

GGG-F-360b

October 5, 1964

SUPERSEDING

Int. Fed. Spec. GGG-F-00360a (GSA-FSS)

February 18, 1963

FEDERAL SPECIFICATION

**FINGER, MECHANICAL, AND RETRIEVER TOOL,
MAGNETIC**

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 mechanical fingers and magnetic retrieving tools used for retrieving such objects as screws, washers, nuts, bolts, pins, and similar objects from tight or inaccessible places.

1.1.1 Federal specification coverage. Federal specifications do not cover all types and classes of the commodity which are commercially available, but cover only those types and classes most commonly used by the Federal Government.

1.2 Classification.

1.2.1 Types and classes. The fingers and retrieving tools shall be of the following types and classes as specified (see 6.1):

Type I—Fingers, mechanical.

Class 1—Rigid.

Class 2—Flexible.

Type II—Retrieving tool, magnetic.

Class 1—Telescoping.

Class 2—Flexible.

Style A—Noninsulated coiled spring.

Style B—Insulated coiled spring.

2. APPLICABLE SPECIFICATIONS AND STANDARDS

2.1 Specifications and standards. The following specifications and standards, of the issues in effect on date of invitation for bids, form a part of this specification:

Federal Standards:

Fed. Std. No. 102—Preservation, Packaging and Packing Levels.

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.

MIL-STD-129—Marking for Shipment and Storage.

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(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.)

3. REQUIREMENTS

3.1 Material. The material used in the manufacture of the fingers and retrieving tools shall be as hereinafter specified. The materials shall be free from any defects and imperfections that may affect their serviceability.

3.2 Finish.

3.2.1 Surface roughness. All surfaces shall be free from pits, nodules, burrs, cracks other detrimental defects. Areas ground, buffed, or otherwise finished by an equivalent method and provided with a coating finish of chromium or nickel plate, shall have a surface roughness equivalent to the finish produced by 120 grit or finer abrasive. Areas ground, buffed, or otherwise finished by an equivalent method and provided with a coating finish as specified in 3.2.2, other than chromium or nickel plate, shall have a surface roughness equivalent to the finish produced by 80 grit of finer abrasive, except that the magnet in type II, class 2, style B shall conform to standard commercial practice. Other areas shall have a surface finish conforming to good commercial practice.

3.2.2 Coatings. The coatings shall be adherent, smooth, continuous, and free from pits, blisters, nodules, and other defects which would interfere with their corrosion-protective value and serviceability. For intermating parts, the coating shall not interfere with the ease of operation.

3.2.2.1 Chromium plating. Chromium plating shall be electrodeposited metal consisting of nickel followed by chromium. The minimum thickness shall be 0.0002 inch for nickel and 0.00001 inch for chromium.

3.2.2.2 Nickel plating. Nickel plating shall be an electrodeposited coating of nickel and shall be not less than 0.0002 inch thick.

3.2.2.3 Cadmium plating. Cadmium plating shall be an electrodeposited coating of cadmium not less than 0.0003 inch thick and shall be subjected to a chemical or electrochemical chromating.

3.2.2.4 Zinc plating. Zinc plating shall be an electrodeposited coating of zinc not less than 0.0003 inch thick and shall be subjected to a chemical or electrochemical chromating.

3.3 Marking. The fingers and retrieving tools shall be marked in a permanent and legible manner with the manufacturer's name or with a trademark of such known character that the source of manufacture may be readily determined.

3.4 Type I, finger, mechanical. Type I, finger, shall consist essentially of a housing, plunger, coil spring, and retracting jaws. The finger shall be designed to allow free movement of the assembled parts with a minimum of clearance between the working parts and to preclude the possibility of the parts becoming loose when tested as specified in 4.4.1.1. The retracting jaws shall be capable of being opened to 7/8 inch, plus 1/8 inch; minus 1/16 inch, measured between the gripping surfaces. The jaws when retracted to a closed position shall be capable of gripping a 0.004-inch feeler gage. The required force to operate the plunger shall not exceed 18 pounds.

