INCH-POUND
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COMMERCIAL ITEM DESCRIPTION

BORESCOPE

The General Services Administration has authorized the use of this Commercial Item Description for all federal agencies.

1. SCOPE.

1.1 Scope. This Commercial Item Description describes various borescopes used to aid in the inspection of the internal components of Air Force aircraft engines.

2. CLASSIFICATION.

2.1 Types. The Types of borescopes covered with this CID are as follow:

a. Type I Borescope with 6mm-diameter insertion tube with working channel and measuring capability.

b. Type II Borescope with 6mm-diameter insertion tube with measuring capability.

c. Type V Borescope with 4mm-diameter insertion tube with measuring capability.

d. Type VI Borescope with 6mm-diameter insertion tube with working channel and measuring capability, 6mm-diameter insertion tube with measuring capability, and 4mm-diameter insertion tube with measuring capability.

3. SALIENT CHARACTERISTICS.

3.1 Borescope description. The borescope shall be supplied with carrying cases, viewing tips, a calibration check block, a battery charger, battery, and an associated electrical cable for use with 110 VAC 50/60 Hz.

3.2 Design and construction.

3.2.1 Identification and information plates.

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3.2.1.1 Identification plate. An identification plate in accordance with MIL-STD-130 shall be securely attached to the borescope in a readily accessible location. The identification plate shall contain the following information:

a. Nomenclature.
b. Part number.
c. Serial number.
d. Date of manufacture.
e. Manufacturer's name.
f. Commercial and Government Entity (CAGE) code.
g. Date of warranty expiration.
h. National Stock Number (NSN).

3.2.1.2 Item Unique Identification (IUID) information. The borescope and any of its components for which the Government's unit cost is more than $5,000, is serially managed, or the procuring agency determines is mission essential, shall have Unique Identification (UID) (also known as Item Unique Identification (IUID) information permanently affixed on or near the respective identification plate(s), marked in accordance with MIL-STD-130. UID information shall be included as both a 2D Data Matrix and human readable markings.

3.2.2 Hazardous material. The design shall minimize and control hazards associated with the inclusion or use of hazardous or toxic materials and the generation of toxic or noxious gases. The borescope shall not generate or use Class I or Class II Ozone Depleting Substances (ODS) during operation, maintenance, or disposal. Class I ODS and hazardous materials shall not be used in any system, component, or process. The borescope shall not contain or use either hexavalent chromium or cadmium without written approval by the procuring activity. Hazardous materials are defined in AFI 32-7086 Wright-Patterson Air Force Base (AFB) Supplement; Class I and Class II ODS are defined in 40CFR82.

3.3 Operation. The borescope offered shall be a complete ready to use borescope with all necessary components described herein.

3.4 Insertion tube.

3.4.1 Insertion tube/probe outside diameter. The insertion tube outside diameter shall be no greater than 4.1mm for 4mm-nominal insertion tubes and no greater than 6.2mm for 6mm-nominal insertion tubes.

3.4.2 Insertion tube/probe working length. The insertion tube working length shall be 3m (objective: 5m), (+0.5m/-0.4m).

3.4.3 Insertion tube/probe construction. The insertion tube probe shall be constructed using multi-layer materials which offer a strong durable insertion tube that remains flexible enough to be maneuverable in the internal components of an engine.

3.4.4 Interchangeability of insertion tube/probe. The borescope shall provide for interchangeability of the insertion tube/probe, to allow changing from one insertion-tube diameter to the other.

3.4.5 Insertion tube/probe interchangeable tips. The probe tip shall be interchangeable to enable different viewing angles, fields of view (FOV), and depth of field (DOF). The following tips shall be provided in accordance with Table I:

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TABLE I. Insertion tube/probe interchangeable tips FOV and DOF.

Salient characteristic		**Minimum Requirements**	
		FOV	**DOF**
4mm	Forward view, near depth of field	80°	4-200mm min range
	Forward view, far depth of field		35-∞mm min range
	Side view, near depth of field		2-15mm min range
	Side view, far depth of field		8-∞mm min range
	Forward view, measurement capability	50°	5-∞mm min range
	Side view, measurement capability		4-∞mm min range
6mm	Forward view, near depth of field	80°	9-120mm min range
	Forward view, far depth of field		35-∞mm min range
	Side view, near depth of field		8-15mm min range
	Side view, far depth of field		30-100mm min range
	Forward view, measurement capability	50°	8-80mm min range
	Side view, measurement capability		15-50mm min range

3.4.6 Insertion tube/probe storage. The insertion tube probe shall be easily retrieved and stored in the designated borescope or insertion tube case.

