall be in accordance with the applicable specifications of MIL-A-8860 series and as specified in the contract.

5. PACKAGING

This section is not applicable to this specification.

6. NOTES

6.1 Intended use. The requirements of this specification are intended for use in the structural design and substantiation of airplanes.

6.2 Ordering data.

This paragraph is not applicable to this specification.

6.3 Definitions and symbols. Documents COESA-Standard Amtmosphere, MIL-STD-210, and NASA SP7 (Dictionary of Technical Terms for Aerospace Use) on nomenclature and atmospheric properties will apply.

6.3.1 Configuration.

6.3.1.1 Basic. All devices such as flaps, slats, slots, cockpit enclosures, landing gear, speed limiting devices, and bomb bay doors should be in their closed or retracted positions, unless such a device is a scheduled maneuvering surface.

6.3.1.2 Dive-recovery or high-drag. These are the same as the basic configuration, except that the speed limiting devices should be in the fully open positions, as limited by the available actuating force or power.

6.3.1.3 High-lift. This is the same as basic configuration, except that any device used to increase lift should be in the maximum lift position and alternately in critical intermediate positions.

6.3.1.4 Landing-approach. This is the same as basic configuration except that landing gear, landing flaps, and other devices that are extended or open for landing should be in the landing positions. If the positions of dive brakes or other devices can affect loads on doors, flaps, or control surfaces, these devices should be in their critical positions.

6.3.1.5 Takeoff. This is the same as basic configuration, except that the landing flaps and other devices that are extended or operated for takeoff should be in the takeoff positions.

6.3.1.6 Model types of airplanes. Airplane model types are defined as follows:

VA - Attack airplane
VC - Cargo airplane
VE - Electronic airplane
VF - Fighter airplane
VO - Observation airplane
VP - Patrol airplane
VR - Reconnaissance airplane
VS - Antisubmarine airplane
VT - Trainer airplane
VU - Utility airplane
VW - Weather airplane

6.3.2 Design weights. The gross weights to be used in conjunction with the loading conditions of MIL-A-8861, MIL-A-8863, MIL-A-8865, MIL-A-8866, MIL-A-8869, and MIL-A-8870 are the applicable gross weights defined in this paragraph and all lesser gross weights, down to and including the minimum flying gross weight, at which critical loads are achieved.

6.3.2.1 Minimum flying gross weight. The minimum flying gross weight for all types of airplanes is composed of the weight empty, as defined in MIL-STD-1374, plus the following:

a. Five percent of internal fuel. (For flying qualities and for flutter, divergence and other aeroelastic considerations, zero fuel should also be assumed.)

b. Oil consistent with 5 percent internal fuel.

c. Minimum crew.

d. No disposable armament or ammunition.

e. No other useful load item.

6.3.2.2 Basic flight design gross weight. For Classes VT, VP, VS, VE, VU, VC, and VR, this weight is the takeoff gross weight with basic mission useful load. For all other classes, the basic flight design gross weight is the weight of the airplane with basic mission useful load minus the weight of 40 percent of maximum internal takeoff fuel. These weights are applicable to flight loads.

6.3.2.3 Maximum design gross weight. The maximum design gross weight is the weight of the airplane with maximum internal and maximum external load for which provision is required, with no reductions permitted for fuel used during taxi, warmup, or climb-out. This weight applies to:

a. Ground maneuvering, ground handling and miscellaneous ground loads.

b. Catapulting loads.

c. Takeoff loads.

d. In-flight refueling conditions.

e. Flight loads at takeoff gross weight.

f. Wheel jacking. (For wing and fuselage jacking, if such jacking is required for changing wheels and tires.)

g. Flutter, divergence and other aeroelastic instability prevention, and vibration and aeroacoustics.

6.3.2.4 Carrier landing design gross weight. The carrier landing design gross weight for jet and turbo-propeller types is the weight of the fully loaded airplane with missiles, special weapons, guns and ammunition, and empty auxiliary fuel tanks, minus the weight of all other external stores and minus the weight of all usable fuel except that required for 20 minutes loiter at sea level with all engines operating, plus 5 percent takeoff fuel, plus fuel for 10 minutes operation with static normal thrust at sea level. For reciprocating engine types, this weight should be as defined above except that the fuel removed must be 60 percent of the takeoff usable fuel. For carrier-based primary or basic trainers, the carrier landing design gross weight is the weight of the fully loaded airplane. These gross weights are applicable to:

a. Carrier arrested landings.

b. Shipboard emergency recovery (barricade).

c. Shipboard securing.

6.3.2.5 Landplane landing design gross weight. The landplane landing design gross weight applies to land-based types and to field landings of carrier-based types. For trainers, this weight is the maximum design gross weight of 6.3.2.3 minus the weight of external stores. For all other types, this weight is the maximum design gross weight of 6.3.2.3 minus the weight of external fuel and minus the weight of 60 percent internal fuel. These weights are applicable to:

a. Landings ashore, including field carrier landing practice (FCLP), of carrier-based airplanes.

b. Field arrested landings.

c. Jacking, other than wheel jacking.

