

GGG-D-777b  
October 31, 1966  
SUPERSEDING  
Fed. Spec. GGG-D-777a  
August 14, 1958

## FEDERAL SPECIFICATION

DRIVER, PROJECTILE UNIT, POWDER ACTUATED (HIGH VELOCITY) (ABOVE WATER ONLY); PIN, DRIVE, POWDER ACTUATED; AND CARTRIDGE, POWDER ACTUATED TOOL

This specification was approved by the Commissioner, Federal Service, General Services Administration, for the use of Federal agencies.

### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers powder actuated projectile unit driver, drive pins, and power loads, for use above water only.

1.1.1 Federal specification coverage. Federal specifications do not cover all varieties of the commodity indicated by the titles of the specifications, but include only those generally used by the Federal Government.

1.2 Classification. Drivers, drive pins, and power loads shall be of the following classification.

1.2.1 Drivers. The drivers shall be of the following classes and styles as specified (see 6.2):

Class 1--1/4-inch barrel, full duty.

Class 2--3/8-inch barrel, full duty.

Class 3--1/4 and 3/8-inch interchangeable barrels.

Style A--Full duty, both barrels

Style B--Full duty, except 3/8-inch barrel not required to drive fasteners with shank diameter of 1/4-inch into steel above 3/8-inch thickness.

Class 4--Drivers with safety attachments to arrest free flight of drive pins.

Style A--Round barrel 1/4-inch drive pins.

Style B--Square barrel 1/4 and 3/8-inch drive pins.

1.2.2 Drive pins. Drive pins shall be of the following sizes and styles as specified (see 6.2):

Size 1/4-inch drive pins shall be of the following styles:

Style A--Drive pin for steel.

Style B--Drive pin for concrete.

Style C--Drive stud, external threaded for steel.

Style D--Drive stud, external threaded for concrete.

Style E--Drive stud, flush internal threaded for concrete.

Size 3/8-inch drive pins shall be of the following styles:

Style A--Drive pin for steel.

Style B--Drive pin for concrete.

Style C--Drive stud, external threaded stud for steel.

Style D--Drive stud, external threaded for concrete.

Style G--Drive stud, combination headed for steel.

Style H--Drive stud, combination headed for concrete.

Style I--Drive stud, driver head and external threaded for concrete.

1.2.3 Power loads. Power loads shall be furnished in 22-, 25-, 32-, and 38-caliber and of the strength specified (see 6.2).

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## 2. APPLICABLE DOCUMENTS

2.1 Specifications and standards. The following specifications and standards, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

### Federal Specification:

PPP-B-566--Boxes, Folding, Paperboard  
PPP-B-585--Boxes, Wood, Wirebound.  
PPP-B-591--Boxes, Fiberboard, Wood-Cleated.  
PPP-B-601--Boxes, Wood, Cleated-Plywood.  
PPP-B-621--Boxes, Wood, Nailed and Lock-Corner.  
PPP-B-636--Box, Fiberboard  
PPP-B-676--Boxes, Setup.  
PPP-T-60--Tape: Pressure-Sensitive Adhesive, Waterproof, for Packaging.

### Federal Standards:

Fed. Std. No. 123--Marking for Domestic Shipment (Civilian Agencies).

Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D.C., Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, and Seattle, Wash.)

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

### Military Specifications:

MIL-P-116--Preservation, Methods of.  
MIL-B-121--Barrier Material, Grease-proofed, (Waterproofed), Flexible.  
MIL-P-3542--Primer; Pressure-Sensitive Tape.  
MIL-L-10547--Linens, Case, and Sheet, Overwrap; Water-Vaporproof or Waterproof, Flexible  
MIL-S-16113--Steel Plate, Hull and Ordnance, Structural, Black (Uncoated) and Zinc Coated (Galvanized).

### Military Standards:

MIL-STD-105--Sampling Procedures and Tables for Inspection by Attributes.  
MIL-STD-129--Marking for Shipment and Storage.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Bureau of Standards (NBS) Handbook:

H28--Screw-Thread Standards for Federal Services.

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

Interstate Commerce Commission Regulation:

49 CFR 71-78--Interstate Commerce Commission Rules and Regulations  
for Transforation of Explosives and Other Dangerous Articles.

(The Interstate Commerce Commission Regulations are now a part of the Code of Federal Regulations, 1949 Edition--Revised 1950, available from the

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Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. Orders should cite "49-CFR-7178").

### 3. REQUIREMENTS

3.1 Illustrations. The illustrations shown herein are for the convenience of identification and are not intended to preclude the purchase of drivers, drive pins, or power loads which are otherwise in accordance with the requirements of this specification.

3.2 Qualification. Drivers, drive pins, and power loads furnished under this specification shall be a product which has been tested and passed the qualification tests specified herein and has been listed on, or approved for listing on, the applicable qualified products list (Q.P.L.).

#### 3.3 Drivers

3.3.1 Design. Drivers shall be designed for the use of individual high velocity (over 300 feet per second) power loads, and drive pin fasteners, and shall be fabricated to operate as a unit and enable the operator to locate and drive a pin or stud efficiently in a horizontal, vertical, or overhead position. The loading and reloading of the power load and fastening stud or pin shall be easily and quickly accomplished by use of the hands without employing tools of any kind other than a stud or pin positioner for positioning fasteners in the barrel. The driver shall be easy, safe, and convenient to operate and all parts subject to wear shall be readily accessible for adjustment and repair. The driver shall comply with the performance test specified in 4.4.

3.3.2 Component parts. The drive shall consist essentially of a barrel or barrel assembly, firing pin mechanism, safety lock mechanism, a suitable housing, handgrip, and safety shield.

3.3.2.1 Barrel or barrel assembly. The barrel or barrel assembly shall be of high-grade alloy steel heat-treated to develop sufficient strength to resist the stress imposed by the shock of the exploding propellant and resist permanent deformation in the event the barrel should become accidentally plugged. The barrel shall be provided with a precision size bore to accurately accommodate the type of drive pin fasteners designed for use with the respective classes and style of driver.

3.3.2.2 Firing pin mechanism. The firing pin mechanism shall be of heat-treated high-grade steel, properly protected against corrosion. The firing pin shall be locked in position away from the cartridge by a primary and secondary control to prevent firing until the tool has been fully depressed and is in contact with the surface of the work.

3.3.2.3 Threads. The threaded parts shall be in accordance with NBS H28.

3.3.2.4 Safety mechanism. The safety mechanism shall control the operation of the firing pin mechanism. The safety mechanism shall be so constructed to prevent accidental discharge and shall function only by deliberate act of the operator.

3.3.2.5 Housing. The housing shall be of a material of suitable characteristics to withstand any possible shock or stress imposed by other relate parts.

3.3.2.6 Handgrip. The handle grip shall be well-proportioned and of a suitable shape and size to provide a comfortable nonslip handgrip.

3.3.2.7 Safety shield (guard). A guard shall be attached either to the housing at the muzzle end of the barrel or to the action tube which encloses the barrel. The guard shall be designed in manner to prevent any possibility of the tool being fired when the guard is detached from the driver. The guard shall completely cover the point of application to protect both operator and bystanders from possible injury by ricochet of fasteners and flying particles of the material being penetrated when the tool is discharged. In order to drive fasteners closer to a wall, means shall be

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provided to position one edge of the guard within 13/16 inch of the barrel on classes 1 and 3 drivers and within 1-1/4 inches on class 2 drivers. The edges of the guard shall have permanent marks to indicate the centerline of the barrel.

