

GGG-T-661b

October 18, 1968

SUPERSEDING

Fed. Spec. GGG-T-661a

December 9, 1953

FEDERAL SPECIFICATION

TRAMMELS AND TRAMMEL POINTS

This specification was 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 trammels and replaceable points used by machinists, toolmakers, and sheet metal workers for general shop usage.

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.

1.2.1 Types, classes, and styles. Trammels and replaceable points shall be of the following types, classes, and styles, as specified (see 6.2):

Type I—Trammels, with extension steel beam.

Class A — Adjustable, solid points.

Class B — Fine adjustment.

Type II—Trammels, without beams.

Class A — Adjustable, solid points.

Class B — Fine adjustable points.

Class C — Nonadjustable solid points.

Type III—Replaceable points.

Class A — Scriber points.

Class B — Caliper legs.

Style 1 — Small.

Style 2 — Large.

Class C — Ball points.

2. APPLICABLE DOCUMENTS

2.1 Specifications and standards. The fol-

lowing 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 Standard:

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 Specification:

MIL-H-15424—Hand Tools; Packaging of.

Military Standards:

MIL-STD-105—Sampling Procedures and Tables for Inspection by Attributes.

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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 document forms 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 Service.

(Copies may be obtained upon application to the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C., 20402.)

3. REQUIREMENTS

3.1 Illustrations. The illustrations herein are descriptive and not restrictive and are not intended to preclude the purchase of trammels and trammel points otherwise conforming to this specification.

3.2 Materials. The materials used in the construction of trammels shall be as herein-after specified. Where materials are not specified, they shall be of first class quality and entirely suitable for the purpose intended.

3.3 Screw threads. Screw threads shall be of fine pitch or lead in accordance with NBS H28.

3.4 Hardness. Trammel points shall be heat treated in such a manner as to obtain the best overall characteristics of the steel used. Types I and II scribe points, and type III, class A scribe points shall be hardened,

and capable of passing the practical-use test specified in 4.4.1.

3.5 Finish. All trammels, trammel points, and steel beams shall have either a natural polished, nickel plated, chrome plated, black-oxide, or black wrinkle finish.

3.6 Marking. Trammels and trammel points shall be marked in a permanent manner with the manufacturer's part number and name or trademark of such known character that the source of manufacture may be readily determined.

3.7 Type I, extension steel beam trammels.

3.7.1 Class A, adjustable solid points. Class A trammels shall consist essentially of a pair of trammel heads, locking nuts, two solid scribe points, and a solid or sectional steel beam. Type I, class A trammels shall be similar to figure 1.

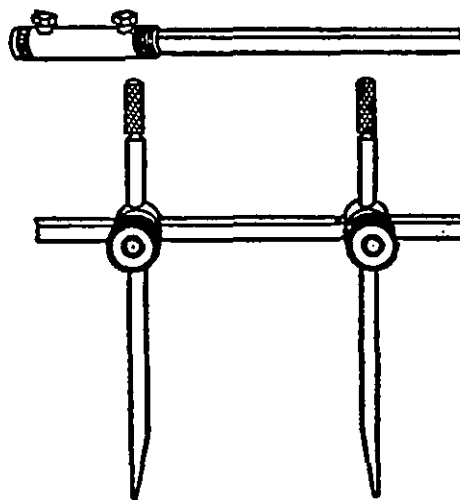


FIGURE 1. TYPE I, class A, extension steel-beam trammels, adjustable solid points.

3.7.1.1 Trammel heads. Trammel heads (slides) shall be of steel and so designed that they will fit neatly on a steel beam conforming to the diameter shown in table I. The head shall be provided with a friction spring or other means to hold the point in

position when the locking nut is loosened. The point and head (slide) shall be held firmly at any position within the adjustment range by a single locking nut.

