

JIS

JAPANESE INDUSTRIAL STANDARD

**90 mm flexible disk cartridges
— 31831 ftprad**

JIS X 6226—1992

Translated and Published

by

Japanese Standards Association

Printed in Japan

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

この標準は、JIS X 6226 92 として制定された。

この標準は、JIS X 6226 92 として制定された。

この標準は、JIS X 6226 92 として制定された。

この標準は、JIS X 6226 92 として制定された。

この標準は、JIS X 6226 92 として制定された。

VI

この標準は、JIS X 6226 92 として制定された。

1. Scope

This standard specifies the characteristics of 90 mm flexible disk cartridges recorded at 31831 ftprad and 5.3 tracks/mm on each side. It specifies the construction, dimensions, the physical, mechanical, electrical and magnetic characteristics, and the track format to record data.

Remarks 1. This standard relates to the following reference standards.

- JIS G 4305—Cold rolled stainless steel plates, sheets and strip
- JIS X 0001—Glossary of terms used in information processing (fundamental terms)
- JIS X 0002—Glossary of terms used in information processing (arithmetic and logic operations)
- JIS X 0004—Glossary of terms used in information processing (organization of data)
- JIS X 0008—Glossary of terms used in information processing (control, integrity and security)
- JIS X 0012—Glossary of terms used in information processing (data media, storage and related equipment)
- JIS X 0201—Code for information interchange
- JIS X 0202—Information Processing — ISO 7-Bit and 8-Bit Coded Character Sets — Code Extension Techniques (ISO 2022:1986)
- JIS X 0208—Code of the Japanese graphic character set for information interchange
- JIS X 0605—Volume and file structure of flexible disk cartridges for information interchange

2. This standard conforms to the following international standard.

- ISO/IEC DIS 10994 Data interchange on 90 mm flexible disk cartridges using MFM recording at 31831 ftprad on 80 tracks on each side — ISO type 303

2. Definitions of terms

For the purposes of this standard, the following definitions apply. Other terms and the definitions are given in JIS X 0001, JIS X 0002, JIS X 0004, JIS X 0008 and JIS X 0012.

- (1) Flexible disk cartridge A flexible, information recording medium (hereinafter called flexible disk) to magnetically record and retain data of the information processing and the related system. The data is recorded on each side of disk enclosed in a case.
- (2) Hub A centering and referencing device attached to the disk which allows torque to be transmitted to the disk. The hub is attached to the center of the disk. It ensures centering of the disk on the drive shaft in a unique angular position.

- (3) Shutter A device which uncovers the head windows upon insertion, and automatically covers them upon removal from the drive.
- (4) Liner Suitable material positioned between the case and the disk to provide cleaning action and protection from abrasion.
- (5) Case shutter mechanism A disk protective enclosure including an identification hole and a write-inhibit hole.
- (6) Write-inhibit hole A through hole of the case to inhibit writing when the hole is open.
- (7) Identification hole A through hole of the case to identify the flexible disk of this standard.
- (8) Master standard reference flexible disk A reference flexible disk selected as the standard for reference fields, signal amplitudes, resolution, peak shift, and reference erase field. The characteristics of this flexible disk are specified by International Standard Organization (ISO).
- (9) Secondary standard reference flexible disk A flexible disk the performance of which is known and stated in relation to the master standard reference flexible disk. The performance relates to deviation in electrical and magnetic properties. This flexible disk permits comparison of electrical and magnetic properties between the flexible disk to be tested and the master standard reference flexible disk.

Informative

reference: Secondary standard reference flexible disk can be ordered from the organization with the specifications shown in Informative reference 3.

Note: Secondary standard reference flexible disk can be ordered from the organization with the specifications shown in Reference 3.

- (10) Typical field The minimum recording field which, when applied to a flexible disk, causes an average signal amplitude equal to 95% of the maximum output (saturation value) when taken at the specified track and flux transition density.
- (11) Average signal amplitude The average signal amplitude for a track is the arithmetically averaged value of the output voltages measured peak-to-peak (P-P) over the whole track.
- (12) Peak value The crest value (O-P) as with the reproduced output voltage 0V being as a reference.
- (13) Standard reference amplitude The standard reference amplitude (SRA) is the average signal amplitude derived from the reference tracks of the master standard reference flexible disk by recording and reading with the specified flux transition density.

