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MILITARY SPECIFICATION

LATHES, ENGINE, GAP, SLIDING BED AND REMOVABLE BLOCK

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers sliding bed and removable block gap lathes that serve as standard engine lathes with the bed closed and provide additional swing and length capacity with the bed extended or with the block removed with equipment and accessories specified herein.

1.2 Classification. This specification covers lathes of the following classes and sizes. The class and size to be furnished shall be as specified (see 6.2.1).

Class A - Sliding bed

Size	-	Swing
1912/36		Over bed 19 inches, over cross slide 12 inches, in gap, 36 inches
2418/52	-	Over bed 24 inches, over cross slide 18 inches, in gap, 52 inches
4025/65	-	Over bed 40 inches, over cross slide 25 inches, in gap, 65 inches

Class B - Removable block bed

Size	Swing
1912/36	Over bed 19 inches, over cross slide 12 inches, in gap, 36 inches

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Industrial Plant Equipment Center, ATTN: DIPEC-SSM, Memphis, Tennessee 38114-5051, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

MIL-L-13896E

2418/52		Over bed 24 inches, over cross slide 18 inches, in gap, 52 inches
3021/41		Over bed 30 inches, over cross slide 21 inches, in gap 41 inches
4025/65	-	Over bed 40 inches, over cross slide 25 inches, in gap, 65 inches

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issue 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

MILITARY

MIL-M-18058 - Machinery, Metal and Woodworking, Packaging of.

STANDARDS

FEDERAL

FED-STD-H28 - Screw Thread Standards for Federal Services.

FED-STD-376 - Preferred Metric Units for General Use by the
Federal Government.

MILITARY

MIL-STD-461 - Electromagnetic Interference Characteristics
Requirements for Equipment.

2.1.2 Other Government documents publications. The following other Government documents and 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.

MIL-L-13896E

U.S. DEPARTMENT OF LABOR

29 CFR 1910 - Occupational Safety and Health Standards (OSHA).

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402-0001).

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

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issue 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 issue of documents not listed in the DoDISS shall be the issue of the non-Government documents which is current on the date of the solicitation.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B5.1 - T-Slots, Their Bolts, Nuts, Tongues, and Cutters.

ANSI B5.8 - Chucks and Chuck Jaws.

ANSI B5.9 - Spindle Noses for Tool Room Lathes, Engine Lathes, Turret Lathes, and Automatic Lathes (ISD 702).

ANSI B5.10 - Machine Tapers.

ANSI B5.16 - Accuracy of Engine and Toolroom Lathes.

ANSI B11.6 - Safety Requirements for the Construction, Care and Use of Lathes.

ANSI/NEMA MG1 - Motors and Generators.

ANSI/NFPA 79 - Electrical Standard for Industrial Machinery.

(Application for copies should be addressed to the American National Standards Institute, ATTN: Sales Dept., 1430 Broadway, New York, NY 10018-3351).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3951 - Commercial Packaging, Standard Practice for.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103-1187).

MIL-L-13896E

AMERICAN GEAR MANUFACTURER'S ASSOCIATION (AGMA)

AGMA 360.02 - Manual for Machine Tool Gearing.

AGMA 390.03 - Gear Classification, Materials and Measuring Methods
For Unassembled Gears.

(Application for copies should be addressed to the American Gear Manufacturer's Association, Standards Department, Suite 1000, 1901 North Fort Meyer Drive, Arlington, VA 22209-1695).

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 54 - Cylindrical Gears For General Engineering and For
Heavy Engineering, Modules and Diametral Pitches of.

(Application for copies should be addressed to the International Organization for Standardization, c/o American National Standards Institute, ATTN: Sales Department, 1430 Broadway, New York, NY 10018-3351).

(Non-Government 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).

2.3 Order of precedence. In the event of 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 First article. When specified in the contract or purchase order (see 6.2.1), a sample shall be subjected to first article inspection (see 4.4 and 6.3).

3.2 Design. The lathe shall be new and one of the manufacturer's current models capable of operations in accordance with the requirements herein. The lathe shall include all components, parts, and features necessary to meet the performance requirements specified herein. All parts subject to wear, breakage, or distortion shall be accessible for adjustment, replacement, and repair.

3.2.1 Measurement systems. Unless otherwise specified, either the U.S. Customary System of Units (US) or the International System of Units (SI) shall be used in the design and construction of the lathe. When only one system of measurement is acceptable, the particular system required shall be as specified (see 6.2.1), In this specification, all measurements,

MIL-L-13896E

dimensions, sizes and capacities are given in US units. These measurements may be converted to SI units through the use of the conversion factors and methods specified in FED-STD-376.