TABLE I. *Steel beam dimensions for type I, classes A and B trammels*

Diameter of beams	Length of beams	Number of sections
<i>Inch</i>	<i>Inches</i>	
7/32	9	1
13/64	14	1
5/16	10	1
5/16	14	1
5/16	20	1
5/16	28	2
5/16	42	3

3.7.1.2 *Locking nuts.* Locking nuts shall be of steel and internally threaded (see 3.3). Locking nuts shall be knurled on the periphery.

3.7.1.3 *Points.* The two scriber points for type I, class A trammels shall be tool steel hardened as specified herein and finish ground. The points shall have an oblique cone point, the end of which shall be in line with one side. The opposite end shall be knurled for not less than 1/2 inch. Points shall be of 7/32-inch diameter and not less than 5 nor more than 8 inches long. (The trammels provide a fine adjustment by loosening the locking nut and rotating the point(s) slightly.)

3.7.1.4 *Beams.* Beams shall be of steel rod, with a flat to prevent heads from turning when clamped in position. Beams shall conform to the dimensions shown in table I.

3.7.2 *Type I, extension steel beam trammels, class B, fine adjustment.* Type I, class B trammels shall be of a precision type and consist essentially of a pair of trammel heads, fine adjustment attachment, a pair of scriber points, and a steel beam. Type I, class B trammels shall be similar to figure 2.

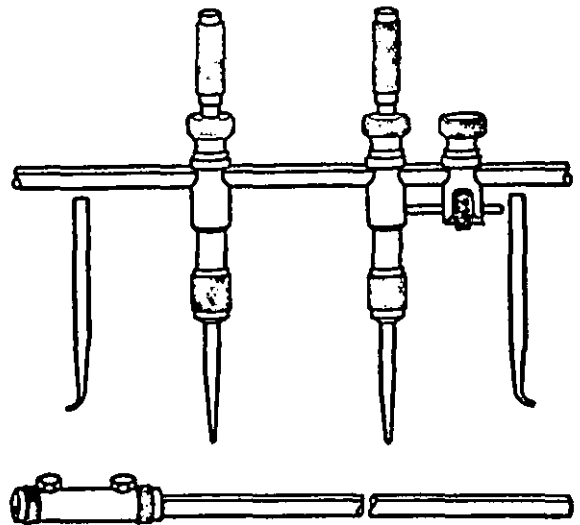


FIGURE 2. TYPE I, class B, extension steel-beam trammels, fine adjustment.

3.7.2.1 *Trammel heads.* Trammel heads for type I, class B trammels shall be substantially similar to figure 2. One head shall consist of a shaft having a hole to fit neatly on the steel beam and a chuck for holding points. A locking nut with a knurled grip shall be provided for holding the head securely on the beam. A spring friction device shall be provided to hold the head in position when the nut is loosened. The other head shall be similar, except that a fine adjustment clamp and adjusting screw shall be attached.

3.7.2.2 *Chucks.* Chucks shall be of such design as to grip and firmly hold the points at any position within the adjustment range. The chucks shall be knurled on the exterior surface.

3.7.2.3 *Locking nuts.* Locking nuts shall be knurled on the periphery.

3.7.2.4 *Fine adjustment clamp.* The fine adjustment clamp shall consist of a yoke to accommodate a fine adjustment screw and nut. The clamp shall be made to fit neatly on the steel beam, and be provided with a locking screw for holding the clamp firmly in position. Clearance between the yoke and

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bearing surface of nut shall not exceed 0.005 inch.

3.7.2.5 Fine adjustment screw and nut. One end of the screw shall pass through the yoke of the fine adjustment clamp and the nut located in the yoke. The other end of the screw shall be attached to one of the heads. The screw shall provide a fine adjustment of not less than $\frac{3}{8}$ inch. The nut shall be circular in shape and knurled on the periphery.

3.7.2.6 Points. Type I, class B trammels shall be furnished with two scriber points which shall be of a good grade tool steel, hardened and ground. They shall have a straight shaft with one end uniformly tapered for approximately 1 inch to a sharp point. Points shall be not less than 3 nor more than 5 inches in length. When specified (see 6.2), a pair of small caliper points shall also be supplied.