If SRA of track 00 shall be designated as SRA_{1f}, and 2f SRA of track 79, as SRA_{2f}.

- (14) Erasability The erasability is the ratio (percentage) of the residual average signal amplitude, after erasing the original signal, to the original average signal amplitude on the specified track and at the specified flux transition density.
- (15) Reference erase field The reference erase field is the DC field which causes an erasability of 5% when measured for the master standard reference flexible disk.
- (16) MFM recording system The system of flux transition where it occurs at the center of bit cell for data ONE, and it occurs at the boundary of bit cell for data ZERO when the ZEROs continue.

3. Construction

A metallic hub is attached to the center of a disk. The disk is enclosed in a case. The inside of the case has liners. The head windows are covered with a shutter. The construction is illustrated in Figs. 1 to 5.

The case has a hub access hole on one side, and a head window, write-inhibit hole and identification hole on both sides.

The case has two sides. Side 0 is the side engaged by the spindle. Side 1 is the opposite side.

4. Shape and dimensions

4.1 Case The shape and dimensions are as follows.

- (1) Reference lines and reference plane As shown in Fig. 1, the reference line X is a straight line passing the center of the first reference hole and the center of the second reference hole. The reference line Y is a line which passes the center of the first reference hole and is perpendicular to the line X. As shown in Fig. 2, the reference plane XY is a plane on Side 0 which corresponds to the shaded area in the illustration.

Fig. 1. Flexible disk (side 0)

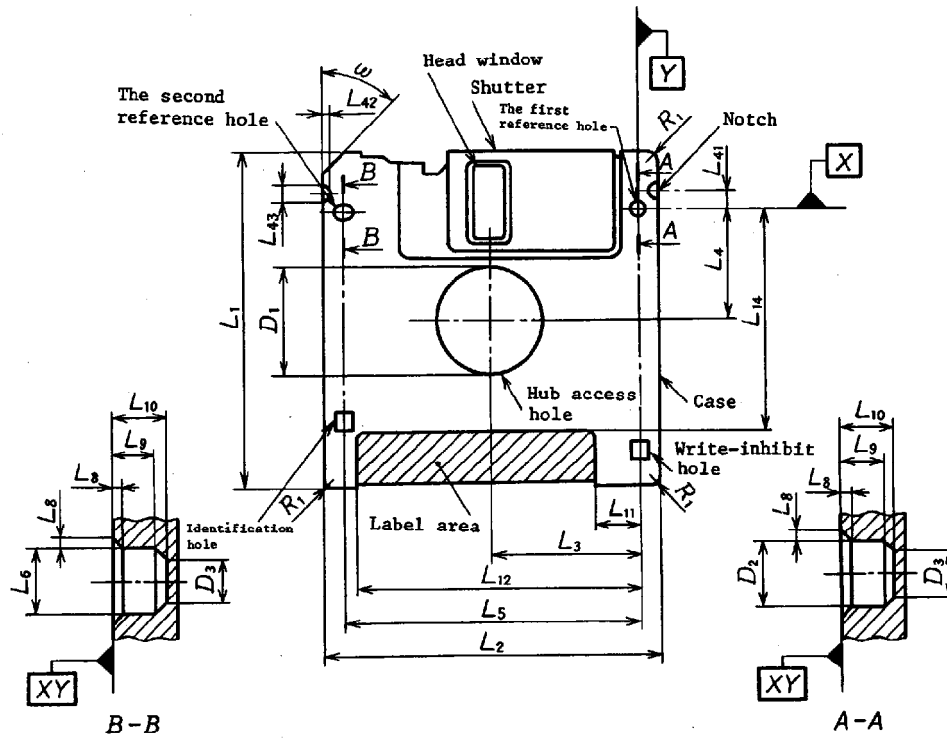
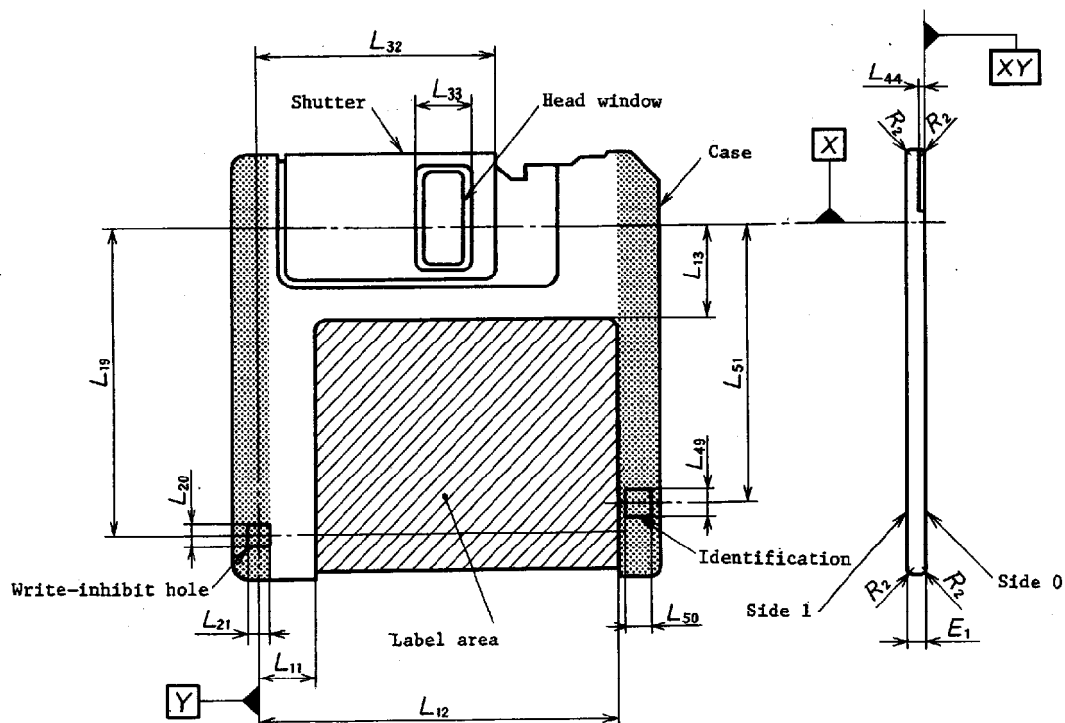


