

INCH-POUND

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SUPERSEDING
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COMMERCIAL ITEM DESCRIPTION

COMPOSITE REPAIR SET, AIRCRAFT
(SINGLE ZONE, CLASS 1 DIV 2)

The General Services Administration has authorized the use of this commercial item description (CID), for all federal agencies.

1. Scope. This commercial item description (CID) covers the requirements for a portable, self contained aircraft composite repair set with capability to generate, control, and monitor vacuum pressures and cure temperatures. This repair set is to be used in the repair and dry-out of aircraft bonded and composite structures.

2. SALIENT CHARACTERISTICS.

2.1 General. The composite repair set shall be a user-friendly unit capable of automatically generating, controlling and monitoring vacuum pressure, cure time and temperatures. Each set shall include heater blankets, temperature controllers, monitoring devices, a vacuum pump, temperature indicators/recorders, and all necessary cables/connectors to perform part-dryout and composite/metal bonded repairs. The repair set shall require only an electrical power source to generate the heat and vacuum required for the repair(s). The repair set shall have the option of using shop air/vacuum or the built-in vacuum source. The set shall include all components, parts and features necessary (with the exception of bagging materials and process materials) to meet the performance requirements specified herein. Included shall be manuals and instructions for all operations. Also a step-by-step video/CD explaining simple operations shall be included.

2.2. Hazardous Environment. The repair set shall be safe to operate in a Class 1, Division 2, Group D hazardous environment as classified by the National Fire Protection Association NFPA 70, National Electrical Code (NEC) 1999, Article 500.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any other data that may improve this document should be sent to FSC: 4920 - 642 CBSG/GBEA, 460 Richard Ray Blvd, Suite 200, Robins AFB, GA 31098-1813. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.daps.dla.mil/online/>.

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2.2.1 Testing Agency. The test set shall be tested, listed and labeled for the above environment by an adequately equipped, nationally recognized laboratory such as Underwriter's Laboratory (UL), Factory Mutual (FM Global), or Mine Safety (MSHA).

2.3 Size and Weight. The sum of the length plus width plus height of the repair set shall not exceed 50 inches and shall not weigh more than 45 pounds. The preferred configuration will be the approximate size of commercial airline carry-on luggage.

2.4 Measuring and indicating devices. All measuring and indicating devices shall have a degrees Fahrenheit (F) scale for measuring temperature and in inches of mercury (Hg) scale for measuring vacuum.

2.5 Power. The repair set shall operate on power sources of 110-120 VAC 50/60 Hz single phase, have a 20 amp rating 120 VAC/60 Hz and have ground fault protection.

2.5.1 Steady-state conditions. The repair set shall operate and maintain the specified performance and accuracy within a steady-state voltage tolerance band of ± 10 percent and within a steady-state frequency tolerance band of ± 5 percent with no detrimental effect on equipment performance.

2.5.2 Transient-state conditions. The repair set shall not experience alterations of characteristics due to transient-state conditions lasting up 100 milliseconds when recovery to the steady-state conditions is within 5 seconds. Operation for transient-state conditions which persist longer than 5 seconds shall be as required for Interruption of source power.

2.6 Temperature controller. The temperature controller shall have the following features:

- a. There shall be a minimum of 8 thermocouples. The operator shall be able to select one of the thermocouples to be the control thermocouple. If the operator has not assigned a control thermocouple the controller shall automatically control, at a minimum, the leading (hot) thermocouple. The operator shall specify allowable deviations, both high and low, from the set point of any thermocouple. Ability for the operator to select control to average temperature or lagging thermocouple is considered a plus.
- b. The operator shall specify the high limit. If the high limit is exceeded, an alarm will sound and power to the blanket will be suspended until the alarm condition is corrected.
- c. Ascertain the continuity of all thermocouples.
- d. All thermocouples temperatures shall be viewable to the operator.
- e. The temperature controller will give a deviation alarm if temperature does not properly change over a period of time.