3.7.2.7 Beams. Beams shall be in accordance with 3.7.1.4.

3.8 Type II, trammels without beams. Type II trammels shall be furnished without beams and shall be suitable for fastening to a wooden beam.

3.8.1 Type II, trammels without beams, class A, adjustable solid points. Class A trammels shall consist of a pair of heads with clamping screws and point-holding device and two scriber points. Type II, class A trammels shall be similar to figure 3.

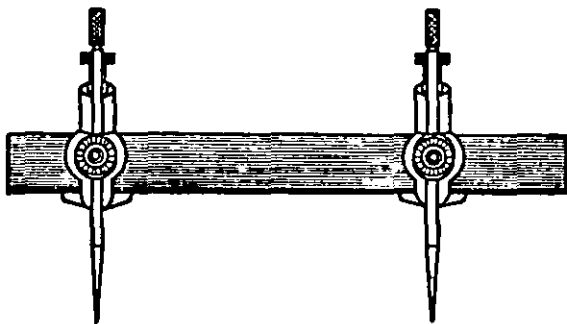


FIGURE 3. TYPE II, class A, trammels without beam, adjustable solid points.

3.8.1.1 Heads. Heads shall be of steel, bronze, or cast iron and so designed that they may be clamped to a wooden beam $\frac{3}{4}$ to 1-1/2 inches wide and of any required thickness. Heads shall have a clamping screw for holding head firmly on the wooden beam and a holding device for attaching $\frac{7}{32}$ or $\frac{5}{16}$ -inch diameter points.

3.8.1.2 Clamping screws. Clamping screws shall be of steel, heat treated to resist wear or distortion. They shall have right-hand threads which shall be a good fit in the threaded hole of the head. The outer end of the screw shall have a circular head, knurled on the periphery. A button of approximately the screwhead diameter shall be attached to the inner end of the screw. The face of the button shall be ground plane. The button shall not turn with the screw when in contact with the beam.

3.8.1.3 Point-holding device. A device shall be attached to the head for holding the points. It shall have a knurled nut with a fine pitch or lead in accordance with 3.3, to provide sufficient tension for holding the point firmly at any position within the adjustment range.

3.8.1.4 Points. Points shall be in accordance with the requirements specified herein for the type I, class A points.

3.8.2 Type II, trammels without beams, class B, fine adjustable points. Class B trammels shall consist essentially of two heads with removable scriber points, locking screws, a fine adjustment device, and a pencil attachment. Type II, class B trammels shall be similar to figure 4.

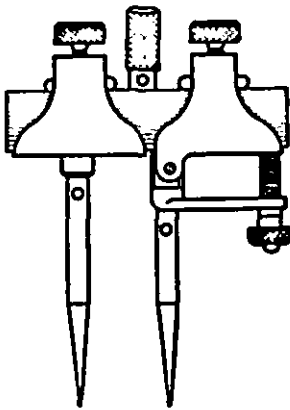


FIGURE 4. TYPE II, class B, trammels without beam, fine adjustable points.

3.8.2.1 Heads. Heads shall be of bronze, brass, zinc alloy die casting, or steel. Unless otherwise specified (see 6.2), heads shall be suitable for attaching to a wooden beam $\frac{3}{4}$ -inch wide and $\frac{5}{16}$ -inch thick. The heads shall have a locking screw and suitable means for attaching points. One head shall have a fine adjustment attachment.

3.8.2.2 Locking screws. Locking screws shall be a good fit in the threaded hole of the head. The outer end of the screw shall have a circular knurled head. The inner end shall have a metal block or plate attached to contact the beam and hold the head firmly in place. The block or plate shall not turn with the screw.

3.8.2.3 Fine adjustment attachment. A fine adjustment device shall be attached to one of the trammel heads in such a manner as to provide a fine adjustment of at least $\frac{1}{2}$ inch.