3.2.1.1 Measuring and indicating device calibrations. Unless otherwise specified, both the U.S. Customary System of Units (US) and the International System of Units (SI) shall be used to graduate the measuring and indicating devices such as scales, depth stops, carriage stops, dial indicators, pressure gauges, temperature indicators, and other similar devices. When only one system of graduation is acceptable, the particular graduation required shall be as specified (6.2.1). Regardless of the measurement system used, all measuring and indicating devices on the lathe shall be graduated in the same system. All feed dials shall have independent zero adjustments and shall be calibrated in such a manner that the last dial graduation progresses into and is continuous with the first dial graduation as the dial is rotated through the zero position.

3.2.1.2 Digital readout system. Unless otherwise specified (see 6.2.1), a digital readout system shall be provided on the X and Z axes of travel. The digital readout system shall consist of a position feedback device, an electronic display for each axis and all related components, mounting hardware, and electrical equipment necessary to assure complete operation of the system. The digital readout system shall be approved by the Underwriter's Laboratory (U.L.). The system shall be capable of providing a readily visible digital display over the full working range of each axis on which installed. The system resolution shall be 0.0001 inch. The system accuracy shall be 0.0002 inch per foot and the repeatability shall be 0.0001 inch. Special requirements for digital readout system components shall be as specified (see 6.2.1). The readout system shall be capable of indicating axis location in both the US and SI systems of measurement. The digital readout system shall be provided with a means for calibration.

3.2.1.2.1 Position feedback device. A position feedback device including all related components, hardware, and electrical equipment shall be provided for each axis having a readout system. The feedback device shall be of the independent type. Each feedback device shall be installed with a cover or guard to prevent physical damage to any portion of the feedback device or contamination by oil, dust, chips and coolants. The device shall provide axis travel feedback over the entire range of axis travel for each specified axis. Provisions shall be made to prevent damage to the feedback device in the event of overtravel.

3.2.1.2.2 Electronic display console. The electronic display console for the digital readout system shall contain a universal digital display with individual illuminated digits not less than 0.560 inch high. The console shall be capable of displaying at least six digits simultaneously. The display console shall also provide keyboard entry, memory, absolute/incremental counting, data preset, power failure indicator, inch/metric conversion, and absolute zero recall. The electrical display console shall be

MIL-L-13896E

installed so as to be readily accessible and easily read from the operator's work position. The console shall be mounted to withstand shock and vibration generated by the lathe. The connecting cable shall be armored and shall be installed so as not to interfere with the normal operation of the lathe. The cable shall be securely fastened to the structure of the lathe in accordance with the requirements of the contract.

3.2.2 Reclaimed materials. The lathe may contain reclaimed materials provided such materials will not jeopardize the lathe's intended use and performance. The reclaimed materials shall have been reprocessed, remanufactured, or recycled in a manner which will restore them to the same chemical composition and physical properties as the materials originally selected for use on the lathe.

3.2.3 Energy efficiency. The lathe and its components that directly consume energy in normal operation shall be designed and constructed for energy efficiency as governed by the latest developments available within the industry.

3.2.4 Controls. All operating controls shall be located convenient to the operator's normal work station.

3.2.5 Safety and health requirements. Covers, guards, or other safety devices shall be provided for all parts of the lathe that present safety hazards. The safety devices shall not interfere with the operation of the lathe. The safety devices shall prevent unintentional contact with the guarded part, and shall be removable to facilitate inspection, maintenance, and repair of the parts. All lathe parts, components, mechanisms, and assemblies furnished on the lathe, whether or not specifically required herein, shall comply with all of the requirements of 29 CFR 1910 that are applicable to the lathe itself. In addition, the machine shall comply with all requirements of ANSI B11.6 that are designated therein as the responsibility of the machine manufacturer. In the event of a conflict between the requirements of 29 CFR 1910 and ANSI Standards, the requirements of 29 CFR 1910 shall apply. Additional safety and health requirements shall be as specified (see 6.2.1).

3.2.6 Mercury restriction. The lathe shall not contain mercury or mercury components nor be exposed to free mercury during manufacture.

3.2.7 Asbestos restriction, Asbestos and materials containing asbestos shall not be used on or in the lathe.

3.2.8 Environmental protection. The lathe shall be so designed and constructed that under the operating, service, transportation, and storage conditions described herein, the lathe shall not emit materials hazardous to the ecological system as prescribed by Federal statutes in effect at point of installation (see 6.4).