3.3.2.8 Special safety shields (guards). When specified (see 6.2), special guards shall be furnished for fastening structural angle or channel, electrical outlet boxes, conduit clips, duct hangers or other special structural forms or fittings where the standard guard does not offer complete protection to the operator.

3.3.3 Finish. The internal and external surfaces shall be substantially free from pits, nodules, burrs, cracks, and other detrimental defects.

3.3.4 Coating. Unless constructed of a non-corrosive material, all internal and external surfaces shall have a suitable protective coating.

3.3.5 Safety features. The safety features and operation of the driver shall incorporate the following:

- (a) Drivers with the guard or shield removed shall be incapable of firing.
- (b) The driver shall not be capable of firing except when the muzzle end of the barrel is fully depressed by forceful contact with the working surface, and the guard or shield is flush with the working surface of the material.
- (c) With the driver fully depressed, it shall not fire when the guard or shield is canted or tilted more than 7 deg. from right angles to the working surface of the material into which the drive pin is being driven.
- (d) The driver shall not fire if dropped, jarred, bumped, or subjected to an impact of any kind.

3.3.6 Class 1, 1/4-inch barrel, full duty. Class 1 drivers shall comply with the requirements specified herein, and shall be capable of satisfactorily driving pins conforming to tables I through VI. The bore of the barrel shall be 0.250 inch minimum diameter and 0.2525 inch maximum diameter. Class 1 drivers shall weigh not more than 8 pounds and shall be similar to figure 1.

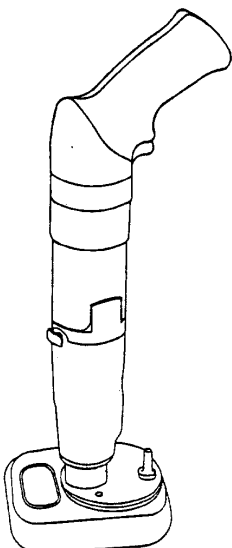
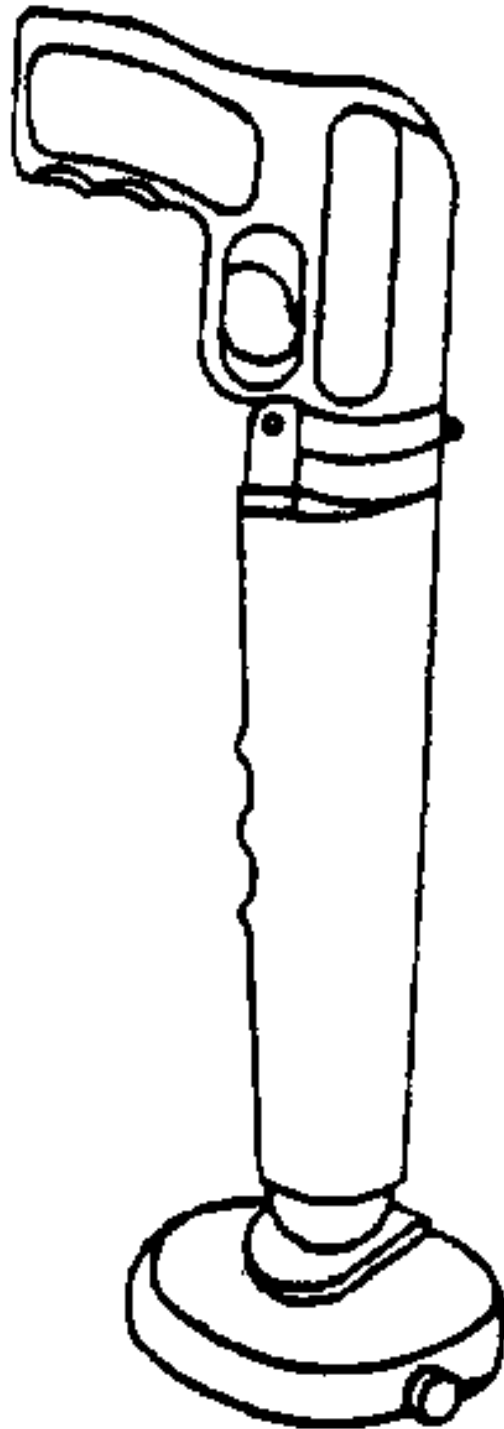


FIGURE 1. Class 1, 1/4-inch barrel, full duty driver.

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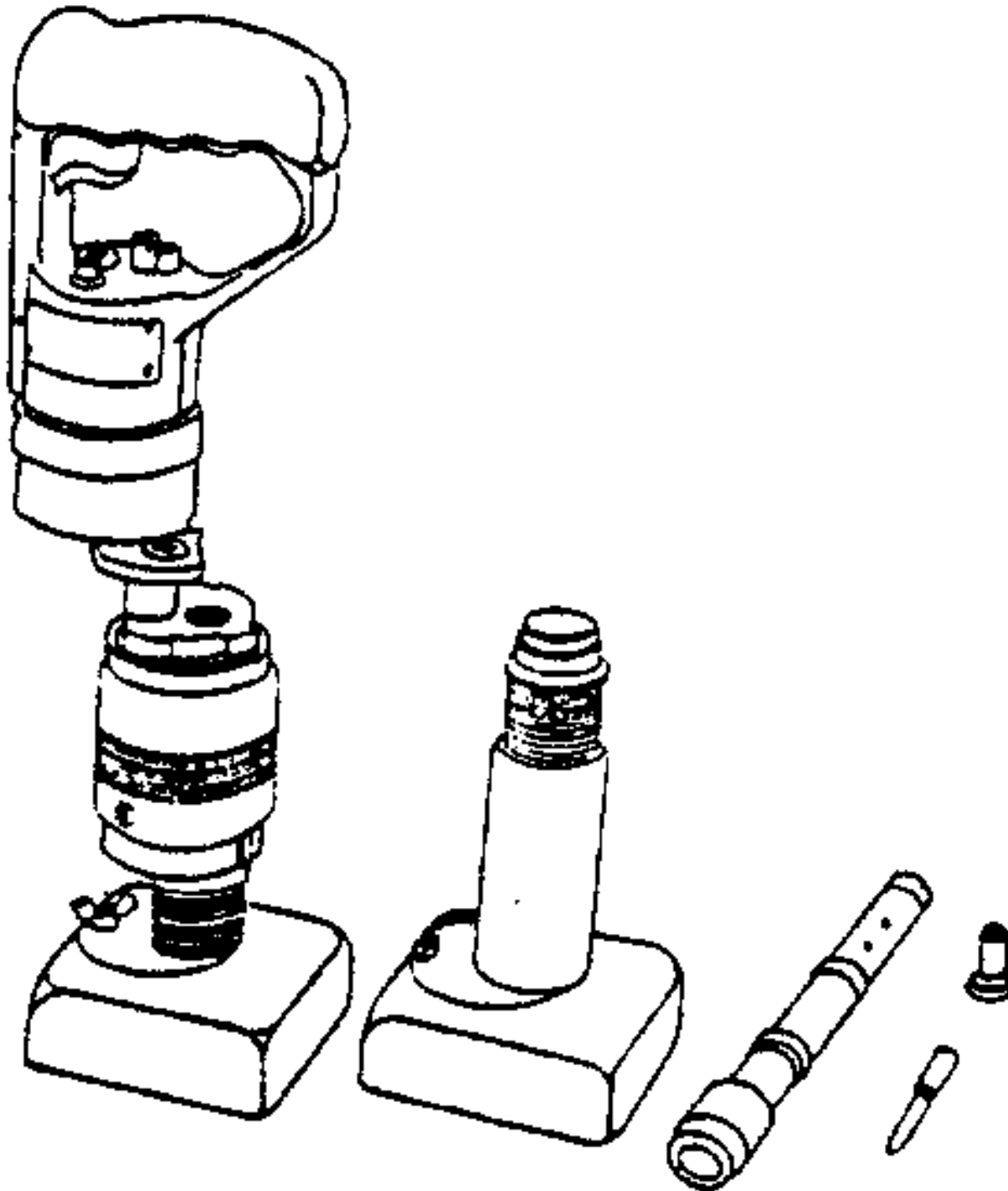
3.3.7 Class 2, 3/8-inch barrel, full duty. Class 2 drivers shall comply with the requirements specified herein, and shall be capable of satisfactorily driving pins conforming to tables VII through XII. The bore of the barrel shall be 0.375-inch minimum diameter and 0.378-inch maximum diameter. Class 2 drivers shall weigh not more than 11-1/4 pounds and shall be similar to figure 2.



