MILITARY SPECIFICATION

THERMAL PROTECTIVE SYSTEMS, AIRCRAFT COCKPIT: GENERAL SPECIFICATION FOR

This specification has been approved by the Naval Air Systems Command, Department of the Navy.

1. SCOPE

1.1 Scope - The purpose of this specification is to cover the general requirements for the components of a protective system which are installed in an aircraft as part of the airframe and airborne equipment to provide quick and positive protection automatically and/or manually to the aircrew members and their stations from the thermal radiation and luminous effects of nuclear weapon detonations. This specification does not cover such components as sensors and aircrew personal equipment which are part of the composite flash/thermal protective system.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

SPECIFCATIONS

Federal

TT-S-735	Standard Test Fluids, Hydrocarbons

Military

MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft and Ordnance
MIL-F-7179	Finishes and Coatings, General Specification for Protection of Aircraft Parts

FSC 1560

Military (continued)

MIL-L-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-I-8500	Interchangeability and Replaceability of Component Parts for Aircraft and Missiles
MIL-C-8779	Colors, Interior, Aircraft, Requirements for
MIL-A-8865	Airplane Strength and Rigidity Miscellaneous Loads
MIL-C-18263	Colors, Exterior, Naval Aircraft, Requirements for
MIL-L-18276	Lighting, Aircraft Interior, Installation of
MIL-S-18471	Seat System, Ejectable, Aircraft, General Specification for
MIL-C-22750	Coating, Epoxy Polyamide, Chemical and Solvent Resistant for Weapons Systems
MIL-A-23121	Aircraft Environmental, Escape and Survival Cockpit Capsule System: General Specification for
MIL-L-23699	Lubricating Oil, Aircraft Turboprop and Turboshaft Engines, Synthetic Base

STANDARDS

Federal

FED-STD-141	Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing
FED-STD-595	Colors

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-130	Identification Marking of U. S. Military Property
MS33586	Metals, Definition of Dissimilar

PUBLICATIONS

Bureau of Naval Weapons

SD-24	General Specification for Design and Construction of Aircraft Weapon Systems
WR-43	Preparation of Quality Assurance Provisions

Naval Air Engineering Center

ACEL Report NAEC-ACEL-533	Anthropometry of Naval Aviators -1964

(When requesting any of the applicable documents, refer to both title and number, All requests should be made via the cognizant Government quality control representative. Copies of this specification and other unclassified specifications and drawings required by contractors in connection with specific procurement functions should be obtained upon application to the Commanding Officer, Naval Supply Depot (Code 1051), 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120. All other documents should be obtained from the procuring activity or as directed by the contracting officer.)

2*2 Other publications - The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on the date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials Standard

D395	Methods of Test for Compression Set of Vulcanized Rubber

American Society for Testing and Materials Standard (Cont'd)

D412	Method of Tension Testing of Vulcanized Rubber (Tent.)
D573	Method of Test for Accelerated Aging of Vulcanized Rubber by the Oven Method
D624	Methods of Test for Tear Resistance of Vulcanized Rubber
D676	Method of Test for Indentation of Rubber by Means of a Durometer (Tent.)
D736	Method of Test for Low-Temperature Brittleness of Rubber and Rubber-like Materials (Tent.)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

3. REQUIREMENTS

3*1 Administrative and Procedural Requirements -

3.1.1 Performance Demonstration - The overall performance of the thermal protective system shall be demonstrated by the prime contractor. The test plan as established by the prime contractor to verify overall system performance shall be approved by the Naval Air Systems Command. Full utilization shall be made of Naval Air Systems 'Command field activities, facilities, and capabilities to achieve optimum coordination and economic utilization of facilities. The thermal protective closure shall satisfy applicable reliability provisions as specified in Section 4.

3.1.1.1 Test Program for Design Approval - A test program in accordance with WR-43 shall be prepared and. submitted to the Naval Air Systems Command with copies to the specified Naval Air Systems Command field activities, for approval. The test program shall consist of sufficient tests to exhibit and insure satisfactory installation of the thermal protective system into parent aircraft and to exhibit and insure overall system performance, reliability, and maintainability.

3.1.2 Design Approval - The thermal protective system must satisfactorily complete the approved testing program, conducted by the prime contractor, and a preproduction evaluation before approval for the design will be granted.

3.1.2,1 Preproduction - Prior to production, a sample of the complete system shall be submitted to each of the following laboratories for evaluation and approval.

(a) For operational evaluation: U. S. Naval Weapons Evaluation Facility, Kirtland Air Force Base, Albuquerque, New Mexico 87117. .

