PD-620
19 July 2012

Purchase Description
for
Tool Kit, Refrigeration Service, Ordnance Supplemental #3

1.0 Scope. This purchase description describes the contents of a supplemental tool kit used to maintain refrigeration and air conditioning of Army vehicles and systems including the Mobile Integrated Remains Collection System (MIRCS), Multi-Temperature Refrigeration Container System (MTRCS), and the Improved Environmental Control Unit (IECU). The Refrigeration Service Tool Kit has capabilities to remove, recover and reclaim R-12, R-22, R-134a, R-410A refrigerants and other Class III, IV and V refrigerants.

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 issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, as of the date of the solicitation.

CODE OF FEDERAL REGULATIONS

49 CFR Part 178 - Specifications for Packaging

(The Code of Federal Regulations is available online at www.gpo.gov/fdsys or from the Superintendent of Documents, U.S. Government Printing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.)

COMMERCIAL ITEM DESCRIPTIONS

A-A-59486 - Padlock Set (Individually Keyed or Keyed Alike)

MILITARY STANDARDS

MIL-STD-1916 - DoD Preferred Methods for Acceptance of Product

(Copies of Commercial Item Descriptions and Military Standards are available online at www.assistdocs.com or from the DoDSSP, Bldg 4/Section D, 700 Robbins Ave, Philadelphia, PA 19111-5098.)

2.2 Non-government documents.

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE

AHRI Guideline K	- Containers for Recovered Non-Flammable Fluorocarbon Refrigerants
AHRI Guideline N	- Assignment of Refrigerant Container Colors
AHRI Standard 700	- Specification For Fluorocarbon Refrigerants
AHRI Standard 740	- Refrigerant Recovery/Recycling Equipment

(AHRI documents are available online at www.ahrinet.org.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM D3575	- Standard Test Methods for Flexible Cellular Materials Made From Olefin Polymers

(ASTM publications are available from www.astm.org or ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA.)

COMPRESSED GAS ASSOCIATION

CGA V-1	- Standard for Compressed Gas Cylinder Valve Outlet And Inlet Connections

(Compressed Gas Association standards are available online at www.cganet.com or CGA Customer Service, 14501 George Carter Way, Suite 103, Chantilly VA 20151, USA.)

SOCIETY OF AUTOMOTIVE ENGINEERS

SAE J1627	- Performance Criteria for Electronic Refrigerant Leak Detectors
SAE J1770	- Automotive Refrigerant Recovery/Recycling Equipment Intended for Use with Both R-12 and R-134a
SAE J2196	- Service Hose for Automotive Air Conditioning

(SAE publications are available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.)

UNDERWRITERS LABORATORIES INC.

UL 1963	- Standard for Safety Refrigerant Recovery/Recycling Equipment

(UL standards are available at www.comm-2000.com or COMM 2000, 151 Eastern Avenue, Bensenville, IL 60106.)

2.3 Order of precedence. In the event of a conflict between the text of this document 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 document,

however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. PRODUCT REQUIREMENTS

3.1 Preproduction Verification. When specified in the contract or delivery order, the contractor shall furnish one or more sets for preproduction verification inspection in accordance with Section 4 herein. The sets submitted shall be in accordance with the requirements of this specification. The approved preproduction set(s) and the production items shall be in accordance with the terms of the contract. Approval of the preproduction verification shall not relieve the contractor of the responsibility to furnish equipment in accordance with the requirements of this Purchase Description. All items supplied under this contract shall be identical to the preproduction verification sample; including packaging requirements specified in the contract or delivery order.

3.2 Components. Components listed in Table 1 and described below shall be furnished.

Table 1

Item	Item Description	Qty	Tool Case	FSC	Wty
3.2.1	Refrigerant recovery cylinder for R-410A	2	external	8120	M
3.2.2	Abrasive cloth	1 roll	1	5350	N
3.2.3	Hex key set	1	1	5120	L
3.2.4	File Set with handles	1	1	5110	M
3.2.5	Telescoping magnetic pick-up tool and inspection mirror kit	1	1	5120	M
3.2.6	High leverage diagonal cutting pliers	1	1	5110	L
3.2.7	High-leverage side cutting lineman's pliers	1	1	5110	L
3.2.8	Long nose pliers	1	1	5120	L
3.2.9	Tube cutter for 1/8-inch to 1-1/8-inch O.D. tubing	1	1	5110	L
3.2.10	Core removal tool	2	2	5120	M
3.2.11	4-valve service manifold	1	2	4130	M
3.2.12	Charging hoses	1	2	4720	M
3.2.13	Flame barrier drop cloth	1	1	3439	M
3.2.14	Self-igniting air-acetylene torch kit	1	2	3433	M
3.2.15	Tank Adaptor	1	2	4730	M
3.2.16	Tank, Nitrogen, refillable, empty, 40 ft^3	1	external	8120	M
3.2.17	Nitrogen regulator	1	1	6685	M
3.2.18	Metal carrying stand	1	external	3920	M
3.2.19	Refrigerant recovery unit, R-410A	1	external	4250	M
3.2.20	Refrigerant recovery/recycling/recharging unit	1	external	4250	M
3.2.21	Magnet bit holders and nut setter set	1	1	5130	M
3.2.22	Protective goggles	2	1	4240	M
3.2.23	Gloves	1 pr	1	8415	M
3.2.24	Mechanical fingers	1	1	5120	M
3.2.25	Liquid leak detector	1	2	6850	M
3.2.26	Refrigerant oil pump	1	2	4320	M
3.2.27	Refrigerant oil/ POE (polyol ester)	1	2	9150	N
3.2.28	Vacuum pump	1	external	4310	M
3.2.29	¾-inch tube cutter	1	1	5110	L
3.2.30	¼-inch to 1/8-inch tube cutter	1	1	5110	L
3.2.31	1/8-inch to 5/8-inch tube cutter	1	1	5110	L
3.2.32	Brazing outfit	1	2	3439	M
3.2.33	Solenoid valve operating magnet	1	1	5340	M
3.2.34	Welding gloves	1 pr	2	8415	M
3.2.35	Electronic leak detector	1	1	4940	M
3.2.36	Noncontact thermometer	1	1	6685	M
3.2.37	Digital vacuum gauge	1	1	6685	M
3.2.38	Belt tension gauge	1	1	6635	M
L – Manufacturer's stated Lifetime warranty					