**FIGURE 2. Class 2, 3/8-inch barrel, full duty driver.**



3.3.8 Class 3, 1/4- and 3/8-inch inter-changeable barrels. Class 3 drivers shall comply with the requirements specified here-in, and shall be designed to permit interchanging of 1/4- and 3/8-inch barrels. Bore of the 1/4-inch barrels shall conform to class 1 drivers, and bore of 3/8-inch barrels shall conform to class 2 drivers. Class 3 drivers shall be supplied in style A full duty both 1/4- and 3/8-inch barrels, or style B full duty 1/4-inch barrel and limited duty for 3/8-inch barrel. Class 3 drivers shall be similar to figure 3 and shall weigh no more than 12 pounds.



**FIGURE 3. Class 3 driver, 1/4- and 3/8-inch interchangeable barrels.**

interchangeable barrels.

3.3.8.1 Style A, full duty, both barrels. Style A drivers with the 1/4-inch barrel inserted shall be capable of satisfactorily driving pins conforming to tables I through VI. Style A drivers with the 3/8-inch barrel inserted shall be capable of satisfactorily driving pins conforming to tables VII through XIII.

3.3.8.2 Style B, full duty, except 3/8-inch barrel not required to drive pins with shank diameter of 1/4-inch into steel above 3/8-inch thickness. Style B drivers shall conform to class 3, style A drivers except that they are not required to drive 3/8-inch pins with shank diameter of 1/4 inch through steel greater than 3/8-inch thickness.

3.3.9 Class 4 drivers with safety attachment kits. Class 4 drivers shall be similar to classes 1, 2, or 3 drivers except that the standard barrel, breech plug, and safety shield shall be replaced by a safety attachment, designed to arrest the pin when fired under conditions offering little or no resistance. Class 4 drivers shall be furnished in style A for 1/4-inch pins or style B for 1/4- and 3/8-inch pins.

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3.3.9.1 Class 4, style A. Class 4, style A drivers shall have a round barrel suitable for driving 1/4-inch pins as specified in tables I through VI.

3.3.9.2 Class 4, style B. Class 4, style B drivers shall be furnished with a square barrel for 1/4- and 3/8-inch drive pins, and shall be capable of driving any of the pins listed herein when using the applicable piston and safety guard.

3.3.10 Marking, driver. Each driver shall be marked in a plain and permanent manner or shall be provided with a suitable name-plate securely attached to the tool. The marking shall designate the manufacturer's name or a trademark of such known character that the source of manufacture may be readily determined. The words "FOR USE ONLY BY CERTIFIED OPERATOR" shall also be included in the marking.

3.3.11 Repair parts. The successful bidders supplying drivers covered by this specification shall make available and furnish repair parts when requested, except parts which the manufacturer restricts for factory fitting and assembly as a safety measure. All parts having the same manufacturer's part number shall be constructed to definite standards, tolerances, and clearances in order that such parts may be completely interchangeable, replaced, or adjusted without requiring modification, except those parts restricted for factory fitting and installation.

3.3.12 Accessory equipment.

3.3.12.1 Carrying case. Each driver shall be provided with a carrying case. The carrying case shall be sheet steel and shall be substantial, of at least 22-gauge steel, and of a rigid construction for storage and transposition of the driver and accessories. The case shall be provided with tray suitable for carrying pins, power loads, tools, and other maintenance equipment required for operation of the tool. The carrying case shall have a substantial carrying handle and shall be provided with either a catch or hasp with staple for securely retaining the hinged cover in a closed position. The interior and exterior surfaces of each carrying case shall have a durable coating of paint or enamel. Each case shall contain a drive pin reference data sheet for illustrating the various styles, sizes, and usage of drive pins designed for use with the driver provided.

3.3.12.3 Equipment. The equipment for each driver shall consist of the necessary tools required for operation and normal maintenance.

3.3.13 Operator's instruction and maintenance manual. The two copies of operator's instruction and maintenance manual shall be supplied with each driver. The manual shall include instructions for a step-by-step proper operating procedure and clearly illustrate all parts necessary in the maintenance of the driver. The instruction shall include the proper methods of cleaning, oiling, and care of the driver to assure satisfactory performance. The manual shall also contain the following mandatory safety regulations:

#### AUTHORIZED PERSONNEL

- (a) Personnel operating drivers shall be instructed and certified by the manufacturer's representative, or a responsible official of the using activity, in the operation of each class and style of tool.
- (b) In the course of instruction, the extreme danger in the use of the

drivers shall be stressed and the personnel certified to operate the tool shall be cautioned that unqualified persons shall not be allowed to operate or handle the tools at any time.

#### IDENTIFICATION CARDS

- (a) Personnel certified to operate drivers shall be issued identification cards signed by a responsible official of the using activity.

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- (b) Identification cards shall clearly state the manufacturer's name, the class, and style of tool for which the operator has been instructed and certified to use.
- (c) A master record of identification cards issued shall be maintained at the point of issue. This record shall correspond with the identification cards issued to the operators.
- (d) In no instance shall a tool be issued to an operator other than the tool of the manufacturer's class and style shown on the identification card issued to the operator.

#### STORAGE AREA

- (a) When not in use, the driver, power loads, and drive pins shall be stored in a moisture-proof area under lock and key.
- (b) Only authorized personnel shall have access to the storage area.
- (c) Special precautions shall be taken to prevent unauthorized personnel from having access to the storage area.

#### MATERIALS AND DRIVING DISTANCES

- (a) The manual shall include a list of materials unsuitable for driving pins.
- (b) Materials on which the driver is to be used shall be such as to offer enough resistance to prevent the pins from passing completely through the material.
- (c) Drive pins shall be driven not less than the following distance from the edge of a structural surface or when fastening steel shapes, wood 2 by 4's or comparable material to concrete.  
Under 7/32-inch shank diameter; 3, 3/4, and 2-inches, respectively.  
7/32-inch and over shank diameter; 5, 1, and 4 inches, respectively.
- (d) Sandbags, timbers, or other materials capable of stopping the drive pin shall be placed directly behind the work area, if necessary, to insure safety to the personnel.
- (e) Preliminary tests of the strength of the material and of the drive pins shall be made before starting the work operations.

