

[INCH-POUND]  
GGG-P-836A  
April 5, 1995  
SUPERSEDING  
GGG-P-836  
December 8, 1954

## FEDERAL SPECIFICATION

### PUNCH AND DIE, KNOCKOUT

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

#### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers light-duty and heavy-duty punches and dies used for cutting smooth holes in plastic, hard rubber, and metal.

1.1.1 Federal specification coverage. Federal specifications do not cover all varieties of the commodity indicated by the title of the specification, or which are commercially available, but are intended to cover only those generally used by the Federal Government.

#### 1.2 Classification.

1.2.1 Types and classes. The punches shall be of the following types and classes, as specified (see 6.1):

Type I - Light duty (chassis)

Class 1 - Round hole

Class 2 - Square hole

Type II - Heavy duty (conduit)

#### 2. APPLICABLE DOCUMENTS

2.1 Government documents. The following documents, 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:

Beneficial comments, recommendations, additions, deletions, clarifications, etc., and any data which may improve this document should be sent to: General Services Administration, Tools and Appliances Commodity Center (6FETE-CO), Washington, DC 20406.

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Federal Standard:

**FED-STD-H28 - Screw-Threads Standards for Federal Services**

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and Commercial Item Descriptions as specified in the General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

(Single copies of this specification, and other Federal specifications and Commercial Item Descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration, Federal Supply Service Bureau, Specification Section, Suite 8100, 470 L'Enfant Plaza, SW, Washington, DC 20407.)

(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards and Commercial Item Descriptions from established distribution points in their agencies.)

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

American National Standards Insitute (ANSI):

**ANSI B209.2 - Hand Tools, Metal Punches and Drift Pins, Safety Requirements**

(Private sector and civil agencies may purchase copies of this voluntary standard from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

**ANSI/ASQC Z1.4 - Sampling Procedures and Tables for Inspection by Attributes**

(Private sector and civil agencies may purchase copies of this voluntary standard from the American Society for Quality Control, P. O. Box 3005, 611 E. Wisconsin Ave., Milwaukee, WI 43201-4606.)

**American Society for Testing and Material (ASTM):**

ASTM E 18	Methods of Test for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM A 29/A 29M	Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold-Finished
ASTM A 322	Specification for Steel Bars, Alloy, Standard Grades
ASTM A 331	Specification for Steel Bars, Alloy, Cold-Finished
ASTM A 576	Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality
ASTM A 681	Specification for Alloy Tool Steels

(Private sector and civil agencies may purchase copies of these voluntary standards from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

(DoD activities may obtain copies of those adopted standards listed in the DoD Index of Specifications and Standards free of charge from the Standardization Document Order Desk, Building 4D, Robbins Avenue, Philadelphia, PA 19111-5094.

**3. REQUIREMENTS**

3.1 **Material**. The material shall be made from quality, fine-grain, hot-rolled or cold-finished carbon or alloy steel bars, or equivalent, conforming to any of the following standards: ASTM A 29/A 29M, ASTM A 322, ASTM A 331, ASTM A 576, or ASTM A 681. All forgings shall be of uniform quality, free from defects, imperfections, flash, and irregular or sharp projections and edges.

3.1.1 **Punches, dies, drivescrews, and threaded alignment shafts**. The punches, dies, drivescrews, and threaded alignment shafts shall be of a high quality alloy steel.

3.1.2 **Nuts**. The nuts shall be of quality steel in accordance with manufacturing practice.

3.2 **Screw threads**. The screw threads shall be in accordance with FED-STD-H28.

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3.3 Hardness.

3.3.1 Punch. The punch shall be hardened and tempered showing a Rockwell C Hardness (HRC) of 50 to 58, (see 4.4.1).

3.3.2 Die. The die shall be hardened and tempered showing an HRC of 50 to 58 or be casehardened to a minimum depth of 0.030 inch showing an HRC of 87 to 90 on a superficial 15 N scale, under 15 kilogram load, (see 4.4.1).