Item	Item Description	Qty	Tool Case	FSC	Wty
M – Manufacturer's stated commercial warranty N – No warranty required					

3.2.1 Refrigerant recovery cylinder. The recovery cylinder shall conform to U.S. Department of Transportation DOT 4BA standards in accordance with 49 CFR Part 178. The recovery cylinder shall be for transportation of non-flammable fluorocarbon refrigerants and shall have a capacity of no less than 50 pounds. The cylinder shall have a service pressure rating of no less than 400 psi and shall be equipped with a Y-valve for drawing either liquid or vapor. The cylinder shall conform to the requirements of DOT 4BA and AHRI Guideline K for containers for recovered non-flammable fluorocarbon refrigerants.

3.2.2 Abrasive cloth. The abrasive cloth shall be an open mesh waterproof abrasive screen for preparing surfaces for soldering. The abrasive cloth shall be 120 grit and furnished in a roll nominally 1-1/2 inches wide and no less than 25 yards long.

3.2.3 Hex key set. The hex key set shall consist of short arm hex keys in the following wrenching sizes: 1.3 mm, 1.5mm, 2mm, 2.5mm, 3mm, 4mm, and 5mm. The hex keys shall be furnished in a roll, pouch or organizer.

3.2.4 File set with handles. The file set shall include a 6 inch (150mm) slim taper file, an 8 inch (200mm) flat bastard file, an 8 inch (200mm) mill bastard file, a 10 inch (250mm) mill bastard file, a 10 inch (250mm) half-round bastard file, and a storage pouch. All files shall be furnished with rubber coated handles assembled to the file tang. Note: Not Berry Amendment compliant.

3.2.5 Telescoping magnetic pick-up tool and inspection mirror kit. The kit shall consist of a telescoping, swiveling magnetic pick-up tool with no less than 14 pound pickup capacity that extends from no greater than 7-1/2 inches to no less than 32 inches. The kit shall also contain a telescoping, swiveling pocket acrylic inspection mirror that extends from no greater than 6-1/2 inches to no less than 27 inches. The mirror shall be no smaller than 1-3/4 inches by 2-1/2 inches. Both the mirror and the pick-up shall have non-slip grips.

3.2.6 High-leverage diagonal cutting pliers. The diagonal cutting pliers shall be for hardened wire cutting, have an 8 inch nominal length, hardened cutting edges and cushion grip handles with co-molded grips.

3.2.7 High-leverage side cutting lineman's pliers. The side cutting pliers shall be for hardened wire cutting, have a 9 inch nominal length, serrated jaws, hardened cutting edges and cushion grip handles with co-molded grips.

3.2.8 Long nose pliers. The pliers shall be long nose with hardened cutting edges, 6 inch nominal length, have serrated jaws and cushion grip handles with co-molded grips. The jaw length shall be 1-7/8 inches long and 11/16 inches wide. The point thickness shall be 3/32 inches.

3.2.9 Tubing cutter. The tubing cutter shall be for cutting 1/8 inch to 1-1/8 inch O.D. hard or soft copper, aluminum, brass, and thin wall steel tubing. The cutter shall maintain a constant length throughout the cutting range while cutting. The cutter shall have a foldaway reamer and a flare-cut off groove in the rollers. The cutter shall be furnished with 2 cutting wheels.

3.2.10 Core removal tool. The ball valve core removal tool shall be for use on ¼ inch flare refrigeration access fittings for removing and replacing a Schrader-type core without losing the charge. The core removal tool shall have a ¼ inch male flare side port for attaching a hose or a gauge. The core removal tool shall have a ball-type shut off valve to prevent losing refrigerant charge.

3.2.11 Service manifold. The manifold shall be a 4-valve service manifold with color coded refrigerant dials and color-coded protective gauge boots. The manifold shall have valves for individually connecting and controlling vacuum, low side, high side, and refrigerant lines. The manifold shall have a 3/8 inch diameter vacuum connection and ¼ inch diameter male flare pressure and refrigerant connections. The manifold shall be furnished with four 60 inches long hoses. The manifold shall have a 0 – 800 psi high-side gauge; 500 psi low-side gauge and shall be capable of reading to 30 inches of mercury vacuum or greater vacuum. The manifold and gauges shall be for use with R-410A refrigerants. The gauges shall be accurate to within 1% of reading. The manifold shall have a hook for hanging.

3.2.12 Charging hoses. The charging hoses shall be a set of three ¼ inch nominal diameter flare refrigerant charging hoses no less than 10 feet long for use with R-410A refrigerants. The working pressure shall be no less than 800 psi. The burst pressure shall be no less than 4000 psi. The hoses shall have a refrigerant permeation barrier and a moisture barrier. Hoses shall meet the requirements of UL 1963. The fittings shall automatically and immediately trap refrigerant in the hose when disconnected to help meet non-venting regulations and prevent finger burns. One hose shall be red, one hose shall be blue and one hose shall be yellow in color. Each hose shall have a 45° fitting on one end. The hoses shall operate in temperatures of -20°F or colder to 180°F or hotter.

3.2.13 Flame barrier drop cloth. The flame barrier shall protect surfaces from torch flames when used for soldering or brazing. The barrier shall be non-asbestos and withstand temperatures to no less than 3,000°F. The cloth shall be no less than 18 inches by 18 inches with the edges taped and sewn and shall have grommets at each corner. The cloth shall have a keyhole cut out for draping over pipes and tubes.