(b) For the design and human capability evaluation: Aerospace Crew Equipment Laboratory, Naval Air Engineering Center, Philadelphia, Pennsylvania 19112.

Such samples shall be the identical design, quality of materials, and workmanship which will be used in the fabrication of the final system.

3.2 Engineering, Design, and Performance Requirements -

3.2.1 Materials and finishes - Materials shall conform to applicable specifications or shall be as specified herein. Materials which are not covered by applicable specifications or which are not specified herein, shall be of the best quality, of the lightest practicable weight, and suitable for the purpose intended.

3.2.1.1 Dissimilar metals - Where practicable, dissimilar metals, such as defined by Standard MS33586, shall not be used in contact with each other.

3.2.1.2 Fungus proof materials - Materials which are not nutrients for fungi shall be used to the greatest extent practicable, If material's that are nutrients for fungi must be used, such materials shall be treated with a fungicidal agents as approved by the Naval Air Systems Command.

3.2.1.3 Metals - When metals that are subject to corrosion in oxygen, salt air or other atmospheric conditions likely to occur during service usage are used in the construction of the thermal protective closure, they shall be protected against such corrosion in accordance with MIL-S-7179. The use of a protective coating that will chip, or stile with age or extremes of atmospheric conditions shall be avoided.

3.2.1.4 Materials and Coatings for Components and Cockpit -

3.2.1.4.1 Closures - The closure shall meet the requirements specified herein. The outside surface of the closure shall be coated with a gloss white paint and the inside surface shall be coated with nonsecular flat black paint as described herein.

3.2.1.4.2 Flexible curtain closure - The fabric material of a curtain closure, including the stitching and fastener materials, shall meet the performance requirements of 3.2.3.

3.2.1.4.3 Semi-rigid closure - Semi-rigid closures shall be similar to silicone coated Fiberglas and shall meet the performance requirements of 3*26 3.

3,2.1.5 unprotected areas - Those areas in the cockpit which are not covered by a thermal protective closure but which would be exposed to thermal radiation, such as in the canopy and windshield areas, shall be protected with thermal radiation reflectant paints as specified in 3.2.1.6 and thermal resistant elastomeric compounds as specified in 3.2, 1.7 except that colors shall be in accordance with the aircraft specification.

3.2.1.6 Thermal radiation reflectant paint - The thermal radiation reflectant paint used in the painting of the closure and unprotected areas of the cockpit shall meet the requirements specified by MIL-C-22750 with modifications in pigmentation and other physical properties necessary to meet the requirements specified herein.

3.2.1.6.1 Color - Unless otherwise specified, the colors shall visually match 37038, 36231, 36440, and 17875 of FED-STD- 595 and have the spectral tristimulus coordinate values of the C. I. E. standard observer specified in Table I.

3.2.1.6.2 Composition - The composition of the paint shall be such that it shall meet the thermal resistance and service life requirements as specified herein.

3.2.1.6.3 Application - The minimum thickness of the thermal radiation reflectant paint on areas exposed to direct radiation or reradiation shall be such as to meet the thermal radiation resistance and service life requirements as specified herein. In areas not exposed to direct radiation the application shall be sufficient to withstand the thermal flux resulting from exposure to thermal radiation,

3.2.1.6.4 Anti-settling agent - An anti-settling agent maybe used to minimize hard settling, but it shall not deleteriously affect the other properties of the coating.

3.2,1.6.5 Physical properties - The paint shall conform to the retirements as listed in Table I.

