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C002-DS090176-F1
ENGINEERING DESIGN SHEET SPECIFICATION

PERFORMANCE/DESIGN AND
PRODUCT CONFIRMATION REQUIREMENTS

FOR
NOZZLE SKIRT EXTENSION

FORMING A PART OF
CEI NUMBER 090290A

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AEROJET-GENERAL CORPORATION

SACRAMENTO, CALIFORNIA

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PERFORMANCE/DESIGN AND QUALIFICATION REQUIREMENTS

for

NOZZLE SKIRT EXTENSION

Replace page(s) with the latest revised page(s) noted below. Revised paragraph(s) are identified with the latest revision letter (or number) in the margin.

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Specification No. DS-90176

1. SCOPE

1.1 Scope.- This specification establishes the performance, design, test, and qualification requirements for equipment identified as the Nozzle Skirt Extension, hereinafter referred to as the skirt extension. It is a part of the subsystem described as the Nozzle Assembly Subsystem and is listed as a design critical component in detail specification EC-90151.

2. APPLICABLE DOCUMENTS

2.1 Aerojet-General Corporation Documents.- The following documents, of the latest issue, form a part of this specification to the extent specified herein. In the event of conflict between documents referenced herein and other detailed content of Sections 3, 4, 5, and 10 the detailed requirements of Sections 3, 4, 5, and 10 shall be considered a superseding requirement.

SPECIFICATIONS

CP-90290	Engine, NERVA, 75K, Full Flow
EC-90151	Nozzle Assembly Subsystem

(Copies of above documents required by suppliers in connection with specific procurement functions should be obtained from the procuring activity).

3. REQUIREMENTS

3.1 Performance.- Except as otherwise specified herein, performance requirements for this equipment shall be in accordance with EC-90151 of which this equipment is a part.

3.1.1 Functional Characteristics.- The skirt extension shall control, direct, and expand the exhaust gases to achieve the requirements specified herein, within the environmental conditions of 3.1.2.4.

3.1.2 Operability.-

3.1.2.1 Reliability.- As specified in EC-90151.

3.1.2.2 Maintainability.-

3.1.2.2.1 Maintenance and Repair Cycles.- Preventive and corrective maintenance period shall not exceed 0.5 man hour per hour during engine assembly. Repair operations shall be limited to those which do not exceed a 2.5 hour period.

3.1.2.2.2 Service and Access.- Service and access requirements shall be as follows:

(a) Manual replacement capability of the skirt extension shall be provided for both ground test engines and space operation engines.

(b) Maintenance and repair of the skirt extension shall be accomplished with standard hand tools.

(c) Interchangeability of the skirt extension shall be provided without adjustment or modification to the mating engine components.

3.1.2.3 Useful Life.- Same as EC-90151.

3.1.2.4 Environments.- The environments experienced by the skirt extension shall be as specified in EC-90151 and the following:

3.1.2.4.1 Thermal Environment.- The skirt extension shall be capable of withstanding the thermal environment generated by the 75,000 lb thrust NERVA engine having a reactor core outlet temperature of 4300°R and a chamber pressure of 460 psia.

3.1.2.4.2 Static Loads.- The skirt extension shall be capable of withstanding the launch loads at 1.0 g lateral and 5.2 g axial acceleration forces.

3.1.2.5 Transportability.- Same as EC-90151.

3.1.2.6 Human Performance.- Not applicable.

3.1.2.7 Safety.-

3.1.2.7.1 Flight Safety.- Flight safety shall be as specified in EC-90151 and as follows: The skirt extension design shall eliminate any single failure or credible combination of errors and/or failure which endangers adjacent structures or components.

3.1.2.7.2 Ground Safety.- The skirt extension design shall eliminate any single failure or credible combination of errors and/or failure which endangers adjacent structures or components.

3.1.2.7.3 Nuclear Safety.- Not applicable.

3.1.2.7.4 Personnel Safety.- As specified in EC-90151.

3.1.2.7.5 Explosive/Ordnance Safety.- Not applicable.

3.2 CEI Definition.- Not applicable.

3.3 Design and Construction.- Except as otherwise specified herein, design and construction of this equipment shall be in accordance with EC-90151 of which this equipment is a part.

3.3.1 General Design Features.-

3.3.1.1 Structural Criteria.- As specified in EC-90151.

3.3.1.2 Contour and Interface Area Ratio Design.- As specified in EC-90151.

3.3.1.3 Leakage.- Permissible leakage shall be as follows:

(a) Permeable leakage emanating from the skirt extension shall not cause degradation of engine thrust below the specified limits in CP-90290.

(b) Interface leakage emanating from nozzle/skirt extension flange interface shall not exceed 0.46 cubic centimeter per second per linear inch of circumference at standard atmospheric and temperature conditions.

3.3.1.4 Weight.- The skirt extension shall have a maximum allowable weight of 600 pounds.

3.3.1.5 Erosion/Corrosion Rate.- The skirt extension shall be designed for maximum erosion/corrosion rate of 0.005 inch per hour.

3.3.1.6 Crack Propagation.- The skirt extension shall be designed to prevent propagation of cracks caused by bombardment of meteroites.

3.3.1.7 Envelope Dimensions.- The overall envelope dimensions of the skirt extension shall be an axial length of 138 inches and outside diameter, varying from 60 inches at the forward attachment interface to 115.5 inches at the aft end.

- 3.3.2 Selection of Specifications and Standards.- As specified in CP-90290.
- 3.3.3 Materials, Parts and Processes.- As specified in CP-90290.
- 3.3.4 Standard and Commercial Parts.- As specified in CP-90290.
- 3.3.5 Moisture and Fungus Resistance.- As specified in CP-90290.
- 3.3.6 Corrosion and Metal Parts.- As specified in CP-90290.
- 3.3.7 Interchangeability and Replaceability.- As specified in CP-90290.
- 3.3.8 Workmanship.- As specified in CP-90290.
- 3.3.9 Electromagnetic Interference.- Not Applicable.
- 3.3.10 Identification and Marking.- As specified in CP-90290.
- 3.3.11 Storage.- The skirt extension shall be capable of performing as specified herein subsequent to storage while protected from the ground environmental conditions specified in 3.1.2.4 for a period not exceeding the ground storage life specified in 3.1.2.3.