

INCH-POUND

A-A-52412A

04 May 2011

SUPERSEDING

A-A-52412

November 3, 1992

## COMMERCIAL ITEM DESCRIPTION

### INCLINOMETER, BALL STYLE

The General Services Administration has authorized the use of this commercial item description (CID) as a replacement for MIL-I-62384A(AT) for all federal agencies.

1. **SCOPE.** This CID covers two types of ball-style inclinometers which are used to indicate the attitude of the vehicle with respect to the horizontal.

2. **CLASSIFICATION.** Inclinometers shall be of the types specified as follows (see 7.2 and 7.3):

- Type I - 0 to 20 degrees (°) scale
- Type II - 0 to 10° scale

### 3. SALIENT CHARACTERISTICS

3.1 **Materials and finishes.** All materials shall be corrosion-resistant type or suitably protected to resist corrosion.

3.1.1 **Color.** The inclinometer shall be dull black except for the rear portion behind the glass tube and marking which shall be white.

3.2 **Damping fluid.** The damping fluid shall be colorless and shall not interfere with satisfactory viewing of the ball.

3.3 **Design and construction.** The assembly shall be constructed so that no part will work loose in service and shall be built to withstand the strains, jars, vibrations, and other conditions in shipping, storage, installation, service, and environment.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to [DAMI\\_STANDARDIZATION@conus.army.mil](mailto:DAMI_STANDARDIZATION@conus.army.mil) or U.S. Army RDECOM, Tank Automotive Research, Development and Engineering Center, ATTN: RDTA-EN/STND/TRANS MS #268, 6501 E. 11 Mile Road, Warren, MI 48397-5000. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.daps.dla.mil>.

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3.4 Configuration. Inclinometers shall be as specified in figure 1.

3.4.1 Indicator. The indicator shall be made of black glass or similar material and be highly polished.

3.4.2 Tube. The glass tube shall be made of clear annealed glass tubing, free from defects which may interfere with normal reading of the inclinometer. The inside of the tube shall be smooth and uniform in order to ensure that the indicator will move smoothly. The tube shall be firmly secured in the frame. An expansion chamber shall be provided at each end of the tube. The tube wall thickness shall be as follows:

Type	Wall thickness
I	0.46 inch (in) [11.9 millimeter (mm)] minimum
II	0.39 in (9.9 mm) minimum

3.5 Air bubble visibility. The air bubble shall not be visible when the inclinometer is viewed from a position 12 in (300 mm) directly in front of the inclinometer zero mark with the inclinometer inclined to 20° [350 milliradians (mrad)] for type I and 10° (175 mrad) for type II.

3.6 Scale error. Scale error of the inclinometer shall not exceed the tolerance at degrees of inclination specified in table I.

Table I. Tolerance for degree of inclination.

Inclination				Tolerance			
Type I		Type II		Type I		Type II	
degrees	(mrad)	degrees	(mrad)	degrees	(mrad)	degrees	(mrad)
0	(0)	0	(0)	1.0	(18)	1.0	(18)
5	(88)	5	(88)	1.5	(26)	1.5	(26)
10	(175)	10	(175)	2.0	(35)	2.0	(35)
15	(263)	-	-	2.5	(44)	-	-
20	(350)	-	-	2.5	(44)	-	-

3.7 Indicator visibility. With the inclinometer tipped in such a manner that the indicator is at rest at either end of the tube, not less than half of the indicator shall be visible when viewed from a position 12 in (300 mm) directly in front of the zero mark of the inclinometer.

3.8 Damping. The elapsed time to move the indicator from zero mark to the maximum degree mark of the inclinometer for type I or type II shall not exceed indicator movement time at temperatures specified in table II.

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Table II. Damping time.

Indicator movement time	Temperature
0.5 sec	77 ± 18 °F (25 ± 10 °C)
10 sec	-26 °F (-32 °C)

3.9 Operating temperatures. The inclinometer shall not be damaged when exposed to temperatures of -65 °F (-54 °C) to 158 °F (70 °C).