TABLE I

PHYSICAL PROPERTIES OF PAINT

REQUIREMENT	TEST METHOD OF FED-STD-141	COLOR 37038 OF FED-STD-595	COLOR 36231 OF FED-STD-595	COLOR 36440 OF FED-STD-595	COLOR 17875 OF FED-STD-595
Pounds/Gallon (Pigmented Portion)	4184	12.0 - 12.2	11.5 - 11.8	11.4 - 11.6	9.8 - 10.1
60° Specular Glass	6101	5 max.	5 max.	5 max.	90 min.
Diffuse Reflectance, Near Infrared Region, (1-2 Microns Wave Length)	Spectrophotometric	0.70 min.	0.70 min.	0.75 min.	0.85 min.
Tristimulus Coordinate Valves (C.I.E. Standard Observer)	4251	x - 0.3052 ±0.005 y - 0.3056 ±0.005 Y - 0.10 max.	x - 0.3022 ±0.005 y - 0.3141 ±0.005 Y - 0.2300 ±0.04	x - 0.3118 ±0.005 y - 0.3224 ±0.005 Y - 0.4382 ±0.03	x - 0.3096 ±0.005 y - 0.3199 ±0.005 Y - 0.8443 min.
Thermal Radiation Resistance	Exposure to thermal radiation of 20 Btu/sq ft-second minimum with spectral quality, representative of 6000° Rankine black body radiation.	No effect other than light non-toxic smoking after 100 Btu/sq ft exposure.	No effect other than light non-toxic smoking after 100 Btu/sq. ft. exposure.	No effect other than light non-toxic smoking after 100 Btu/sq ft exposure.	No effect other than light non-toxic smoking after 150 Btu/sq ft exposure.
Anchorage Tape Test (After 7 days Air Dry)	6301	No failure	No failure	No failure	No failure
Accelerated Weathering	6152	No pronounced deleterious effects.	No pronounced deleterious effects.	No pronounced deleterious effects.	No pronounced deleterious effects.
Fluid Resistance MIL-L-23699 Lubricant MIL-L-7808 Lubricant TT-S-735 Fluid, Type III MIL-H-5606 Fluid (All after 7 days - 77°F)	Immersion 250°F - 2 hours Immersion 250°F - 2 hours Immersion 77°F - 4 hours Immersion 77°F - 7 days	No softening or severe discoloration or permanent damage	No softening or severe discoloration or permanent damage.	No softening or severe discoloration or permanent damage.	No softening or severe discoloration or permanent damage
Cleanability	Wash with soft cloth dampened with lacquer thinner.	No softening or "glossing" up.	No softening or "glossing" up.	No softening or "glossing" up.	No softening or noticeable "dulling".
Drying Time Dust Free Dry to Handle Dry Through Complete Cure	4061 -- 4061 (Chemical Resistance)	30 minutes 3 hours 24 hours 7 days	30 minutes 3 hours 24 hours 7 days	30 minutes 3 hours 24 hours 7 days	30 minutes 6 hours 24 hours 7 days

3.2.1.7 Elastomeric-coating, thermal radiation reflectant -

3.2.1. '?. 1 Color - Unless otherwise specified, the colors shall visually match 36440 and 17875 of MIL-STD- 595 and have the spectral tri-stimulus coordinate values of the C. I. E. standard observer specified in Table II.

TABLE II

PHYSICAL PROPERTIES OF ELASTOMER COATING

REQUIREMENT	TEST METHOD OF FED-STD-141	COLOR 36440 OF FED-STD-595	COLOR 17875 OF FED-STD-595
'ounds/Gallon (Pigmented Portion)	4184	9.6 ±0.2	9.6 ±0.2
iffuse Reflectance, Near Infrared egion, (1-2 Microns Wave Length)	Spectrophotometric	0.75 min.	0.85 min.
'ristimulus Coordinate Values C.I.E. Standard Observer)	4251	x - 0.3118 ±0.005 y - 0.3224 ±0.005 Y - 0.4382 ±0.03	x - 0.3096 ±0.003 y - 0.3199 ±0.002 Y - 0.8443 min.
'hermal Radiation Resistance	Exposure to thermal radiation of 20 Btu/sq ft-second minimum with spectral quality representative of 6000° Rankine black body radiation.	No effect other than light non-toxic smoking after 150 Btu/sq ft exposure.	No effect other than light non-toxic smoking after 250 Btu/sq ft exposure.
ccelerated Weathering	6152	No pronounced deleterious effects.	No pronounced deleterious effects.
leanability	After full vulcanization, the paint shall be completely cleaned with water and mild detergents.	No damage to the coating.	No damage to the coating.
)rying Time	To a rubbery solid.	1 hour	1 hour

3.2.1.7.2 Composition - The elastomer coating shall be a room temperature vulcanizing silicone compound and shall meet the thermal resistance and service life requirements as specified herein.

3.2.1.7.3 Physical properties - The coating shall conform to the f ollowing requirements of Table II, when tested, where applicable, in accordance with FED-STD-141 method as specified.

3.2.1..7.4 Shelf life - The coating shall have a minimum shelf life of four (4) months when at normal room temperature, 70 to 85° F and a shelf life of one year if stored below 40° F.

3.2.1.8 Thermal radiation resistant silicone rubber - The silicone rubber furnished to these requirements shall have a nominal hardness of 50.

3.2.1.8.1 Color - Unless otherwise specified, the material shall be supplied in the following colors per FED-STD-595:

(a) White, No. 37875
(b) Light Gull Gray, No. 36440
(c) Dark Gull Gray, No, 36231
(d) Black, No. 37038

3.2.1.8.1.1 Color match - The C. L E. standard observer spectral tristimulus coordinate color values shall conform to those specified in Table III when tested per Method 4251 of FLW-STD-141.

