



The American Society of
Mechanical Engineers

A N A M E R I C A N N A T I O N A L S T A N D A R D

PLIERS: LOCKING, CLAMP, AND TUBING PINCH-OFF

ASME B107.36-2002

Date of Issuance: February 4, 2003

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FOREWORD

The American National Standards Committee B107, Socket Wrenches and Drives, under sponsorship of The American Society of Mechanical Engineers, was reorganized as an ASME Standards Committee, and its title was changed to Hand Tools and Accessories. In 1996, its scope was expanded to include safety considerations.

The purposes of this Standard are to define general and dimensional data and safety considerations specifically applicable to locking clamp and tubing pinch-off pliers and to specify test methods to evaluate performance relating to the defined requirements.

A principal change in this edition of the Standard is the allowance of any material that meets the performance and safety requirements specified.

The format of this standard is in accordance with The ASME Codes & Standards Writing Guide 2000. Requests for interpretations of the technical requirements of this Standard should be expressed in writing to the Secretary, B107 Committee, at the address below.

Suggestions for the improvement of this Standard are welcome. They should be addressed to the American Society of Mechanical Engineers, B107 Standards Committee, Three Park Avenue, New York, NY 10016-5990.

The requirements of this Standard become effective at the time of publication. This Standard was approved as an American National Standard on September 16, 2002.

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Secretary, B107 Standards Committee
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Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

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PLIERS: LOCKING, CLAMP, AND TUBING PINCH-OFF

1 SCOPE

This Standard covers dimensions and functional characteristics of locking clamp pliers and tubing pinch-off pliers suitable for clamping operations in assembly and repair work. Tubing pinch-off pliers are used to pinch off the flow of gas or other material flowing through rubber or soft copper tubing. Inclusion of dimensional and functional data in this Standard is not intended to imply that all products described herein are stock production sizes. Consumers are requested to consult with manufacturers concerning lists of stock production sizes.

2 CLASSIFICATION

Pliers covered by this Standard shall be of the following types, classes, and styles, as specified.

Type I — Clamp

Class 1 — "C" Clamp

Style A — Fixed

Style B — Fixed, with swivel pads

Class 2 — Sheet metal clamp

Class 3 — Welding clamp

Type II — Tubing Pinch-Off

3 NORMATIVE REFERENCES

The following documents form a part of this Standard to the extent specified herein. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the documents indicated here.

ASME B46.1-1995, Surface Texture (Surface Roughness, Waviness, and Lay)

ASME B107.25M-1996, Pliers — Performance Test Methods

Publisher: The American Society of Mechanical Engineers (ASME International), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300

4 REQUIREMENTS

4.1 Illustrations

Illustrations shown herein are descriptive and not restrictive, and are not intended to preclude the manufacture of pliers that are otherwise in accordance with this Standard.

4.2 Material

Materials used in the manufacture of pliers shall be such as to produce pliers conforming to the requirements specified in this Standard.

4.3 Design

Pliers shall be similar to the illustration to which reference is made and shall be proportioned in all parts so as to meet the requirements of this Standard. Pliers shall be provided with a toggle or cam device that has an adjustable mechanism designed so that the jaws can be clamped and locked. Pliers shall be released by hand anywhere within the pliers' capacity by either of the release mechanisms shown in Fig. 1. Test specimens shall withstand applicable test procedures without cracking or breaking.