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- f. An "ON/OFF" vacuum switch.
- g. A low battery indicator is required if a dead battery will disable the controller or cause loss of programming data.
- h. The capability to use controller as a thermocouple reader only.
- i. There shall be a mechanism to disable user input (e.g. key lock, password).
- j. An audible alarm with a volume of 80 db weighted sound pressure at a 3 foot distance. Associated with each alarms is a visual alarm indicator of at least 0.18 inch length by 0.18 inch width. The audible alarm has a silence button; however, the visual alarm indicator remains on until the deviation has been eliminated. The audible alarm is able to retrigger for any additional deviations in this mode. The visual and audible alarms reset automatically when the deviations(s) is (are) corrected. The controller prints the problem and time of correction for all alarms.
- k. Programmable for multi-step cures. Stores a minimum of 5 programs of 3 steps.. Heat-up and cool-down rates are programmable from 1°F/min to 15 °F/min. The operator shall enter number of steps, heat up rates, dwell temperatures, dwell times, cool down rates and alarm conditions (high limit, low limit, low vacuum, etc). Each step includes both ramp and hold segments. Uses the ambient temperature of the repair area as the controller initial set point. The program is temperature sensitive so that dwell times begin when the dwell temperature is achieved as monitored by the controlling thermocouple(s). The controller has nonvolatile memory for a period of one year.
- l. The controller shall have the ability for the program to be changed during the run. Any change must be recorded to the printer.
- m. The programming must be simple enough as to be obvious, without the need for a manual.
- n. Accuracy of plus or minus 1/4 % of the actual reading plus the least significant digit.
- o. Triggers an audible and visible indication at the end of the curing and remains for a duration of several seconds.
- p. Visually displays the current controller mode (program or run), the progress of the cure cycle, and heater status.
- q. Simultaneously displays the repair area temperature as monitored by the control thermocouple, and the programmed set point temperature.

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- r. Visually displays all cure cycle parameters continuously and remains on until the controller is programmed for another cure cycle or shut down. When in a temperature dwell, the controller displays the time to complete the dwell. Display and program variables are written in plain language with no symbols or codes.
- s. All cure information required, shall be displayed, i.e., ramp rate, dwell temp, dwell time for each cure step, cool down rate, temperature set point, remaining dwell time, vacuum, control T/C temp, limit T/C temp, etc.
- t. The capability to print all of the parameters selected during a normal print interval. This shall not interfere with the normal print cycle.
- u. Activates a recovery mode when the power has been interrupted for 2 minutes or less. The recovery mode operates as follows:
 - (1) A new set point temperature is established from the control thermocouple indication.
 - (2) If the controller is to resume program operation of a ramp, the controller continues the ramp at the rate as programmed.
 - (3) If the controller is to resume program operation of a dwell, the controller ramps the repair temperature at the programmed rate used to achieve that dwell temperature. Dwell time is not advanced during this recovery ramp. When the dwell temperature is achieved, the dwell time is resumed.

2.7 Thermocouples. The thermocouples shall be J-type, not integral to the heater blanket, and be accurate to within ± 5 °F when assembled to a 50 foot length. The tips shall be welded.

2.7.1 Connecting wires. All connecting wires and leads shall be designed to eliminate air leak paths, i.e., fused and non-porous insulation and covers, during vacuum bagging operations. All wires shall have stress relieves at the stress points.

2.8 Display Panel. Displays and indicators are visible outdoors in sunlight without hoods or special screens and indoors under less than 20 to more than 100 foot candles of illumination at the face of the instrument when viewed at an angle of 45 degrees or less from the plane of instrument face.

2.9 Temperature/vacuum/deviation alarm recorders. The repair set shall be provided with a temperature, vacuum, and deviation alarm recorder with the following features:

- a. Records temperature, vacuum, and deviation alarm messages on one output print.
- b. Records temperature from the control thermocouple as monitored at the repair surface and vacuum as monitored at the repair set.

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c. Records alphanumeric characters using commercially available paper and/or ribbons. The recorder is easily set and loaded without disassembling the repair set.

c. Print interval is programmable ranging from "OFF" to "10" minutes.

2.9.1 Printing features. The recorders shall be capable of printing the following information as a minimum:

a. Self test status.

b. Cure cycle program (dwell temperatures and times, ramp and cooling rates and minimum vacuum alarm setting).

c. Print interval information (ramp or dwell number, set point TEMP, actual TEMP and vacuum level).

d. Deviation alarm information (time of incidence, deviation nomenclature and values, time of deviation correction).

e. Cure cycle "complete" indication.

f. Reprint of cure cycle program, if modified.

g. All auxiliary thermocouple readings.

h. Recovery mode including commencement time, action (new set point, ramp rate), and recovery mode completion.

2.10 Vacuum. Each zone of the repair set shall be capable of generating a manually adjustable vacuum from 0 to 27 INHG at sea level on a standard day, using an internal vacuum pump and also by the use of an eductor venturi jet and shop compressed air. Pump and the eductor venturi jets shall be muffled and externally exhausted to the repair set.

2.10.1 Vacuum pump. Vacuum pump shall be dual head, oil free, electric and mounted as an integral part of the repair set. Pump shall have a vacuum rating of 27 IN HG or more and a goal minimum open airflow rating of 0.90 SCFM.

2.10.2 Eductor venturi jets. The eductor venturi jets shall derive the motive power from shop compressed air of a minimum of 60, to a maximum of 100 psig.

2.10.3 Vacuum connectors. Repair set shall be provided with 1 through the bag vacuum ports and 1 through the bag vacuum ports with gages.