3.2.1.8.1.2 Color fastness - The Y relative luminosity value shall not change more than the limits specified in Table III after exposure in a single arc Atlas Fadeometer for 96 hours at 100°F ± 10°F.

TABLE III

COLOR AND REFLECTANCE REQUIREMENTS

REQUIREMENT	WHITE No. 37875	LIGHT GULL GRAY No. 36440	DARK GULL GRAY No. 36231	BLACK No. 37038
Tristimulus Coordinate Values (C. I. E. Standard Observer)	x-0.3096 ±0.005 y-0.3199 ±0.005 Y-0.85 Min.	x-0.3118 ±0.005 y-0.3224 ±0.005 Y-0.4382 ±0.04	x-0.3022 ±0.005 y-0.3141 ±0.005 Y-0.2300 ±0.04	x-0.3052 ±0.005 y-0.3056 ±0.005 Y-0.06 Max.
Color Fastness (Y)	±1.0%	+4.0%	+4.0%	+2.0%
Thermal Radiation Exposure (Btu/sq ft)	300	200	150	100
Diffuse Reflectance Near Infrared Region	0.85 Min.	0.85 Min.	0.85 Min.	0.85 Min.

3.2.1.8.2 Composition - The composition shall meet the thermal radiation requirements as specified herein.

3.2. L 8.3 Odor and toxicity - The material shall not have an obnoxious odor and shall be free from toxic fumes within operating temperature ranges.

3.2.1.8,4 " Cleanability - The material shall be capable of being cleaned with a mild soap solution or an alcohol-water solution without adverse effect.

3.2.1.8.5 Mechanical properties - the material shall conform to the requirements liked herein when tested on standard ASTM molded test slabs and buttons in accordance with listed ASTM methods, with state of cure equivalent to that of the material.

3.2.1.8.5.1 As received:

Hardness, Durometer "A" or Equivalent	*50 ± 5	ASTM D676-59T
"Tensile Strength, psi, min	900	ASTM D412-51T, Die C
Elongation, %, min	.500	ASTM D412-51T, Die C
Tear strength, lb/in, min "	75	ASTM D624-54, Die B

*Except Black shall have a +5, -8 tolerance.

3.2.1.8.5.2 Dry heat: resistance:

Hardness Change, Durometer "A" or equivalent	-10 to +10	ASTM D573-53 Time: 70 hr Temp: 300 ± 10°F
Tensile Strength, Change, %	-25 to +25	Die C
Elongation Change, %	-20 to +20	Die C
Surface Hardening	None	

3.201 .8.5.3 Compression set

Percent of original deflection, max	40	ASTM D395-55 Method B Time: 70 hr Temp: 300 ± 10° F "-" Compressed: to 0.350 inch thickness
Percent of original thickness, max	15	

3. 2.1 8.5.4 Low temperature resistance:

Flex Test	No Cracking	ASTM D736-54T Time: 5 hr Temp. 80 ± 2° F

3.2.1 .8.5.5 Thermal radiation resistance - The material shall exhibit no visible deterioration other than light nontoxic smoking when subjected to the thermal radiation concentration of 3.2.3.2. The material shall not . transmit by direct transmission of radiant energy or reradiation, or combination of both, more than 2 percent of the total incident radiation.

3.2.2 General design requirements -

3.2. 2*1 General design characteristics - A design investigation of each type of thermal protective closure shall be required during the preliminary phase of the protective closure development. This requires a thorough investigation into the optimization of design characteristics as set forth in this specification. Particular attention shall be directed to the development of optimum configuration, installation into parent aircraft, overall reliability of the thermal protective closure system perfomance, safety and ease of maintenance.

3.2.2.1.1 Selection of materials - The selection of materials, processes, corrosion protection, and design features significant to corrosion protection shall be in accordance with the requirements of Bureau of Naval Weapons General Design Specification SD-24, except as provided herein.

'3* 2.2.2 Environmental design considerations - The thermal protective system as an installed part of the aircraft shall be compatible with the primary objective in the design of the aircrew station, which is the achievement of a comfortable and liveable environment throughout the performance envelope of the aircraft, and the optimization of the efficiency and effectiveness of the aircrew members' performance.

3.2.2.3 Escape and survival considerations - The thermal protective system shall not compromise the emergency escape and survival provisions of the aircraft. In the aircraft equipped with ejection seats for emergency escape and survival, the aircrew shall be able to eject through the thermal

protective closure when it is in the closed or any intermediate position. When in the stowed position the thermal protective closure shall not interfere with the clearance envelope needed for the ejection seat as specified in MIL-S-18471. In aircraft equipped with the cockpit capsule for emergency escape and survival, the thermal protective closure shall not interfere with the emergency escape . and survival mission of the cockpit capsule as specified in MIL-A-23121.