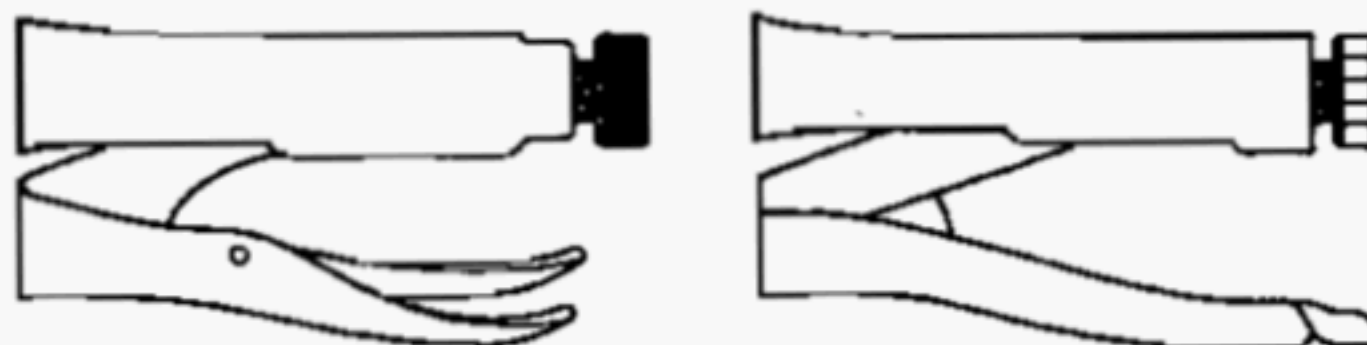


FIG. 1 TYPICAL RELEASE MECHANISMS FOR LOCKING PLIERS

4.4 Handles

Handles of pliers shall be through hardened from 30 to 50 HRC or case hardened from 75 to 86 HR15N, with a case depth of a minimum of 0.010 in. (0.25 mm). Handles shall be so shaped as to afford a comfortable grip and shall be free from rough edges and sharp corners. When the pliers are locked in any position of the jaws, the minimum handle clearance between the fixed and movable handle shall be as specified in the appropriate tables. Outer hand-gripping surfaces of handles shall be smooth, knurled, or impressed.

4.5 Joints

Pliers joints shall have no excessive looseness, play, or any other indications of side play of the two halves of the pliers when opened or closed, which could impair the function of pliers. Joint fasteners shall be through hardened from 25 to 50 HRC. Where fasteners receive a case hardening treatment in addition to the through hardening, a maximum hardness of 60 HRC or equivalent will be permitted.

4.6 Jaws

4.6.1 Jaw Openings. Ends of jaws shall open, when adjusted by the screw, to the entire respective clamping range minimum specified in Tables 2 through 5. Pliers shall operate in a smooth and uniform manner.

4.6.2 Jaw Hardness. Jaws shall be through hardened from 35 to 50 HRC or case hardened from 83 to 90 HR15N, with a case depth minimum of 0.010 in. (0.25 mm). If provided, swivel pads need not be hardened.

4.7 Adjusting Screw

Adjusting screw located at the end of handle shall have a minimum hardness of 30 HRC.

4.8 Marking

Pliers shall be marked in a plain and permanent manner with the manufacturer's name or with a trademark of such known character that the source of manufacture and country of origin can be readily determined. Marking shall be as permanent as the normal life expectancy of the pliers, providing the surface has not been subjected to a fretting or abrading action, and be capable of withstanding the cleaning normally experienced during its intended use.

4.9 Finish

4.9.1 Appearance. Surfaces shall be tested in accordance with ASME B46.1. Surfaces shall be free from pits, nodules, burrs, and other conditions that may adversely affect performance or appearance. Ground surfaces shall have a maximum surface roughness of 200 μ in. (5.1 μ m) arithmetic average. Measurement of the finish shall be made with a measuring instrument using a cutoff length of 0.03 in. (0.8 mm).

4.9.2 Coating. Coating shall be adherent, smooth, continuous, and free of pits, blisters, nodules, oxide scale, and any other conditions that may interfere with the protective value and serviceability of the pliers. Cadmium plate shall not be allowed. Pliers shall be coated with a supplementary rust-preventative treatment.

4.10 Spring

Spring shall be capable of opening the jaws to the maximum value of the respective clamping range minimum dimension as specified in the tables for the individual type and class of pliers.

4.11 Dimensions

Dimensions shall be determined by measuring the pliers with jaws in the closed and locked position. The overall length measurement shall include the adjusting screw.

4.12 Workmanship

Requirements within this Standard are intended to describe the best commercial quality pliers available. Pliers shall conform to the requirements of this Standard.

5 TEST PROCEDURES

5.1 Safety

WARNING: MANY TESTS REQUIRED HEREIN ARE INHERENTLY HAZARDOUS, AND ADEQUATE SAFEGUARDS FOR PERSONNEL AND PROPERTY SHALL BE EMPLOYED IN CONDUCTING SUCH TESTS.

5.2 Hardness Test

Hardness range specified shall be tested in accordance with ASME B107.25M, para. 5.3.

TABLE 1 LOCKING/LOAD TEST FOR TYPE I CLAMP PLIERS

Classification	Nominal Size, in. (mm)	Maximum Load to Lock Handles, lbf. (N)	Minimum Test Load on Jaw Tips, lbf. (N)
Class 1	5 (127)	45 (200)	450 (2000)
Class 1	6 (150)	45 (200)	500 (2225)
Class 1	11 (280)	45 (200)	900 (4000)
Class 2	8 (200)	50 (220)	1000 (4450)
Class 3	9 (230)	25 (110)	500 (2225)

5.3 Locking/Load Test — Type I

Pliers shall be tested on a system capable of applying the required minimum test load given in Table 1. The pliers' handles shall be locked, using maximum value shown in Table 1. Test load shall be applied to the jaw tips in a direction to spread the jaw clamping surfaces apart for a minimum of 10 sec. Pliers shall remain locked while the load is applied. Pliers shall have passed the test if the jaw tips close, and all the joints and adjusting screw work properly after removal of the load.

