

Specification for

Magnetic single-disk cartridges (top loading) for data processing —

Part 1: Mechanical and magnetic
properties

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Foreword

This British Standard has been authorized by the Data Processing Industry Standards Committee.

Work on magnetic disk packs began at the International Organization for Standardization (ISO) in 1968 with the setting up of a working group, now a sub committee, under the secretariat of Germany. The first project to be undertaken, the standardization of a six-disk pack, has now been completed. Work on a British Standard for the six-disk pack went ahead simultaneously and resulted in the publication of BS 4850:1972 (Parts 1 and 2).

Attention was then turned to projects dealing with a magnetic eleven-disk pack and a magnetic single-disk cartridge of the type which is loaded onto its drive spindle from the top. BS 5356-1 (based on ISO 3562) specifies the physical and magnetic characteristics and BS 5356-2 (based on ISO 3563) specifies the track format of the single-disk cartridge; BS 5359 (based on ISO 3564) specifies the physical and magnetic characteristics of the eleven-disk pack.

This British Standard is based on ISO 3562, to which it conforms in all essential particulars. The principle adopted has been to specify those characteristics which are necessary for interchange, so that manufacturers will be able to retain some individual design features, whilst incorporating those essential for interchange. Although the parameters quoted have been based on existing materials and methods, wherever possible the use of alternatives which would maintain the original requirements has been permitted.

Certification. Attention is drawn to the certification facilities described on the inside back cover.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 24, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1 Scope

Part 1 of this British Standard specifies the mechanical and magnetic characteristics of magnetic single-disk cartridges (top loading) from different sources necessary for interchange between different data processing systems.

NOTE Track format is specified in Part 2.

2 References

The titles of the publications referred to in this standard are listed on the inside back cover.

3 General requirements

After exposure to the range of conditions specified in this Part of BS 5356, the disk cartridge shall meet all the other requirements of this Part and of Part 2.

4 Description

4.1 Main elements. A typical single-disk cartridge is represented in Figure 1, Figure 2 and Figure 3.

The main elements are

- top cover
- seal inserted in the rim of the top cover
- recording disk
- disk hub
- armature plate
- protective cover
- removable cover

4.2 Other elements. Only the main elements are shown in the drawings. Disk cartridges generally comprise also a handle, a mechanism for disconnecting the removable cover from the position of Figure 2 so that it can be placed in the position of Figure 3, and means for removing the disk cartridge from the drive. These other elements are not represented as they are not part of BS 5356.

4.3 Non-working and working positions. Figure 2 shows the cartridge in the unmounted condition, in which the removable cover is maintained in contact with the seal in the top cover so as to prevent ingress of dirt and contamination. A means shall be provided to restrain the disk safely and securely within the cartridge during operator handling, transit, etc.

Figure 3 shows the cartridge in the mounted position, with the removable cover on top of the cartridge. In this position the rim of the removable cover lies on the upper surface of the rim of the top cover. Not represented is the mechanism of the disk drive which exerts a downward retaining force on the pressure area of the removable cover.

4.4 Direction of rotation. The recording disk shall rotate anti-clockwise when viewed from the top.

Section 2. Dimensions (measured under the conditions specified in 15.3)

5 Overall external dimensions (see Figure 4)

5.1 External diameter. The maximum external diameter of the cartridge is that of the rim of the top cover, d_1 (see 6.2).

5.2 External height. The external height h_1 shall be 62 mm maximum.

6 Top cover with protective cover (see Figure 5 to Figure 8)

6.1 Reference axis. The reference axis is a line through the centre of the cartridge from which all angles and certain dimensions are derived (see X-X in Figure 6).

6.2 Outside diameter of the rim. The outside diameter of the rim of the top cover d_1 shall be 381.3 ± 0.5 mm.

6.3 Inside diameter of the rim. The inside diameter of the rim of the top cover d_2 shall be 370.3 ± 0.4 mm.

This dimension shall apply both above and immediately below the rim.

6.4 Height below the rim. The height of the top cover below its rim h_2 shall be 32.90 ± 0.13 mm.

6.5 Head window

6.5.1 Location. The location of the head window shall be defined by the angles

$$\beta_1 = 11^\circ 0' \pm 15' \text{ and}$$

$$\beta_2 = 7^\circ 0' \pm 15'.$$

6.5.2 Edges. The distance of the upper edge of the head window from the rim of the top cover h_3 shall be 4.0 mm maximum.

The distance of the lower edge of the head window from the rim of the top cover h_4 shall be 30.7 mm minimum.

6.6 Brush window

6.6.1 Location. The location of the brush window shall be defined by the angles $\gamma_1 = 58^\circ$ minimum and $\gamma_2 = 18^\circ 31'$ maximum.