3.2,2.4 Components and parts selection - The selection of components and parts shall be in Accordance with the requirements of Bureau of Naval Weapons General Design Specification SD-24, except as provided herein.

3.2.2.5 Interchangeability and replaceability - Parts and assemblies of the thermal protective system. shall be interchangeable or replaceable in accordance with MIL-I-8500.

3.2.206 Reliability " 'Because of the survival nature of the thermal protective closure system, prime importance shall be placed in the establishment of a high degree of overall reliability. The degree of reliability shall be verified by a sufficient number of tests by the prime contractor.

3:2.2.7 Foolproofness - Each component of the thermal protective closure system shall be as foolproof as possible to avoid incorrect assembly which would result in damage or malfunction to the overall system.

3.2.2,8 Accessibility and maintainability- The overall design shall provide for maximum accessibility and maintainability of all components.

3.2. 2? 9 Thermal protective closure - The specific design considerations shall be optimized With respect to overall performance, reliability, system accessibility, safety, overall maintainability, and service life integrity. The thermal protective closure shall optimize aircrew member performance, efficiency, and comfort throughout the mission profile. The thermal protective closure shall be completely compatible for the lower limit five percentile man and the upper limit 95 percentile man, as defined in Naval Air Engineering Center Report No. NAEC-ACEL-533, The thermal protective closure in the open position shall not restrict crewmen in the performance of both normal and emergency flight duties. When not in use, the system shall stow out of the way so as to not restrict ready crew entrance and exit.

3,2,2,9,1 Installation in aircraft cockpit - The design of the thermal protective closure shall be such that it is completely compatible with the design of the aircraft cockpit, taking into consideration such factors as size, shape, weight, and structural design. The performance or mission capability of the aircraft shall not be adversely affected by the thermal protective system.

3.2.2.9.2 Vision -With the thermal protective closure in the stowed or open position, maximum practicable overall vision shall be provided for the aircrew commensurate with the mission profile and design criteria of the aircraft. The design objective shall be compatible with that of the aircraft which is directed to provide vision for tactical utilization of the aircraft, rearward observation, and for carrier and field landing.

3.2.2.10 Operational mode - The thermal protective closure shall be designed with a stowed, an open, and a closed position for the closure. To ready the closure for use, the aircrewman will manually position the closure from the stowed to the open position, and when the system is no longer required, he will manually position the closure from the open to the stowed position. In use, manual actuation shall be possible from the seat restrained position by the 5 to 95 percentile crewman with one hand, either left or right. Actuation of the thermal protective closure to the closed position by any means shall cause the special weapons illumination system for the cockpit to be actuated in accordance with MIL-L- 18276.

3.2.2 .10.1 Automatic initiation of the power actuation of the closure - The power actuation of the closure shall be automatically initiated by the same system that detects the radiation pulse and initiates the nuclear flashblindness protective device. The sensing circuit shall be open during take-off and landing.

3.2.2,10.1.1 Power actuation pulse - The characteristics of the signal impulse for initiation of the closure system shall be a nominal 1 volt pulse (range, 1 to 1-1/4 volts) with a rise time of 2 microseconds, half-amplitude width of approximately 5 microseconds, developed across a 100 ohm resistor.

3.2.2.1002 Inadvertent closure or opening - The thermal protective system shall be designed to preclude inadvertent closure or opening during any phase of flight or during crash landing.

3.2.2.10.3 Latches and other retention or holding devices - The thermal protective closure shall have positive acting latches, retention, and holding devices for the stowed, open, and closed positions. These shall be capable of being manually operated in such a way that a simple motion is required to release the closure when operated between the open and closed positions.

3.2.2.11 Color - The color of the thermal protective closure shall be as herein specified. Other colors not specifically covered herein shall be in accordance with MIL-C-8779 for interiors and MIL-C-18263 for exteriors.

3..2.2.12 Marking - Each thermal protective closure shall be marked for identification in accordance with MIL-STD-130.

3,2.3 Performance requirements -

3,2.3.1 Mission - The cockpit thermal protective system shall provide quick and positive protection to the aircrew members and their stations from the thermal radiation and luminous effects of nuclear weapon detonations. The thermal protective system design, as a part of the aircraft, shall provide efficient protection from the luminous and thermal effects of a nuclear explosion and comfortable aircrew operation under all conditions of mission profile. The thermal protective closure shall be light tight as specified in 3.2.3.3. The closure shall be capable of remaining in the stowed, open, or closed position when subject to loads which result from all flight profiles, including emergency escape and survival conditions. When closed against the effects of a nuclear detonation, the system shall provide protection for the cockpit and crew within the limits specified herein.