3.3.3 Drivescrew. The drivescrew shall be hardened and tempered showing an HRC of 40 to 50, (see 4.4.1).

3.3.4 Threaded alignment shaft. The threaded alignment shaft shall be hardened and tempered showing an HRC of 40 to 50, (see 4.4.1).

3.3.5 Drive nut. The drive nut shall be hardened and tempered showing an HRC of 40 to 50, (see 4.4.1).

3.4 Interchangeability of parts. All parts having the same manufacturer's part number shall be constructed to definite standards, and clearances, in order that such parts may be completely interchangeable, replaced, or adjusted without requiring modification.

3.4.1 Illustrations. The illustrations herein are descriptive and not restrictive and are not intended to preclude the purchase of punches otherwise conforming to this specification.

3.5 Identification marking. Each item shall be marked with the manufacturer's name or identifying symbol and the state or country of manufacture. The marking shall be engraved, etched, or stamped in such a manner that it will be permanent to the extent that it will remain clear and legible throughout the life of the item.

3.6 Type I, light duty (chassis). The type I, light duty (chassis) punch shall consist of a punch, die, drivescrew, or drivescrew and nut. The punch shall be capable of cutting clean accurate holes in plastic, hard rubber, and metal equal to 16 gauge (0.060 inch) sheet steel, (see 4.4.3).

3.6.1 Type I punch. The type I punch shall have the outer surfaces machined or ground. The drive-end bearing surface shall be at a right angle to the axis of the punch. The cutting end of the punch shall be machined or ground to cut with a shearing action.

3.6.2 Die. The die shall have the top and bottom surfaces machined or ground at a right angle to the axis of the die. The surface of the hole in the die accommodating the punch shall be smoothly machined or ground.

3.6.3 **Drive nut.** The drive nut shall be either square or hexagon in shape having a threaded center hole to engage the thread on the drivescrew. The driving surface of the nut shall be machined at a right angle to the axis of the threaded center hole of the drive nut.

3.6.4 **Class 1, round hole punch.** The class 1, round hole punch shall be designed to cut round holes accomplishing the punching operation by the use of a drivescrew.

3.6.4.1 **Punch.** The punch shall have a threaded center hole to accommodate the thread of the drivescrew. The outside diameter of the punch shall be concentric with the threaded center hole.

3.6.4.2 **Die.** The die shall be provided with a machined center hole to accommodate the body of the drivescrew. The hole accommodating the punch shall be of a depth and concentric with the center hole.

3.6.4.3 **Drivescrew.** The drivescrew shall have either a square or hexagon-shaped head. The surface at the head of the screw which bears against the die shall be flanged. The driving surface of the screw shall be machined at right angles to the axis of the body of the screw.

3.6.4.4 The class 1, round hole punch shall be capable of punching holes conforming to the sizes shown in table I, and shall be similar to figure 1.

TABLE I. Type I, class 1, light duty (chassis), round hole punch

Hole size +0.020/-0.000	Drivescrew size (min.)	Drivescrew flange/washer (min.)
Inches	Inch	Inch
1/2	1/4	1/2
5/8	5/16	9/16
11/16	3/8	5/8
3/4	3/8	5/8
7/8	3/8	5/8
1	3/8	5/8
1-1/16	1/2	5/8
1-1/8	1/2	5/8
1-5/32	1/2	5/8

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TABLE I. Type I, class 1, light duty (chassis), round hole punch cont'd

Hole size +0.020/-0.000	Drivescrew size (min.)	Drivescrew flange/washer (min.)
Inches	Inch	Inch
1-11/64	1/2	5/8
1-3/16	1/2	5/8
1-1/4	1/2	5/8
1-3/8	1/2	5/8
1-1/2	1/2	5/8
1-5/8	3/4	1-1/2
1-3/4	3/4	1-1/2
1-7/8	3/4	1-1/2
2	3/4	1-1/2
2-1/4	3/4	1-1/2

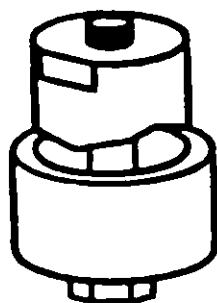


Figure 1. Type I, class 1, light duty (chassis), round hole punch.