Fig. 2. Flexible disk (side 1)



- (2) Dimensions The case has a rectangular form. The lengths (L_1 , L_2) of two sides, the radius (R_1) of three of its corners, and the angle (ω) of its fourth corner shall be as follows and specified in Fig. 1.

$$L_1 = 94.0 \pm 0.3 \text{ mm}$$

$$L_2 = 90.0^{+0.4}_{-0.1} \text{ mm}$$

$$R_1 = 2.0 \pm 1.0 \text{ mm}$$

$$\omega = 45 \pm 2^\circ$$

- (3) Thickness The thickness (E_1) of the case, is the area extending 8.5 mm from each of the two edges (the shaded areas as shown in Fig. 2), and the edge radius (R_2) shall be as follows.

$$E_1 = 3.3 \pm 0.2 \text{ mm}$$

$$R_2 = 0.40 \pm 0.25 \text{ mm}$$

When the flexible disk is inserted in the test gauge with a vertical wall specified in Appendix 1, a force of 0.2 N maximum, applied to the disk, shall cause the disk to drop through the gauge.

- (4) Hub access hole The locations (L_3 , L_4) and the diameter (D_1) of hub access hole shall be as shown in Fig. 1 and as follows.

$$L_3 = 40.00 \pm 0.15 \text{ mm}$$

$$L_4 = 31.00 \pm 0.15 \text{ mm}$$

$$D_1 \geq 26.50 \text{ mm}$$

- (5) Locating holes

- (a) Primary locating hole The center of the primary locating hole shall be at the intersection of Reference Axes X and Y. The dimensions (L_8 , L_9 , L_{10} , D_2 , D_3) shall be as shown in Fig. 1 and as follows.

$$L_8 = 0.2 \pm 0.1 \text{ mm}$$

$$L_9 \geq 1.0 \text{ mm}$$

$$L_{10} \geq 2.5 \text{ mm}$$

$$D_2 = 3.6 \pm 0.1 \text{ mm}$$

$$D_3 \geq 1.5 \text{ mm}$$

- (b) Secondary locating hole The center of the secondary locating hole shall be on Reference Axis X. Its distance (L_5) from Reference Axis Y, and the dimensions (L_6 , L_7) shall be as specified in Figs. 1 and 3, and as follows.