3.10 Leakage. The size of the air bubble shall show no appreciable change after exposure to a temperature of 140 °F (60 °C) for 1 hour.

3.11 Relative humidity (nonoperating). The inclinometer shall not be damaged when exposed to a relative humidity of 2 percent at 155 °F (68 °C) and 100 percent at 86 °F (30 °C) for a period of 24 hours.

3.12 Atmospheric pressure (nonoperating). The inclinometer shall not be damaged when exposed to an atmospheric pressure equivalent to an altitude of 40,000 feet (ft) [12,192 meters (m)].

3.13 Salt fog. The inclinometer shall not show any signs of damage after being subjected to a 5 percent saline atmosphere for a 48 hour period.

3.14 Fungus resistance. The inclinometer shall be constructed of materials that will not support fungus growth.

3.15 Shock (nonoperating). The inclinometer shall not be damaged when exposed to half-sine wave shock impulses of 25 gravity units (g) applied along three mutually perpendicular axes for 11 milliseconds and have the velocity change ( $V_i$ ) of 6.8 feet per second (ft/sec) [2.1 meters per second (m/sec)].

3.16 Vibration (nonoperating). The inclinometer shall not be damaged when exposed to a simple harmonic motion applied along three mutually perpendicular axes at a peak acceleration of  $\pm 10$  g at all frequencies within a range of 55 to 2000 hertz (Hz) for type I and a range of 20 to 2000 Hz for type II. Frequency sweep time shall be logarithmic and sweep time shall be  $35 \pm 5$  minutes. In addition, the inclinometer shall withstand 5 minutes vibration at each observed resonant frequency.

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3.17 Marking. All markings shall be durable and permanent to withstand usage encountered in service and shall include the following information, as a minimum:

- a. Manufacturer's CAGE code.
- b. Operation markings.
  - Type I - see figure 1
  - Type II - see figure 2
- c. Part identification

3.18 Workmanship. The inclinometer shall be free of defects such as burrs, chips, sharp edges, cracks, unblended radii, surface defects, dirt, grease, corrosion products, or other foreign matter that would affect appearance and performance. All required marking shall be neat, sharply defined, and permanent.

4. REGULATORY REQUIREMENTS. The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

## 5. PRODUCT CONFORMANCE PROVISIONS

5.1 Product conformance. The products provided shall meet the salient characteristics of this Commercial Item Description, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial marketplace. The government reserves the right to require proof of such conformance.

6. PACKAGING. Preservation, packing, and marking shall be as specified in the contract or order (see 7.2).

## 7. NOTES

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

### 7.1 Addresses for obtaining copies of referenced documents.

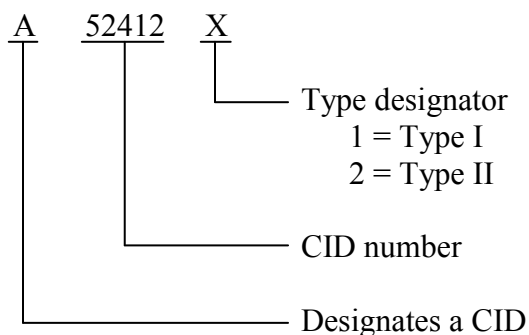
7.1.1 Non-Government publications. IEEE/ASTM SI10, "Use of the International System of Units (SI): The Modern Metric System," is available from [www.astm.org](http://www.astm.org), [www.ieee.org](http://www.ieee.org), or ASTM International, P.O. Box C700, West Conshohocken, PA 19428-2959.

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7.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this CID.
- b. If required, the specific issue of individual documents referenced (see 7.1.1).
- c. Specify type and PIN (see 2 and 7.3).
- d. Selection of applicable level of packaging requirements (see 6).