#### OPERATING PRECAUTIONS

- (a) Personnel certified to operate drivers shall be provided with chipper goggles or face shield and a hard hat.
- (b) The driver shall never remain loaded when not in use.
- (c) The driver shall never be loaded while being transported.
- (d) If for any reason the work is interrupted after loading, the driver shall be unloaded immediately.
- (e) In case of misfire, the driver shall be held in the operating position for not less than 30 seconds. The driver shall be opened and the power load shall be removed before removing the guard from the working surface.
- (f) At no time shall an attempt be made to experiment or make adjustment to the driver, except by instructions from the manufacturer.
- (g) The driver shall not be used where there is evidence of a combustible atmosphere.
- (h) Power loads and drive pins shall be kept in their respective containers and separate from other equipment.
- (i) Defective power loads shall not be thrown into trash containers or otherwise discarded. They shall be returned and properly disposed of by the issuing personnel.
- (j) Power loads shall be kept in a metal container with the word "EXPLOSIVE" conspicuously lettered thereon.
- (k) The operator shall begin with light loads and progress to the heavier loads when determining correct power loads for a

particular application.

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## CONTACT WITH MANUFACTURER

- (a) The manufacturer shall be contacted immediately if any difficulty is experienced in the use of the driver.
- (b) Defective drivers shall be removed from service until proper repairs have been completed.

3.4 Drive pins. Drive pins shall be of the type, style, sizes and dimensions specified herein. Pin covered shall be suitable for the applications shown on figure 4.

3.4.1 General applications. The general application of drive pins as shown on figure 4 shall apply to all the various fasteners designed for use with the respective classes and styles of drivers.

3.4.2 Driver pin fasteners. The drive pin fasteners shall be of high-quality steel heat-treated to a Rockwell hardness value of not less than 45 nor more than 55 on the C scale (see 4.5.2.1). Each drive pin shall be provided with a suitable tip or collar for holding or retaining the pin in the barrel preparatory to firing. The drive pin fasteners shall have a noncorrosive coating. The drive pin fasteners illustrated hereinafter include only those most generally used. When special pins or other sizes are required, they shall be as specified (see 6.2). Drive pins shall meet the bend test specified in 4.5.2.2.

3.4.2.1 Threads, drive pin studs. All threaded studs shall have threads in conformance with NBS H28.

3.4.3 Studs and pins for 1/4-inch barrels. Studs and pins for 1/4-inch barrels shall be similar to figures 5 through 9 and shall conform to the sizes and dimensions listed in tables I through VI for the style and pins for (see 6.2). The shank of studs and pins for driving into steel shall have a straight knurl. The shank of studs and pins for driving into concrete shall be smooth. All Studs and pins shall have conventional shaped points. The heads of pins shall be flat or slightly oval shaped on top. Studs and pins shall conform to the hardness specified herein when tested in accordance with the test requirements of section 4.

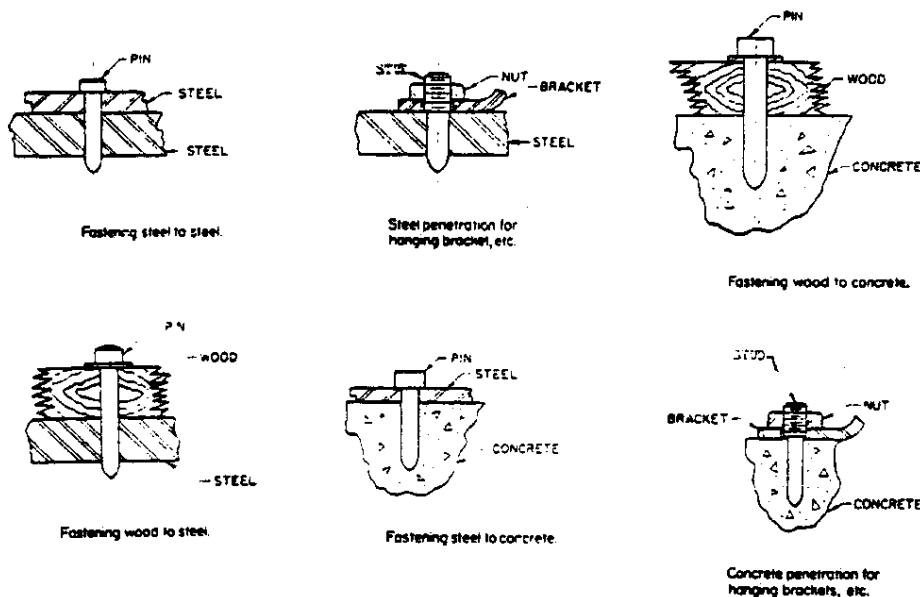
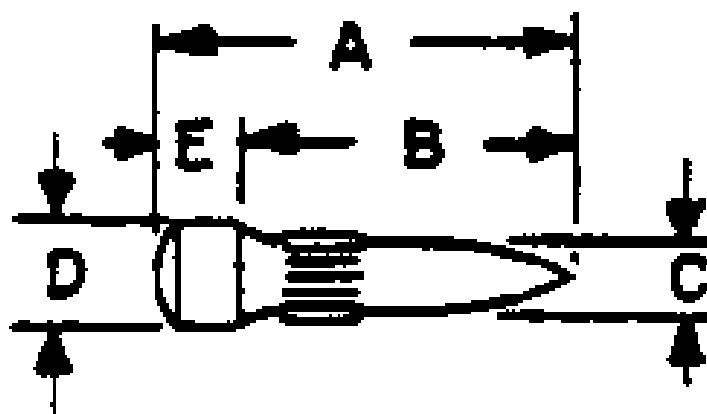


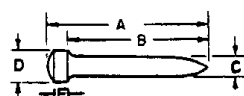
FIGURE 4. Drive pin applications.



**FIGURE 5. Drive pin for steel, style A**

**TABLE I. Dimensions of drive pin for steel, style A**

<b>A</b> <b>± 3/32</b>	<b>B</b> <b>± 3/32</b>	<b>C</b> <b>± 0.008</b>	<b>D</b> <b>(max.)</b>	<b>E</b> <b>(min.)</b>
<i>Inch</i> <b>15/16</b>	<i>Inch</i> <b>23/32</b>	<i>Inch</i> <b>0.153</b>	<i>Inch</i> <b>0.250</b>	<i>Inch</i> <b>7/64</b>



**FIGURE 6. Drive pins for concrete, style B.**

**TABLE II. Dimensions of drive pins for concrete, style B**

<b>A</b> <b>± 5/32</b>	<b>B</b> <b>± 1/8</b>	<b>C</b> <b>± 0.010</b>	<b>D</b> <b>(max.)</b>	<b>E</b> <b>(min.)</b>
<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>
1-3/8	1-7/32	.155	.250	7/64
1-3/4	1-37/64	.155	.250	7/64
2-1/8	2	.155	.250	7/64
2-3/8	2-1/4	.155	.250	7/64
2-5/8	2-1/2	.155	.250	7/64
3-1/16	2-15/16	.155	.250	7/64
4-1/8	3-15/16	.155	.250	7/64
1-5/16	1-3/10	.125	.250	7/64
2-1/8	2	.125	.250	7/64
2-3/8	2-1/4	.125	.250	7/64
3-1/16	2-15/16	.125	.250	7/64