5.4 Pinch-Off Test — Type II

Pliers shall be tested using the following procedure:

5.4.1 Fit a 0.25 in. (6.4 mm) outside diameter soft copper tube, with a 0.030 in. (0.76 mm) wall thickness, onto an air line having an air pressure of 95 to 100 lb/sq in. gauge (psig) (6.7 to 7.0 kPa).

5.4.2 Place the copper tube between the jaws of the pliers 0.50 in. (12.7 mm) minimum from free end of the tube. Apply 70 to 75 lb of force (311 to 334 N) to the end of the movable handle to close the pliers. With air pressure of 95 to 100 psig (6.7 to 7.0 kPa) applied to one end of the tube, immerse the other end of the tube and the pliers in water.

5.4.3 Pliers shall seal the tube by pinching-off the air supply and remain locked on the tube. Pliers shall be considered to have passed the test if no bubbles appear within 1 min.

6 TYPE, CLASS, AND STYLE PROVISIONS

6.1 Type I Clamp

Pliers shall be capable of withstanding the load test specified in para. 5.3. The design of the toggle or cam mechanism for Classes 1, 2, and 3 shall be such that

when the movable handle is released from the closed and locked position, the jaw tips shall move apart a minimum of 1.00 in. (25.4 mm).

6.1.1 Class 1, "C" Clamp, Style A, Fixed. Jaws shall have radiused or lightly serrated clamping surfaces. Class 1, Style A pliers shall conform to the dimensions of Table 2 and shall be similar to the illustration accompanying Table 2. With the jaws closed and locked, a rectangular block of a size equal to dimensions B and C shall pass freely through the throat.

6.1.2 Class 1, "C" Clamp, Style B, Fixed With Swivel Pads. Jaws shall have smooth clamping surfaces that are movable so as to facilitate parallel clamping throughout adjustment range. Clamp shall conform to the dimensions of Table 3 and shall be similar to the illustration accompanying Table 3. With clamp jaws closed and locked, a rectangular block of a size equal to dimensions B and C shall pass freely through the throat.

6.1.3 Class 2, Sheet Metal Clamp. Jaws shall have enlarged clamping surfaces suitable for firmly holding sheet metal. Clamp shall conform to the dimensions in Table 4 and shall be similar to the illustration accompanying Table 4.

6.1.4 Class 3, Welding Clamp. Jaws shall be "U" shaped and constructed with an open area in the center to permit welding, soldering, riveting, and similar operations while the work is clamped. Class 3 clamps shall conform to the dimensions in Table 5 and shall be similar to the illustration accompanying Table 5.

6.2 Type II, Tubing Pinch-Off

Pliers shall be capable of withstanding testing in accordance with para. 5.4. With the pliers in the closed and locked position, the jaw tips shall make contact and the remainder of jaw contact surface shall be such that a 0.005-in. (0.13-mm) thickness gage cannot be