3.2.3.2 Thermal radiation resistance - Components of the nuclear thermal radiation protection system shall withstand a minimum of five exposures at 30 Cal/cm^2 applied at a rate of 15 $cal/cm^2/sec$ for two seconds, without visible deterioration other than light nontoxic smoking. After five exposures, no burn-through or other degradation that would compromise crew safety shall have occurred. The thermal protective closure shall not transmit by direct transmission and/or reradiation more than two percent of the total incident radiation. Cockpit areas that are not protected by the thermal protective closure and are exposed to direct thermal radiation and/or reradiation shall be provided with protection equivalent to the thermal protective closure system, 3.2.1.5.

3.2.3.3 Visual transmission - Under incident light conditions of direct sunlight and with the thermal protective closure actuated and closed, the maximum allowable level of illumination attributed to light transmission in any part of the cockpit enclosed for aircrew thermal protection shall not exceed O. 01 percent of the incident light intensity. Materials that are used in the thermal protective closure to assure light tightness shall be capable of withstanding the same thermal flux as the closure when exposed to thermal radiation without causing toxic smoking.

3.2.3.4 Service life - The materials used in the thermal protective closure system shall be capable of meeting the above specified radiation protective requirements after being subjected to a service life test of 1000 cycles in an environment of 70 $\pm$ 10 degrees Fahrenheit.

3.2,3.5 Strength-

3.2.3.5.1 Flight loads- The thermal protective closure system shall withstand without failure all loads to which it might be subjected within the operational envelope of the aircraft. In the open position the system shall be capable of withstanding a 40 "G" longitudinal load and $\pm$ 5 "G" vertical load in accordance with MIL-A-8865. In the closed position, the system shall maintain light tightness under a $\pm$ 5 "G" load in. the vertical plane.

3.2.3. 5.2 Crash loads -The thermal protective system design shall not introduce hazards to the aircrew during the imposition of crash load (see Figure 1) conditions or other emergency situations,

3.2.3.6 Operation times - Power actuation from the open to the closed position by the automatic system or by manual actuation of the power system shall take place in not more than O. 2 second. Manual actuation, without power, from the open to the closed position and actuation from the closed to the open position shall be accomplished by the aircrew in not more than 1.0 second, Actuation from the stowed to the open position, or the reverse, shall be accomplished by the aircrew in not more than 5.0 seconds,

3.2.3.6.1 Latches and other retention or holding devices - With the closure in full open position the latch or retention device shall hold the closure with an applied load of 40 "G" forward. In the full closed position the closure shall be held against the light seal with a force necessary to meet the light tightness requirements of 3.2.3.3. The thermal protective closure shall remain in each position with an applied vertical downward load of 5 "G".

3.3 Workmanship - Workmanship shall be of the highest quality to assure optimum performance, reliability, and service life.