MIL-L-13896E

3.2.9 Interchangeability. To provide for replacement of worn parts, all parts shall be manufactured to definite dimensions and tolerance.

3.3 Construction. The lathe shall be constructed of parts which are new, without defects, and free of repairs. The structure shall be capable of withstanding all forces encountered during operation of the lathe at its maximum rating and capacity without permanent distortion.

3.3.1 Lubrication. All bearings, (except sealed for life, permanently lubricated type), mating gears, and all other moving parts shall be provided means to assure adequate lubrication. Recirculating systems shall include filters which are cleanable or replaceable. Each lubricant reservoir shall have means for determining fluid levels. All oil holes, grease fittings, and filler caps shall be readily accessible. The supplier shall include and install all lubricants, fluids, greases and other compounds. The lubricant systems shall be temporarily capped or stopped to prevent loss of lubricants during shipment. The supplier shall include a warning notice in the instruction manual to remove the temporary caps and stoppers prior to the startup or use of the machine. The supplier shall include all applicable National Stock Numbers (NSN) of the oils, fluids, and lubricants used in the lathe.

3.3.2 Castings and forgings. All castings and forgings shall be free of defects, scale and mismatching. No processes such as welding, peening, plugging, or filling with solder or paste shall be used for reclaiming any defective part.

3.3.3 Welding, brazing, or soldering. Welding, brazing, or soldering shall be employed only where specified in the original design. None of these processes shall be employed as a repair measure for any defective part.

3.3.4 Fastening devices. All screws, pins, bolts, and other fasteners shall be installed in a manner to prevent change of tightness. Fastening devices subject to removal or adjustment shall not be swaged, peened, staked, or otherwise permanently installed.

3.3.5 Surfaces. All surfaces shall be clean and free of sand, dirt, fins, sprues, flash, scale, flux, and other harmful or extraneous materials. All edges shall be either rounded or beveled unless sharpness is required to perform a necessary function. Except as otherwise specified herein, the condition and finish of all surfaces shall be in accordance with the manufacturer's commercial practice.

3.3.6 Painting. Unless otherwise specified (see 6.2.1), the lathe shall be painted in accordance with the manufacturer's commercial practice.

3.3.6.1 Protective finish. When specified (see 6.2.1), the following protective finish requirement shall apply. All surfaces to be painted shall, immediately prior to painting, be cleaned and dried and be free of

MIL-L-13896E

foreign matter. The protective paint coating shall be at least 0.0020 inch thick and shall have the hardness and adhesion necessary for the prevention of scuffing and peeling. Where no protective finish is utilized (such as bedways, machine guide surfaces, etc.), the natural finish of the material or the finish obtained from heat treatment is permissible provided the surfaces are free from scale or corrosion.

3.3.7 Threads. All threaded parts used on the lathe and its related attachments and accessories shall conform to FED-STD-H28 and the applicable "Detailed Standard" section referenced therein.

3.3.8 Dials. All rotating dials or handwheels which are used to position machine axis or for tool movement shall be graduated in increments not larger than 0.001 inch. Dial and handwheel diameters shall be permanently and legibly engraved or etched on a nonglare background with graduations that can be read from the operator's normal position.

3.3.9 Gears. All gears and pinions of spindle and axis drive trains shall be designed and manufactured of a suitable ferrous material to meet or exceed the requirements of AGMA 360.02 and 390.03 for the English (US) system or ISO 54 for the metric (SI) system. The gears shall be of proper width and size to transmit full-rated torque and horsepower throughout the speed ranges without failure for the expected service life of the machine. Gears in the drive train shall be hardened and ground steel. Hardness shall be not less than Rockwell C-45.

3.3.10 Electromagnetic interference control. When specified (see 6.2.1), equipment furnished under this specification shall comply with MIL-STD-461. The equipment and subsystems class and the emission and susceptibility requirements shall be as specified.

3.4 Components. Each lathe shall consist essentially of a bed and base, headstock, headstock spindle, spindle drive, spindle speed change mechanism, carriage and apron, feed mechanism, cross slide, compound rest, and tailstock. In addition, the machine shall have all other equipment specifically described herein and all additional equipment necessary for the machine to meet all of the performance requirements stated herein.