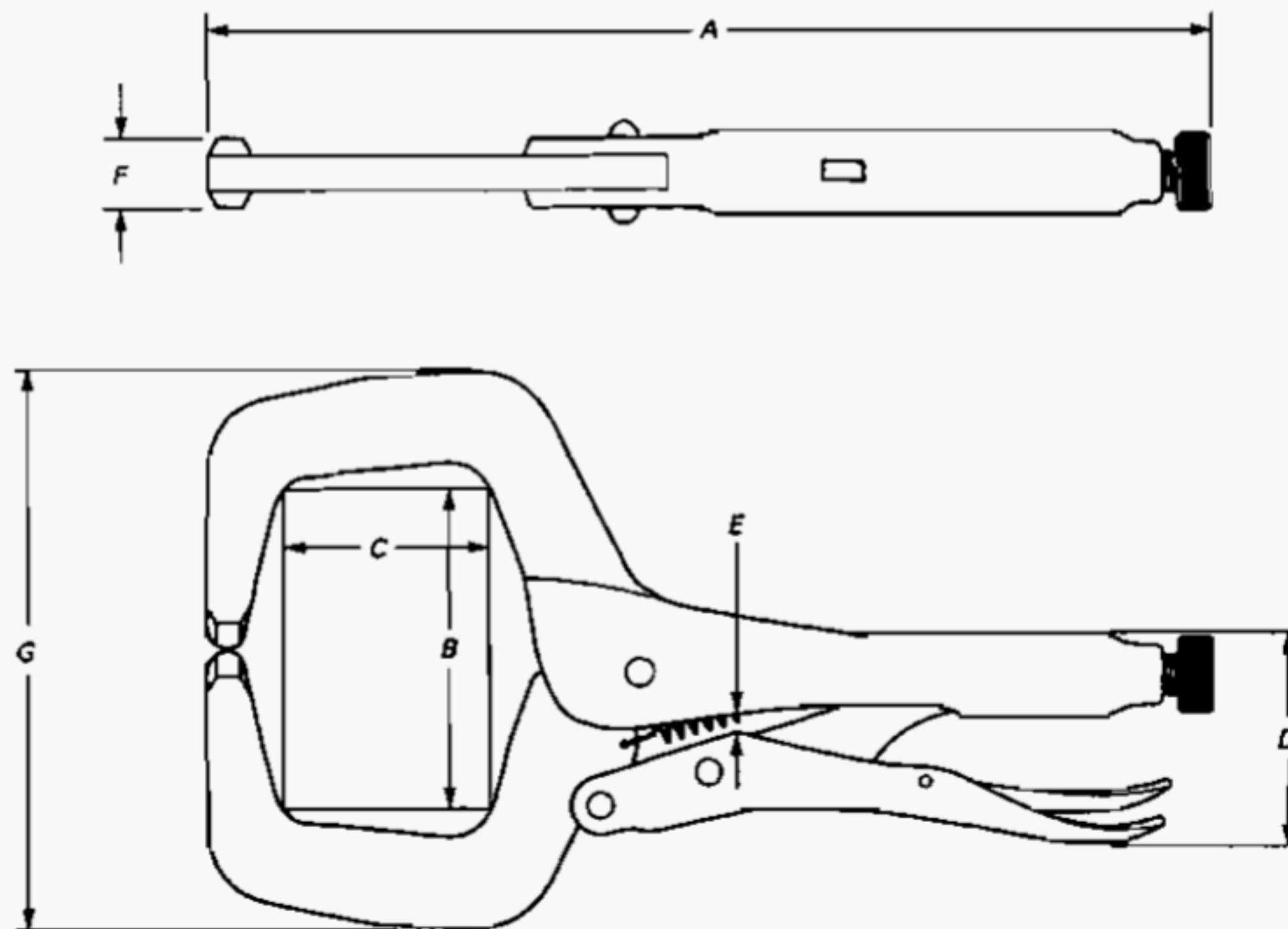


TABLE 2 TYPE I, CLASS 1, STYLE A, "C" CLAMP, FIXED

Nominal Size, in. (mm)	Overall Length, A, in. (mm) ± 1.00 (25.4)	Min. Throat Width, B, in. (mm)	Min. Throat Depth, C, in. (mm)	Handle Width, D, in. (mm) ± 0.25 (6.4)	Min. Handle Clearance, E, in. (mm)	Jaw Width, F, in. (mm) ± 0.13 (3.3)	Height, G, in. (mm) ± 1.00 (25.4)	Min. Clamping Range, in. (mm)
6 (150)	6.50 (165.1)	1.50 (38.1)	1.25 (31.8)	1.50 (38.1)	0.09 (2.3)	0.38 (9.7)	3.50 (88.9)	0 - 2.00 (0 - 50.8)
11 (280)	10.50 (266.7)	3.00 (76.2)	2.25 (57.2)	2.00 (50.8)	0.16 (4.1)	0.50 (12.7)	5.50 (139.7)	0 - 3.38 (0 - 85.9)

inserted through the closed jaws. The throat depth shall be a minimum of 0.750 in. (19.05 mm). Pliers shall conform to Table 6 and shall be similar to the illustration accompanying Table 6.

- (a) Title, number, and date of this Standard.
- (b) Type, class, and style of pliers required.
- (c) Size of pliers required.
- (d) Type of coating required.

7 DESIGNATIONS

Purchasers should select the preferred options permitted herein, and include the following information in procurement documents:

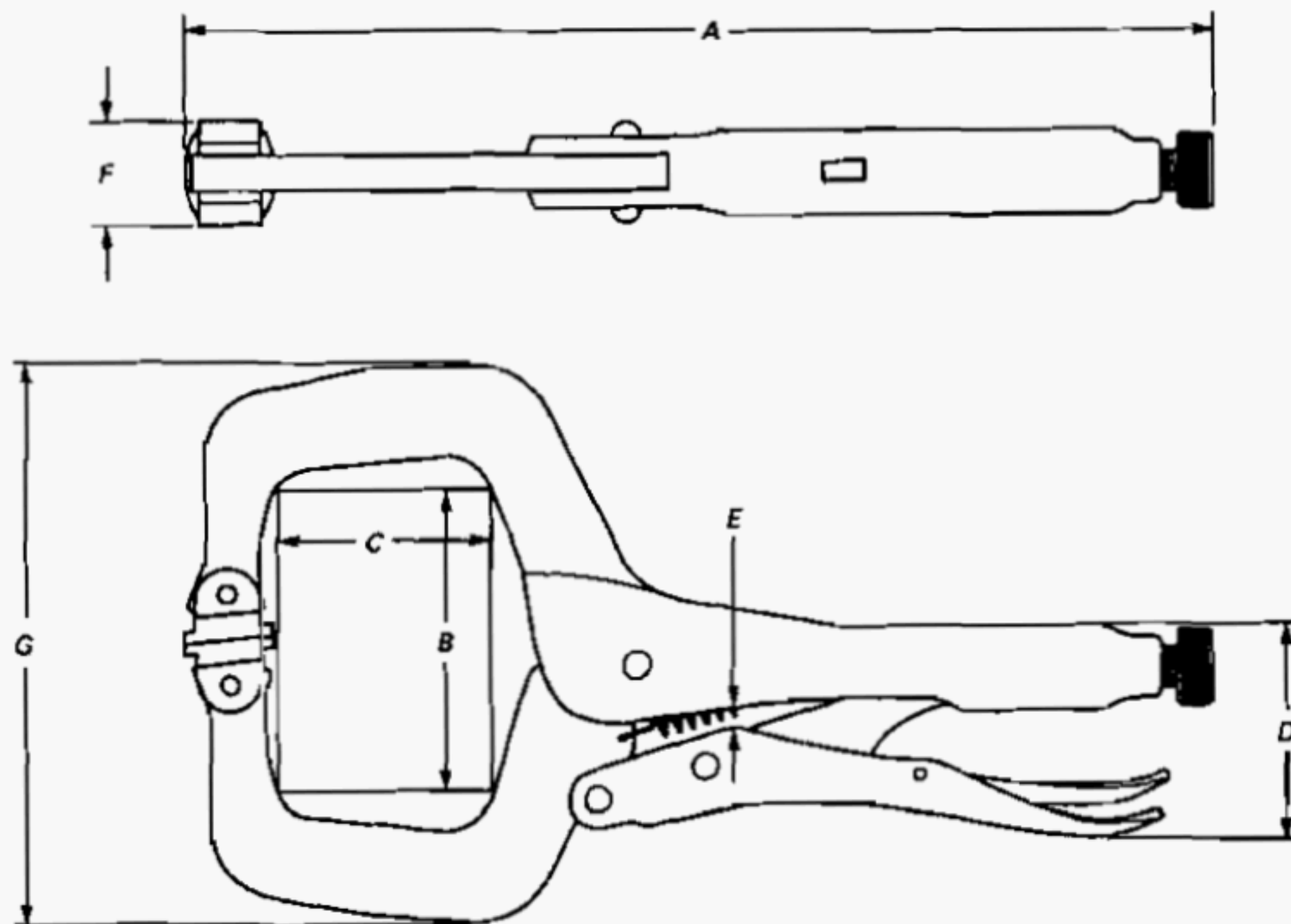


TABLE 3 TYPE I, CLASS 1, STYLE B, "C" CLAMP, FIXED WITH SWIVEL PADS

Nominal Size, in. (mm)	Overall Length, A, in. (mm) ± 1.00 (25.4)	Min. Throat Width, B, in. (mm)	Min. Throat Depth, C, in. (mm)	Handle Width, D, in. (mm) ± 0.25 (6.4)	Min. Handle Clearance, E, in. (mm)	Pad Width, F, in. (mm) ± 0.13 (3.3)	Height, G, in. (mm) ± 1.00 (25.4)	Min. Clamping Range, in. (mm)
5 (127)	5.25 (133.4)	1.38 (35.1)	0.90 (22.9)	1.31 (33.3)	0.09 (2.3)	0.63 (16.0)	2.75 (69.9)	0 - 1.50 (0 - 38.1)
6 (150)	6.50 (165.1)	1.50 (38.1)	1.13 (28.7)	1.50 (38.1)	0.09 (2.3)	0.88 (22.4)	3.50 (88.9)	0 - 2.00 (0 - 50.8)
11 (280)	10.50 (266.7)	3.00 (76.2)	2.25 (57.2)	2.00 (50.8)	0.16 (4.1)	1.13 (28.7)	5.50 (139.7)	0 - 3.38 (0 - 85.9)