3.6.5 Class 2, square hole punch. The class 2, square hole punch shall be designed to cut square holes accomplishing the punching action by the use of a threaded alignment shaft and nut.

3.6.5.1 Punch. The punch shall be provided with a shaped center hole to accomplish self-alignment of the punch when assembled to the threaded alignment shaft.

3.6.5.2 Die. The outer surface of the die shall be either circular or square in shape. The die shall have a squared hole to accommodate the punch and suitable means shall be provided to neatly fit on the drivescrew to insure proper alignment with the punch when assembled to the threaded alignment shaft.

3.6.5.3 Threaded alignment shaft. The threaded alignment shaft shall have either a square, round, or hexagon-shaped head and shall be threaded on the opposite end to engage the drive nut to accomplish the punching action. The surfaces of the threaded alignment shaft which aligns the punch and die shall be machined to insure proper alignment of the punch with the die.

3.6.5.4 The class 2, square hole punch shall be capable of punching holes conforming to the sizes shown in table II, and shall be similar to figure 2.

TABLE II. Type I, class 2, light duty  
(chassis), square hole punch

Hole size $\pm 0.010$
Inch
5/8
11/16
3/4
7/8
1

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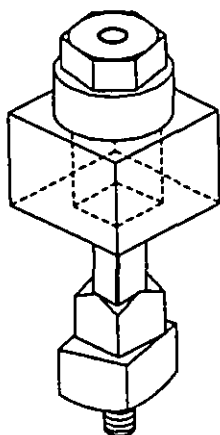


Figure 2. Type I, class 2, light duty (chassis), square hole punch.

3.7 Type II, heavy duty (conduit) punch. The type II, heavy duty (conduit) punch shall be designed to cut round holes, accomplishing the punching action by means of a drivescrew or drivescrew and nut. The punch shall consist of a punch, die, and drivescrew or drivescrew and nut, and a thrust ball bearing. The punch shall be capable of cutting clean, accurate holes in plastic, hard rubber, and metal equal to 10 gauge (0.135 inch) sheet metal, (see 4.4.3).

3.7.1 Type II punch. The type II punch shall be in accordance with 3.6.1 and 3.6.4.1. The type II punch shall be capable of punching round holes conforming to the sizes shown in table III and shall be similar to figure 3 or 4.

TABLE III. Type II, heavy duty (conduit) punch

Hole sizes +0.010/-0.000	Conduit size
Inches	Inches
7/8	1/2
1-3/32	3/4
1-11/32	1
1-11/16	1-1/4
1-15/16	1-1/2
2-3/8	2



TABLE III. Type II, heavy duty (conduit) punch cont'd

Hole sizes +0.010/-0.000	Conduit size
Inches	Inches
2-7/8	2-1/2
3-1/2	3
4	3-1/2
4-1/2	4

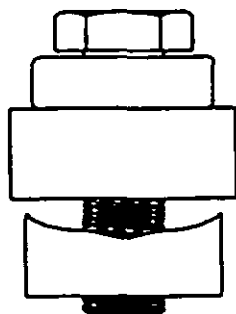


Figure 3

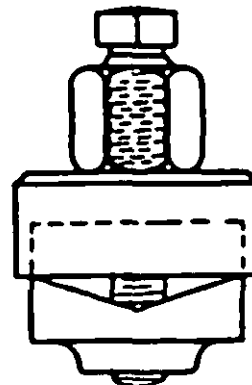


Figure 4

## Type II, heavy duty (conduit) punch

3.7.2 Die. The die shall be in accordance with 3.6.2 and 3.6.4.2.

3.7.3 Drivescrew. The drivescrew shall have either a square or hexagon-shaped head. The driving surface of the screwhead shall be smoothly machined at a right angle to the axis of the body of the drivescrew. The body of the drivescrew shall be machined to insure proper alignment of the punch with the die and to engage the thread of the drive nut to effect the punching action. The drivescrew shall be heat-treated to possess a minimum tensile strength of 200,000 psi, (see 4.4.2).