2.10.4 Gages. Vacuum gages shall be flush mounted.

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2.10.5 Vacuum Alarm. Senses and provides indications of system level vacuum and has an adjustable low limit vacuum alarm, both audible and visual.

2.11 Heater blankets. The repair set shall be supplied with heater blankets meeting the following criteria:

- a. The heater blankets shall be electrical resistance type and having a maximum operating temperature of not less than 450°F.
- b. The blankets shall plug into the controller with 10 feet, nominal power leads and shall have connectors that prevent inadvertent hookup with source power receptacles
- c. The blankets shall not have integral thermocouples and the blanket shall not be an integral part of the vacuum bag.
- d. Repair set shall be supplied with 2 each, 10" x 10", and 12" x 12" blankets.

2.12 Cables, vacuum hoses and cable assemblies. The repair set shall be provided the following:

- a. One power cable, 15 feet in length shall be provided for 115 volt , 20 amp service. Connectors shall be capped during transit.
- b. One blanket extension cord, 10 feet long. Connectors shall have a locking mechanism.
- c. A 10 foot vacuum hoses consisting of a hose.
- d. Ten thermocouple assemblies 10 feet long each and 8 thermocouple extension cables 10 feet long each.

2.13 Calibration. The repair set shall not require calibration more than once every year and it shall not require any special equipment, rooms or chambers to accomplish the calibration. The mean time to calibrate shall be 2 hours or less. Calibration standards shall be traceable to NIST.

3. REGULATORY REQUIREMENTS.

3.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs. The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

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3.2 Green Procurement Program. Green Procurement Program (GPP) is a mandatory federal acquisition program that focuses on the purchase and use of environmentally preferable products and services. GPP requirements apply to all acquisitions using appropriated funds, including services and new requirements. FAR 23.404(b) applies and states the GPP requires 100% of EPA designated product purchase that are included in the Comprehensive Procurement Guidelines list that contains recovered materials, unless the item cannot be acquired: a) competitively within a reasonable timeframe; b) meet appropriate performance standards, or c) at a reasonable price. The prime contractor is responsible for ensuring that all subcontractors comply with this requirement.

4.0 PRODUCT CONFORMANCE PROVISIONS

4.1 Product conformance. The products provided shall meet the salient characteristics of the CID, conform to the producer's own drawings, specifications, standards, and quality assurance practices and be the same product offered for sale in the commercial market. The Government reserves the right to require proof of such conformance prior to first delivery and thereafter as may be appropriate. Proof of conformance may include, but shall not be limited to the performance of operational tests, lab tests, modeling and simulation and delivery of reports and data from these tests.

4.2 Market Acceptability. The following market acceptability criteria is necessary to document the quality of the product provided under this CID. All components of the offered Composite Repair Set shall have been on the market at least 2 years.

4.3 Product sample. A product sample may be required, for examination and testing to determine whether it provides acceptable form, fit, function and suitability for use. If a product sample is required, shipping instructions will be provided.

5. PACKAGING.

5.1 Preservation, packing, and marking. Preservation, packing, and marking shall be as specified in the contract or order.

6. NOTES

6.1 Source of documents.

6.1.1 FAR and DFARS may be obtained from the Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. Electronic copies of the FAR may be obtained from <https://www.acquisition.gov/far/> . Electronic copies of the DFARS may be obtained from <http://www.acq.osd.mil/dpap/dars/dfars/index.htm> .

6.1.2 National Institute of Standards and Technology (NIST) standards may be obtained at <http://www.NIST.gov> or available from 100 Bureau Drive, Stop 1070, Gaithersburg, MD 20899-1070

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6.1.3 National Fire Protection Association (NFPA)/National Electrical Code (NEC) standards may be obtained at <http://www.nfpa.org> or available from 1 Batterymarch Park, Quincy, Massachusetts USA 02169-7471

6.1.4 FM Global standards may be obtained at <http://www.fmglobal.com/> or available from 270 Central Avenue, P.O. Box 7500, Johnston, RI USA 02919

6.1.5 Mine Safety and Health Administration (MSHA) standards may be obtained at <http://www.msha.gov/> or available from 1100 Wilson Boulevard, 21st Floor, Arlington, VA 22209-3939

6.1.6 Underwriters Laboratories (UL) copies may be obtained online at <http://ulstandardsinfontet.ul.com/> or from: COMM 2000, 1414 Brook Drive, Downers Grove, IL 60515-5000.

6.2 Key Words

Cure temperatures
Portable
Self contained
Vacuum pressures

MILITARY INTERESTS:

Custodians:
Air Force – 84

Preparing Activity:
Air Force – 84

Reviewers:
Air Force – 99

Agent:
Air Force – 99

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