7.3 Part identification number (PIN). The PIN to be used for inclinometers acquired to this CID are as follows (see 2 and 7.2):



7.4 Cross reference data. Inclinometers conforming to this CID are interchangeable/substitutable with inclinometers conforming to MIL-I-62384A(AT) (see figures 1 and 2).

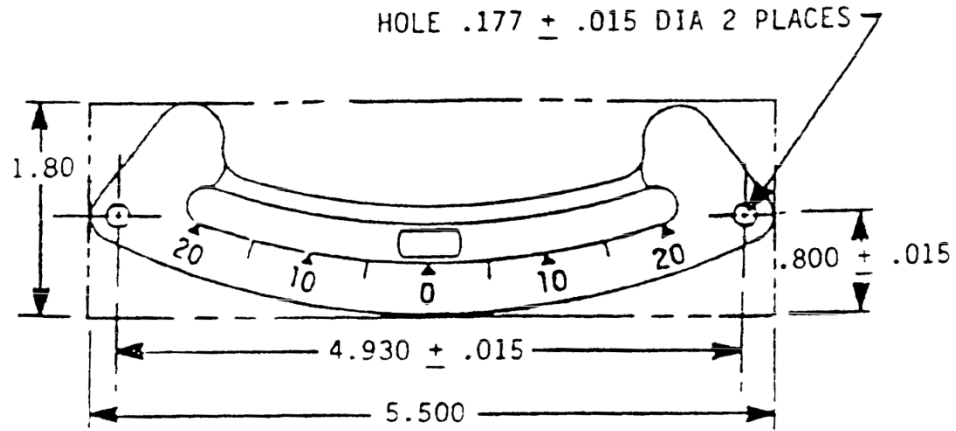
7.5 Metric product. Inclinometers that are to metric dimensions will be considered on the following basis:

- a. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within specified tolerances using conversion tables contained in the latest revision of IEEE/ASTM SI10, and all other requirements of this CID are met.
- b. 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 contracting officer to determine if the product is acceptable.
- c. The contracting officer has the option of accepting or rejecting the product.

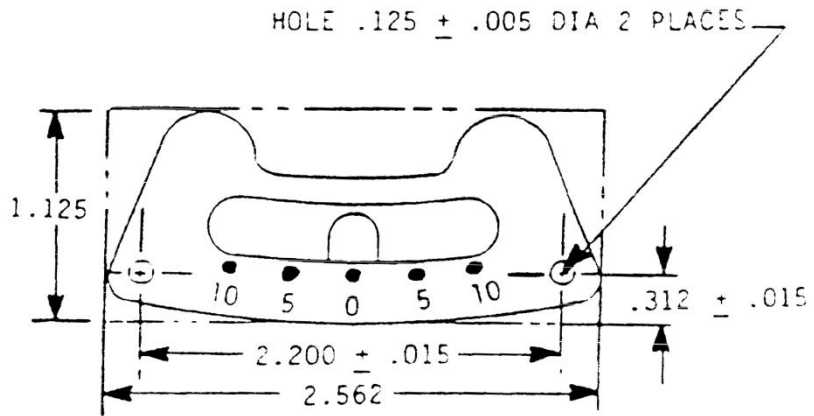
7.6 Key words.

Vehicle Attitude

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Type I



Type II

Type	PIN	Former Part Number
I	A 52412-1	12265593
II	A 52412-2	12265594

Note:

1. Envelope tolerances are shown in maximum dimensions except for mounting holes which shall be specified in envelope.
2. Inclinometer in envelope drawings are shown for reference purposes only.
3. Dimensions are in inches DO NOT SCALE.

Figure 1. Inclinometer.

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MILITARY INTERESTS:

Custodian:

Army – AT  
DLA - GS

CIVIL AGENCY COORDINATING ACTIVITY  
GSA - FAS

Preparing Activity:  
Army - AT

(Project 6695-2011-001)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.daps.dla.mil>.