4. QUALITY ASSURANCE PROVISIONS

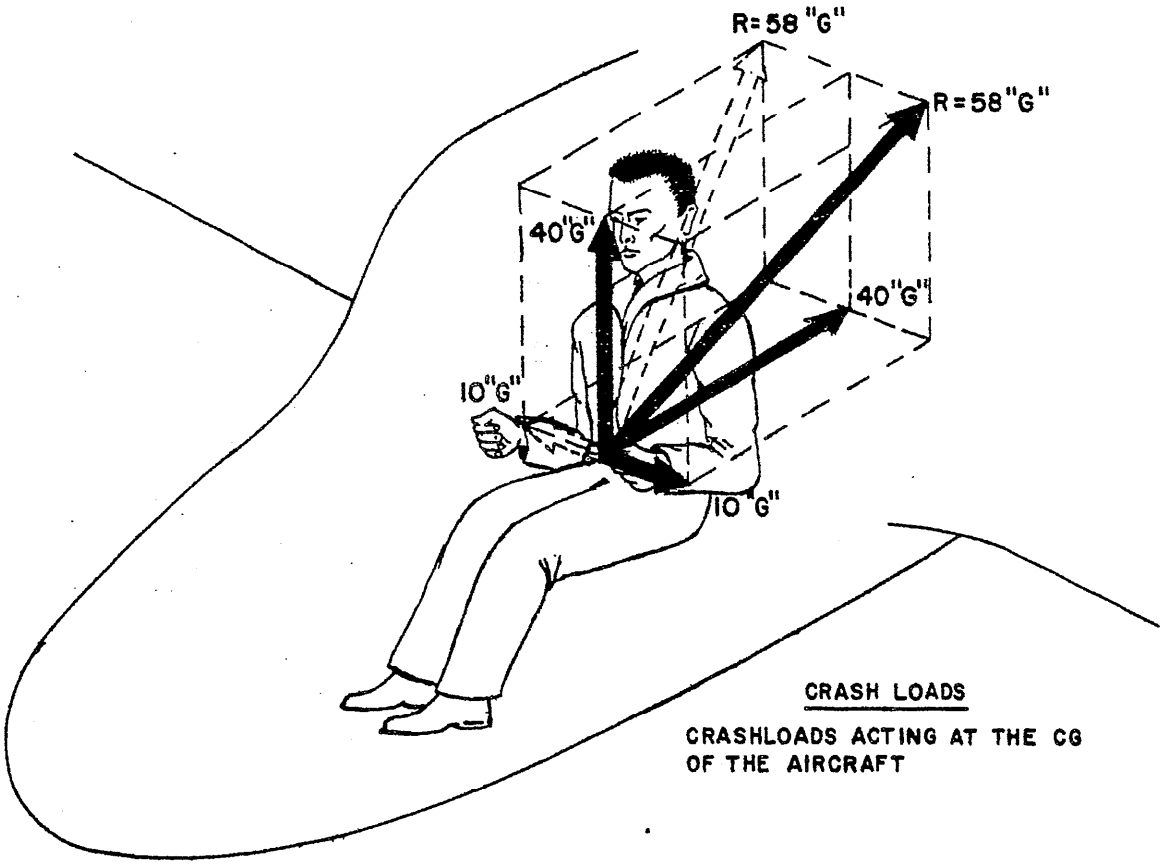
4.1 Quality conformance inspections -

4.1.1 Quality conformance inspection - Quality conformance inspection consists of examination and tests performed on individual products or lots to determine conformance of the products or lots with the requirements set forth in this specification.

4. 1.1.1 Inspection - The quality conformance inspection shall consist of the following:

Visual examination
Dimensional check
Light transmission
Serviceability
Applicable tests of the approved test program established in accordance with 3.1, 1.1.

4.1.2 Responsibility for inspection - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform

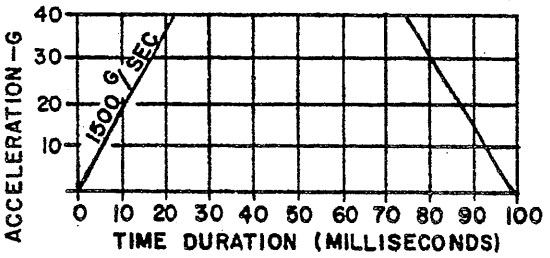


CRASH LOADS

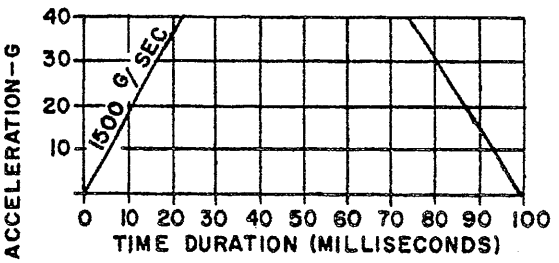
CRASHLOADS ACTING AT THE CG OF THE AIRCRAFT

IMPACT ACCELERATION — TIME EXPOSURE

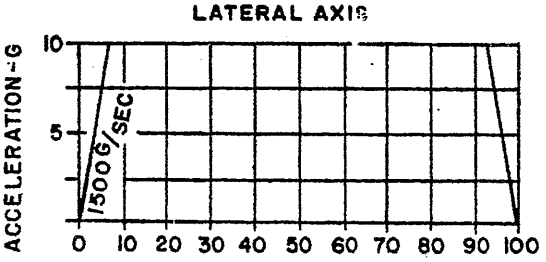
VERTICAL AXIS



LONGITUDINAL AXIS



LATERAL AXIS



COMPOSITE VECTOR OF THREE AXES

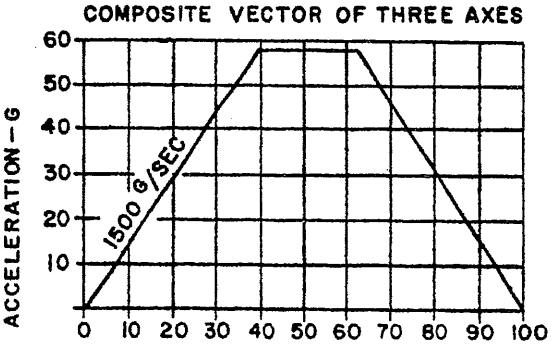


FIGURE 1

any of the inspections set forth in the specification Where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1*3 Sampling -

4.1.3.1 Inspection lot - An inspection lot size shall be expressed in units of one thermal protective closure and shall consist of systems produced under essentially the same manufacturing conditions and submitted for inspection at one time.