3.4.7 Optical insertion tube/probe tip adapters. The insertion-tube probes shall have interchangeable probe tips. The borescope shall be supplied with the different tips in reusable storage cases. Each tip shall have an individual storage compartment in the tip-storage case and identified as to the actual part/model number of the tip. The tip-storage case shall be stored in the designated borescope or insertion tube case. Determination as to the tip configuration/selection will be evaluated on an individual basis.

3.5 Articulation. The insertion probe articulation shall be a minimum of four way.

3.5.1 Articulation direction. The directions of articulation shall be up-down and left-right.

3.5.2 Articulation angle. The articulation range (angle) of the insertion probe (degrees from center) shall be at least 120°.

3.6 Light. The light source shall be a light-emitting diode (LED) or laser diode (LD).

3.7 Hardware/software.

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3.7.1 Internal data-storage component. The borescope shall have internal data storage capacity in accordance with Table II.

TABLE II. Internal data storage.

Salient characteristic	Minimum Requirement
Still image capacity, digital images in compressed Bitmap or JPEG format	200
Still image resolution (pixels)	H1024 x V768
Video recording and storage time, MPEG-4 format	10 minutes
Video recording resolution (pixels)	H1024 x V768

3.7.2 Data storage, software, connectivity, and cybersecurity.

3.7.2.1 Data storage transfer media device. The borescope shall enable data storage and transfer via commercially available universal serial bus (USB) compact disc (CD)/ digital versatile disc read-write (DVD-RW) drive at a minimum. The borescope shall have the ability to capture, store, and download color digital images in standard Windows image format (jpeg, bitmap, tiff, or mpeg). Each system shall be delivered with appropriate hardware to facilitate final data transfer onto CD/DVD-RW media. Commercial media storage and transfer hardware are not required to meet operating temperature requirements specified within this CID.

3.7.2.2 Internal measurement software. The borescope shall be supplied with internal measurement software with the ability to accurately and reliably measure with the following measurement software tools:

a. Distance. Distance between two points.
b. Point-to-line. Perpendicular distance between a point and a user-defined line.
c. Depth. Orthogonal depth/height distance between a point and a user-defined plane.
d. Area/Lines. Multiple point circumference and area measurement.
e. The software shall be able to measure in inches and millimeters. The software shall be free of any malware and contain no major vulnerability. Software shall be fully supported by the vendor.

3.7.2.2.1 Three-dimensional (3D) modeling. The borescope software shall be able to generate 3D modeling of a specific area. The 3D modeling shall find and measure the deepest point of the specific modeling area. The 3D modeling shall be able to rotate to all directions for a better view. In addition, the 3D software shall have the measurement-software tools mentioned in 3.7.2.2.

3.7.2.2.2 Capabilities and support. The software shall be able to measure in inches and millimeters. The software shall be free of any malware and contain no major vulnerability. Software shall be fully supported by the vendor.

3.7.2.3 External re-measurement/evaluation software. The borescope shall be supplied with an external measurement software program. This software is used to re-evaluate discontinuities found during an engine inspection which was digitally stored during the inspection. This

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software packages shall be capable of reading and interpreting all data from the internal measurement software. The software shall be free of any malware, contain no major vulnerabilities (including those that prevent inclusion on Air Force-Evaluated product List (AF-EPL)), and shall be Windows 11 64-bit compatible, and be able to be certified for the AF-EPL for use on a non-classified internet protocol (IP) router network (NIPRNet) computer. Software shall be fully supported by the vendor.

3.7.2.4 External/network connectivity.

TABLE III. External/network connectivity.

Salient Characteristic	**Minimum Requirement**	**Objective**
External/network connectivity	The borescope may include built-in Wi-Fi capability; however, it shall be capable of being disabled with password-protected BIOS/settings and/or with Administrator-level permissions not accessible to ordinary users. All other forms of external/network connectivity such as Ethernet or Bluetooth shall have the ability to be disabled.	No user accessible external/network connectivity

3.7.2.5 Operating System (OS). The vendor shall fully support the OS with updates and security patches. The OS shall implement antivirus protection. The OS shall be an Original Equipment Manufacturer (OEM) supported version of Linux or Windows and shall implement least privilege access for user roles.

3.7.2.6 Least privilege access. The borescope OS shall implement least privilege concept via Role Based Access Control (RBAC). Administrative (or root) access shall be restricted to privileged users, such as OEM developer/administrators, OEM field service representatives, or other personnel identified by the AF. All standard functions necessary to operate the borescope shall be accessible by regular users.

3.8 Measurement requirements.

3.8.1 Calibration check block. The borescope shall be supplied with a means to periodically check the measurement accuracy of the borescope, with a calibration check block.

3.8.2 Certification of calibration. Each borescope shall be supplied with a certificate of calibration. Calibration shall be traceable to National Institute of Standards and Technology (NIST) or a nationally recognized testing laboratory.