3.2.14 Self-igniting air-acetylene torch kit. The torch kit shall consist of an acetylene regulator with a CGA 200 fitting for use on a MC size cylinder, an acetylene hose no less than 12 foot long, a torch handle capable of accepting quick-connect tips, a tank carrier for MC-size acetylene tanks, and no fewer than 3 heating tips with piezo crystal igniters built into the tip assemblies to allow the torch to be lit with no flint, striker or batteries. The tank carrier shall have a handle for carrying and allow for storage of the tips, the hose and the handle. One heating tip shall allow soft soldering of refrigeration and copper tubing from 1/4 inch to no less than 1 inch and shall allow gas flow of no less than 3.6 SCFH (Standard Cubic Feet per Hour) at 14 psi. One heating tip shall allow soft soldering of refrigeration and copper tubing from ¾ inch to no

less than 1-1/2 inches and shall allow gas flow of no less than 5 SCFH at 14 psi. One heating tip shall allow soft soldering of refrigeration and copper tubing from 1 inch to no less than 2 inches, silver brazing from ½ inch to 1 inch and shall allow gas flow of no less than 7 SCFH at 14 psi.

3.2.15 Tank Adapter. The tank adapter shall allow for connecting a B-size acetylene regulator (CGA 520) to an MC-size acetylene tank (CGA 200).

3.2.16 Refillable nitrogen tank. The tank shall be refillable and have a capacity of no less than 40 cubic feet. The tank shall meet DOT specification 3AA2015 in accordance with 49 CFR Part 178 and shall have a CGA 580 outlet connection and valve. The tank shall be furnished empty.

3.2.17 Nitrogen regulator. The regulator shall be for testing and purging brazed joints. The regulator shall have a CGA 580 inlet fitting and a ¼-inch 37° flare tube fitting on the outlet. The regulator shall have a delivery pressure of 400 psi or greater. The regulator shall have two pressure gauges: a cylinder pressure gauge reading no less than 4000 psi, and a delivery pressure gauge reading no less than 600 psi. The regulator shall be equipped with a porous metal inlet filter pressed into the regulator inlet nipple.

3.2.18 Carrying stand. The stand shall be a wheeled cart for transporting two welding/brazing tanks. The cart shall be able to be used with MC and B acetylene tanks and R and R40 oxygen tanks. The cart shall have a handle for towing and a handle for lifting. The cart shall include a hose holder and a container for the torch and tips and welding or brazing supplies. There shall be a method for securing the tanks to the stand.

3.2.19 Refrigerant recovery unit, R-410A. The refrigerant recovery unit shall have an oil-less recovery compressor of no less than 1HP that shall operate from 115 VAC, 50/60 Hz, single phase power. The recovery unit shall have an automatic low pressure shut-off feature that shall turn the unit off when recovery is completed, and a 550 psi high pressure shut-off switch. The recovery unit shall be able to be used with all refrigerants including R-12, R-22, R-134a, R-404A, R-407A and R-410A. It shall be capable of recovering refrigerants by direct liquid or vapor recovery and at a rate of 20 pounds per minute using the push-pull method. The recovery unit shall have suction and discharge pressure gauges reading inches and centimeters of mercury vacuum, psig and kg/cm and suction and discharge shut-off valves. The recovery unit shall have a cleanable built-in suction filter and shall be certified by a qualified independent certifying laboratory to AHRI Standard 740.

3.2.20 Refrigerant Recovery/Recycling/Recharging Unit, R-12/R-134a. The recovery unit shall allow the recovery, recycle and recharge of R-12 and R-134a refrigerants as well as R-22 and other Class III and IV refrigerants in accordance with AHRI Standard 740. The unit shall have wheels for rolling the unit across a shop floor. The unit shall operate from 230 VAC, 50/60 Hz single phase power. The recovery unit shall include automatic operation, an integral electronic scale for weighing recovered refrigerant, automatic shut-off when recovery is complete, a vacuum pump of no less than 6 cfm capacity, a built-in suction filter, a replaceable filter/drier and a recovery rate of no less than 4 pounds per minute. The recovery unit shall have a lockout to prevent mixing of refrigerants and shall be certified by a qualified independent

certifying laboratory to SAE J1770. The recovery unit shall be furnished with two 50 pound capacity refrigerant tanks – one with ¼-inch fittings and the other with ½-inch Acme fittings – and 3 sets of hoses for connecting the unit to the system to be recharged – two sets for refrigerants using ¼-inch SAE fittings and one set with R-134a field service couplers. The hose sets shall be as stated in the table below.

Hose Set	Tank Hoses (3)	System Hoses (2)
R-134a automotive	36 inches long, ½-inch Acme with double Quick Seal	96 inches long, one Quick Seal with one quick coupler
R-12 automotive	36 inches long, ¼-inch flare with double Quick Seal	96 inches long, ¼-inch flare with double Quick Seal
All other refrigerant types	36 inches long, ¼-inch flare with single Quick Seal	96 inches long, ¼-inch flare with ball valve

3.2.21 Magnet Bit Holders and Nut Setter Set. The set shall consist of 21 pieces and a carrying case. The set shall include the following ¼-inch hex bits: six each #2 Phillips bits one inch long; one each #1 and #3 Phillips bits one inch long; one each #3 Phillips bit 2 inches long; one each #6, #8 and #10 slotted bits one inch long; one each #1 and #3 square recess bit tips one inch long; 3 each #2 square recess bits one inch long; one each #2 square recess bit 2 inches long; one each ¼-inch magnetic nut driver; one each 5/16-inch magnetic nut driver; magnetic tip bit holder. Note: Not Berry Amendment compliant.

3.2.22 Protective goggles. The goggles shall conform to ASSE Z87.1, be vented to minimize fogging and shall have a scratch-resistant, anti-fogging and UV resistant coating. Two pair shall be furnished. One pair shall be clear and the other pair shall be darkened for torch work.

3.2.23 Gloves. The gloves shall be Gunn cut with a wing thumb, have a lined leather palm, safety cuff, fiberfill insulation, reflective knuckle strap, and a high visibility color such as safety yellow or safety orange. The gloves shall be furnished in size large.

3.2.24 Mechanical fingers. The mechanical fingers shall be a 4-jaw flexible, spring return pick-up tool with a jaw opening of no less than 1 inch and no less than 23 ½ inches long.

