INCH-POUND

A-A-52412(AT)
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), which is canceled.

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

1.1 Classification. Inclinometers shall be of the types specified as follows (see 5.2):

Type	Scale degree
I	0 to 20°
II	0 to 10°

2.0 Salient characteristics.

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

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

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

2.3 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.

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

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

Beneficial comments, recommendations, additions, deletions clarifications, etc. and any other data which may improve this document should be sent by letter to: U.S. Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, MI 48397-5000.

AMSC N/A **FSC 6695**

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

2.4.2 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 (1.19 mm) minimum
II	0.39 inch (.99 mm) minimum

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

2.6 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 degrees (mrad)	Type II degrees (mrad)	Type I degrees (mrad)	Type II 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)	- -

2.7 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 inches (300 mm) directly in front of the zero mark of the inclinometer.

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

TABLE II. Damping time.

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

reference rounds rounds, ten test rounds, five r

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

2.10 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.

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

2.12 Atmosphere pressure (nonoperating). The inclinometer shall not be damaged when exposed to an atmospheric pressure equivalent to an altitude of 40,000 feet (12,192 m).

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

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

2.15 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 (Vi) ft/sec of 6.8.

2.16 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 ± 10g 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 ± 5 minutes. In addition the inclinometer shall withstand 5 minutes vibration at each observed resonant frequency.

2.17 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 number (PIN) (see 5.3).

2.18 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.

3.0 Quality assurance provisions.

3.1 Responsibility for inspection. The contractor is responsible for the performance of all inspections (examinations and tests).

3.2 Contractor certification. The contractor shall certify and maintain substantiating evidence that the product offered meets the salient characteristics of this commercial item description and that the product conforms to the producer's own drawings, specifications, standards, and quality assurance practices. Items with known defects shall not be submitted for Government acceptance. The Government reserves the right to require proof of such conformance prior to the first delivery and thereafter as may be otherwise provided for under the provisions of the contract.

4.0 Preservation, packaging, packing, labeling, and marking. Preservation, packaging, packing, labeling, and marking shall be as specified in the contract or order (see 5.1).

5.0 Notes.

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

5.1 Ordering data. Acquisition documents must specify the following:

a. Title, number, and date of this CID.
b. Specify type and PIN number (see 1.1 and 5.2).
c. Selection of applicable level and packaging requirements (see 4).

5.2 Part identification number (PIN). The PIN to be used for inclinometers acquired to this CID are as follows:

A 52412 - X

- X: Type designator. 1 = Type I; 2 = Type II
- 52412: CID number.
- A: Designates a CID.

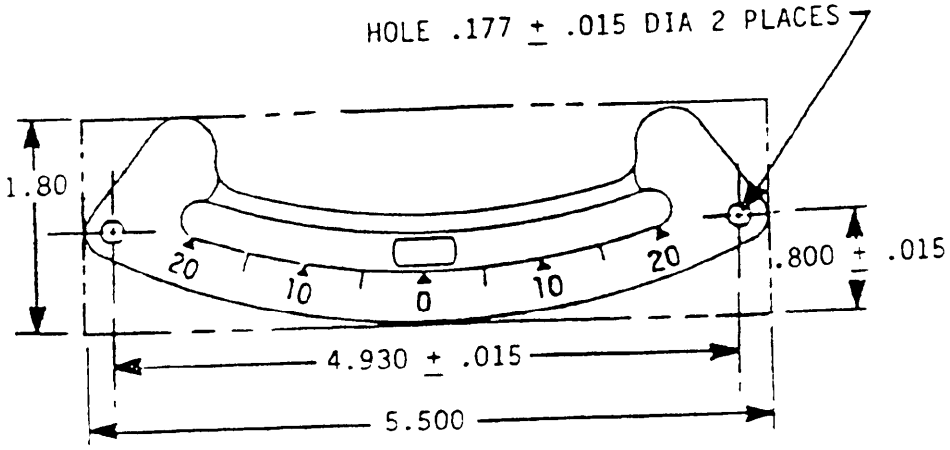
5.3 Cross-reference data. Inclinometers conforming to this CID are interchangeable/substitutable with inclinometers conforming to MIL-I-62384A(AT) (see figures 1 and 2).

5.4 Metric product. Inclinometers manufactured to metric dimensions will be considered on the following basis:

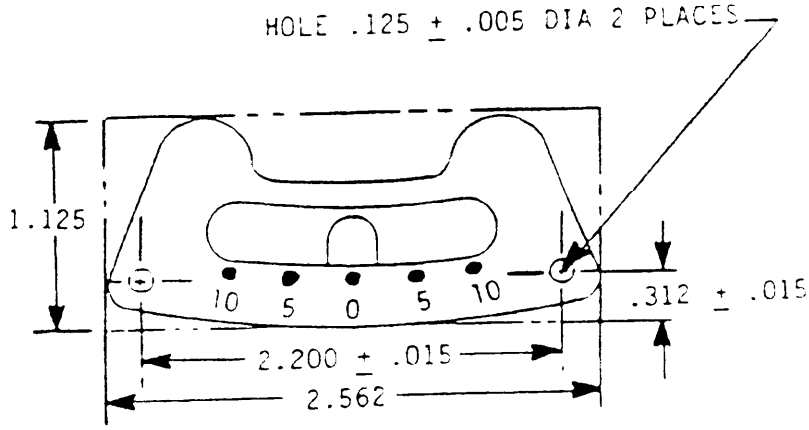
a. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within specified tolerances using conversion tables contained in the latest revision of ASTM E380, and all other requirements of this CID are met.

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.



Type I



Type II

NOTE:

1. Envelope tolerances are shown in maximum dimensions except for mounting holes which shall be as specified in envelope.
2. Inclinometer in envelope drawings are shown for reference purposes only.
3. Dimensions are in inches. DO NOT SCALE.
4. Cross reference of PINs to former part numbers are as follows:

Type	PIN No.	Former part no.
I	A 52412-1	12265593
II	A 52412-2	12265594

FIGURE 1. Inclinometer.

5.5 Regulatory requirements. The offeror/contractor is encouraged to use recovered materials in accordance with Public Law 94-580 to the maximum extent practicable.

Custodian:
Army - AT

Preparing activity:
Army - AT

(Project 6695-0100)