3.4.1 Housing. The housing shall be of either steel or brass tubing. The jaw end of the housing shall be flared to allow smooth expansion and retraction of the jaws. The opposite end of the housing shall be provided with a steel or brass flange having a diameter equal to or larger than the diameter of the head of the plunger to afford an adequate grip.

3.4.2 Plunger. The plunger shall be of a round steel rod having a head attached to one end and a pair of jaws attached to the opposite end. Means shall be provided to secure the head and jaws to the rod in such a manner to assure that the head and jaw

assembly will not become loose when tested as specified in 4.4.1.

3.4.3 Coil spring. The coil spring shall be of spring steel having sufficient strength to assure the proper grip when tested as specified in 4.4.1.

3.4.4 Retracting jaws. The retracting jaw shall be of tempered spring steel having sufficient strength to withstand the test requirements of 4.4.1. The jaws shall flex open when the plunger is fully depressed and shall retract smoothly, closing the gripping surfaces when the plunger is fully released.

3.4.5 Class 1, rigid. The fingers shall be provided with a rigid housing of either steel or brass tubing. Class 1 fingers shall conform to table I and be similar to figure 1.

TABLE I.—Type I, class 1; finger, mechanical, rigid

Size	Plunger head diameter A	Overall length B	Reach C	Weight Max.
	± 1/8 inch	± 1/4 inch	± 1/2 inch	
	Inches	Inches	Inches	Ounces
1	1-1/4	6-1/2	3-3/4	2
2	1-1/4	8-1/2	5-3/4	3
3	1-1/4	10-1/2	8	4
4	1-1/4	14-1/2	11-3/4	5

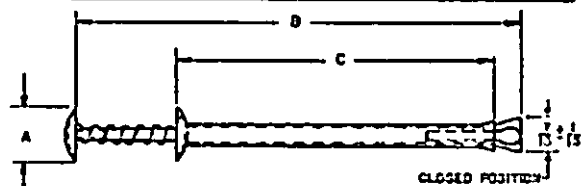


Figure 1. Type I, class 1, finger, mechanical, rigid.

3.4.6 Class 2, flexible. The fingers shall be provided with a housing of either steel or brass tubing and a flexible midsection. The flexible midsection shall be of spirally wound, armored cable capable of being bent into various directions. The fingers shall conform to table II and be similar to figure 2.

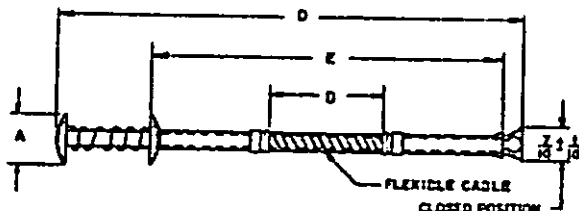


Figure 2. Type I, class 2, finger, mechanical, flexible.

3.5 Type II, retrieving tool, magnetic. The retrieving tools shall consist essentially of a magnet case and handle.

3.5.1 Magnet case. The magnet case except type II, class 2, style B shall be either a metal or nylon casing with means provided for accepting and securely holding a magnetic element in one end, and for assembly to a handle on the other end.

3.5.1.1 Magnetic element. The magnetic element shall be composed of a material commercially available having long life permanent magnetic qualities and shall meet the applicable test requirements specified in 4.4.