3.8.2.4 Points. Points shall be in accordance with the requirements for type I, class B points, except that they may be threaded for attaching to the head. Points shall be not less than $2\frac{1}{2}$ nor more than 5 inches long.

3.8.3 Type II, trammels without beams, class C, nonadjustable solid points. Class C

trammels shall consist essentially of two heads with clamping screws and removable solid points. Type II, class C trammels shall be similar to figure 5.

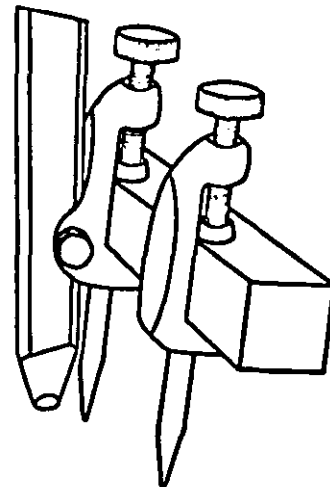


FIGURE 5. TYPE II, class C, trammels without beam, nonadjustable points.

3.8.3.1 Heads. Heads shall be of steel, bronze, or cast iron and so designed that they may be clamped on a wooden beam $\frac{3}{8}$ to $1\frac{1}{4}$ -inches thick. Heads shall have a clamping screw for holding head firmly on the wooden beam and shall be provided with a threaded hole for attaching points.

3.8.3.2 Clamping screws. Clamping screws shall be in accordance with the requirements for type II, class A clamping screws.

3.8.3.3 Points. Type II, class C trammels shall be furnished with two scriber points of a good grade tool steel, hardened and ground. They shall have a straight shaft, one end threaded to provide a good fit with threaded hole in the head, the other end shall be uniformly tapered for approximately $\frac{3}{4}$ inch to a sharp point. Points shall be not less than $1\frac{3}{8}$ nor more than 4 inches in length.

3.8.3.4 Pencil-holding device. One head of the trammel shall be so designed that a carpenter's pencil can be attached by a screw

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(having a knurled or serrated head) or similar means not requiring the use of tools for adjustment.

3.9 Type III, replaceable points. Type III points shall be of a style suitable for replacing points of type I, class A, and type II, class A trammels. Replaceable points of all classes except class C shall be supplied in pairs.

3.9.1 Type III, replacement points, class A scribe points. Class A points shall conform to the requirements for type I, class A points and shall be similar to figure 6.

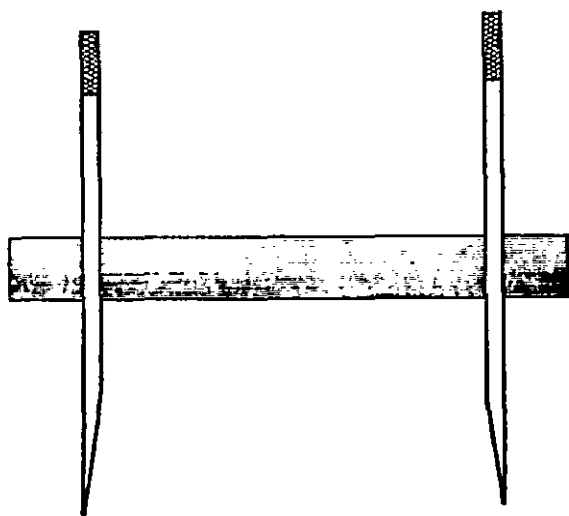


FIGURE 6. TYPE III, class A scribe points.

3.9.2 Type III, replaceable points, class B, caliper legs. Class B caliper legs shall be furnished in two styles—style 1, small, and style 2, large.

3.9.2.1 Class B, caliper legs, style 1, small. Style 1 caliper legs shall conform to the requirements for class A replaceable points, except that the pointed section shall be shaped as the legs of inside calipers. Type III, class B, style 1 caliper legs shall be similar to figure 7.

