

[INCH-POUND]  
A-A-58051  
17 November 1995

## COMMERCIAL ITEM DESCRIPTION

### OPTICAL FLATS

The General Services Administration has authorized the use of this commercial item description as a replacement for GG-O-635A for all federal agencies.

#### 1. SCOPE.

1.1 Scope. This commercial item description (CID) covers optical flats used in laboratories, and in gage and inspection departments.

1.2 Intended use. Optical flats covered by this CID are intended for use with a monochromatic light source to determine flatness, parallelism or size of gages, by interpretation of light interference patterns and bands.

#### 2. CLASSIFICATION.

2.1 Classification. Optical flats covered by this CID shall be of the following types and classes. The type and class shall be as specified (see 7.2).

#### 2.2 Types and classes.

Type I - Reference flats

Class 1 - Single surface

Class 2 - Double surface

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any other data which may improve this document should be sent to: WR-ALC/LKJE, 460 Second Street, STE 221, Robins AFB GA 31098-1640.

AMSC N/A

FSC 5210

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**Type II - Master flats**

- Class 1 - Single surface
- Class 2 - Double surface

**Type III - Working flats**

- Class 1 - Single surface
- Class 2 - Double surface
- Class 3 - Double surface parallel

**3. SALIENT CHARACTERISTICS.**

3.1 **Design.** Flats of all types and classes shall be cylindrical in shape. Flats shall be designed to produce accurate, straight interference bands from edge to edge of the working surface when suitably illuminated by a monochromatic light, placed in contact with a known flat surface and normally viewed through the optical flat. The edges of the flats shall be beveled and smooth to avoid chipping at the edges. The working surfaces of the flats shall be optically polished to a flat surface. No zone of the working surfaces shall be out of flatness more than one-third of the total flatness tolerance. The working surfaces shall be free from measurable surface roughness or scratches visible to the naked eye.

3.2 **Material.** The material used in the optical flats shall be relatively clear, colorless, and free from extraneous matter. The material shall be free of manufacturing defects which would affect the functional characteristics of the flat. Occasional bubbles, not exceeding 0.05 inch (1.27 mm) in diameter nor two in any cubic inch, may be permitted provided they do not interfere with the viewing performance. The coefficient of expansion of the material shall not exceed 0.32 millionths per degree Fahrenheit (0.58 millionths per degree centigrade).

3.3 **Accuracy's.** Optical flats shall conform to the tolerances specified for the respective types and classes. The working surface shall be flat within the tolerance specified over the entire surface greater than 1/8 inch (3.2 mm) from the edge. The flatness tolerance shall be the total distance measured at a constant standard temperature of  $70^{\circ}\text{F} \pm 5^{\circ}\text{F}$  ( $21^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ) along a line parallel to the axes of the flat from the highest point on the surface to the lowest point on the surface. A calibration certification shall be furnished with each optical flat. Each certification shall indicate the deviation in millionths of an inch from true flatness, if any, and whether concave or convex.

3.3.1 **Small flats.** For optical flats of 4 inches (102 mm) diameter or less, the flatness tolerances shall be as follows:

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(a) Type I, reference flats. The flatness tolerance on the working surface shall not exceed plus or minus 0.000001 inches (0.000025 mm).

(b) Type II, master flats. The flatness tolerance on the working surfaces shall not exceed plus or minus 0.000002 inches (0.000051 mm).

(c) Type III, working flats. The flatness tolerance on working surfaces shall not exceed plus or minus 0.000004 inches (0.000102 mm).

3.3.2 Large flats. For optical flats larger than 4 inches (102 mm) in diameter, the flatness tolerances shall not exceed 1.5 times the tolerances specified in 3.3.1.

3.4 Classes. Optical flats shall be of the following classes.

3.4.1 Class 1. Class 1 optical flats shall have ground and polished ends and one surface shall be flat within the tolerance accuracy specified for the applicable type.

3.4.2 Class 2. Class 2 optical flats shall have ground and polished ends and both surfaces shall be flat within the tolerance accuracy specified for the applicable type.

3.4.3 Class 3. Class 3 optical parallel flats shall have both opposing working surfaces ground and polished. Both of these working surfaces shall have a flatness within plus or minus 0.000004 inches (0.000102 mm) and shall be parallel within 0.000004 inches (0.000102 mm) for a linear distance equaling the diameter of the flat. These parallel optical flats shall be clearly indicated with a double-ended arrow, along with the thickness in hundred-thousandths of an inch, marked along the cylindrical edge.

3.5 Working surface indications. The working surfaces of all types and classes of optical flats shall be indicated by arrows located on the cylindrical edges.