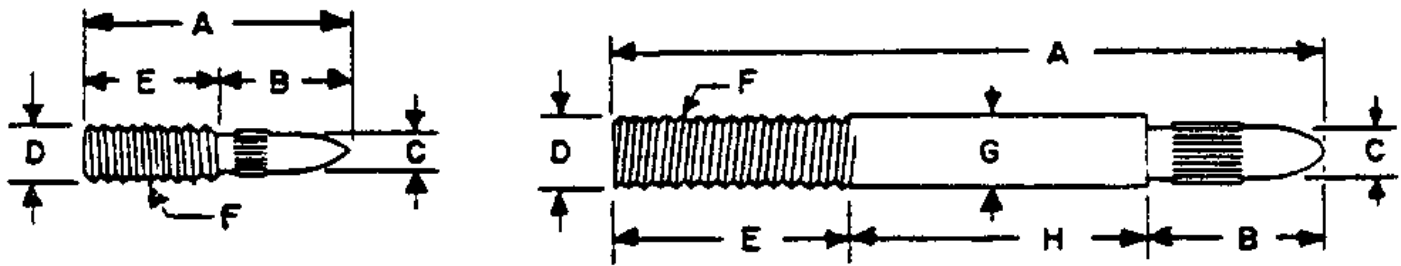


FIGURE 7. External threaded stud for steel, style C.

TABLE III. Dimensions of external threaded studs for steel, style C

A	B	C	D	E	F	G		H
						Min.	Max.	
$\pm 1/8$	$\pm 5/64$	$\pm 0.010$	(max.)	(approx.)	UNC-2A			(approx.)
<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>	<i>Inches</i>	<i>Thread size</i>	<i>Inch</i>	<i>Inch</i>	<i>Inches</i>
1-1/16	11/16	0.155	0.250	3/8	1/4-20	--	--	---
1-3/8	11/16	.155	.250	11/16	1/4-20	--	--	---
1-13/16	11/16	.155	.250	1-1/8	1/4-20	--	--	---
2-3/4	11/16	.155	.250	1	1/4-20	0.212	0.250	1-1/16

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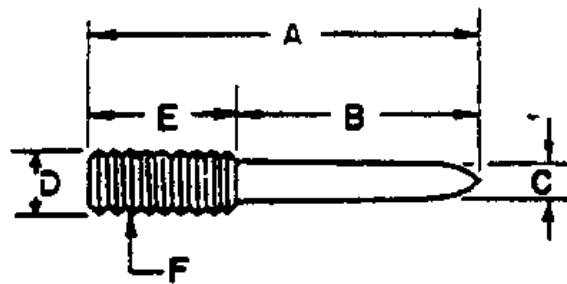


FIGURE 8. External threaded stud for concrete, style D.

TABLE IV. Dimensions of external threaded studs for concrete, style D

A $\pm 8/32$	B $\pm 1/16$	C $\pm 0.015$	D (max.)	E (approx.)	F
<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inches</i>	<i>Thread size</i>
1-5/8	1-1/4	.130	.250	3/8	1/4-20 UNC-2A
1-11/16	1	.180	.250	11/16	1/4-20 UNC-2A
1-7/8	1-1/4	.160	.250	1/2	1/4-20 UNC-2A
1-15/16	1-1/4	.160	.250	11/16	1/4-20 UNC-2A
2-5/16	1-1/4	.160	.250	1-1/16	1/4-20 UNC-2A
2-1/2	1-1/4	.160	.250	1-1/4	1/4-20 UNC-2A
2-1/2	1-3/4	.160	.250	3/4	1/4-20 UNC-2A
3-3/16	1-1/4	.160	.250	1-15/16	1/4-20 UNC-2A

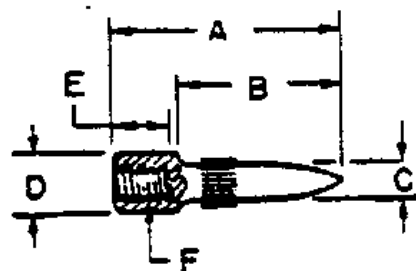


FIGURE 9. Flush internal threaded stud for steel, style E.

TABLE V. Dimensions of internal threaded stud for steel, style E

A $\pm 1/16$	B $\pm 3/64$	C $\pm 0.015$	D (max.)	E Full thread (min.)	F	G $\pm 1/16$
<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>	<i>Thread size</i>	<i>Inch</i>
1-1/16	23/32	0.160	0.250	3/16	10-24 UNC-2B	23/64

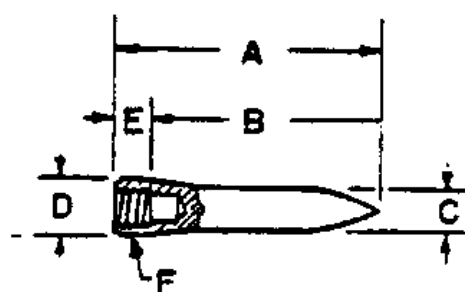


FIGURE 10. Flush internal threaded stud for concrete, style F.

TABLE VI. Dimensions of flush internal threaded studs for concrete, style F

A $\pm 7/64$	B $\pm 1/8$	C $\pm 0.015$	D (max.)	E Full thread (min.)	F
<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>	<i>Thread size</i>
1-3/16	1-1/32	0.160	0.250	3/16	8-32 UNC-2B
3-1/16	2-29/32	.160	.250	3/16	8-32 UNC-2B
1-1/16	27/32	.160	.250	3/16	10-24 UNC-2B
1-13/32	1-9/32	.160	.250	3/16	10-24 UNC-2B

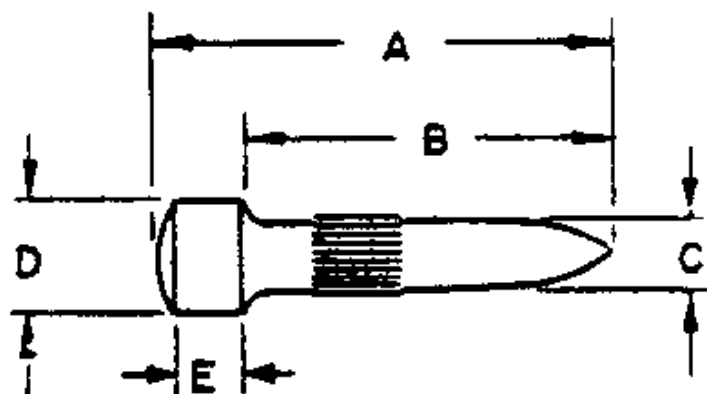


FIGURE 11. Drive pin for steel, style A.

TABLE VII. Dimensions of drive pin for steel, style A

A $\pm 1/8$	B $\pm 1/8$	C $\pm 0.005$	D (max.)	E (min.)
<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>
1-13/32	1-3/16	0.215	0.375	11/64

3.4.4 Studs and pins for 3/8-inch barrels. Studs and pins for 3/8-inch barrels shall conform to the dimensions of tables VII through XIII, as applicable. Studs and pins shall be similar to figures 10 through 17 for the style as specified (see 6.2). The shank of studs and pins for driving into steel shall have a straight knurl. The shank of studs and pins for driving into concrete shall be smooth. All Studs and pins shall have conventional shaped points. The heads of pins shall be flat or slightly oval shaped on top. Studs and pins shall conform to the hardness specified herein when tested in accordance with the test requirements of section 4.