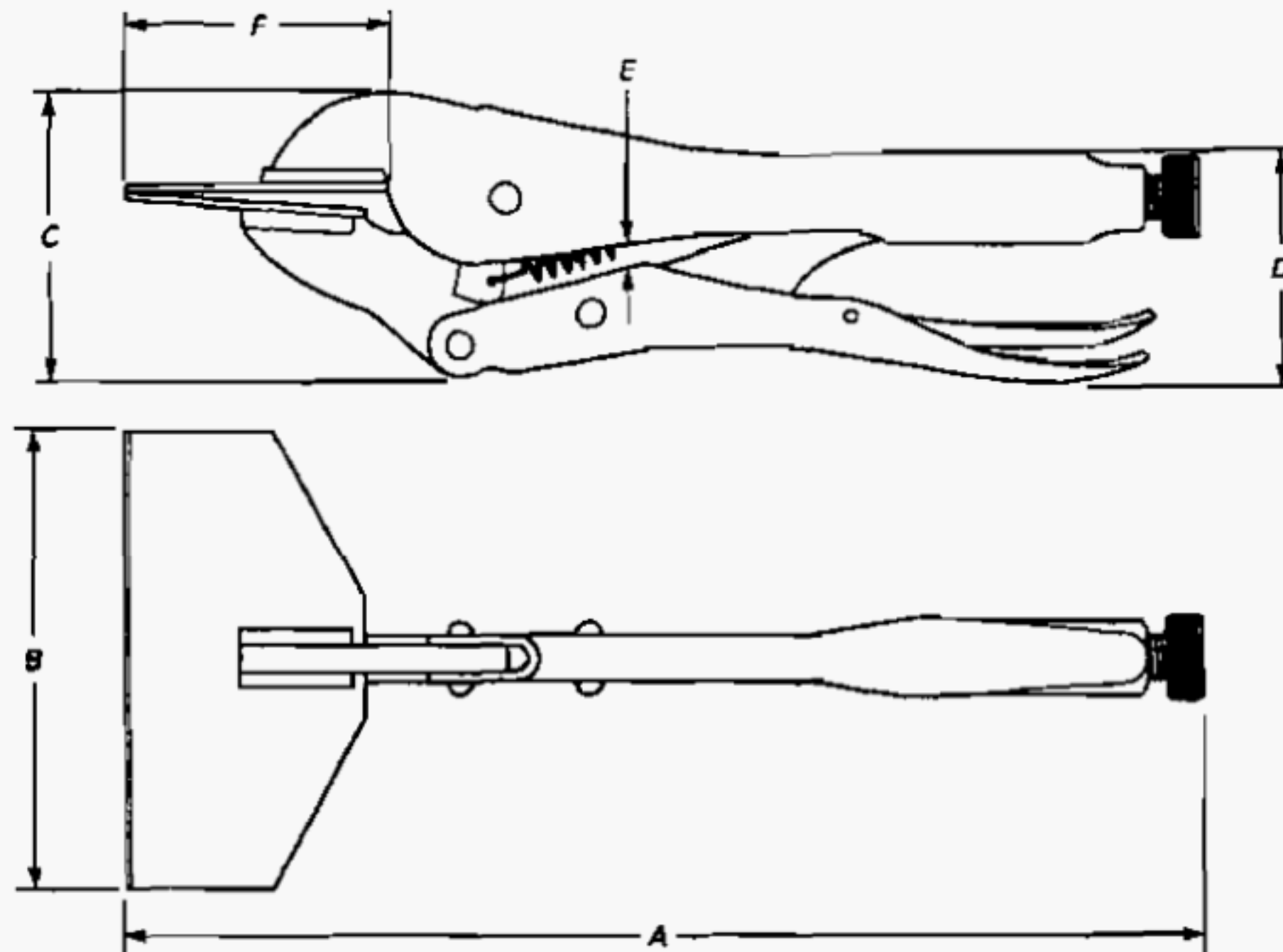


TABLE 4 TYPE I, CLASS 2, SHEET METAL CLAMP

Nominal Size, in. (mm)	Overall Length, A, in. (mm) ± 0.63 (16.0)	Clamp Width, B, in. (mm) ± 0.13 (3.3)	Height, C, in. (mm) (9.7) ± 0.38	Handle Width, D, in. (mm) ± 0.38 (9.7)	Min. Handle Clearance, E, in. (mm)	Clamp Depth, F, in. (mm) ± 0.50 (12.7)	Min. Clamping Range in. (mm)
8 (200)	7.75 (196.9)	3.13 (79.5)	2.25 (57.2)	1.75 (44.5)	0.16 (4.1)	1.75 (44.5)	0 - 0.50 (0 - 12.7)