3.2.25 Leak detector solution. The leak detector shall be an aqueous solution that is non-toxic, non-corrosive and biodegradable for use in detecting gas and refrigerant leaks. The detector shall form bubbles when a leak is detected. The solution shall be safe for use on oxygen systems and in food processing areas. The leak detector shall be furnished in a 1 quart spray bottle.

3.2.26 Refrigerant oil pump. The refrigerant oil pump shall be designed for fitting the opening of one and five gallon refrigerant oil containers. It shall be capable of pumping against a system pressure of no less than 250 psi. The pump shall be furnished with an oil removal hose that attaches to the bottom of the pump.

3.2.27 Refrigerant oil/POE (polyol ester). The oil shall be a polyol ester refrigeration lubricant with antioxidants for use with HFC and HCFC refrigerants. The flash point shall be no less than 518°F. The viscosity at 105°F shall be 65.5 Centistokes (CST) and 9.3 CST at 212°F. The pour point shall be no greater than -38°F. Water content shall be less than 40 parts per million. The lubricant shall be furnished in a one gallon container.

3.2.28 Vacuum pump. The vacuum pump shall be designed for evacuating the air from refrigeration systems. The pump shall be a two-stage pump and be rated for no less than 6 cubic feet per minute at 60 Hz. The vacuum pump shall be capable of pulling vacuums to 20 microns or less. The pump shall have a carrying handle, an on/off switch and both ¼ inch and ½ inch male flare intake fittings. The vacuum pump shall operate from 115 and 230 VAC, 50/60 Hz. The pump shall be furnished with the appropriate lubricant. It shall have a sight glass for determining lubricant level and a drain for draining the oil.

3.2.29 Close quarters tubing cutter. The tubing cutter shall be for use in restricted spaces on small diameter, hard and soft copper, aluminum, brass and plastic tubing. The cutter shall have grooved rollers for close-to-flare cuts. The tubing cutter shall cut tubing with outside diameters of 3/16-inches to 15/16-inches. A spare cutter wheel shall be furnished with the tubing cutter.

3.2.30 Close quarters tubing cutter. The tubing cutter shall be for use in restricted spaces on small diameter, hard and soft copper, aluminum, brass and plastic tubing. The cutter shall have grooved rollers for close-to-flare cuts. The tubing cutter shall cut tubing with outside diameters of 1/4-inches to 1-1/8-inches. A spare cutter wheel shall be furnished with the tubing cutter.

3.2.31 Close quarters tubing cutter. The tubing cutter shall be for use in restricted spaces on small diameter, hard and soft copper, aluminum, brass and plastic tubing. The cutter shall have grooved rollers for close-to-flare cuts. The tubing cutter shall cut tubing with outside diameters of 1/8-inches to 5/8-inches. A spare cutter wheel shall be furnished with the tubing cutter.

3.2.32 Brazing outfit. The brazing outfit shall consist of a torch handle with attached oxygen and fuel gas hoses no less than 10 feet long, a single flame tip, a twin flame tip, a “C” style tip, a heating tip, and adapters that will adapt the hoses to A or B style regulator connections. The torch outfit shall be capable of being used with acetylene. The single flame tip shall have heat output of no less than 7,360 BTU/hour and brazing capacity of ½ to ¾ inch copper pipe. The twin flame tip shall have heat output using acetylene of no less than 12,200 BTU/hour and brazing capacity of 5/8 to 1-3/8 inch copper pipe. The twin flame tip shall allow equal size flames to be applied simultaneously to opposite sides of the tubing. The “C” style tip shall have heat output of no less than 12,350 BTU/hour and brazing capacity of ½ to 1-1/8 inch copper pipe. The “C” style tip shall allow even heating around all sides of the pipe, tubing or fitting simultaneously. The heating tip shall have heat output using acetylene of no less than 13,760 BTU/hour and brazing capacity of ½ to 1-5/8 inch copper pipe. An adapter shall be furnished so that the oxygen torch hose can be attached to a regulator with 9/16-18 RH outlet threads and to a regulator with 3/8-24 RH outlet threads. An adapter shall be furnished so that the

acetylene torch hose can be attached to a regulator with 9/16-18 LH outlet threads and a regulator with 3/8-24 LH outlet threads. The torch handle shall have valves to shut off and regulate the fuel gas and the oxygen.

3.2.33 Solenoid valve operating magnet. The solenoid valve operating magnet shall allow the manual opening and closing of solenoid valves when the valve is not under power. The magnet shall have a nominal 18 mm (3/4-inch) hole through the center to fit around the stem of the solenoid valve.

3.2.34 Welding gloves. The gloves shall be for MIG welding and be made of heavy-duty top-grain cowhide, with wing thumb, seamless forefinger, be unlined and have a 4 inch gauntlet cuff. The gloves shall be furnished in large size.

3.2.35 Electronic leak detector. The electronic leak detector used to detect refrigerant leaks in air conditioning and refrigeration systems. It shall have a sensitivity selection switch which allows it to be used with CFCs and HCFCs at one setting and HFCs at the other. The leak detector shall be capable of detecting refrigerant leaks of 1/2 ounce per year or smaller. The leak detector shall have audible and visual leak indicators, a low battery indicator, a volume control, a threshold balancing control and a flexible gooseneck probe no less than 16 inches long which holds its position for one-handed operations. When the leak detector is not being used, the probe shall wrap into a retaining clip on the back of the case. The leak detector shall be certified by a nationally recognized testing laboratory to meet SAE J1627 for R-12 and R-134a refrigerants. The leak detector shall operate from AA alkaline batteries.

3.2.36 Noncontact thermometer. The thermometer shall allow temperature readings to be taken from a distance of up to 6 feet. The thermometer shall have a range of -20°F to 932°F (-30°C to 500°C) or greater. It shall be accurate to ±1°C (2°F) from 10°C to 30°C (50°F to 86°F), ± 1.5% of reading or ± 1.5°C (3°F) whichever is greater over the balance of the range. The thermometer shall have a laser to indicate the area of measurement. The thermometer shall have a backlit display with a resolution of 0.5°F or less. The display shall be selectable to allow the temperature to be read in °F or °C and shall show current and maximum readings. The thermometer shall be battery operated. A storage pouch shall be included.