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3.8.3 Periodic calibration check. The borescope shall be subject to a calibration check prior to use of the measurement function on the borescope.

3.9 Liquid crystal display (LCD) monitor. The borescope monitor shall be supplied with a high-resolution LCD monitor or screen for a handheld device which provides bright and easy to view images inside or in outdoor lighting conditions.

TABLE IV. LCD monitor.

Salient characteristic	**Minimum Requirement**	**Objective**
Size (diagonal)	4-inch	6-inch
Resolution, VGA (video graphics array) (pixels)	H1024 x V768 pixels	H1024 x V768

3.9.1 Glare protection. The monitor shall produce sufficient brightness and provide sufficient contrast to be readable in glare and sunlight viewing conditions.

3.10 Borescope controls. The borescope shall be supplied with easy-to-use controls for the operation of all the functions for this borescope.

3.10.1 Scope articulation. The borescope shall have joystick articulation with position locking.

3.10.2 Software controls. The borescope shall have all software features controllable via touchscreen menu or toggle and/or soft-touch buttons integrated into hand-held monitor.

3.10.3 External remote control. The borescope shall be supplied with an external remote control that is capable of the operations of all functions for the borescope.

3.11 Functional characteristics.

3.11.1 Working-channel requirements. For the Type I and VI borescope, the scope shall be supplied with a working channel that is an integral part of the insertion tube/probe assembly. The tools that are to be supplied with the working channel shall be the following:

a. Hook.
b. Snare.
c. Basket.
d. Three-pronged grabber.
e. Magnet.

3.11.2 Rigid adapter tube. The borescope shall be supplied with a rigid adapter tube with a length of 14 to 18 inches.

3.12 Power requirements. Borescope shall operate on 100-120 VAC, 50/60 Hz, and shall operate on an integrated DC battery supply for at least 100 minutes before having to be recharged.

3.12.1 Battery. The borescope kit shall have one additional battery. The batteries shall be easy to connect and interchange in the borescope without additional tooling.

3.13 Operating temperature requirements.

3.13.1 Probe operating temperature requirements.

3.13.1.1 Minimum operating temperature. The minimum operating temperature of the insertion tube probe shall be -13° F.

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3.13.1.2 Maximum operating temperature. The maximum operating temperature of the insertion tube shall be 212° F.

3.13.2 Borescope operating temperature requirements.

3.13.2.1 Minimum operating temperature. The minimum borescope operating temperature shall be -4° F (with battery power).

3.13.2.2 Maximum operating temperature. The maximum borescope operating temperature shall be 115° F (with battery power).

3.14 Borescope overall weight. The maximum weight of the borescope, with all of the included accessories and the case, shall not exceed 80 pounds (objective: 20 pounds).

3.14.1 Labeling. Any borescope overall weight that exceeds the weight of 25 pounds shall have the actual weight clearly marked on the case. A two-person lift label shall be clearly marked on the case if the borescope overall weight exceeds 50 pounds.

3.15 Stand. The borescope kit shall include the contractor's standard adjustable height stand to hold the handheld borescope main unit or monitor.

3.16 Fluid/contaminate resistance. The borescope insertion tube, control cables, and borescope case shall offer protection against water, jet fuel, engine oil, synthetic lubricating oils, and hydraulic fluid found in and around the aircraft and engine as well as foreign objects, that is, dirt, dust, and sand found in hangar environments or in a storage environment.

3.17 Workmanship. The borescope, including all parts and accessories, shall be constructed and finished in a thoroughly workmanlike manner. Workmanship objectives shall include freedom from blemishes, defects, burrs and sharp corners and edges; accuracy of dimensions, surface finish, and radii of fillets; and proper alignment of parts and tightness of assembly fasteners.

3.18 Borescope carrying cases.

3.18.1 Type I borescope carrying case. This case shall contain the base unit with its accessories described in this CID and the 6mm diameter insertion tube with working channel with its tips and working tools. This carrying case shall have wheels for easy mobility.

3.18.2 Type II borescope carrying case. This case shall contain the base unit with its accessories described in this CID and the 6mm diameter insertion tube without working channel with its tips. This carrying case shall have wheels for easy mobility.

3.18.3 Type V borescope carrying case. This case shall contain the base unit with its accessories described in this CID and the 4mm diameter insertion tube. This carrying case shall have wheels for easy mobility.

3.18.4 Type VI borescope carrying cases. The borescope kit shall have three carrying cases.

3.18.4.1 Base unit- and 6mm-diameter insertion tube without working channel case. This case shall contain the base unit with its accessories described in this CID and the 6mm-diameter insertion tube without working channel with its tips. This carrying case shall have wheels for easy mobility.

3.18.4.2 6mm-diameter insertion tube with working channel case. This case shall contain the 6mm-diameter insertion tube with working channel and working channel tool set and its tips.