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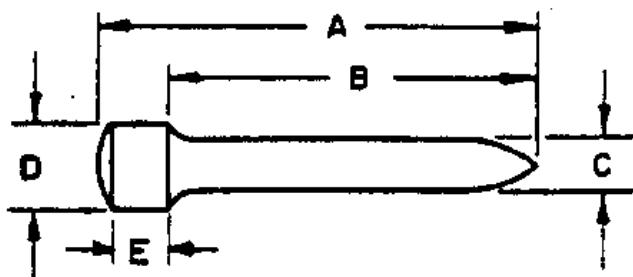


FIGURE 12. Drive pin for concrete, style B.

TABLE VIII. Dimensions of drive pins for concrete, style B

A $\pm 3/16$	B $\pm 3/16$	C $\pm 0.012$	D (max.)	E (min.)
<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>
1-1/2 <sup>1</sup>	1-3/8	.161	.375	.100
2 <sup>1</sup>	1-7/8	.161	.375	.100
2-7/16 <sup>1</sup>	2-5/16	.161	.375	.100
3 <sup>1</sup>	2-7/8	.161	.375	.100
1-13/16	1-5/8	.222	.375	11/64
2	1-25/32	.222	.375	11/64
2-9/32	2-1/16	.222	.375	11/64
2-1/2	2-5/16	.222	.375	11/64
3	2-25/32	.222	.375	11/64
3-3/8	3-3/16	.222	.375	11/64
3-3/4	3-1/2	.222	.375	11/64

<sup>1</sup> For class 3, style B drivers only.

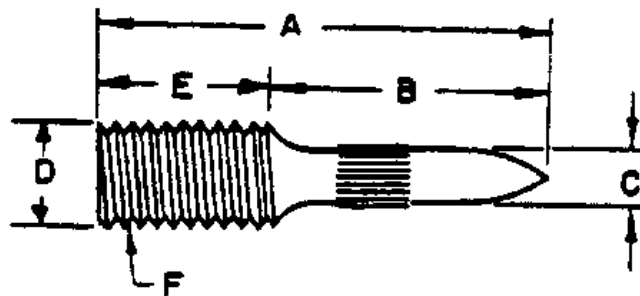


FIGURE 13. External threaded stud for steel, style C.

TABLE IX. Dimensions of external threaded drive studs for steel, style C

A $\pm 3/32$	B $\pm 5/64$	C $\pm 0.005$	D (max.)	E (approx.)	F
<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inches</i>	<i>Thread size</i>
2-1/8	1-1/8	.215	.375	1	3/8-16 UNC-2A
2-7/16	1-1/8	.215	.375	1-1/4	3/8-16 UNC-2A
1-15/16	1-3/16	.250	.375	3/4	3/8-16 UNC-2A
2-1/8	1-3/16	.250	.375	1	3/8-16 UNC-2A
2-7/16	1-3/16	.250	.375	1-1/2	3/8-16 UNC-2A

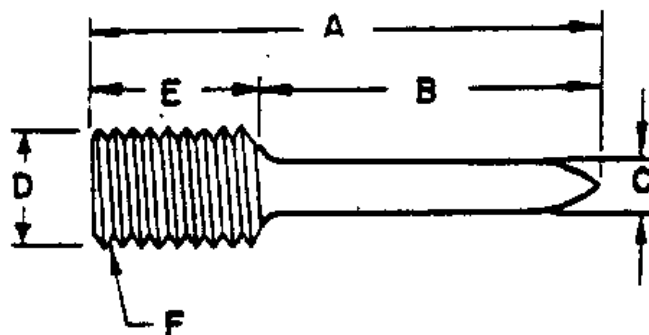


FIGURE 14. External threaded stud for concrete, style D.

TABLE X. Dimensions of external threaded drive studs for concrete, style D

A (approx.)	B $\pm 1/8$	C $\pm 0.005$	D (max.)	E (approx.)	F
<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inches</i>	<i>Thread size</i>
2-5/8	1-7/8	.250	.375	3/4	3/8-16 UNC-2A
2-3/4	1-3/4	.250	.375	1	3/8-16 UNC-2A
2-7/8	1-5/8	.250	.375	1-1/4	3/8-16 UNC-2A
3-1/8	2-3/8	.250	.375	3/4	3/8-16 UNC-2A
3-1/4	1-27/32	.250	.375	1-3/8	3/8-16 UNC-2A
3-5/8	2-15/32	.250	.375	1-1/8	3/8-16 UNC-2A
4	1-3/4	.250	.375	2-1/4	3/8-16 UNC-2A



FIGURE 15. Combination headed stud for steel, style G.

TABLE XI. Dimensions of combination head studs for steel, style G

A $\pm 1/16$	B $\pm 3/64$	C $\pm 0.015$	D	E (min.)	F (min.)	G $\pm 0.015$
<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Thread size</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>
1-1/32	3/4	0.172	1/4-20 UNC-2A	5/64	1/4	0.360

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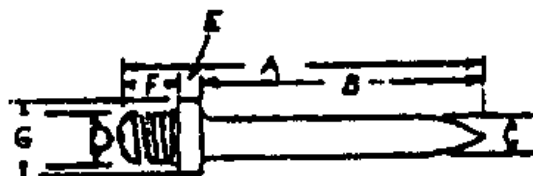


FIGURE 16. Combination headed stud for concrete, style H.

TABLE XII. Dimensions of combination head studs for concrete, style H

A $\pm 1/16$	B $\pm 3/64$	C $\pm 0.015$	D	E (min.)	F (min.)	G $\pm 0.015$
<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Thread size</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>
1-19/32	1-1/4	.0172	1/4-20 UNC-2A	5/64	1/4	.0300
2-11/32	2	.172	1/4-20 UNC-2A	5/64	1/4	.360
3-3/32	2-3/4	.172	1/4-20 UNC-2A	5/64	1/4	.360

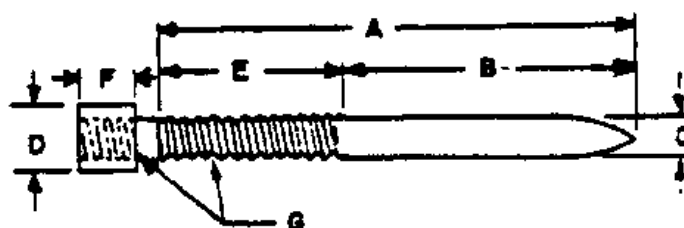


FIGURE 17. Driver head and external threaded stud for concrete, style I.

TABLE XIII. Dimensions of driver head and external threaded studs for concrete, style I

A (approx.)	B $\pm 1/8$	C $\pm 0.005$	D (max.)	E (approx.)	F $\pm 1/8$	G
<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inches</i>	<i>Inch</i>	<i>Thread size</i>
2-1/16	1-21/32	.0216	.0375	13/32	3/8	1/4-20 UNC-2A (External thread)
						1/4-20 UNC-2B (Internal thread)
2-1/2	1-1/2	.216	.375	1	3/8	1/4-20 UNC-2A (External thread)
						1/4-20 UNC-2B (Internal thread)
3-1/2	1-1/2	.216	.375	2	3/8	1/4-20 UNC-2A (External thread)
						1/4-20 UNC-2B (Internal thread)
3-9/16	2-1/8	.216	.375	1-7/16	3/8	1/4-20 UNC-2A (External thread)
						1/4-20 UNC-2B (Internal thread)

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3.5 Power loads. The power loads shall be of the clean burning smokeless type packed in a suitable cartridge case and primed with a noncorrosive priming mixture. The power loads shall be independent of the fasteners and supplied individually not to form live ammunition. The power load shall be of the caliber and strength recommended by the driver manufacturer for the desired penetration in steel or concrete. Power loads shall be furnished in 22-, 25-, 32-, or 38-caliber, and of the strength specified (see 6.2).