3.2.37 Digital vacuum gauge. The digital vacuum gauge shall sense vacuums in the range of 760,000 to 1 micron. The gauge shall have no greater than 1 micron resolution below 1000 microns and accuracy of ±20% of reading or greater. It shall operate at temperatures of -30°F to no less than 125°F. The digital vacuum gauge shall be battery powered, self calibrating, have automatic temperature compensation, and automatic battery condition check and compensation. The vacuum gauge shall connect to a ¼-inch male flare connection. The digital vacuum gauge shall be furnished in a molded plastic case and shall be furnished with a ball valve to isolate the gauge during system pressurization.

3.2.38 Belt tension gauge. The gauge shall be for measuring the tension on V-belts up to 7/8 inches top width. The gauge shall measure belt tensions of 30 to 160 pounds and 15 to 75 kg. The gauge shall have a clip for holding the gauge in a shirt pocket.

3.3 Component packaging. The components shall be loaded into either Case 1 or Case 2 as identified in Table 1. The cases shall be in accordance with paragraph 3.5 below. Larger items marked "external" in Table 1 shall be packaged in accordance with the contract or delivery order.

3.4 Industrial quality tools. All components supplied with this set shall be industrial quality. "Industrial quality tools" are defined as tools commercially marketed and manufactured for constant, rigorous, industrial or professional environment use. The items offered shall have either achieved industrial market acceptance (as defined in paragraph 3.4.1) or have been satisfactorily supplied to the Government under current or recent contracts for the same or similar requirements. Industrial quality tools are used primarily by skilled professionals and technicians in such areas as refrigeration and air-conditioning repair, machine shops, automotive maintenance and repair facilities, aircraft maintenance and repair facilities, industrial automotive assembly plants, fleet maintenance facilities, and airline service facilities. The tools will be used for specialized applications in an environment of virtual constant use, (i.e. around-the-clock 8 hour shifts), with applications requiring high torque, low slippage, and strict tolerances.

3.4.1 Market acceptance. Market acceptance is demonstrated by the component having a higher percentage of sales to industrial/professional customers than to retail or government customers. Advertising or marketing literature that indicates "professional grade" or "industrial quality", or merely stating that an item is "professional grade" or "industrial quality" is insufficient to establish industrial quality tools since these are terms for which there is no generally accepted definition. A claim that an item is manufactured to an industry consensus standard is also insufficient to establish industrial quality tools. The contracting officer may require offerors to provide evidence of market acceptance in the professional or industrial market. Evidence of acceptance by industrial/professional customers includes sales to fleet operators, distributors, contractors, industrial and professional users, and sales to distributors who retail exclusively to the professional or industrial market.

3.4.2 Warranty. All components shall be warranted with the Original Equipment Manufacturer's (OEM) warranty stated in Table 1. The offeror shall state the length and terms of the manufacturers' warranties in response to the solicitation. The warranties shall become part of the contract or delivery order.

3.5 Tool Cases. The tool cases shall contain and organize the components listed in Table 1. The tool cases shall be constructed of any material that provides the performance described below. The weight of each individual case and its tools shall not exceed 250 pounds when fully loaded. The top and at least one side of each case shall be conspicuously marked "X of Y", with X being the number of the case in the set and Y being the total number of cases. The components shall be places in the cases as specified in Table 1. The cases can be different heights, but they shall all have the same length and width. The cases shall be able to be stacked on top of one another.

3.5.1 General exterior configuration. The cases shall be constructed with a base and a lid that shall be entirely separable. Multiple cases shall be similar in design and shall be stackable to no less than two high.

3.5.2 Hardware. All metal hardware on the case shall be corrosion resistant stainless steel, and shall be able to withstand long term exposure under corrosive atmospheric conditions. Hardware that protrudes into the case interior shall not present a hazard to users' hands. Rivets and screws that attach the hinges, handles and locking hasps shall not be removable with common tools, and resist removal from outside the case when the lid is on and locked.

3.5.3 Handles. The case shall have no fewer than two handles on each side of the lower half of the case, totaling a minimum of eight handles. The handles shall be rated, as pairs, for not less than 1-1/2 times the weight of the fully loaded case (375 pounds). Handles shall be affixed using mechanical fasteners, e.g. rivets or screws, which cannot be readily removed with common tools. In addition, four more handles shall be added to the lid to aid in removing the lid when opening the case for access to the tools. These handles maybe the same as the handles used on the lower half of the case, or may be smaller if required for proper fit onto the lid. Each case shall have a warning label prominently displayed on the exterior of the case stating "Multiple person lift required."The weight of the case shall be indicated on the outside of the case.

3.5.4 Security. The case shall include one or more locking feature(s) for the entire case. If a single locking feature is used, it shall prevent opening or removing the lid when locked. The locking feature(s) shall not use a cable. If padlocks are used they shall conform to the requirements of Commercial Item Description A-A-59486 and shall be included. The case shall also include a means to tether the case to a post, or pillar, by means of a chain that can be run from case to case, through the handles, or other tethering devices, and then locked. Two keys shall be provided with each padlock. If the case design is such that it is lockable with an internal lock, the keying and tumbler action shall also meet the requirements of CID A-A-59486. All locks in a single tool set shall be keyed alike, with two keys for each lock.

3.5.5 Finish. The exterior surface finish shall be clean and corrosion resistant and shall have no sharp edges or projections.

3.5.6 Color. The color of the case shall be olive drab and the coloring agent shall be part of the base material such that no painting is required to maintain the color.

3.5.7 Pressure differential compensation. The case shall be designed to compensate for differential pressures that may develop as a result of changes in temperature or in altitude.

3.5.8 Cold weather use. The tool case shall be designed for storage and use in cold weather down to -25 degrees Fahrenheit (F) or colder.

3.5.9 Hot weather use. The tool case shall be designed for storage in temperatures of no less than 175 degrees F and use in temperatures of no less than 120 degrees F.

3.5.10 Load. Each tool case shall be capable of being loaded with its portion of the component items in paragraph Table 1 and then closed, latched and lifted by its handles to a height of not less than 12 inches from the floor to the bottom of the tool case and then lowered 25 times without damage occurring to the side handles or the tool case.