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3.18.4.3 4mm-diameter insertion tube case. This case shall contain the 4mm diameter insertion tube with its tips.

4. REGULATORY REQUIREMENTS.

4.1 Recycled materials. Recycled, recovered, environmentally preferable, or biobased 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 lifecycle costs. The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with 23.403 of the Federal Acquisition Regulation (FAR). However, used, rebuilt, or refurbished items shall not be provided.

4.2 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 purchases 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) meeting appropriate performance standards, or c) at a reasonable price. The prime contractor is responsible for ensuring that all subcontractors comply with this requirement.

5. PRODUCT CONFORMANCE PROVISIONS.

5.1 Conformance The products provided shall meet the salient characteristics of this Commercial Item Description, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial marketplace, modified as necessary to comply with the requirements herein. The Government reserves the right to require proof of such conformance.

5.2 First production inspection. The first production borescope shall be subjected to the analyses, demonstrations, examinations, and tests described in 5.5.1 through 5.5.2. The contractor shall provide or arrange for all test equipment and facilities.

5.3 Conformance inspection. Each production borescope shall be subjected to the examination described in 5.5.1.

5.4 Inspection requirements.

5.4.1 General inspection requirements. Apparatus used in conjunction with the inspections specified herein shall be laboratory-precision type, calibrated at proper intervals to ensure laboratory accuracy.

5.4.2 Data. During all testing specified herein, at least the following data, unless not applicable, shall be recorded at intervals not to exceed 30 minutes. Additional data or shorter intervals shall be provided as appropriate for any specific test:

a. Date.
b. Time started.
c. Time finished.
d. Ambient temperature.
e. Ambient humidity.

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5.4.3 Test rejection criteria. Throughout all tests specified herein, the borescope shall be closely observed for the following conditions, which shall be cause for rejection:

a. Failure to conform to design or performance requirements specified herein or in the contractor's technical proposal.
b. Thermal or structural failure of any component, including permanent deformation, or evidence of impending failure.
c. Evidence of excessive wear. If excessive wear is suspected, the original equipment manufacturers (OEM's) specifications or tolerances shall be utilized for making a determination.
d. Evidence of corrosion or deterioration.
e. Misalignment of components.
f. Conditions that present a safety hazard to personnel during operation, servicing, or maintenance.

5.5 Test methods.

5.5.1 Examination of product. Each borescope shall be examined to verify compliance with the requirements herein prior to accomplishing any other demonstrations or tests listed in 5.5. A contractor-generated, Government-approved checklist (part of the test procedure) shall be used to identify each requirement not verified by an analysis, certification, demonstration, or test, and shall be used to document the examination results. Particular attention shall be given to materials, workmanship, dimensions, surface finishes, and their application, fastening, and markings. Proper operation of each borescope function shall be verified. Certifications and analyses shall be provided in accordance with Table V. Each production borescope shall be inspected to a Government-approved reduced version of the checklist.

TABLE V. Certifications and analysis.

Paragraph	**Required Certifications and Analyses**
3.8.2 Certification of calibration.	Each borescope shall be supplied with a certificate of calibration traceable to NIST or a nationally recognized testing laboratory.
3.13.1 Probe operating temperature requirements.	Contractor certification that the probe complies with the operating temperature requirements of 3.13.1.1 and 3.13.1.2.
3.13.2 Borescope operating temperature requirements.	Contractor certification that the borescope complies with the operating temperature requirements of 3.13.2.1 and 3.13.2.2.
3.16 Fluid/contaminate resistance.	Contractor certification that the borescope shall offer protection to fluid and foreign objects listed in 3.16.

5.5.2 Borescope overall-weight test. The first production borescope shall be weighed to demonstrate compliance with the weight requirement of 3.14.

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

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7. NOTES.

7.1 Source of documents.

7.1.1 AFI. Copies of AFIs are available online at: http://www.e-publishing.af.mil/.

7.1.2 CFR. Copies of the CFR are available online at: http://www.ecfr.gov/.

7.1.3 FAR. Electronic copies of the FAR may be obtained from: https://www.acquisition.gov/.

7.1.4 Military documents. Specifications, Standards and Handbooks referenced herein may be obtained from: https://quicksearch.dla.mil/qsSearch.aspx.

7.1.5 NIST documents. Copies of NIST documents are available at: https://www.nist.gov.

7.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this CID.

b. Type of borescope required (see 2.1).

c. Product conformance provisions.

d. Packaging requirements.

7.3 Key words.
3D
Insertion tube

MILITARY INTERESTS:

Custodian:
Air Force – 184

Reviewer:
DLA – GS

Preparing Activity:
Air Force – 184

Agent:
Air Force – 110

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