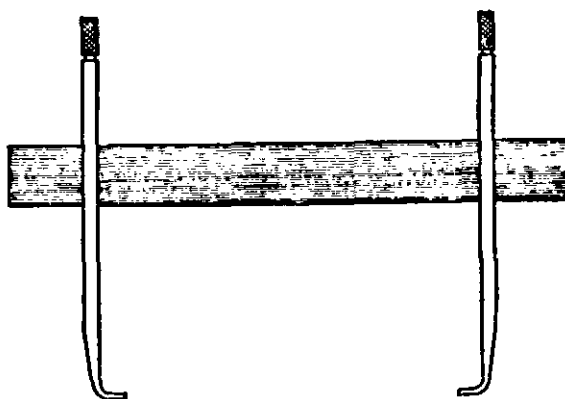


FIGURE 7. TYPE III, class B, style 1 caliper legs, small.

3.9.2.2 Class B, caliper legs, style 2, large. Style 2 caliper legs shall conform to class A replaceable points, except that diameter shall be 5/16-inch and length not less than 8 nor more than 10 inches, the pointed section is not required, and caliper legs shaped as outside calipers shall be attached. One leg shall have a thumbscrew attachment to provide fine adjustment. Type III, class B, style 2 caliper legs shall be similar to figure 8.

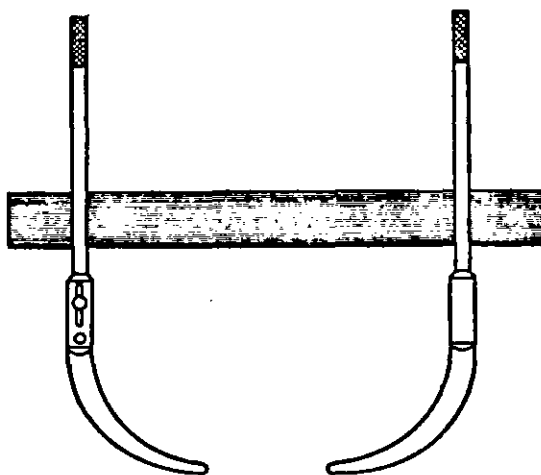


FIGURE 8. TYPE III, class B, style 2 caliper legs, large.

3.9.3 Class C, ball points. Class C ball points shall consist of a holder which shall conform to the requirements for class A replaceable points, except that a pointed section is not required and one end shall be

shaped to fit into a ball point. Ball points shall be of steel, and four ball points of 1/2, 3/4, 1, and 1-9/16 inches in diameter shall be furnished with each holder. Type III, class C ball points shall be similar to figure 9.

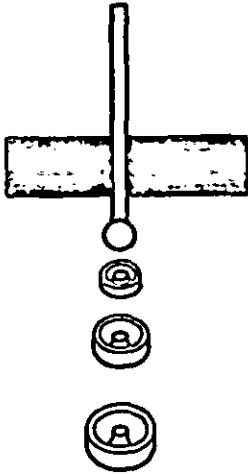


FIGURE 9. TYPE III, class C, ball points and holder.

3.10 Accessories for trammels. When accessory items or points for trammels not otherwise specified herein are required, these accessories or points shall be as specified (see 6.2).

3.11 Workmanship. Workmanship of the trammels and trammel points shall be of the quality prevailing among manufacturers nor-

mally producing trammels and points of the styles and sizes 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.

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

4.2 Sampling procedures. Sampling procedures shall be in accordance with MIL-STD-105. Data for sampling shall be as stated in table II.

TABLE II. *Sampling data*

Category	Sample unit	Inspection level	Acceptable quality level (AQL)	AQL expressed in terms of	Reference
Visual examination	1 ea.	II	2.5	Defects per 100 units	4.3.1
Dimensional examination	1 ea.	II	2.5	do.	4.3.2
Testing	1 ea.	II	2.5	do.	4.4.1
Preparation for delivery	One container	S-2	4.0	do.	4.5

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4.3 Examination.