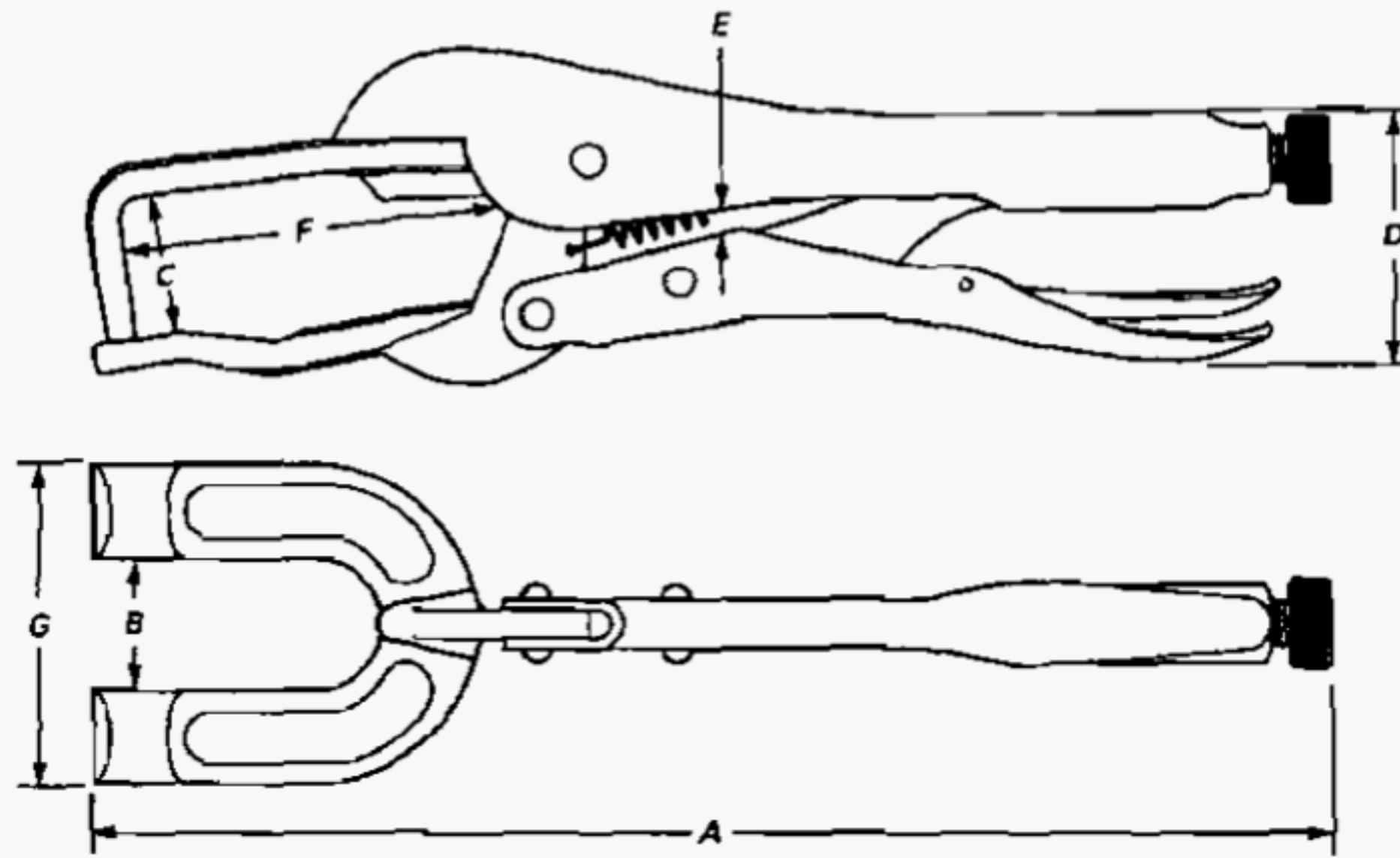


TABLE 5 TYPE I, CLASS 3, WELDING CLAMP

	Overall Length, A,	Inside Width, B,	Inside Height, C,	Handle Width, D,	Min. Handle Clearance, E,	Inside Depth, F,	Outside Width, G,	Min. Clamping Range,
Nominal Size, in. (mm)	in. (mm) ± 0.50 (12.7)	in. (mm) ± 0.13 (3.3)	in. (mm) ± 0.13 (3.3)	in. (mm) ± 0.50 (12.7)	in. (mm)	in. (mm) ± 0.50 (12.7)	in. (mm) ± 0.13 (3.3)	in. (mm)
9 (230)	9.00 (228.6)	1.00 (25.4)	1.00 (25.4)	1.88 (47.8)	0.16 (4.1)	3.00 (76.2)	2.75 (69.9)	0 - 1.63 (0 - 41.4)