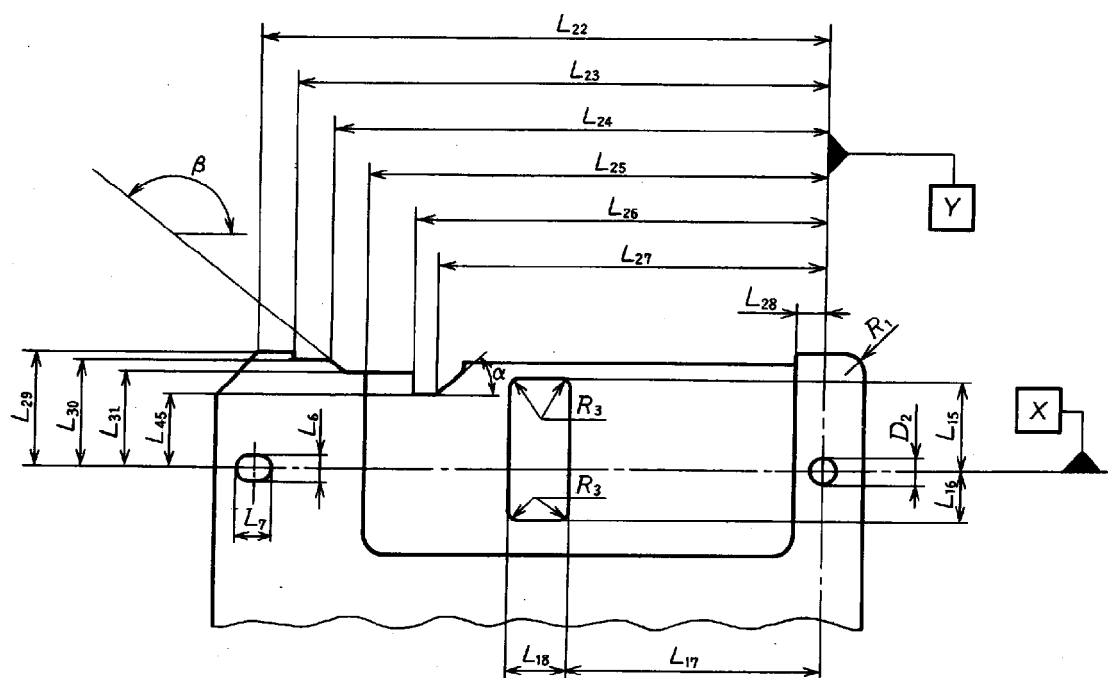
$$L_5 = 80.0 \pm 0.2 \text{ mm}$$

$$L_6 = 3.6 \pm 0.1 \text{ mm}$$

$$L_7 = 4.4 \pm 0.2 \text{ mm}$$

The dimensions of the secondary locating hole (L_8 , L_9 , L_{10} , D_3) shall be as specified in (a).

Fig. 3. Enlarged view of top part of flexible disk (side 0)



(6) Label area

- (a) Side 0 The label area of side 0 shall be the shaded areas as shown in Fig. 1. The defining dimensions (L_{11} , L_{12} , L_{14}) shall be as follows.

$$L_{11} \geq 3.5 \text{ mm}$$

$$L_{12} \leq 76.5 \text{ mm}$$

$$L_{14} \geq 60.0 \text{ mm}$$

- (b) Side 1 The label area of side 1 shall be the shaded areas as shown in Fig. 2. The defining dimensions (L_{11} , L_{12} , L_{13}) shall be as follows.

$$L_{11} \geq 3.5 \text{ mm}$$

$$L_{12} \leq 76.5 \text{ mm}$$

$$L_{13} \geq 20.0 \text{ mm}$$

- (7) Head windows The locations (L_{15} to L_{17}), width (L_{18}), and the radius (R_3) of the four corners shall be as shown in Fig. 3 and as follows.

$$L_{15} \geq 12.3 \text{ mm}$$

$$L_{16} \geq 11.5 \text{ mm}$$

$$L_{17} = 35.5 \pm 0.2 \text{ mm}$$

$$L_{18} = 9.00 \pm 0.20 \text{ mm}$$

$$R_3 = 0.5 \pm 0.1 \text{ mm}$$

- (8) Write-inhibit hole The center of the write-inhibit hole shall be on Reference Axis Y. The distance (L_{19}) from Reference X, and the dimensions (L_{20} , L_{21}) shall be as shown in Fig. 2 and as follows.