4.3.1 *Visual examination.* Each sample unit shall be examined for any nonconformance in design, material, finish, coating, construction, workmanship, and marking. Defects are listed in table III.

TABLE III. *Classification of defects*

Examine	Defects
Design	Type, class, and style not as specified.
Construction and workmanship	Plating, where used, chipped, cracked, peeling, or evidence of nonadherent areas.
	Incomplete; parts missing damaged or not as specified.
	Threaded parts; threads stripped, crossed, cracked, torn or not good fit with mating parts.
	Evidence of cracks, splits, rust, burrs, or rough edges.
	Points not within length requirements or points not straight along main body.
	Knurl on end of points missing or not suitable.
	Caliper legs not formed as specified.
	Ball points missing.
	Holder does not fit into ball point.

4.3.2 *Dimensional examination.* Each sample unit shall be examined for any nonconformance with dimensional requirements.

4.4 *Testing.* Each sample unit shall be tested in accordance with 4.4.1.

4.4.1 *Practical-use test.* Each sample scriber point for types I and II trammels, and each type III, class A scriber point shall be tested by scribing sufficient circles to equal a total circumference of at least 75 feet. The plate on which the circles are to be scribed shall have a hardness value of not less than 30 nor more than 36 on the Rockwell C scale. An increase of 50 percent in the width of the

lines scribed, or other evidence of point wear, shall be evidence of test failure. Any scriber point in the sample failing the test shall be rejected. Each scriber point passing this test shall be considered as properly hardened.

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 in section 5. Defects shall be scored in accordance with table IV. For examination of interior packaging, the sample unit shall be one shipping container fully prepared for delivery, selected at random just prior to the closing operations. Defects of closure listed shall be examined on shipping containers fully prepared for delivery. The lot size shall be the number of shipping containers in the end item inspection lot.

TABLE IV. *Classification of preparation for delivery defects*

Examine	Defects
Marking (exterior and interior)	Omitted; incorrect; illegible; improper size, location, sequence, or method of application.
Materials	Any component missing or damaged.
Workmanship	Inadequate application of components such as incomplete closure of container flaps, loose strapping, inadequate stapling.
	Distortion of container.

5. PREPARATION FOR DELIVERY

5.1 *Preservation, packaging, and packing.* Unless otherwise specified (see 6.2), the trammels and trammel points shall be preserved, packaged, and packed in accordance with MIL-H-15424. The level of preservation and packaging shall be A or C and the level of packing A, B, or C, as specified (see 6.2).

5.1.1 As part of the requirements of section 5 of this specification, table V is considered as part of and used in lieu of that portion of table I of MIL-H-15424 covering trammels.

- (a) Title, number, and date of this specification.
- (b) Type, class, style, and size (see 1.2 and table I).
- (c) Whether small caliber points are re-

TABLE V.

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7
Trammel:						
With extension steel beam up to and including 12 ins.	P-8, P-9	1A-8	1	---	24	24
18 ins. through 48 ins.	P-8, P-9	1A-8	1	---	12	12
Without beams	P-8, P-9	1A-8	1	---	24	24
Replaceable points	P-8, P-9	1A-8	1	24	6	144
Ball points	P-8, P-9	1A-8	1	24	6	144

5.2 Marking.

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

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

6. NOTES

6.1 Intended use. The trammels and replaceable points covered by this specification are intended to be used by craftsmen for laying out work and measuring distances between points too great for ordinary dividers.

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

quired for type I, class B (see 3.7.2.6).

- (d) Whether special beam capacity is required for type II, class B (see 3.8.2.1).
- (e) Whether accessories are required (see 3.10).
- (f) Selection of applicable levels of packaging and packing required (see 5.1).

MILITARY INTEREST:

CUSTODIANS:

Army—GL
Navy—SH
Air Force—67

Review activities:

Army—GL
Navy—SH
Air Force—67

User activities:

Army—MO, WC
Navy—YD
Civil agency: GSA-FSS

Preparing activity:

Navy—SH

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