3.5.11 Stack-ability and crush resistance. The fully loaded case, when closed, latched, and in its normal resting position shall protect its contents from damage. It shall withstand, without damage or permanent deformation to itself, a load consisting of three other fully loaded tool cases stacked on top of it for one hour. After the removal of the top cases, the case that was on the bottom shall retain its original shape.

3.5.12 Water repellence. When closed and locked, the case shall repel water from a direct rain and the tools shall remain dry. It shall withstand blowing rain on all four sides with a minimum wind speed of 25 mph without water entering the case.

3.5.13 Rough handling. At room temperature a fully loaded tool case shall withstand being dropped 4 times from 60 inches to a concrete floor, each time landing on a different one of the four bottom edges. On the last drop it shall then be rolled over on its lid and back to the base. All this shall be accomplished without sustaining any permanent damage or degradation to its proper functioning, or the tools being damaged, becoming dislodged and moving freely around in the case. After being dropped, the locking features and the tool case shall operate properly without degradation of performance.

3.5.14 Impact Resistance. When fully loaded, closed, latched and placed in its normal resting position in a room temperature environment, each type of tool box, shall withstand impacts from dropped objects. As a minimum they shall withstand an impact from a steel bar weighing at least 3 pounds, with a cross section no larger than 3/16 x 1 inch and with an edge radii no larger than 1/16 inch. This bar shall have been dropped in free fall from a height of 8 feet, and shall have landed narrow end down on the lid of the tool box. Each tool box shall absorb this blow without suffering permanent deformation to its general overall configuration.

3.5.15 Interior tool storage system. An interior tool storage system shall be provided that groups the tools in the case so that tools can be immediately located, and allow withdrawing the tools from the case without having to sort through the case. The tool organizing method shall retain tools in position, provide for rapid inventory of the tool load, and maintain the position of the tools under rough handling and shipping conditions. Each single pocket or cutout that is intended to hold a tool or component shall be configured to hold the tool snugly and completely while allowing easy removal of the tool and shall include as necessary pick holes, cut out or recessed areas or protrusion of tools above the tool organizing method. Each contoured retention feature shall securely hold the tool in place so that when the tool case is dropped, the tools will be retained in position. Each retention feature shall be smooth and free from rough edges. Finger pick relief shall be provided for tools that would otherwise be difficult to remove. If foam is used, it shall be closed cell and coated so that moisture is not retained in pores. If foam is used, it shall be closed-cell, no less than 6-pound density, and shall have a water absorption rate of no greater than 0.02 pounds/square foot over the cut surfaces when tested in accordance with ASTM D3575. Each retention feature shall be smooth and free from rough edges. Webs between component storage locations shall provide rigidity and shall be resistant to tearing. If foam laminations are used, laminations shall be complete, essentially making one large piece of foam. The lamination method shall not allow the laminations to be readily separated, or pulled apart by hand. The organizing method shall provide contrasting color underneath the tools to aid in rapid inventory. The materials used in the tool organizing method, including trays or pallets, shall be

resistant to water, refrigerants, automotive oils, greases, lubricants, fuels including gasoline, diesel fuel, JP-8 and JP-4, acids, bases, coolants, alcohols and cleaning agents. Wood or metal trays or pallets to support the organizing method shall not be used because they are not resistant to fluids listed above. Each group of tools in its system shall be layered inside the case and each layer shall be provided handles as needed for two persons to lift each layer out of the case. The combined weight of the lifted layer shall not exceed 73 pounds (two person lift). The use of rust inhibiting or moisture removal compounds is permitted, providing that the item is replaceable, able to be incorporated into the storage system, and does not cause deposits on the tools or case. If items are on the bottom of the tool box/case, for bulky items the object or tool can be removed individually. In some cases the weight of several items in the bottom may weigh more than the 73 pounds for the two man lift tray. In all cases the heavy tool should be placed in the bottom layer.

3.6 Placing items in individual cases. The items listed as external in Table 1 shall be crated and protected from damage in shipping as specified in the contract or delivery order. The other items shall be packaged in the cases designated in Table 1. Items with their own case shall be stored in their case inside the larger case whenever possible. A layout of the contents in the case shall be printed or attached to the lid to aid in locating specific tools stored in the case. Tools shall be grouped and packed together as stated in Table 1. Each tray shall be light enough for two individuals to lift out, and have handles or straps that are easily accessible and firmly mounted.

3.7 Warranty Placard. A placard shall be attached to the inside of the lid of the tool cases containing warranty information and how to order warranty or replacement components. If unable to attach to the lid of the tool cases, then the placard shall be attached in a conspicuous place where it is protected from the elements.

3.8 Identification Data Plate Information. A second placard shall also be attached inside the lid of each tool case. The placard shall minimally contain a list of the contents of case.

Nomenclature: Tool Kit, Refrigeration Service, Ordnance Supplemental #3
Part Number: (SC to be assigned)
NSN: (To be assigned)
Net Weight: (To be assigned)
Cube: (To be assigned)
Contract Number: (To be assigned after award)
CAGE Code: (To be assigned after award)
Date Manufactured: (To be assigned after award)

3.9 Supplemental kit. When specified in the contract or delivery order, one each of item 3.2.1 and items 3.2.29 through 3.2.38 shall be made available as a separate kit.

4. QUALITY ASSURANCE PROVISIONS

4.1 General provisions. The product verifications and conformance inspections stated herein shall be performed to determine whether the item conforms to Section 3 of this Purchase

Description. Unless otherwise specified in the contract, all verifications and inspections shall be performed in accordance with the conditions specified herein. The contractor is responsible for the performance of all product verifications and conformance inspections specified herein. The contractor may use his own or any other facilities suitable for the performance of the verifications and inspections, unless disapproved by the Government. The Government reserves the right to perform any of the verifications and inspections set forth in this DFP, at a later date and in its own facilities, where such verifications and inspections are deemed necessary to assure supplies and services conform to prescribed requirements. The absence of any verification requirements shall not relieve the contractor of the responsibility of assuring that all products submitted to the Government for acceptance comply with all requirements of the contract.