3.6 Dimensions.

3.6.1 Classes 1 and 2. Dimensions of classes 1 and 2 optical flats shall be as specified in Table I. The opposing flat surfaces shall be sufficiently parallel to prevent distortion of indicating lines. Optical flats shall be supplied singularly enclosed with a case.

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**TABLE I. Dimensions of classes 1 and 2 optical flats**

<u>Minimum Diameter (inches)</u>		<u>Minimum Thickness (inches)</u>	
1	(25.4 mm)	1/4	(6.3 mm)
1-1/4	(31.7 mm)	1/4	(6.3 mm)
2	(50.8 mm)	1/2	(12.7 mm)
3	(76.2 mm)	9/16	(14.2 mm)
4	(101.6 mm)	11/16	(17.4 mm)
5	(127 mm)	7/8	(22.2 mm)
6	(152.4 mm)	1	(25.4 mm)
8	(203.2 mm)	1-5/16	(33.3 mm)
10	(254 mm)	1-11/16	(42.8 mm)
12	(304.8 mm)	2	(50.8 mm)

3.6.2 Class 3. Dimensions of class 3 optical flats shall be as specified in Table II. Class 3 parallel flats shall be supplied in sets of two or four, as specified (see 7.2).

**TABLE II. Dimensions of class 3 parallel flats**

<u>Minimum Diameter (inches)</u>		<u>Thickness (inches) + 0.0001 in (0.00254 mm)</u>	
1	(25.4 mm)	0.50000	(12.70000 mm)
1	(25.4 mm)	0.50630	(12.86002 mm)
1	(25.4 mm)	0.51250	(13.01750 mm)
1	(25.4 mm)	0.51880	(13.17752 mm)

3.7 Case. The optical flats shall be supplied in a hinged case designed to prevent the flats from contacting one another. The case shall be able to be latched. The case shall provide maximum protection of the flats during handling and storage. The case shall be lined with a material that will prevent any scratches or abrasions to the flats while they are being stored or transported.

#### 4.0 REGULATORY REQUIREMENTS.

4.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirement, and promotes economically advantageous life cycle costs.

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4.2 Environmental protection. The optical flats shall meet all applicable Environmental Protection Agency restrictions in effect on the date of the contract. These regulations apply to the emission of materials hazardous to the environment or the operator's health and shall be met during the manufacturing, service, transportation, storage, and operation of the optical flats.

## 5.0 QUALITY ASSURANCE PROVISIONS.

5.1 Contractor certification. The contractor shall certify and maintain evidence that the product offered meets the salient characteristics of this CID, and that the product conforms to the producer's own drawings, specifications, standards, and quality assurance practices. The government reserves the right to require proof of such conformance prior to first delivery and thereafter as may be otherwise provided for under the provisions of the contract.

## 6.0 PACKAGING.

6.1 Preservation, packaging, packing, and marking. Preservation, packaging, packing, and marking shall be as specified in the contract or purchase order (see 7.2).

## 7.0 NOTES.

7.1 Part Identification Number (PIN). The following part identification numbering procedure is for government purposes and does not constitute a requirement for the contractor.

This example describes a part numbering system for CID A-A-XXX.

AAXXX - A 2

Type: A - Type I - Reference flats  
 B - Type II - Master flats  
 C - Type III - Working flats

Class: 1 - Class 1 - Single surface  
 2 - Class 2 - Double surface  
 3 - Class 3 - Double surface parallel

7.2 Ordering data. Acquisition documents must specify the following:

- a. Title, number, and date of this document
- b. Type and class of optical flats required (see 2.1)
- c. Parallel optical flats supplied, as specified (see 3.6.2)
- d. Packaging requirements, if required (see 6.1)

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7.3 National Stock Numbers (NSNs). The following is a list of NSNs assigned which correspond to this CID. The list may not be indicative of all possible NSNs associated with the CID.

<u>NSN</u>	<u>Type</u>	<u>Class</u>
5210-00-213-9058	III	2
5210-00-028-9208	I	2
5210-00-203-5371	I	1
5210-00-265-7069	II	2
5210-00-516-4076	III	1
5210-00-762-8966	I	1
5210-00-882-6636	II	2
5210-00-947-6293	II	2
5210-01-189-1619	II	1

7.4 Known sources. The following is a list of sources known to meet the requirements of this CID. The list may not be indicative of all possible sources.

<u>Company Name</u>	<u>Cage Code</u>
VAN KEUREN INC.	62679
DOALL CO.	18056
DAVIDSON OPTRONICS INC.	91141

## MILITARY INTERESTS:

## Custodians:

Air Force - 99

Army - GL

## Review Activities:

Army - CD, CE-1

## CIVIL AGENCY COORDINATING ACTIVITY:

GSA - FSS

## Preparing Activity:

Air Force - 84

## Agent Activity:

Air Force - 99

(Project 5210-0286)