3.7.4 Drive nut. The drive nut shall be in accordance with 3.6.3.

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3.8 Punch sets. When sets of punches are specified (see 6.1), all punches contained in the set shall conform to the requirements of their respective type, class, and style covered by this specification. Unless otherwise specified, a minimum of two screws shall be provided in the set. If only two screws are provided, they shall accommodate all four punch and die components.

3.8.1 Containers for sets. Punches, when ordered in encased sets, shall be furnished in durable wooden or plastic boxes, fabric wraps, plastic wraps, or rolls as specified (see 6.1). The containers shall have a separate compartment for each tool. Each tool compartment shall be legibly and permanently marked with the tool size or a listing shall be permanently affixed to the inside of the container. In addition, each tool compartment shall provide a safe, compact, and secure method of storing the tool, shall provide for convenient tool selection, and shall prevent damage to the tool during handling, shipment, and storage. With the container secured in a closed position, tools shall not be displaced from their individual compartments by any orientation of the container.

3.8.1.1 Plastic boxes. The boxes and covers shall be constructed of a double layer, impact resistant material. The box shall have at least one shutter hook, snap-type latch, or similar hardware to secure the box in a closed position. Boxes shall be fitted with at least two hinges or a continuous hinge.

3.8.1.2 Wooden boxes. The boxes and covers shall be constructed of hardwood such as maple, ash, hickory, or birch. The box shall have at least one shutter hook, snap-type latch, or similar hardware to secure the box in a closed position. The boxes shall be fitted with at least two hinges or a continuous hinge. Unless otherwise specified (see 6.1), the box shall have a natural finish.

3.8.1.3 Fabric wraps, rolls, or bags. The fabric wraps, rolls, or bags shall be made of durable material such as canvas or duck and shall be provided with durable ties.

3.8.1.4 Plastic wraps or rolls. Plastic wraps or rolls shall be made of plastic or plastic-coated cloth. The wraps or rolls shall be provided with snap fasteners or durable ties.

3.9 Metric products. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within the tolerances specified and all other requirements of this document are met. If a product is manufactured to metric dimensions and those dimensions exceed the tolerances specified in the inch-pound units, a request should be made to the specification preparing activity for change to this document.

3.10 Workmanship. Details of workmanship shall be in accordance with the best commercial standards and practices. The item shall be clean and free of corrosion and debris (e.g., chips, shavings,

slivers) or other foreign material. The item shall be free from manufacturing workmanship defects (e.g., sharp or rough external edges, corners, or surfaces) and material workmanship defects (e.g., pits, rips, fins, burrs, tears, nodules, cracks, blisters) which may adversely impact the item's serviceability, durability, safety, or appearance.

#### 4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Component and material inspection. In accordance with 4.1 above, the supplier is responsible for insuring that components and materials used were manufactured, tested, and inspected in accordance with the requirements of referenced subsidiary specification and standards to the extent specified, or, if none, in accordance with this specification.

4.2 Sampling procedures. Unless otherwise specified, sampling for inspection shall be performed in accordance with ANSI/ASQC Z1.4.

#### 4.3 Examination.

4.3.1 Inspection of the end item. Representative samples of punches and dies shall be examined to determine compliance with this specification. A lot shall consist of punches and dies of the same type and class. The sample unit shall be one completely fabricated punch and die.

4.3.1.1 Visual examination of the end item. Visual examination of the end item shall be made for the defects specified in table IV. The Inspection Level shall be Level 1 with an Acceptable Quality Level (AQL) of 1.5, expressed in terms of defects per hundred units.

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TABLE IV. End item visual inspection

Examine	Defect
Design	Type and class not as specified
Construction and workmanship	Tool incomplete; component parts missing or improperly assembled Evidence of sticking, binding, or excessive looseness Cutting edge of punch not machined or ground properly Threaded alignment shaft not machined to required accuracy resulting in improper alignment of punch with the die (see 3.6.5.3) Operation omitted or not properly performed Cracked, malformed, deep pits, flakes, or evidence of rust Drivescrew head not flanged Threads stripped, tom, cracked, crossed, drunken, or not having full threads Center hole of die not smoothly machined
Marking	<u>Missing, incomplete, not as specified, or not readily determined or permanent</u>

4.3.1.2 Dimensional examination of the end item. Examination of the end item shall be made to determine compliance with the dimensional requirements specified in applicable paragraphs and tables. Any dimension not in accordance with requirements shall constitute a defect. The lot size shall be expressed in units of punches and dies. The sample unit shall be one punch and die. The Inspection Level shall be level S-4 with an AQL of 4.0, expressed in terms of defects per hundred units.