6.6.2 Edges. The distance of the upper edge of the brush window from the rim of the top cover h_5 shall be 7.0 mm maximum.

The distance of the lower edge of the brush window from the rim of the top cover shall be the same as h_4 (see 6.5.2).

6.7 Brush area (see Figure 7)

6.7.1 Location. The location of the brush area shall be defined by the angle $\delta = 52^\circ$ nominal and the radius $r_1 = 220$ mm nominal.

6.7.2 Dimension. The brush area shall be a sector of a circle. Its minimum surface shall be defined by the radius (centred as defined by δ and r_1) $r_2 = 120$ mm nominal.

6.8 Notches (see Figure 5 and Figure 6). The top cover shall include four notches N_1, N_2, N_3, N_4 .

6.8.1 Location of notches. The location of notch N_1 shall be defined by the angle $\alpha_1 = 20^\circ 0'$ nominal.

The location of notch N_2 shall be defined by the angle $\alpha_2 = 20^\circ 0'$ nominal.

The location of notch N_3 shall be defined by the angle $\alpha_3 = 64^\circ 0'$ nominal.

The location of notch N_4 shall be defined by the angle $\alpha_4 = 51^\circ 0' \pm 15'$.

6.8.2 Depth of notches. All four notches shall have the same minimum depth defined by radius $r_8 = 176.83$ mm maximum.

6.8.3 Width of notches. Notches N_1, N_2 and N_3 shall have the same width $w_1 = 12.7$ mm minimum.

Notch N_4 shall have a width $w_2 = 8.23 \pm 0.13$ mm.

6.8.4 Edge. The distance of the upper edge of the notches from the rim of the top cover h_6 shall be 23.0 mm maximum.

6.8.5 Inside radii. No inside radius shall exceed 0.5 mm.

6.9 Seal

6.9.1 Location. The seal shall be inserted in the lower surface of the rim of the top cover in a location defined by the diameters d_1 and d_2 (see 6.2 and 6.3).

6.9.2 Other requirements. The material of the seal shall be such that the seal does not protrude from the lower surface of the rim when the cartridge is in the mounted position with the removable cover in the position of Figure 3 and with the pressure applied to it as defined in 20.2.

6.10 Opening for the index transducer

6.10.1 Location. The location of the opening for the index transducer shall be defined by the distance $a = 14.5 \pm 0.5$ mm and radius $r_3 = 112.5 \pm 0.5$ mm.

6.10.2 Width. The width of the opening for the index transducer w_3 shall be 29.0 ± 0.5 mm.

6.10.3 Depth. The distance of the bottom of the opening for the index transducer below the rim of the top cover h_7 shall be 25.7 mm maximum.

7 Removable cover, pressure area (see Figure 9)

The removable cover shall incorporate a pressure area which is defined as follows.

7.1 Nominal radius. The radius of the pressure area r_4 shall be 169.0 mm nominal.

7.2 Limits. The limits of the pressure area shall be defined by the radii

$$r_5 = 167.0 \text{ mm nominal and}$$

$$r_6 = 182.0 \text{ mm nominal.}$$

7.3 Height over the rim of the top cover. The height h_8 of the pressure area at radius r_4 over the lower surface of the rim of the top cover shall be 45.5 ± 1 mm.

7.4 Slope. At radius r_4 the slope of the pressure area shall be defined by the angle

$$\epsilon = 13^\circ \pm 2^\circ.$$

7.5 Rigidity. The rigidity of the removable cover shall be such that under the locking force specified in **20.2**, it retains all dimensions specified in **7.1** to **7.4**.

8 Disk (see Figure 10 and Figure 11)

8.1 Diameter. The diameter d_3 of the disk shall be 356.25 ± 0.15 mm.

8.2 Thickness. The thickness e_1 of the disk shall be 1.27 ± 0.05 mm.

8.3 Disk edge relief. For a distance $b = 1.3$ mm maximum from the outside edge of the disk, the disk contour may be relieved within the extended boundaries of the disk surfaces.

8.4 Location of magnetic surface. The area of the magnetic surface shall extend from a minor diameter of 208.3 mm maximum to a major diameter of 353.6 mm minimum.

9 Disk hub (see Figure 10)

9.1 Diameter. The diameter d_4 of the disk hub shall be 187.45 mm maximum.

Up to a height $h_9 = 7.5$ mm from the lower surface of the armature plate, the diameter d_5 of the hub shall be 145.0 mm maximum.