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

a. Product preproduction performance verification (see 4.2)
b. Conformance inspection (see 4.3)

4.2 Product preproduction performance verification. Product preproduction performance verification is performed before full production begins and is intended to verify that the product is designed and manufactured to meet the requirements of this specification. It includes visual and manual inspections, some of which result in measured or counted values, as well as tests and demonstrations to prove compliance of the tested product and all of its assemblies and subcomponents with the requirements of this document. It also includes the product conformance inspections, as described in paragraph 4.3, that will be performed during production to prove that all inspected characteristics are in compliance at the beginning of production. Product submittal, inspections and acceptance criteria are as follows:

a. Submission. The contractor shall submit one or more tool kit sets for preproduction product verification and conformance inspections. (see 3.1)

b. Inspections to be performed. As determined by the Government, the kit assemblies, components and specimens may be subjected to any or all of the verifications and inspections specified in paragraphs 4.2.1 thru 4.2.15 and 4.3.

c. Rejection. If any kit assembly, component or specimen fails to comply with any of the applicable requirements, the entire kit shall be rejected in accordance with TACOM Local Clause 52.246-4534 of the contract. The Government reserves the right to terminate further verifications and inspections upon any failure of a kit assembly, specimen or component to comply with any of the requirements.

4.2.1 Tool case. Verify the weight of the case and its tools does not exceed 250 pounds when fully loaded. Verify the top and at least one side of the case is conspicuously marked “X of Y”, with X being the number of the case in the set and Y being the total number of cases.

4.2.1.1 General exterior configuration. Verify the case is constructed with a base and a lid that are entirely separable. Verify multiple cases are similar in design and are stackable to no less than two high.

4.2.1.2 Hardware. Verify with objective evidence that all metal hardware on the case is corrosion resistant stainless steel, and able to withstand long term exposure under corrosive atmospheric conditions. Verify that all hardware that protrudes into the case interior does not present a hazard to users' hands. Verify rivets and screws that attach the hinges, handles and locking hasps cannot be removed with common tools, and resist removal from outside the case when the lid is on and locked.

4.2.1.3 Handles: Verify the case has a minimum of two handles on each side of the lower half of the case, totaling a minimum of eight handles. Verify by objective evidence or test that the handles are rated, as pairs, for no less than 1-1/2 times the weight of the fully loaded case of 375 pounds. Verify the handles are affixed using mechanical fasteners, e.g. rivets or screws, which cannot be readily removed with common tools. Verify there are four handles on the lid to aid in removing the lid when opening the case for access to the tools. These handles maybe the same as the handles used on the lower half of the case, or may be smaller if required for proper fit onto the lid. Verify each case has a warning label prominently displayed on the exterior of the case stating, "Multiple person lift required."

4.2.1.4 Security. Verify the case includes one or more locking feature(s) for the entire case. When a single locking feature is used, verify it prevents opening or removing the lid when locked. When padlocks are used verify they conform to the requirements of Commercial Item Description A-A-59486 and are provided. Verify the case includes a means to tether the case to a post, or pillar, by means of a chain that can be run from case to case, through the handles, or other tethering devices, and then locked. Verify two keys are provided with each padlock. Verify when the case design is lockable with an internal lock, the keying and tumbler action conforms to the requirements of CID A-A-59486. Verify all locks in a single tool set are keyed alike and two keys are provided for each lock.

4.2.1.5 Finish. Verify the exterior surface finish is clean and corrosion resistant and contain no sharp edges or projections.

4.2.1.6 Color. Verify the color of the case is olive drab and the coloring agent is part of the base material such that no painting is required to maintain the color.

4.2.1.7 Pressure differential compensation. Verify the case compensate device for differential pressures that may develop as a result of changes in temperature or in altitude. The device may be a pressure relief valve. Verify by objective evidence the device does not alter the waterproof, dustproof, or any other design requirement of the tool case.

4.2.1.8 Cold weather use. A fully loaded tool case shall be stored, (a simulated load is permissible to prevent damage to delicate instruments/hardware), for 3 hours at a temperature no warmer than -25 degrees F. Within 5 minutes the tool box shall be removed from the cold temperature environment and be dropped from a height of 2 feet minimum onto a concrete floor surface. Verify all of the latches, locks and handles operate properly, lid opening and closing without difficulty and drawers opening and closing without difficulty without permanent deformation or breakage of the tool case.

4.2.1.9 Elevated temperature resistance demonstration. A case shall be fully loaded with a simulated tool load, closed, latched, and stored for a minimum of 3 hours at a temperature of no less than 175°F. Following the 3 hour storage test the tool case shall be conditioned for 1 hour at no less than 120°F. Within 5 minutes the tool box shall be removed and be dropped from a height of no less than 36 inches onto a concrete floor surface. Verify all of the latches, locks and handles operate properly, lid opening and closing without difficulty and drawers opening and closing without difficulty without permanent deformation or breakage of the tool case.

4.2.1.10 Load Test. The tool cases shall be fully loaded with its portion of the component items and then closed, latched and lifted by its handles to a height of not less than 12 inches from the floor to the bottom of the tool case and then lowered 25 times without damage occurring to the handles, or the tool case. Any damage to the handles or the fasteners or case shall constitute failure of this test.

4.2.1.11 Stack-ability and crush resistance. Demonstrate a case, when closed, latched, in its normal resting position protects its contents from damage. A load consisting of three other identical fully loaded tool cases shall be stacked on top of it for no less than one hour. After the removal of the top three cases examine the bottom case to verify it retained the original shape without evidence of damage or permanent deformation to itself.

4.2.1.12 Water repellence. The tool case shall be fully loaded with its component items and then closed, latched and placed in a shower device for 5 minutes with water flowing directly at the toolbox from above in a sprinkle pattern at a rate not less than 1 gallon per minute. During this test the spray shall be moved so it can be blown onto all 4 exposed sides of the box, for a minimum of 1 minute at the same flow rate, to simulate a blowing rain. Wind speeds shall be above 25 mph and perpendicular to the box face. At the end of the period turn off the water and towel dry the exterior of the toolbox. Open the tool case and inspect the inside for accumulation of water. The accumulation of water inside shall constitute failure of this test.