$$L_{19} = 67.75 \pm 0.25 \text{ mm}$$

$$L_{20} \geq 3.5 \text{ mm}$$

$$L_{21} \geq 4.0 \text{ mm}$$

- (9) Identification hole The dimensions (L_{49} , L_{50}) and the location of center (L_5 , L_{51}) shall be as shown in Figs. 1 and 2 and as follows.

$$L_{49} \geq 3.5 \text{ mm}$$

$$L_{50} \geq 4.0 \text{ mm}$$

$$L_{51} = 62.25 \pm 0.25 \text{ mm}$$

- (10) Profile of the shutter edge of the case The edge on which the shutter is mounted shall have a profile defined by the following dimensions (L_{22} to L_{31} , L_{45}), and indent angles (α, β), as shown in Fig. 3.

$$L_{22} = 80.0 \pm 0.2 \text{ mm}$$

$$L_{23} = 76.0 \pm 0.3 \text{ mm}$$

$$L_{24} = 68.0 \pm 0.3 \text{ mm}$$

$$L_{25} = 64.50 \pm 0.35 \text{ mm}$$

$$L_{26} = 57.00 \pm 0.35 \text{ mm}$$

$$L_{27} = 55.5 \pm 0.6 \text{ mm}$$

$$L_{28} \geq 3.5 \text{ mm}$$

$$L_{29} = 17.5 \pm 0.2 \text{ mm}$$

$$L_{30} = 17.00 \pm 0.15 \text{ mm}$$

$$L_{31} = 15.50 \pm 0.25 \text{ mm}$$

$$L_{45} = 12.50 \pm 0.25 \text{ mm}$$

$$\alpha = 45 \pm 2^\circ$$

$$\beta = 135 \pm 2^\circ$$

- (11) Shutter In the open position of the shutter, the distance (L_{32}) from Reference Y, and the window width (L_{33}) shall be as specified in Figs. 2 and 3, and as follows.

$$L_{32} = 53.75 \pm 1.25 \text{ mm}$$

$$L_{33} = 12.0 \pm 0.2 \text{ mm}$$

The traveling range of shutter is from L_{25} to L_{28} .

4.2 Liner No part of the liner shall protrude by more than 0.2 mm into the head access windows.

4.3 Disk Disks shall be as follows.

- (1) Dimensions The diameter (D_4) and thickness (E_2) shall be as specified in Fig. 4, and as follows.

$$D_4 = 85.8 \pm 0.2 \text{ mm}$$

$$E_2 = 0.080 \pm 0.008 \text{ mm}$$

- (2) Effective area of magnetic layer The area of magnetic layer shall be the area limited by two radii.

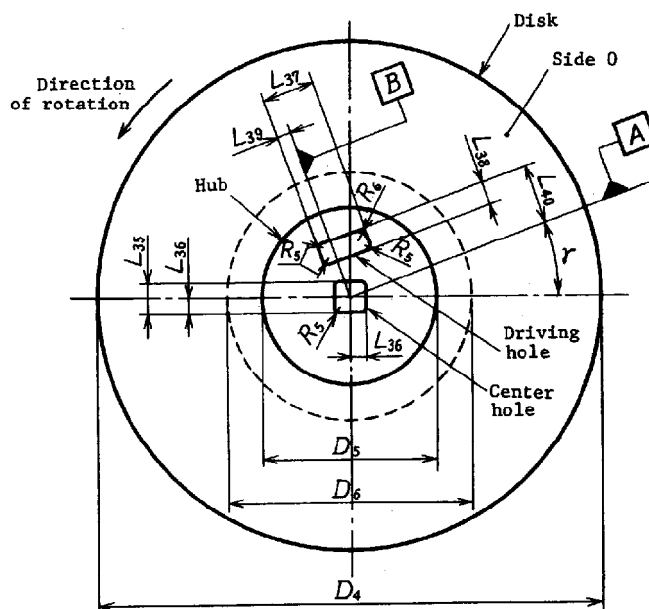
$$\text{Inner diameter} = 20.6 \text{ mm}$$

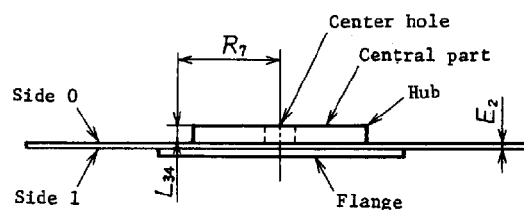
$$\text{Outer diameter} = 42.0 \text{ mm}$$

- (3) Recording surface Side 0 is the side having the hub access hole. Side 1 is the opposite side.