9.2 Bore

9.2.1 Bore angle. The angle θ of the conical bore shall be $40^\circ 0' + 10', - 0'$.

9.2.2 Bore upper diameter. The diameter d_6 of the upper hole of the hub shall be 8.00 ± 0.25 mm.

9.2.3 Bore finish. The finish of the bore shall have a maximum arithmetical mean deviation of $3.2 \mu\text{m}$.

9.3 Compliance. With the disk hub supported by the armature plate, a centrally applied force of 67 N shall result in a 0.15 mm to 0.28 mm deflection.

10 Armature plate (see Figure 10 and Figure 12)

10.1 Diameters. The major diameter d_7 of the armature plate shall be 145.8 ± 0.2 mm.

The minor diameter d_8 shall be 101.6 ± 0.5 mm.

10.2 Thickness. The thickness e_2 of the armature plate shall be 2.34 ± 0.03 mm.

10.3 Index slot

10.3.1 Depth. The minimum depth of the index slot shall be defined by the radius $r_7 = 71.2$ mm maximum.

10.3.2 Width. The width w_4 of the index slot shall be $2.03 \pm 0.00, - 0.13$ mm.

11 Disk and disk hub relationship (see Figure 10)

11.1 Disk height over armature plate. The height h_{10} of the lower surface of the disk above the lower surface of the armature plate shall be 15.09 ± 0.28 mm.

11.2 Axial runout of the disk. The axial runout of the disk at any diameter, and at any speed up to 2 500 rev/min, is included in the dimension h_{10} , but shall not exceed 0.28 mm.

11.3 Acceleration of axial runout. The acceleration of the disk surface in the axial direction shall not exceed 140 m/s^2 at any speed within the range 2 350 rev/min to 2 450 rev/min.

11.4 Radial runout of disk. The total indicated radial runout shall be 0.5 mm maximum.

11.5 Angular shift between the disk and the disk hub. After the cartridge has experienced a positive or negative acceleration up to $3\,000 \text{ rad/s}^2$, there shall be no angular displacement between the disk and the hub when measured with a device capable of detecting a shift of three seconds of arc.

12 Armature plate and disk hub relationship (see Figure 10)

12.1 Reference plane. The reference plane shall be the plane on which rests a reference ball of diameter $d_9 = 12.700 \text{ mm}$ (0.5000 in).

The rotational axis of the disk cartridge shall be perpendicular to the reference plane.

12.2 Height of the armature plate. The relationship between the armature plate and the bore of the hub in the unmounted position shall be defined by the height over the reference plane $h_{11} = 1.70 \pm 0.05 \text{ mm}$.

12.3 Radial runout of the armature plate. The total indicated radial runout of the armature plate shall be 0.4 mm maximum.

13 Armature plate and top cover relationship (see Figure 10)

The height h_{12} of the top cover rim from the lower surface of the armature plate in the mounted position shall be $33.15 \pm 0.25 \text{ mm}$.

14 Drive spindle and disk hub relationship (see Figure 10)

The drive spindle shall penetrate through the bore of the disk hub into a zone defined by $h_{13} = 18.80 \text{ mm}$ nominal and $h_{14} = 19.05 \text{ mm}$ nominal.

Section 3. Mechanical characteristics

15 Environment

15.1 Operating conditions. The operating temperature measured within the cartridge shall lie within the range 15°C to 50°C at a relative humidity of 8 % to 80 %. The wet bulb reading shall not exceed 26°C . Before a cartridge is placed into operation, it shall be conditioned within its covers for a minimum of 2 h in the same environment as that in which the disk drive is operating. The above specified range does not necessarily apply to the disk drive.

15.2 Storage conditions

15.2.1 Unrecorded. The storage temperature shall lie within the range -40°C to $+65^\circ\text{C}$, the wet bulb reading not exceeding 30°C . For wet bulb temperatures between 0.5°C and 30°C the disk cartridge shall be able to withstand a relative humidity of 8 % to 80 %.

15.2.2 Recorded. The storage temperature shall lie within the range -40°C to $+65^\circ\text{C}$, the wet bulb reading not exceeding 30°C . For wet bulb temperatures between 0.5°C and 30°C the disk cartridge shall be able to withstand a relative humidity of 8 % to 80 %. The stray magnetic field intensity shall not exceed $4\,000 \text{ A/m}$.

A suggested accelerated storage life test is given in Appendix A.

15.3 Conditions for mechanical tests. Unless otherwise stated, measurements shall be carried out at $23 \pm 3^\circ\text{C}$, 40 % to 60 % relative humidity after 24 h of acclimatization. Tests shall be carried out with the disk cartridge in the upright position, unless otherwise stated.

16 Shock and vibration

The disk cartridge shall withstand the exposure to shock and/or vibration expected during normal operator usage and still meet all dimensional and functional specifications of this standard. Protection against shock and vibration during transportation and storage shall be subject to agreement between supplier and user.