3.5.1 Power load strength and identification. Power load strength shall be described by load numbers ranging from one to twelve with the strengths increasing in steps as the numbers increase. The strength of each power load shall be identified by the cartridge case and load color as shown in table XIV. The wadding of each power load shall be marked with the proper load color.

Table XIV. Power load identification

Load	Color identification	
	Cartridge case color	Load color
1	Brass	Gray
2	Brass	Brown
3	Brass	Green
4	Brass	Yellow
5	Brass	Red
6	Brass	Purple
7	Nickel	Grey
8	Nickel	Brown
9	Nickel	Green
10	Nickel	Yellow
11	Nickel	Red
12	Nickel	Purple

3.5.2 Power load containers. All power loads in each containers shall be of the same strength and caliber. At least one panel of each container shall be clearly marked with the proper color in writing, caliber, cartridge case color and power load number on the proper color background. The marking shall be in the form of a dial as shown on figure 18. The dial shall be not less than 1-3/8 inches in diameter.

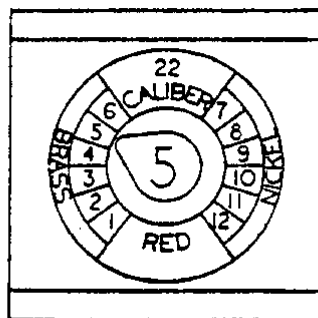


FIGURE 18. Power load container marking. (Marking indicates a No. 5 power load.)



3.6 Workmanship. The workmanship of the drivers, drive pins, and power loads shall be of a quality prevailing among manufacturers normally producing the classes and styles of equipment specified herein.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Qualification tests<sup>L1J</sup>. Qualification tests shall be conducted at a laboratory satisfactory to the Naval Ship Engineering Center. Qualification tests shall consist of the examination of 4.3.1 and all the tests of 4.4 and 4.5.

<sup>L1J</sup> Application for qualification test shall be made in accordance with "Provisions Governing Qualifications" (see 6.3 and 6.4).

4.2.1 Samples for qualification tests. The manufacturer shall submit one driver and one drawing of each class and style for which qualification approval is desired, complete with 50 power loads of each strength and studs as specified in table XV, for the class and style to be tested.

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#### 4.2.2 Sampling for quality conformance inspection.

4.2.2.1 Lot. All drivers of the same class or style presented at one time shall be considered a lot for purposes of quality conformance inspection. All drive pin fasteners of the same style, size, and all power loads of the same strength presented at one time shall be considered a lot for purposes of quality conformance inspection.

4.2.2.2 Sampling. A random sample of drivers, drive pins, and power loads shall be selected from each lot in accordance with MIL-STD-105 at inspection level III. The acceptable quality level (AQL) shall be 1.5 percent defective.

4.2.3 Classification of tests. Inspection and testing of drivers, driver pins, and power loads shall be classified as follows:

- (a) Qualification tests
- (b) Quality conformance inspection.

4.3 Quality conformance inspection. Quality conformance inspection shall be applied to each sample selected in accordance with 4.2.2.2. Failure to pass the examination or one or more of the tests specified shall be cause for rejection. Quality conformance inspection shall consist of the following:

- (a) Examination (4.3.1).
- (b) Tests (4.5).
- (c) Inspection of preparation for delivery (4.6).

4.3.1 Examination. Each of the sample drivers, drive pins, and power loads selected in accordance with 4.3.3.3 shall be examined. Drivers shall be examined for design, component parts, accessory equipment, safety features, finish, coatings, marking, operator's manual, and workmanship. Drive pins shall be examined for style and dimension. Power loads shall be examined for strength color. Any sample containing one or more defects shall not be offered for delivery. If the number of defectives in any sample exceeds the acceptance number for that sample, this shall be cause for rejection of the lot represented by the sample.

4.4 Performance and safety tests. Performance of the drivers shall be determined by driving specified drive pins in steel plates and concrete blocks. Safety of the drivers shall be determined by the drop test (4.4.3), and for class 4 drivers, the safety attachment kit firing test (4.5.2).

Table XV. Drive pins required for performance and qualification tests

Driver			Shank size of studs for steel, style C			Shank size of studs concrete, style D		
Class	Style	Size of bar-rel	Diameter	Length =5 64	Quan- tity	Diameter	Length	Quan- tity
		Inch	Inch	Inches		Inch	Inches	
1	--	1/4	0.155=0.010	11/16	36	0.160=0.015	1-1/4 =1/32	36
2	--	3/8	.250= .005	1-3/16	36	.250= .005	1-27/32=1/8	36
3 or 4	A	1/4	.155= .010	11/16	36	.160= .015	1-1/4 =1/32	36
3	A	3/8	.250= .005	1-3/16	36	.250= .005	1-27/32=1/8	36
3 or 4	B	1/4	.155= .010	11/16	36	.160= .015	1-1/4 =1/32	36
3 or 4	B	3/8	.250= .005	1-3/16	36	.250= .005	1-27/32=1/8	36

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4.4.1 Steel test. The steel used shall be black (uncoated) medium steel, grade M conforming to MIL-S-16113 in strips not less than 4-inches wide in thicknesses of 1/4-, 3/8-, 1/2-, 5/8-, and 3/4-inch, having a Brinell hardness of 126/140. Three or more of the studs specified in table XV, for use in steel for the size barrel, class, and style of driver under test shall be driven the full depth of the shank into the plates of the thicknesses specified in table XVI, except that steel above 3/8-inch thickness does not apply to 3/8-inch barrel of class 3, Style B, and 1/4-inch drive pins shall not be required to fasten 3/4-inch steel plate. For acceptability, the average pull-out force of the studs driven in each plate thickness shall equal or exceed in the minimum pull-out force values given in table XVI for the size of barrel, class, and style of driver under test.

Table XVI. Minimum pull-out force of studs in steel.

Steel plate thickness	Pull-out force for 1/4-inch barrel (min.)	Pull-out force for 3/8-inch barrel (min.)
Inch	Pounds	Pounds
1/4	2000	3800
3/8	2400	6000
1/2	2200	7000
5/8	1800	7000
3/4		6000

4.4.2 Concrete test. Three or more of the studs specified in table XV for use in concrete for the size of barrel, class, and style or drive under test shall be driven the full depth of the shank in seasoned concrete blocks having a compression strength of approximately 1500, 2500, 3500, and 4000 p.s.i. The blocks shall be 24 by 30 by 9 inches in thickness, reinforced 2 inches below each 24 by 30-inch face and 2 inches in from each side. For acceptability, the average pull-out force of the studs driven in each class of concrete shall equal or exceed the minimum pull-out force values given in table XVII for the size of barrel, class, and style of driver under test.

Table XVII. Minimum pull-out force of studs in concrete

Class of concrete (compression strength)	Pull-out force for 1/4-inch barrel (min.)	Pull-out force for 3/4-inch barrel (min.)
P.s.i.	Pounds	Pounds
1500	700	800
2500	800	900
3500	800	1000
4000	800	1000

4.3.3 Drop test. The driver shall be loaded with a live cartridge and dropped three times from a height of 10 feet onto a concrete surface, in such a way that it will land on the muzzle, on the handle, and on the side. The driver shall be rejected if it fires as a result of the test or if it does not meet the requirements of 3.3.5 after the test.