4.1.3.2 Sampling for examinations and tests - The sample size, acceptance criteria, and examinations and tests required for the thermal protective closure shall be as specified in Table IV.

TABLE IV

SAMPLE SIZE, ACCEPTABLE QUALITY LEVEL, TESTS AND EXAMINATION OF THE THERMAL PROTECTIVE CLOSURE

INSPECTION	PARAGRAPH	SAMPLE SIZE	ACCEPTANCE CRITERIA 1/
Visual examination	4.2.2	Every thermal protective closure for critical defects, Inspection Level II 2/ for minor defects	Acceptance number zero, rejection number one for critical defects and an acceptable quality level of 25.0 defects per hundred units for minor defects.
Dimensional check	4.2.2	Inspection Level L-6 2/	Acceptance number zero, rejection number 1.
Light transmission	4.2.3.2	Every thermal protective closure	Acceptance number zero, rejection number 1.
serviceability 3/	4.2.3.3	One thermal protective closure from each 100 or fraction thereof	Acceptance number zero, rejection number 1. .
Test program	Approved test program	As established by the program	As established by the program.

1/ Rejected lots shall not be resubmitted without the written approval of the contracting officer.

2/ The sample size shall be based only on the applicable sample size code letter corresponding to the specified inspection level of MIL- STD-105.

3/ Samples subjected to these tests shall not be delivered as part of the contract or order.

4.2 Reliability previsions -

4.2.1 Preproduction evaluation and approval - Preproduction evaluation shall consist of examinations and tests performed on samples which are representative of the production item after award of a contract to determine that the production item meets the requirements of this specification. The preproduction evaluation of the thermal protective system shall consist of examinations and tests for all the requirements specified herein.

4.2.1.1 Preproduction evaluation samples - The preproduction evaluation samples shall consist of two complete systems. One sample together with the name and code number of the supplier of each material submitted shall be forwarded to each laboratory designated in paragraph 3.1.1.2. These samples shall be representative of the construction, workmanship, components, and materials to be -used during production. When a manufacturer is in continuous production of these closures from contract to contract, submission of further preproduction samples on the new contract maybe waived at the discretion of the procuring activity. Approval of the preproduction samples or #e waiving of preproduction inspection does not preclude the requirements of submitting to the quality conformance inspection. The preproduction samples shall be plainly identified and marked with the following information:

Samples submitted by (name) (date) (Manufacturer's part number) for preproduction evaluation in accordance with the requirements of Specification MIL-T-831571(AS) under contract No.

4.2.1.2 Upon completion of the preproduction evaluation, the applicable evaluation and testing reports and, when applicable, recommendations and comments pertinent for use in monitoring production shall be forwarded to the cognizant Government quality control representative,

4.2.2 Visual examination - Every thermal protective closure shall be checked dimensionally and examined visually to determine conformance to this specification and applicable manufacturing drawings. The classification of defects, Tables V and VI shall be used to classify the defects found.

TABLE V

CLASSIFICATION OF DEFECTS FOR VISUAL EXAMINATION
OF THE THERMAL PROTECTIVE CLOSURE

CRITICAL	MINOR
1. Any component missing, malformed, fractured or otherwise damaged	201. Marking - missing, insufficient incorrect, illegible, or not permanent
2. Any component loose or otherwise not securely retained	202. Material imperfections not affecting serviceability or thermal resistance
3. Incorrect assembling or improper positioning of components	203. Surfaces rough, unclean or other flaws affecting appearante
4. Any functioning part that works with difficulty	
5. Not being able to lock the closure in the closed position	
6. Color - thermal paint not as specified	
7. Materials exposed which cannot withstand the thermal radiation or thermal flux specified for testing.	
8. Any visible separations in the closure which would admit light	

TABLE VI

CLASSIFICATION OF DEFECTS FOR FINISHED DIMENSIONS

EXAMINE	DEFECT
Measure thermal protective closure	Any measurement deviating from the dimensions and applicable tolerances as specified in the applicable drawings shall be classified as a dimensional defect

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	☐ 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
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