4.2.1.13 Rough handling demonstration. The tool case shall be fully loaded with its component items, closed and fastened (delicate instruments or hardware may be substituted with a simulated item to minimize instrument/hardware damage). Drop the tool case 4 times from a height of 60 inches onto a concrete floor surface, landing on each of the 4 edges around the bottom. Inspect the case for cracks, breaks, dents or other damage that renders it less usable, including less transportable. On the last drop roll the tool case over on its top and back and then upright and opened to check if the tools have dislodged. Tools should not be loose in the case. The case, hinges, handle, and cover shall function in the same manner as prior to the drop test.

4.2.1.14 Impact resistance demonstration. Verify a fully loaded, closed, latched case placed in its normal resting position at ambient environment can withstand impacts from falling objects. A steel bar shall be dropped, in free fall, from a height of not less than 8 feet. The steel bar shall weigh not less than 3 pounds, shall have a cross section no larger than 3/16 X 1 inch and shall have an edge radii no larger than 1/16 inch. The bar shall land narrow end down on the case. Any damage or effect beyond minor denting of the exterior, e.g. penetration, shall constitute failure of this requirement.

4.2.1.15 Interior tool storage system. Verify the interior tool storage system groups the tools in the case so that tools can be immediately located, and allow withdrawing the tools from the case without having to sort through the case. Verify each single pocket or cutout that is intended to hold a tool or component is configured to hold the tool snugly and completely while allowing easy removal of the tool and includes as necessary pick holes, cut out or recessed areas or protrusion of tools above the tool organizing method. Verify each retention feature is smooth and free from rough edges. Verify finger pick relief is provided for tools that would otherwise be difficult to remove. Verify when foam is used, it is closed-cell, no less than 6-pound density, and has a water absorption rate of no greater than 0.02 pounds/square foot over the cut surfaces when tested in accordance with ASTM D3575. Verify the webs between component storage locations provide rigidity and demonstrate the webs are resistant to tearing. When foam laminations are used verify the laminations are complete, making one large piece of foam that cannot be separated, or pulled apart by hand. Verify the organizing method provides contrasting color underneath the tools to aid in rapid inventory. Verify with objective evidence that the materials used in the tool organizing method, including trays or pallets, are resistant to water, refrigerants, automotive oils, greases, lubricants, fuels including gasoline, diesel fuel, JP-8 and JP-4, acids, bases, coolants, alcohols and cleaning agents. Verify that all surfaces that could accumulate moisture are coated or sealed. Verify each group of tools in its system are layered inside the case and each layer provides handles for two persons to lift each layer out of the case. Verify by measurement that the combined weight of the lifted layer is less than 73 pounds (two person lift).

4.3 Conformance inspection. Conformance inspection shall be applied to the first units inspected at the Product Preproduction Performance Verification step (see 4.2) and to production units being offered for acceptance under the contract. These inspections shall include all verifications listed under paragraph 4.3 and shall be limited to the examination of product to verify compliance with design requirements established during product performance verification.

4.3.1 Inspection lot formation. Inspection lots shall be formed in accordance with Section 4 of MIL-STD-1916.

4.3.1.1 Sampling plan determination. Sampling inspections shall be conducted in accordance with MIL-STD-1916 using Verification Level I.

4.3.1.2 Rejection: Failure of any unit to pass any verification shall be cause for rejection of the lot.

4.3.2 Product examination. Visually, dimensionally, and manually examine each set to determine conformance with the requirements. Visual examination shall include verification of completeness of manufacture and assembly, proper cleaning, and freedom from the identified defects. Dimensional examination includes measuring dimensions as specified and weighing the unit. Manual examinations shall include the operation of movable parts by hand to assure proper functioning.

4.3.3 Components and related items of the tool set. Verify the tool set is furnished with all the components in quantities indicated as listed in Table 1.

4.3.4 Warranty. Verify that all warranty documents are included in the box for components.

4.3.5 Warranty placard. Verify a placard is attached to the inside of the lid of the tool cases. Verify in the case when unable to attach it to the lid of the tool cases, that the placard is attached in a conspicuous place where it is protected from the elements. Verify the placard contains the information as described in paragraph 3.7 of this document.

4.3.6 Identification data plate information. Verify a second placard is also attached inside the lid of each tool case. Verify the placard, as a minimum, contains a list of the contents of case and the identification as described in paragraph 3.8 of this document.

4.3.7 Packaging. Verify that unit packaging, unit package markings, shipping containers, shipping container markings, packing lists, quality certification heat treatment markings and unitization requirements are in accordance with the TACOM-Warren Local Clause 52.211-4517 of the contract. Failure to comply with the requirements may be cause for rejection.

4.4 Changes to materials, processes, or configuration. The contracting officer shall be informed of any changes to the materials, processes, or configuration of any characteristic of the units. The contracting officer shall determine if the reported changes to materials, processes, or configuration shall require additional verifications.

4.5 Conformance of subsequent production quantity. All products offered for acceptance throughout the life of the contract shall conform to all of the requirements of the contract. The Government reserves the right to re-verify conformance with requirements at any time during the life of the contract whenever there is a lapse in production for a period in excess of one year; or whenever a change occurs in place of performance, manufacturing process, material used, specification, or source of supply and return to the contractor such product that does not conform to the specified requirements in accordance with FAR Clause 52.212-4(a) of the contract. When any of the conditions above occur, the Contractor shall notify the Contracting Officer so that a determination may be made concerning the need for additional product performance verification and conformance inspections. Costs of any additional testing and inspection shall be borne by the Contractor, unless the change was directed by the Government. Further, any production delays caused by additional testing and inspection will not be the basis for an excusable delay as defined in FAR 52.212-4 of this contract. Such delays shall not form the basis for adjustment in contract price or delivery schedule.

5. PRESERVATION, PACKAGING AND PACKING

5.1 Preservation, Packing and Packaging. Preservation, Packing and Packaging shall be in accordance with the contract or delivery order.