3.4.1 Bed and base. The lathe shall have a bed and base structure that supports the headstock, tailstock, carriage and other related equipment. The bed and base shall be a ferrous casting with integral cross ribs, having sufficient strength and rigidity to maintain all the lathe components in alignment in accordance with table II alignment requirements, while turning parts. The base shall be of the box-type construction, and shall have hold down bolts and leveling screws or other means for mounting or leveling the machine on a foundation. The base shall be fitted with a water tight chip pan arranged to facilitate removal of chips and coolant. The bed shall have a sufficient number of covered access openings to facilitate inspection, adjustment and repair of components located within the structure.

MIL-L-13896E

3.4.1.1 Class A lathes. The lathe bed shall consist of two sections: a stationary base and a movable top section. The top section shall be mounted on V-ways on the stationary section. The bed and base shall retain the required alignment between the top bed and the spindle centerline, When in the closed position, the top bed ways section shall extend to the headstock, permitting the running of the carriage up to the spindle for normal operations. All surfaces of the top bed ways on which the carriage bears for support and guidance shall have a hardness of not less than Rockwell C-50. The top bed section shall be moved along the stationary section to extend the center distance and to open a gap to permit additional swing capacity. Suitable clamps shall lock the top bed in selected position, retain alignment, and prevent movement under workload. The lathe shall be equipped with means of supporting the sliding bed when extended.

3.4.1.2 Class B lathes. The bed of the class B lathe shall be one piece and shall have a cut out section, at the headstock end of the bed, to create a gap. The gap opening shall be fitted with a precision machined block to match the bed. The bed shall be designed to maintain the alignment accuracies of table II, both with the block removed and with the block inserted.

3.4.2 Headstock. The lathe shall have a headstock that supports and aligns the spindle axis parallel with the bed ways. The headstock shall house the gearing for the spindle drive and power take-off source for the feed mechanism. The headstock shall be constructed to support the spindle and gear shafts so as to prevent deflection that would affect accuracy rider full operating and cutting loads. All load carrying surfaces of gears, clutch jaws and surfaces of shafts on which gears and clutches slide, or internal surfaces of sliding parts, shall have a surface hardness of not less than Rockwell C-48. The headstock shall be an oil tight unit and shall have means of lubricating all bearings and gears that require continuous and changing spindle speeds.

3.4.2.1 Headstock spindle. The lathe shall have a headstock spindle to support a chuck, faceplate, or collet which in turn holds and provides rotation of the workpiece. The spindle shall be supported by roller or ball-type bearings that have a size, type and precision class suitable for the application. The spindle nose shall be as specified (see 6.2.1) and shall conform to the requirements of ANSI B5.9. The spindle nose shall be accurately machined to provide locating surfaces for lathe centers, faceplates and chucks. The inner and outer surfaces of the spindle nose, on which work holding devices are mounted, shall be hardened to prevent wear.

3.4.3 Spindle drive. The lathe shall have a spindle drive mechanism that will provide the required range of spindle speeds listed in table I. The spindle shall be driven through an all gear or combination gear and belt driven by an electric motor as specified in table I, All gears shall meet the requirements of 3.3.9.

MIL-L-13896E

3.4.3.1 Spindle speed change mechanism. Spindle speed change mechanism shall be the manual or variable speed type. The shifting mechanism shall be designed so that speed change cannot occur unintentionally. Except for the variable speed drive, speeds shall be in geometric progression. The manual speed change mechanism shall allow spindle speed changes by positioning gear shift levers or dials located on the front side of the headstock. Speeds shall be selected by positioning the levers as indicated on a conveniently located speed chart or by positioning a direct reading dial. The spindle shall operate in both directions of rotation. The actual spindle speeds in RPM shall be shown by a speed indicating device located convenient to the operator.

3.4.4 Feed thread gear box. The feed thread gear box shall control the ratio of the speed of the spindle with respect to the lead screw and feed rod to obtain the feed rate and thread lead. Unless otherwise specified (see 6.2.1), a combination inch/metric gear box shall be furnished. A feed and thread chart shall be mounted near the gear box as a ready reference for feed and thread selections. All feed and thread selections shall be shown without need for mathematical conversion. It shall be possible to feed or thread in either direction independently of the direction of spindle rotation. There shall be an interlock to prevent simultaneous engagement of both the feed and threading mechanisms.

3.4.5 Carriage. The carriage shall support the apron, cross slide and compound rest. A means shall be provided to maintain adjustment between sliding surfaces and to securely lock the carriage in position on the bed when cross feeding. The carriage shall traverse longitudinally on the bed ways and operate in both longitudinal directions under power, regardless of the direction of spindle rotation. Way wipers shall be fitted to the carriage wings to prevent entrance of chips and abrasive materials between the way surfaces.