#### 4.5 Test procedures.

4.5.1 Driver safety of operation and firing test. The driver shall be tested to determine performance of safety requirements and safety features specified in section 3. Each driver submitted shall fire at least two power loads of not less than No. 7 strength in both vertical and horizontal positions. No drive pins shall be used during the test. After the firing test each driver shall be examined. The safety features specified.

4.5.2 Safety attachment kit firing test. Each class IV driver with safety attachment kit selected in accordance with 4.2.2.2 shall fire at least five power loads of not less than No. 5 strength into a wooden test fixture to assure that the arresting attachment will capture the piston and pin in free flight when overtravel occurs. After the firing test, a visual examination shall be conducted to detect any defects or mutilation of the arresting attachment. Any evidence of defects or mutilation of arresting attachment shall be cause for rejection.

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4.5.2.1 Hardness test (drive pins). One half of the sample drive pins selected in accordance with 4.2.2.2 shall be tested on a Rockwell tester to determine whether the fasteners conform to the required Rockwell hardness of 45 or 55 on the "C" scale. The reading shall be taken on the "C" scale using a diamond penetrator and employing a 150 Kilogram load. Only the necessary minimum amount of material shall be removed at the point of measurement. A General Electric metals comparator with a properly selected and calibrated test coil, or other instrument of equal sensitivity in accurately determining hardness, may be used as an alternate procedure for determining the hardness of drive pins. Any nonconforming drive pin shall be rejected. If the number of nonconforming pins in any hardness sample exceeds the acceptance number for the sample, the lot represented by the sample shall be rejected.

4.5.2.2 Bend test (drive pins). One of every 10 sample drive pins selected in accordance with 4.2.2.2 shall be subjected to a bend test. The shank of each knurled pin tested shall be capable of bending a minimum of 15 deg. over a radius equal to the shank diameter without fracturing. Other pins shall be capable of bending a minimum of 45 deg.

4.6 Inspection of preparation for delivery. Drivers, drive pins, power loads, and packages shall be selected and inspected to verify conformance to the requirements of section 5. All packages offered at the same time shall be considered a lot. Samples shall be selected in accordance with MIL-STD-105 at inspection level I with an AQL of 2.5 percent defective.

## 5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Preservation and packaging shall be level A or C, as specified (see 6.2)

5.1.1 Level A. Component parts of the driver, accessories, and fasteners subject to corrosion shall be cleaned by process C-1 and coated with type P-9 preservative, in accordance with MIL-P-116.

5.1.1.1 Driver. The driver and accessories shall be wrapped with greaseproof barrier material conforming to MIL-B-121, type I, grade A, class 2, secured with pressure-sensitive tape conforming to PPP-T-60, type III, class 3, and unit packaged in accordance with method 1A-2, or 1A-14 of MIL-P-116, using a fiberboard box conforming to PPP-B-636.

5.1.1.2 Drive pins and power loads. Drive pins and power loads of like description shall be unit packaged in accordance with method 1A of MIL-P-116, in quantities of 100 each unless otherwise specified (see 6.2), using snug-fitting folding or setup boxes conforming to PPP-B-5666 or PPP-B-676, as the container. The cartons containing the fasteners shall be lined with greaseproof barrier material conforming to MIL-B-121, type I, grade A, class 2.

5.1.1.3 Intermediate packaging. The driver and accessories, repair parts, tools, and publications comprising a complete unit shall be packaged together in the carrying case. Cushioning shall be provided within the case. The lid shall be closed and secured with the means provided. The lid joints shall be sealed with pressure-sensitive tape conforming to PPP-T-60, type III, class 1. Surfaces to which the tape will adhere shall be coated with pressure-sensitive tape primer conforming to MIL-P-3542, before the tape is applied.

5.1.1.3.1 Drive pins and power loads. Packaged drive pins and power loads of like description, shall be intermediate packaged in snug-fitting fiberboard boxes conforming to PPP-B-636, in quantities not to exceed the

weight limitation of the box specification. The boxes shall be closed and sealed in conformance with the appendix to the box specification.

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5.1.2 Level C. The driver and accessories, power loads, and drive pins shall be preserved and packaged to afford protection against deterioration and damage during shipment. Packaged quantities shall be as specified.

5.2 Packing. Packing shall be level A, B, or C, as specified (see 6.2).

5.2.1 Level A. Intermediate packages of like description shall be packed in quantities not to exceed 200 pounds gross weight in overseas type snug-fitting nailed wood boxes conforming to PPP-B-621 (class 2) or wood cleated plywood boxes conforming to PPP-B-601. The boxes shall be closed and strapped in conformance with the appendix to the applicable box specification. Shipping containers shall have case liners conforming to MIL-L-10547 and shall be closed and sealed in accordance with the appendix thereto.

5.2.2 Level B. Intermediate packages of like description shall be packed in domestic type snug-fitting wood cleated fiberboard, wood cleated plywood, nailed wood, or wirebound wood boxes conforming to PPP-B-591, PPP-B-601, PPP-B-621, and PPP-B-585, respectively. Gross weight shall not exceed 200 pounds.

5.2.3 Level C. The driver and accessories, drive pins, and power loads shall be packed to insure carrier acceptance and safe delivery at destination. Shipping containers shall comply with the rules and regulations applicable to the mode of transportation.

5.3 Marking.

5.3.1 Civil agencies. In addition to special marking required by the contract or order, the interior packages and shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.3.2 Military activities. In addition to special markings required by the contract or order, the interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

5.3.3 Marking for containers of power loads. In addition to 5.3.1 and 5.3.2 as applicable, marking for containers of power loads shall conform to 49 CFR 71-78.

## 6. NOTES

6.1 Intended use. Powder-actuated drivers and drive pins covered by this specification are designed for above water use only, and are intended to be used by authorized craftsmen to fasten timber studs or sleepers to mild steel or concrete, or mild steel to mild steel.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following data in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Class and style required (see 1.2.1).
- (c) Size and style of drive pins required (see 1.2.2).
- (d) Identification of power loads required; also, size of barrel, class and size of driver (when applicable), and manufacturer of driver (see 1.2.3, 3.5, and table XIV).
- (e) If the driver is to be provided with special safety shields (guards) (see 3.3.2.8). If so, specify object to be fastened, together with complete dimensional description, and when

available, manufacturer's identification of the object. In the case of special structural shapes or fittings which cannot be adequately described in the above manner, the specified information shall be supplemented with a completely dimensioned sketch of the object (suitable for reproducing). If special guards are ordered later, also specify manufacturer and model of the driver being used, and class and style (when applicable), of the driver.



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- (f) Special drive pin fasteners or other sizes required (see 3.4.2).
- (g) Selection of applicable levels of preservation, packaging, and packing required (see 5.1 and 5.2).
- (h) Quantity of drive pin and power loads to be unit packaged if other than in quantities of 100 (see 5.1.1.2).

6.3 With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in QPL-GG-D-777 whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the qualified products list in the Naval Ship Engineering Center, Department of the Navy, Washington, D.C., 20360, and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.4).

6.4 Copies of "Provisions Governing Qualification" may be obtained upon application to Commanding Officer, Navy Supply Depot, 5801 Tabor Ave., Philadelphia, Pa., 19120.

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