3.5.2 Class 1, telescoping. Class 1 magnetic retrieving tool shall be provided with a telescoping handle consisting of an inner and outer handle. The tool shall be designed to

TABLE II.—Type I, class 2, finger mechanical, flexible

Size	Plunger head diameter A	Flexible cable length B	Overall length D	Reach E	Weight Max.
	± 1/8 inch	Min.	± 1/4 inch	± 1/4 inch	
	Inches	Inches	Inches	Inches	Ounces
1	1-7/82	8	17-1/2	14-7/8	6-3/4
2	1-7/82	7	26-1/2	23-3/4	8-1/2

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TABLE III.—Type II, class 1, retrieving tool, magnetic, telescoping

Closed length		Extended length		Lifting power	Magnet case diameter	Knurled length	Weight
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Inches	Inches	Inches	Inches	Ounces	Inch	Inches	Ounces
16-1/4	17	26	27	18	1/2	2-7/8	7-1/2

allow free movement of the assembled parts of the handle with a minimum of clearance between the working parts and to preclude the possibility of the parts becoming loose under normal service conditions. The tool shall be of either single or compound hinge construction. The maximum diameter of the magnet case shall be 1/2 inch.

3.5.2.1 Inner handle. The inner handle shall be of steel with means provided for assembly to the magnet case. The handle end of the inner handle shall be provided with a positive stop to prevent the outer handle from being disengaged when fully extending the outer handle.

3.5.2.2 Outer handle. The outer handle shall be swaged approximately 1 inch at opposite end of handle to properly engage the inner handle, so that when inner handle is fully extended and magnet is held at an angle to the handle, no swiveling of the inner handle can take place. The design of the outer handle shall provide for suitable assembly to the inner handle and the outer end properly sealed. The outside diameter of the tubing at the hand grip end shall be knurled. When specified (see 6.1), a vinyl or plastic grip, completely encasing the handle for at least 3 inches from the end of the handle, shall be provided.

3.5.2.3 The retrieving tool shall conform to table III and be similar to figure 3a or 3b.

3.5.3 Class 2, style A, flexible. Class 2, style A, magnetic retrieving tool shall be provided with a handle consisting of a knurled handgrip on one end and a flexible section extending to the magnet case. Means shall be provided to securely attach the flexible section to the magnet case. The handgrip shall be of either steel, brass, or aluminum having a minimum length of 3 inches. The flexible section shall be spirally wound, spring wire capable of being bent into various directions.

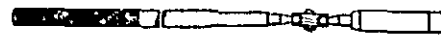


Figure 3. Type II, class 1, retrieving tool, magnetic, telescoping.

3.5.3.1 The retrieving tool shall conform to table IV and be similar to figure 4.

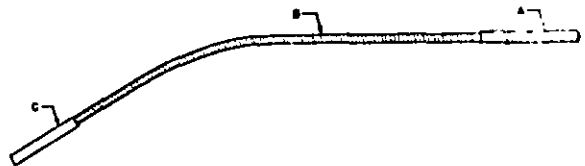


Figure 4. Type II, class 2, style A, retrieving tool, magnetic, flexible, (non-insulated).

3.5.4 Class 2, style B, flexible. Class 2, style B, magnetic retrieving tool shall be provided with a permanent type magnet, a flexible coiled spring with insulating cov-

TABLE IV.—Type II, class 2, style A, retrieving tool, magnetic, (noninsulated)

Overall length	Hand-grip		Flexible section		Magnet case		Lifting power
	A		B		C		
	Length	Diameter	Length	Diameter	Length	Diameter	
Min.	Min.	Max.	Min.	Max.	Max.	Max.	Min.
Inches	Inches	Inch	Inches	Inch	Inches	Inch	Ounces
18	3	5/16	12-1/2	1/4	2-1/2	5/16	16

er and an eye suitable for hanging the tool when not in use.

3.5.4.1 Magnet. The magnet shall be round, square, hexagonal or oval in cross section, and shall be not less than 3/16 inch, with a tolerance of minus 0.007, nor more than 7/32 inch with a tolerance of plus 0.002 in diameter or width. The magnet (element) shall also conform to 3.5.1.1.

3.5.4.2 Magnet case. The magnet case shall be of brass, nonferrous metal or nylon. At one end of the case, means shall be provided to securely fix the magnet, while at the other end a means for securely attaching the flexible spring shall be provided. The case shall be not less than 1-1/2 inches in length.