3.4.6 Apron. The apron shall contain the feed mechanism, threading mechanism, operating controls and automatic lubrication system for the apron and carriage components. Safety devices such as disengaging or slip type clutches and interlocks shall protect the feed mechanism from damage by overload. The feed rod and lead screw shall be separate units. Rotating shafts shall be supported at both ends by ball or roller bearings.

3.4.6.1 Apron controlled lead screw reverse. Unless otherwise specified (see 6.2.1), the lathe shall have an apron controlled reversing mechanism to permit reversing the direction of the carriage without disengaging the lead screw half-nut or changing the speed and direction of spindle rotation.

3.4.7 Cross slide. The cross slide shall be fitted to the carriage ways and shall have means to compensate for wear between the sliding surfaces. The cross slide shall be positioned by a precision feed screw which shall be protected from dirt and chips. The cross slide shall be located at the extreme left end of the carriage to make full use of the gap and to provide maximum tool rigidity.

MIL-L-13896E

3.4.8 Compound rest. A compound rest shall be fitted to the top of the cross slide to allow positioning of the cutting tool at any horizontal angle. The compound rest slide shall be moved over the base by a precision feed screw with the acme or square form thread. A manual crank shall impart feed movement to the compound rest. The base for the compound rest shall swivel and lock at any position through 360 degrees. The base shall be graduated in one degree increments to at least 90 degrees each side of a zero point of reference. The compound rest shall have a standard T-slot for tool holders. T-slot dimensions shall meet the requirements of ANSI B5.1.

3.4.9 Tailstock. The tailstock shall be constructed to permit supporting a work part close to the compound rest without interference with operation of the top slide. The tailstock shall be easily moved along the bed ways and have a quick acting clamp for locking in position. The spindle shall hold and eject tang type tools, and shall be graduated in increments not greater than 1/16-inch for measuring spindle extension. The tailstock spindle taper shall be in accordance with ANSI B5.10 for self-holding tapers. Spindle locking shall not affect accuracy of alignment. The tailstock shall be marked to indicate set-over as specified in table I.

3.4.10 Electrical system. Unless otherwise specified (see 6.2.1), the electrical system shall conform to ANSI/NFPA 79. The machine shall draw all of its electrical power from a single 230/460-volt, 3-phase, 60-Hz circuit. The machine shall be initially wired for operation on 460 volts. An identified terminal for grounding the machine when installed shall be mounted in or near the disconnect switch. The terminal shall be suitable for connecting the size grounding conductor specified in table 15-5(b) of ANSI/NFPA 79 for the disconnect fuse rating.

3.4.10.1 Motors. Motors shall be rated for continuous duty and shall have ball or roller bearings of the sealed and permanently lubricated type. Unless otherwise specified (see 6.2.1), each motor enclosure shall meet the requirements for a dripproof enclosure. Motors shall meet the requirements of ANSI/NEMA MG-1.

3.4.11 Coolant system. The coolant system shall include a sump or reservoir, a power driven pump and all necessary piping. The sump or reservoir shall have sufficient capacity to permit full flow of coolant. The system shall have means for draining and cleaning and shall include a baffle or a strainer which is easily removable for cleaning. Means shall be provided to permit the operator to direct and control the amount of coolant.

MIL-L-13896E

3.5 Size and capacity. Unless otherwise specified (see 6.2.1), the size and capacity of the machine shall be not less than those specified in table I for the machine size speified.

3.6 Alignment tolerances. Each machine shall meet the alignment accuracies of table II and ANSI B5.16 when tested in accordance with 4.7.2.

3.7 Performance. The machine shall be capable of performing to the accuracies of table III, when tested in accordance with 4.7.3.

3.7.1 Additional performance requirements. Performance requirements in addition to, or in lieu of, the requirements herein shall be specified and fully described (see 6.2.1).

3.8 Standard equipment. Unless otherwise specified (see 6.2.1), a machine shall be furnished with all standard equipment normally furnished by the machine manufacturer. The following shall also be included as standard equipment.

3.8.1 Lathe centers and center sleeve. One headstock center, one tailstock center and one headstock center sleeve shall be furnished. The centers and sleeves shall conform to the requirements of ANSI B5.9 for the type spindle furnished.

3.8.2 Chuck and chuck jaws. The number and type of chuck and chuck jaws shall be as specified (see 6.2.1), and shall conform to the applicable requirements of ANSI B5.8.