4.4 Hub The hub shall have a central part and a flange as shown in Fig. 4.

Fig. 4. Disk and hub





- (1) **Dimensions** The diameter (D_5) of the central part, the diameter (D_6) of the flange, the distance (L_{34}) from the surface of the central part to the surface of Side 0, and the radius (R_7) at the measurement position of L_{34} shall be as specified in Fig. 4 and as follows.

$$D_5 = 25.00 \begin{smallmatrix} 0 \\ -0.15 \end{smallmatrix} \text{ mm}$$

$$D_6 \leq 31.15 \text{ mm}$$

$$L_{34} = 1.36 \pm 0.10 \text{ mm}$$

$$R_7 : 14 \text{ mm nominal}$$

- (2) **Hub orientation holes** The hub shall have two orientation holes. The first one is the center hole, and the second is the driving hole.

- (a) **Center hole** The length (L_{35}) of one side of a square, the distance (L_{36}) from the rotation center of disk, and the radius (R_5) of the corner shall be as specified in Fig. 4 and as follows.

$$L_{35} \geq 4.00 \text{ mm}$$

$$L_{36} = 1.995 \text{ mm}$$

$$R_5 = 1.0 \pm 0.3 \text{ mm}$$

The center of rotation of the disk shall be within 0.5 mm of the geometric center of the disk. The position of the center of disk rotation shall be measured by two sides of two L_{36} holes as shown in Fig. 4.

- (b) **Driving hole** The position and dimensions of the sides of the rectangular driving hole are referred to two Reference Lines A and B that are perpendicular to each other. The angle (γ), the length (L_{37} , L_{38}) of the sides of this hole, the distance (L_{39} , L_{40}) from Reference Lines A and B, the radius (R_5) of the three corners, and the radius (R_6) of the fourth corner shall be as specified in Fig. 4 and as follows.

$$\gamma = 15 \pm 3^\circ$$

$$L_{37} = 8.0 \pm 0.3 \text{ mm}$$

$$L_{38} \geq 4.5 \text{ mm}$$

$$L_{39} = 2.0 \pm 0.2 \text{ mm}$$

$$L_{40} = 10.00 \pm 0.15 \text{ mm}$$

$$R_5 = 1.0 \pm 0.3 \text{ mm}$$

$$R_6 = 2.0 \pm 0.1 \text{ mm}$$

4.5 Optional handling notches Two handling notches are permitted. If present they shall satisfy the following requirements. The distance (L_{41}) from Reference Axis X, the dimensions (L_{42} , L_{43}), and the depth (L_{44}) below the Reference Plane XY shall be as specified in Figs. 1 and 2, and as follows.

$$L_{41} = 7.50 \pm 0.15 \text{ mm}$$

$$L_{42} \geq 3.0 \text{ mm}$$

$$L_{43} = 4.2 \pm 0.2 \text{ mm}$$

$$L_{44} \geq 2.0 \text{ mm}$$

4.6 Interface between flexible disk and drive When the flexible disk is inserted into the drive, the dimensions shall be as specified below and in Fig. 5. They are: the distance (L_{46}) between the surface of the central part of hub and plane XY, the thickness (E_3) from Side 1 of the case to the center plate, the outer diameter (D_7) of center plate, the thickness (E_4) of the annular zone, and the locations (L_{47} , L_{48}).

$$L_{46} : 0.3 \text{ mm nominal}$$

$$D_7 \geq 7.0 \text{ mm}$$

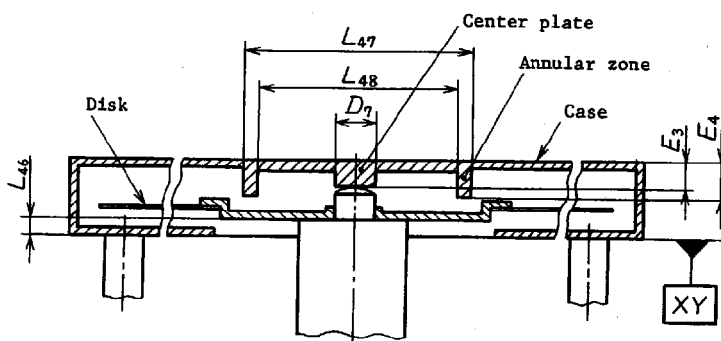
$$E_3 = 1.3 \pm 0.1 \text{ mm}$$

$$E_4 \leq 2.5 \text{ mm}$$

$$L_{47} \leq 22.6 \text{ mm}$$

$$L_{48} = 21.7 \pm 0.2 \text{ mm}$$

Fig. 5. Cartridge/drive interface



4.7 Compliance When the flexible disk is constricted in the manner described in Appendix 2, Fig. 1, the disk shall be in contact with four posts (P_1 to P_4).