3.5.4.3 Flexible spring. The flexible spring shall be of coiled spring steel and completely encased in an insulating covering of plastic or neoprene rubber. The spring shall be approximately 3/16 inch in diameter and the overall length, including the magnet, shall be not less than 30 nor more than 36 inches.

3.5.4.4 Type II, class 2, style B retrieving tools shall be similar to figure 5.

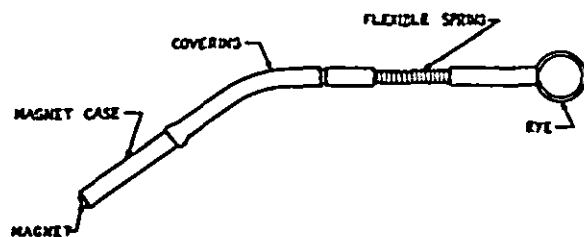


Figure 5. Type II, class 2, style B, retrieving tool, magnetic, flexible, (insulated).

3.6 Workmanship. Workmanship shall be of the highest grade throughout and equal in every respect to good commercial practice. The fingers and retrieving tools shall be free from rust, burrs, fins, and any imperfections which may impair their serviceability or durability.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Responsibility for inspection. The supplier is responsible for the performance of

all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services 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 Sampling for lot acceptance.

4.2.1 Lot. All mechanical fingers and retrieving tools of the same size, class and type submitted for acceptance at one time shall be considered a lot for purposes of inspection.

4.2.2 Sampling for examination. Sampling shall be performed in accordance with MIL-STD-105. The inspection level shall be II with the acceptable quality level (AQL) of 4.0 percent defective.

4.2.3 Sampling for acceptance tests. A random sample shall be selected from each lot for acceptance test in accordance with MIL-STD-105 at inspection level S-3. The AQL shall be 2.5 percent defective.

4.3 Visual and dimensional examination. Each of the sample tools shall be visually and dimensionally examined to determine compliance with this specification. Any samples containing one or more defects shall be rejected and if the number of defective tools in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

4.4 Acceptance tests. Each sample tool selected in accordance with 4.2.3 shall be tested in accordance with 4.5 to verify compliance with this specification. Any tool in the sample which does not meet the requirements for any of these tests shall be rejected and if the number of nonconforming tools exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

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4.5 Test methods.

4.5.1 *Type I, finger, mechanical.*

4.5.1.1 *Fatigue test.* Each sample mechanical finger shall be operated by hand or by some suitable method to its complete limit, opening and closing a minimum of 500 times and then subjected to the test specified in 4.5.1.2.

4.5.1.1.1 *Class 2, flexible.* The sample fingers selected in accordance with 4.2.3 shall be clamped or otherwise secured with the plunger end on a horizontal plane. The gripping end shall be raised until the nonflexible portion is at an angle of 70 degrees to the horizontal plane. The flexible portion shall be curved its full length. The plunger mechanism shall be actuated 10 times as specified in 4.5.1.1. The 70-degree angle shall be sustained within a tolerance of plus or minus 5 degrees.

4.5.1.2 *Lifting test.* A No. 0-80 screw inserted in a 24-ounce block of metal shall be used for the test. The sample fingers, after completion of the fatigue test, shall be capable of gripping the No. 0-80 screw, lifting the block of metal, with the axis of the fingers in a vertical position and holding it suspended for one minute.

4.5.2 *Type II, retrieving tool, magnetic.* Each sample retrieving tool shall be subjected to a lift test specified in 4.5.2.1.1 or 4.5.2.1.2, as applicable. The piece of steel used for the lifting test shall be SAE 1020 or its equivalent.

4.5.2.1 *Lift test.*

4.5.2.1.1 *Class 1, telescoping, and class 2, flexible.* The sample retrieving tools shall lift a weight (see 4.5.2.1.2) of 18 ounces minimum for class 1; 16 ounces minimum for class 2, style A; and 5 ounces minimum for class 2, style B when any portion of the end magnet case is placed in contact with an area on the cross-section of the weight.