3.8.3 Drive plate. The drive plate shall be the maximum allowable diameter, not to exceed the nominal swing over the cross slide. The plate shall not have less than two radial T-slots for driving lathe dogs. The T-slots shall conform to ANSI B5.1.

3.8.4 Faceplate, large. The large faceplate shall be of cast iron, of ribbed construction and fitted to the spindle nose. The plate shall have four or more T-slots in accordance with ANSI B5.1.

3.8.5 Thread-chasing dial. The thread-chasing dial shall be calibrated to indicate correct engagement of the lead screw and half-nut when cutting threads. A thread chasing stop shall be provided.

3.8.6 Micrometer carriage stop. The micrometer stop shall be mounted on the front bed to provide an ajustable stop. The micrometer dial shall be graduated in increments of 0.001 inch or less with at least 3/4 inch of adjustable.

3.8.7 Work light. The work light shall be an adjustable arm type with all necessary components for mounting on the machine tool, The light shall operate on 110 to 120 volts, alternating-current, 60-hertz, and shall be shielded against dirt and chips.

MIL-L-13896E

3.8.8 Wrenches. All special tools and wrenches required for operating the lathe and accessories that are normally supplied with the equipment shall be provided.

3.9 Optional equipment. Optional equipment shall be furnished as specified and as fully described (see 6.2.1).

3.10 Additional requirements. Performance features, attachments or accessories required in addition to, or in lieu of those specified herein, shall be as required by the procuring activity (see 6.2.1).

3.11 Lubrication chart or plate. Unless otherwise specified (see 6.2.1), a lubrication chart or plate shall be permanently and securely attached to each lathe. If a chart is furnished, it shall be placed in a transparent plastic folder or permanently sealed between clear plastic sheets, with suitable means for mounting. The chart or plate shall contain the following:

- Types of lubricants (with all applicable NSN's)
- Points of lubricant application
- Service interval
- Viscosity

3.12 Nameplate. Unless otherwise specified (see 6.2.1), a corrosion-resistant metal nameplate shall be securely attached to the lathe. The nameplate shall contain the information listed below. If the lathe is a special model, the model designation shall include the model of the basic standard lathe and a suffix identified in the manufacturer's permanent records. The captions listed may be shortened or abbreviated, provided the entry for each caption is clear as to its identity.

- Nomenclature
- Manufacturer's name
- Manufacturer's model designation
- Manufacturer's serial number
- Power input (volts, total amps, phase, frequency)
- Contract Number or Order Number
- National Stock Number or Plant Equipment Code
- Date of manufacture

3.13 Technical data. When technical data (operating manuals, maintenance manuals, parts catalogs, prints, wiring diagrams, lubrication chart) machine alignment and accuracy test results) is required, it shall be furnished in accordance with the requirements of DD Form 1623, All technical data furnished shall be written in the English language.

3.14 Workmanship. Workmanship of the lathes and accessories shall be of a quality equal to that of the manufacturer's commercial equipment of the type specified herein.

MIL-L-13896E

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.4).
- b. Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified (see 6.2.1), all inspections, tests, and examinations shall be performed in the manufacturer's designated indoor test area under the ambient temperature, the relative humidity, and the air pressure existing inside the building at the time the inspections, tests, and examinations are performed.

4.4 First article inspection. When a first article inspection is required, it shall be applied to the first article submitted in accordance with 3.1. Unless otherwise specified (see 6.2.1), first article inspection shall consist of the examination in 4.6 and all tests in 4.7. Failure of the item to pass the first article examination and all tests shall be cause "for rejection.

4.5 Quality conformance inspection. Quality conformance inspection shall be applied to each item prior to being offered for acceptance under the contract. Unless otherwise specified (see 6.2.1), quality conformance inspection shall consist of the examination in 4.6, the test in 4.7.1, and the inspection in 4.8. Failure of the item to pass the examination, the test, and inspection shall be cause for rejection.

MIL-L-13896E

4.6 Examination. The lathe shall be examined to determine compliance with all requirements of this specification including compliance with all referenced standards.

4.7 Tests.

4.7.1 Operational test. The lathe shall be operated at no load for not less than 60 minutes. Proper operation of all controls, motors, adjusting mechanisms, and accessories shall be verified during the trial period.

4.7.2 Alignment accuracy tests. Each lathe shall be tested to determine that it complies with the alignment tolerance requirements of 3.6.

4.7.3 Performance tests. The lathe shall be subject to the following turning test to determine conformance to the accuracies of 3.7.