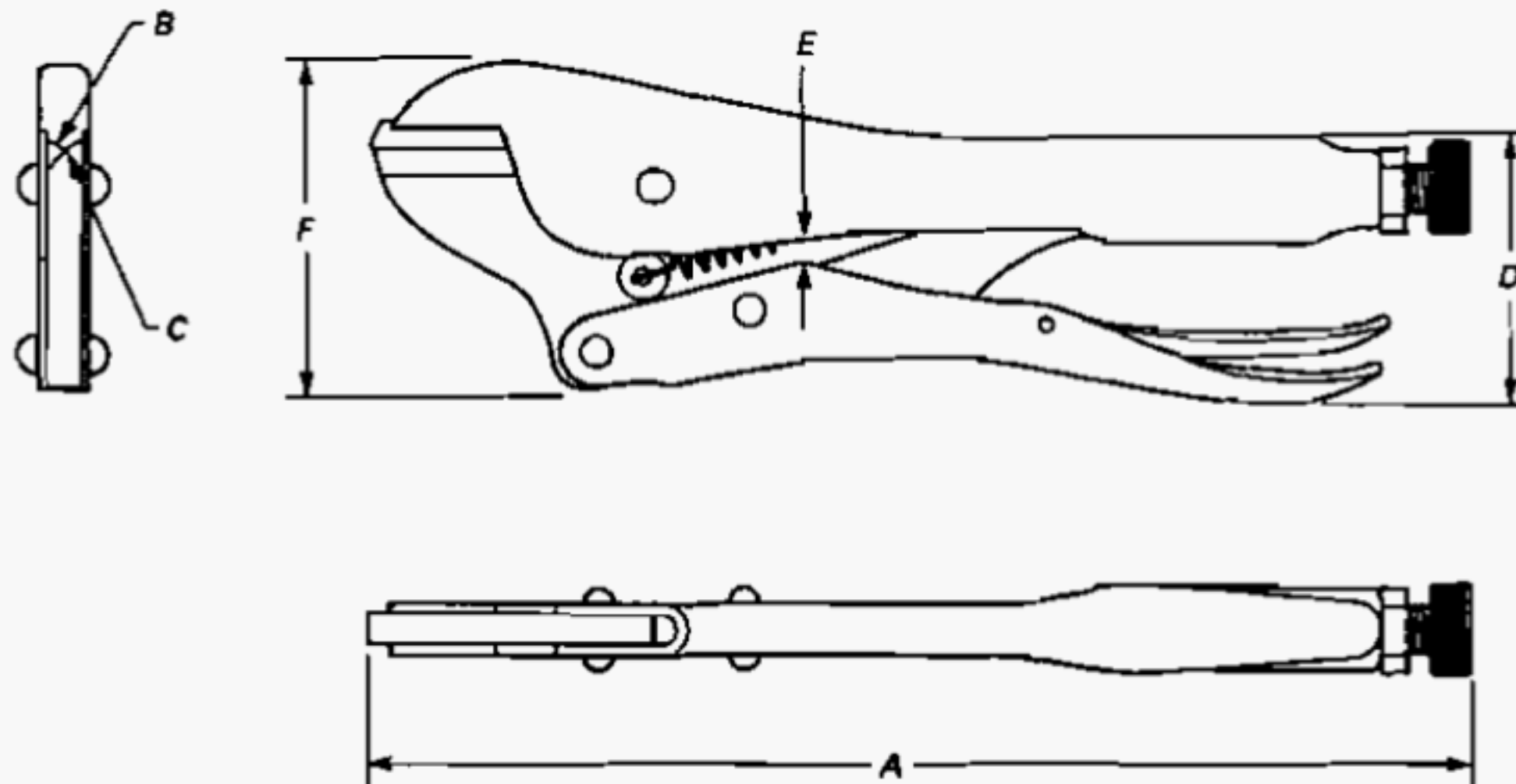


TABLE 6 TYPE II, TUBING PINCH-OFF

Nominal Size, in. (mm)	Overall Length, A, in. (mm) ± 0.63 (15.0)	Top Jaw Radius, B, in. (mm) ± 0.016 (.41)	Bottom Jaw Radius, C, in. (mm) ± 0.016 (.41)	Handle Width, D, in. (mm) ± 0.38 (9.7)	Min. Handle Clearance, E, in. (mm)	Height, F, in. (mm) ± 0.38 (9.7)
7 (180)	7.00 (177.8)	0.13 (3.3)	0.06 (1.5)	1.75 (44.5)	0.16 (4.1)	2.25 (57.2)

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