5. Materials

5.1 Case The case may be constructed from any suitable material (e.g. ABS resin).

5.2 Liner The material of the liner shall be able to retain dust or debris without damage to the disk (e.g. nonwoven fabric).

5.3 Disk The disk may be constructed from any suitable material (e.g. bi-axially oriented polyethylene terephthalate) coated on both sides with a flexible layer magnetic material (e.g. barium ferrite).

5.4 Hub The hub shall be made of any material having suitable magnetic property (e.g. SUS 430 according to JIS G 4305).

6. Track

6.1 Number of tracks In the effective area of the magnetic layer, there shall be 80 tracks on each side of the disk.

6.2 Track number The track number shall be a two-digit decimal number, starting at the outermost track, and ranging from 00 to 79.

6.3 Widths of tracks The width of a recorded track shall be 0.115 ± 0.008 mm.

The method of measuring track width is given in Appendix 3.

6.4 Track location The track location shall be specified as follows.

- (1) Relationship between track number and track radius The nominal radius (R_n) of the centerlines of all tracks shall be calculated by using the formula:

$$R_n = X - 0.1875 n$$

where, R_n : nominal radius of centerlines of track (mm)

X : 39.500 mm for Side 0, and 38.000 mm for Side 1

n : track number (00 to 79)

- (2) Allowance of track radius The tolerance of each track radius when measured in the test environment specified in 13.1.1. shall be ± 0.020 mm.

7. Physical and mechanical properties

7.1 Flammability The disk, case and liner components shall be made from materials that, if ignited from a match flame, do not continue to burn in a still carbon dioxide atmosphere.

7.2 Coefficient of linear thermal expansion of the disk The coefficient of the linear thermal expansion of the disk shall be $(17 \pm 8) \times 10^{-6}/^{\circ}\text{C}$.

7.3 Coefficient of linear hygroscopic expansion of the disk The coefficient of linear hygroscopic expansion of the disk shall be $(0 \text{ to } 15) \times 10^{-6}/\% \text{RH}$.

7.4 Torque The starting torque and the running torque shall be specified as follows.

- (1) Starting torque The starting torque, without the heads loaded, shall not exceed 0.006 Nm.
- (2) Running torque The torque necessary to turn the disk shall be in the range 0.0005 Nm to 0.0025 Nm when the disk is in operation at a speed of 300 ± 3 rpm.

7.5 Shutter resistance force The minimum resistance force at the fully closed position shall be 0.2 N, and the maximum resistance force at the fully open position shall be 1 N.

7.6 Write-inhibit hole The write-inhibit hole is intended for use with a mechanical switch or with an optical detector. When covered, the closure device shall not exceed outside the Reference Plane XY of the case. The closure device shall not deflect by more than 0.3 mm from the Reference Plane XY under the action of a force of 3 N.

When covered, the light transmittance of the write-inhibit hole shall not exceed 1%, when measured with an optical system as described in Appendix 4.

8. Electrical and magnetic properties

8.1 Test conditions The test conditions of electrical and magnetic properties shall be specified as follows (See Appendix 5.).

- (1) Head The drive shall have a combined head consisting of an erase head and a read/write head. The erase head shall be located ahead of the read/write head, so that it erases previously written data before the new data is written by the read/write head.

The gap width of the erase head shall be larger than that of the read/write head, to prevent previously written data from being left on either side of the newly written data.

- (2) Flux transition frequency The test frequencies, expressed in flux transitions per second (ftps) shall be:

$$1f = 500000 \pm 500 \text{ ftps}$$

$$2f = 1000000 \pm 1000 \text{ ftps}$$

- (3) Test recording current The test recording current shall be the current between 198% and 202% of the current which produces the Reference Field at the test frequency 2f on Track 79.
- (4) Test erase current The test erase current shall be the current between 148% and 152% of the erase current which produces the Reference Erase Field at the test frequency 1f on Track 00.