4.7.3.1 Round turning test. A bar of SAE 1045 carbon steel or steel of similar machinability not less than 2 inches in diameter and 4 inches long, shall be held in the chuck furnished with the lathe. A rough and finish cut shall be made at least 2 inches long using a cutting speed of not less than 80 feet per minute. The turned diameter shall conform to the accuracy of the round turning test in table III.

4.7.3.2 Cylindrical turning test. A bar of SAE 1045 carbon steel or steel of similar machinability not less than 4 inches in diameter and 12 inches long with a collar at each end shall be used for a cylindrical turning test. The collars shall be not less than 4 inches apart. A finish cut shall be taken over the two collars in one pass using a single point carbide tip turning tool and a cutting speed not less than 350 feet per minute. The turned diameters shall conform to the accuracy of table III. Upon completion of the test, the test specimen shall be prepared for turning between centers. A single cut shall be taken over the two collars and the turned diameters shall conform to the accuracy of the cylindrical turning test in table III.

4.7.3.3 Horsepower test. Each lathe shall be subjected to a test which applies not less than the full rated input power to the spindle motor for not less than one minute. Spindle speed shall be chosen by the supplier at the lowest practicable for this test without applying torque in excess of the design maximum value to any machine components. Material and dimensions of the workpiece, tooling, depth of cut, and feed rate shall be at the option of the supplier, to provide the required loading. There shall be no chatter, stalling, or distortion during or after testing.

4.7.4 Electromagnetic interference control tests. Equipment requiring electromagnetic interference control shall be tested for compliance with 3.3.10.

4.8 Packaging inspection. Packaging of each item shall be inspected to determine compliance with the requirements of section 5.

MIL-L-13896E

5. PACKAGING

5.1 Preservation, packing, and marking. Unless otherwise specified, preservation, packing, and marking shall be in accordance with ASTM D 3951. When specified (see 6.2.1), level A preservation, level A or level B packing, and marking shall be accomplished in accordance with MIL-M-18058.

6. NOTES

6.1 Intended use. The lathes covered by this specification are intended for use in any machine shop as a standard engine lathe with additional swing and length capacity for handling large diameters and odd shapes. The lathes are suitable for light and heavy duty turning operations using high speed steel or carbide tooling.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Class and size lathe required (see 1.2).
- c. First article approval, if required (see 3.1).
- d. If machine is required to be configured in a specific measurement system (US or SI), state required system (see 3.2.1).
- e. If measuring and indicating devices are required to be graduate in a specific measurement system (US or SI), state required system (see 3.2.1.1).
- f. Digital readout system, if not required (see 3.2.1.2).
- g. Special requirements of digital readout (see 3.2.1,2).
- h. Additional safety and health requirements, if required (see 3.2.5).
- i. Painting, if different (see 3.3.6).
- j. Protective finish, specify if required (see 3.3.6.1).
- k. If electromagnetic interference control is required, specify the equipment and subsystem class and the emission and susceptibility required (see 3.3,10).
- l. Spindle nose, as specified (see 3.4.2,1).

MIL-L-13896E

- m. Specify combination inch/metric gear box, if required (see 3.4.4).
- n. Specify apron controlled lead screw reverse, if not required (see 3.4.6.1).
- o. Electrical system, if different (see 3.4.10).
- p* Type motor enclosure, if different (see 3.4.10.1).
- q. Size and capacity, if different (see 3.5).
- r. Additional performance requirements (see 3.7.1),
- s. Standard equipment, if different (see 3.8).
- t. Specify chuck and chuck jaws required (see 3.8.2).
- u. Optional equipment, as required (see 3.9).
- v. Additional requirements, as required (see 3.10).
- w. Lubrication chart or plate, if different (see 3.11).
- x. Nameplate, if different (see 3.12).
- y. Inspection conditions, if different (see 4,3).
- z. First article inspection, if different (see 4.4).
- aa. Quality conformance inspection, if different (see 4.5).
- bb. Specify packaging, packing; specify level A or B packing; and specify special marking if required (see 5.1).

6.2.2 Contract data requirements. Required technical data (operating manuals, parts lists, wiring diagrams, foundation and anchor bolt plans and acceptance test reports) should be specified on a DD Form 1423, Contract Data Requirements List, incorporated into the contract.

6.3 First article. When first article inspection is required, the item to be tested should be the first item offered for acceptance under the contract. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

6.4 Supersession data. This specification includes the requirements of sliding gap bed lathes size 19-inch through 26-inch which were formerly included under type I, class II and type II, class II of MIL-L-23400C dated 6 March 1981.

MIL-L-13896E

TABLE I. Size and capacities.