4.3.2 Sampling for tests. Tests shall be performed on each sample unit in accordance with 4.4 to determine conformance to applicable paragraphs of section 3. The Inspection Level shall be level S-4 with an AQL of 1.5, expressed in terms of defects per hundred units, for the tests specified in 4.4.1 and 4.4.3. For the test specified in 4.4.2, the sample size shall be three drivescrews or threaded alignment shafts from each lot. Any failure to meet the tensile strength requirements shall be cause for rejection of the lot represented by the samples. For hardness and tensile strength purposes, a lot shall consist of items heat treated as a batch under the same process and temperature control.

#### 4.4 Testing.

4.4.1 Hardness test. Each sample knockout punch and die shall be tested in accordance with ASTM E 18 to determine compliance with the hardness of types I and II, as applicable.

4.4.1.1 Punches and dies. The punches and dies of the sample punches shall be subjected to a hardness test to determine conformance with 3.3.1 and 3.3.2.

4.4.1.2 Drive nuts, drivescrews and threaded alignment shafts. Drive nuts, drivescrews and threaded alignment shafts for the type I sample punch shall be subjected to a hardness test to determine conformance with 3.3.3, 3.3.4 and 3.3.5. A lubricant may be used on the screw to ease strain on the operator and the punch and die unit.

4.4.2 Tensile strength test. The drivescrews for the type II sample punch shall be subjected to a tensile strength test to determine conformance with 3.7.3.

4.4.3 Punch cutting test. Each sample punch shall be subjected to the applicable tests specified in 4.4.3.1 and 4.4.3.2.

4.4.3.1 Type I, light duty (chassis) punch. At least twelve holes shall be punched in 16 gauge (0.060 inch) sheet steel with each sample punch to determine compliance with 3.6..

4.4.3.2 Type II, heavy duty (conduit) punch. At least twelve holes shall be punched in 10 gauge (0.135 inch) sheet steel with each sample punch to determine compliance with 3.7..

4.4.3.3 Punch failure. Failure of the sample punch shall occur when the punch or die break, chip, spall, or the cutting edges become dull to any appreciable extent, or the drivescrew or nut show any deformation.

4.5 Inspection of preparation for delivery requirements. An inspection shall be made to determine that the preservation, packaging, packing, and marking comply with the requirements of section 5 of this specification. Defects shall be scored in accordance with Table V. The lot size shall be the number of shipping containers in the end item inspection lot. The sample unit shall be one container. The Inspection Level shall be S-2 with an AQL of 4.0, expressed in terms of defects per hundred units.

TABLE V. Classification of preparation for delivery defects

Examine	Defect
Marking (exterior and interior)	Omitted; incorrect; illegible; improper size, location, sequence, or method of application
Materials	Any component missing, damaged, or not as specified

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TABLE V. Classification of preparation for delivery defects con'td

Examine	Defect
Workmanship	Inadequate application of components such as incomplete closure of container flaps, loose strapping, inadequate stapling Distortion of container
Contents	Number per container is more or less than required Net weight exceeds requirements.

## 5. PREPARATION FOR DELIVERY

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

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Type and class of punches required (see 1.2.1).
- c. Size number of punches required (see applicable tables).
- d. Whether punches in sets are required (see 3.8).
- e. Whether sets should be furnished in wooden boxes, plastic boxes, fabric wraps, rolls, or plastic containers (see 3.8.1.1 through 3.8.1.4).

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**MILITARY INTERESTS:**

**Custodians:**

Army - GL  
Air Force - 99

**Review activity:**

Air Force - 84

**MILITARY COORDINATING ACTIVITY:**

Army - GL

**PREPARING ACTIVITY:**

GSA - FSS