6.3.2.6 Maximum landplane landing design gross weight. The maximum landing design gross weight applicable to landings ashore is the weight of 6.3.2.3 less the following items:

a. Assist-takeoff fuel.

b. Droppable fuel and tanks.

c. Dumpable fuel.

d. Any other items expended during or immediately after takeoff as routine takeoff procedure.

6.3.2.7 Hoisting design gross weight. The hoisting design gross weight is the weight of the airplane with maximum internal and external load for which provision is required minus the weight of crew and external stores.

6.3.3 Speeds. Speeds are in knots based upon the international nautical mile.

6.3.3.1 Calibrated airspeed (CAS). The indicated airspeed corrected for installation and instrument errors.

6.3.3.2 Equivalent airspeed (EAS). The true airspeed multiplied by the square root of the air density ratio at the altitude concerned.

6.3.3.3 Indicated airspeed (IAS). The reading of the airspeed indicator uncorrected for instrument, installation, and compressibility errors.

6.3.3.4 True airspeed (TAS). The speed at which the airplane moves through the air surrounding it.

6.3.3.5 Catapult end airspeed (V_c). The catapult end airspeed as defined in the detailed specification.

6.3.3.6 Level flight maximum speed (V_H). The maximum speed attainable at the basic flight design gross weight in the basic configuration in level flight with maximum available thrust, including use of afterburners (and rocket thrust augmentation if applicable).

6.3.3.7 Limit speed (V_L). For the basic and high drag configurations, the maximum attainable speed commensurate with the operational use of the airplane considering shallow and steep dive angles, thrust, operation and nonoperation of speed brakes, and inadvertent upsets from gusts.

6.3.3.8 Limit speed (V_{L_F}). The maximum speed for the landing approach and takeoff configurations.[F] This speed is the highest of: 120 percent of the maximum speed attainable, including use of afterburner if applicable, without exceeding 200 feet altitude after takeoff from runway or carrier deck, over the period of time required to convert from the takeoff to the basic configuration; 120 percent of the best climb speed at sea level; or $1.75V_s$ in the basic configuration. The gross weight should be the maximum design gross weight.

6.3.3.9 Minimum approach speed, (V_{PA}) min. The minimum approach speed as defined in the detailed specification.

6.3.3.10 Stalling speed (V_S). The minimum speed for level flight at sea level in the basic configuration with zero thrust.

6.3.3.11 Stalling speed with power (V_{SPA}). The minimum speed for level flight at sea level in the landing configuration with the power or thrust required to provide satisfactory wave-off characteristics.

6.3.3.12 Stalling speed (V_{S_L}). The minimum speed for level flight in the landing approach configuration with zero thrust.

6.3.4 Miscellaneous.

6.3.4.1 Abrupt displacement of controls. Where these specifications require an abrupt displacement of controls by application of a specified force or displacement in a specified time interval, it is not required that hinge moments, power or boost system maximum rates, or maximum displacements be exceeded.

6.3.4.2 Critical condition. The design loading condition for which margins of safety indicate the structure is most likely to fail.

6.3.4.3 Load factor N. The ratio of a given load to the weight with which the load is associated. If employed, a subscript designates the direction of the load.

6.3.4.4 Limit load or limit load factor. A load or load factor which establishes a strength level for the design of the airplane and components and is the maximum load factor normally authorized for operations.

6.3.5 MIL-A-8860 series. This series of specifications includes MIL-A-8860, MIL-A-8861, MIL-A-8863, MIL-A-8865, MIL-A-8866, MIL-A-8867, MIL-A-8868, MIL-A-8869, and MIL-A-8870.

6.4 Supersession data. This specification supersedes MIL-A-8860(ASG). It also supersedes MIL-A-008860A(USAF) in part, although MIL-A-008860A(USAF) will remain in effect until cancelled by the Air Force. The 8860 series supersedes the 5700 series, MIL-A-8629, and MIL-F-25352 in their entirety.

6.5 Subject term (key word) listing.

Aeroacoustics
Aeroelastic
Airplane
Airplane configuration
Airplane rigidity
Airplane speeds
Airplane strength
Design weight
Divergence
Fail-safe
Flight loads
Flight tests
Flutter
Landing-gear
Shock absorption (landing gear)
Special weapons
Structural design
Takeoff
Ultimate loads
Vibration

6.6 Changes from previous issue. Asterisks or vertical lines are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing activity:
Navy - AS

(Project 1510-N022)

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-A-8860B(AS)	Airplane Strength and Rigidity, General Specification For

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)*:

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

DD FORM 82 MAR 1426 PREVIOUS EDITION IS OBSOLETE.

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)