Characteristics	Classes A & B		Class B	
	Size 1912	Size 2418	Size 4025	Size 3021
Swing over bed, inches	19	24	39-1/2	30
Swing over cross slide, inches	12	17	31	20 3/8
Swing in gap, inches	34	28	65	41
Width of gap, to faceplate, inches	---	---	---	---
Distance between centers, inches:				
bed closed	30	45	74	60
bed open	54	77	96	160
Spindle speed selections or infinite:				
Standard	12	16	12	20
Spindle speed ranges, RPM:				
Standard	25 to 1000	18 to 600	6 to 500	10 to 800
Cross slide travel, inches	15	18	20	15
Compound slide travel, inches	4	4	5-1/2	6-1/2
Main drive motor, H.P.: (continuous)				
Standard	7-1/2	10	25	30
Optional	---	15	40	---
Size hole through spindle, inches	1-3/4	3-1/16	4	6-3/4
Spindle nose size, type	6" D-1	8" D-1	11" D-1	11" A-2
Spindle center, Morse taper	#4	#5	#6	#6
Longitudinal feed selections	.0025 to .093	.002 to .064	.002 to .064	.002 to 6.125
Threads, English:				
Number of selections	40	40	40	88
Number of threads, TPI	2 to 56	2 to 56	2 to 56	1/4 to 112
Thread, Metric:				
Number of selections	35	35	40	70
Number of threads, pitch in mm	.5 to 44 mm	.5 to 14 mm	.5 to 14mm	.2 to 112 mm
Tailstock spindle diameter, inches	2-3/4	4	5-1/2	3-23/32
Tailstock spindle travel, inches	7	7	10	7-1/2
Tailstock center, Morse taper	#4	#5	#6	#6
Tailstock set over, each side of center, inches	1/2	1/2	5/8	5/8
Leadscrew diameter, inches	1-1/4	1-1/4	1-7/8	1-3/4

NOTE: Machine sizes and capacities shall be not less than the stated requirements of the size ordered shown in above table. When the largest size and capacity machine shown in above table is ordered, the size and capacity of the machine offered shall not exceed the stated requirements by more than 10 percent. When a range is shown, the required performance is from the stated minimum or less to the stated maximum or greater.

TABLE II Alignment accuracies.

Test	Permissible error	
	Size 19-24	Size 30-40
Spindle center runout	0.0004 in. TIR	0.0006 in. TIR
Spindle nose runout	0.0004 in. TIR	0.0006 in. TIR
Cam action of spindle, rear side of test plate	0.0005 in. TIR	0.0006 in. TIR
Spindle taper runout:		
at end of 12 in. test bar	0.0012 in. TIR	0.0012 TIR
at spindle nose end of bar	0.0004 in. TIR	0.0006 TIR
Headstock alignment:		
Vertical, high at end of 12 in. test bar	0.0008 in.	0.0012 in.
Horizontal, at end of 12 in. test bar toward operators side	<u>+0.0008 in.</u>	<u>+0.0008 in.</u>
Headstock and tailstock center alignment, vertical, high at tailstock	0.0008 in.	0.0012 in.
Leadscrew, lead per foot	0.0004 in.	0.0012 in.
Cross slide alignment, to face, hollow or concave only, on 12 in. diameter	0.0008 in.	0.0008 in.
Face plate runout:		
on diameter	0.001 in.	0.0015 in. TIR
on face at nominal diameter	0.0015 in.	0.002 in. TIR
Chuck-runout, face and periphery	0.003 in.	0.005 in. TIR

TABLE III Performance accuracies.

Test	Size 19-24	Size 30-40
Rough turning:		
-out-of-round	0.005 in.	0.008 in.
-taper per foot	0.005 in.	0.008 in.
Finish turning,		
-out-of-round	0.0004 in.	0.0008 in.
Cylindrical:		
-two finished collars shall have the same diameter within		
-Part held in chuck or collet	0.0015 in.	0.0018 in. TIR
-Part held between centers	0.0010 in.	0.0014 in. TIR

MIL-L-13896E

6.5 Subject term (key word) listing.

Bed and base class A
Bed and base class B
Engine
Gap
Lathes
Removable block
Sliding Bed

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

Custodians:

Army - AL
Air Force - 99

Preparing activity:

DLA - IP

project (3416-0194)

Review activities:

DLA - GS
Air Force - 84

User activities:

Army - ME, SM

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-L-13896E		2. DOCUMENT TITLE Lathes, Engine, Gap, Sliding Bed and Removable Block	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> 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)	