4.5.2.1.2 The weight shall be made from a piece of plain carbon steel. The cross-section

of the weight shall be in the form of a circle, hexagon, or square and shall not exceed 0.88 square inches round (one inch diameter). The length of the weight shall be as necessary to obtain 18, 16 and 5 ounces.

4.5.2.2 *Telescope handle and joint tightness test.* Type II, class 1 retrieving tools shall be capable of being positioned in, and holding any pre-set angle of the magnet or length of the handle. When the telescoping type handle is fully extended and the magnet is set at 90 degrees to the longitudinal axis of the handle, the outer handle shall be rotated (manually) through at least 360 degrees without evidence of the one or more inner handle sections slipping or sliding in the outer handle section. This test shall be conducted at least once with the longitudinal axis of the handle horizontal to the floor and once vertical (magnet positioned above handle).

4.6 *Inspection of preparation for delivery requirements.* An inspection shall be made to determine that packaging, packing and marking requirements of section 5 of this specification are complied with. Defects shall be scored in accordance with table V. For examination of contents the sample unit shall be one shipping container fully prepared for delivery selected 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. The inspection level shall be S-1 and the AQL shall be 1.5 defects per hundred units.

TABLE V.—*Classification of preparation for delivery defects*

Examine	Defect
Markings (exterior and interior)	Omitted; incorrect; illegible; or 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. Bulging or distortion of container.

5. PREPARATION FOR DELIVERY

(For civil agencies only, Fed. Std. No. 102 should be referred to for definitions of the various levels of packaging protection for supplies and equipment.)

5.1 Preservation and packaging. Preservation and packaging shall be level A or C, as specified (see 6.1).

5.1.1 *Level A.* Tools, preservation and packaging shall be in accordance with level A of MIL-H-15424.

5.1.2 *Level C.* Cleaning, preservation, and packaging shall be in accordance with the supplier's commercial practice.

5.2 Packing. Packing shall be level A, B, or C, as specified (see 6.1).

5.2.1 *Level A.* Tools packaged as specified (see 5.1), shall be packed in accordance with the level A requirements of MIL-H-15424.

5.2.2 *Level B.* Tools packaged as specified (see 5.1), shall be packed in accordance with the level B requirements of MIL-H-15424.

5.2.3 *Level C.* Tools packaged as specified (see 6.1), shall be packed in a manner to insure carrier acceptance and safe delivery destination. Containers shall be in accordance with rules or regulations of carriers as applicable to the mode of transportation.

5.3 Marking.

5.3.1 *Military agencies.* In addition to any special marking required by the contract or order or herein, interior and exterior shipping containers shall be marked in accordance with MIL-STD-129.

5.3.2 *Civil agencies.* Marking for shipment shall be in accordance with the standard marking of Fed. Std. No. 123.

6. NOTES

6.1 Ordering data. Purchasers should exercise any desired options offered herein

and procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type and class required (see 1.2).
- (c) Size of type I finger required (see tables I and II).
- (d) Plastic grip, if required (see 3.5.2.2) on type II, class 1, retrieving tools.
- (e) Selection of applicable levels of preservation, packaging and packing (see section 5).

6.2 Transportation description. Transportation descriptions and minimum weights applicable to this commodity are:

Rail:

Tools, not otherwise indexed by name.
Carload minimum weight 30,000 pounds.

Motor:

Tools, hand, not otherwise indexed.
Truckload minimum weight 30,000 pounds, subject to Rule 115, National Motor Freight Classification.

MILITARY INTEREST:

Custodians:

Army—GL
Navy—SH
Air Force—69

Review activities:

GL, MO
SH, MC
69

User activities:

SM, EL

Review/user information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current Federal Supply Classification Listing of DOD Standardization Documents.